YAYASAN BRATA BHAKTI DAERAH JAWA TIMUR
UNIVERSITAS BHAYANGKARA SURABAYA
LEMBAGA PENELITIAN DAN PENGABDIAN PADA MASYARAKAT
(LPPM)
Kampus : Jl. A. Yani 114 Surabaya Telp. 031 - 8285602, 8291055, Fax. 031 - 8285601

SURAT KETERANGAN

Nomor: Sket/ 26 /I/2023/LPPM/UBHARA

Kepala Lembaga Penelitian dan Pengabdian kepada Masyarakat (LPPM) Universitas Bhayangkara Surabaya menerangkan bahwa:

Nama : Dr. Amirullah, ST, MT.
NIP : 197705202005011001
NIDN : 0020057701
Unit Kerja : Universitas Bhayangkara Surabaya

Benar telah melakukan kegiatan:

1. Menulis proseding berjudul A Dual UPQC to Mitigate Sag/Swell, Interruption, and Harmonics on Three Phase Low Voltage Distribution System (Amirullah, Adiananda, Adi Soeprijanto, Ontoseno Penangsang), yang telah dipublikasikan pada Proseding International Conference on Vocational Education and Electrical Engineering (ICVEE), Date of Conference: 03-04 October 2020, pp. 1-6, Faculty of Engineering, State University of Surabaya, Publisher IEEE. Terindeks Ieeexplorer.
2. Telah melakukan korespondensi melalui email dalam proses penerbitan jurnal tersebut. Bukti korespondensi email dan bukti pendukung adalah benar sudah dilakukan oleh yang bersangkutan serta sudah dilampirkan bersama surat ini.

Demikian surat keterangan ini dibuat untuk kepentingan kelengkapan pengusulan Guru Besar.

Surabaya, 20 Januari 2023
Kepala LPPM

Drs. Heru Irianto, M.Si.
NIP. 9000028

Lampiran 1

Bukti Korespondensi Email dengan Editor/Pengelola Jurnal

Ubhara Surabaya

Amirullah Ubhara Surabaya <amirullah@ubhara.ac.id>

Abstract LOA and reminder upload #525 ICVEE full paper

1 pesan

ICVEE UNESA <icvee@unesa.ac.id> 8 Agustus 2020 pukul 22.27
Bcc: amirullah@ubhara.ac.id

Dear ICVEE participant,
Congratulations, your abstract has been accepted for continuing to be submitted to the full paper. The Full paper template and the abstract LOA are in the attachment file.

The full article should be submitted before **August 12, 2020** . Please follow the guidelines IEEE template in the attachment file when submitting your full article and make sure you have checked your paper thoroughly. A brief paper must not exceed 6 pages of formatted text in the IEEE two-column style.

Please pay more attention to the grammar, communication/presentation skills and scientific contributions to the field that have been explored clearly. The paper also includes tables, graphs, figures, and equations with good resolution and it has been explained with clarity in the article. Please make sure that your full paper submission has a similarity score of less than 20%.

The full paper should include the introduction, method, results & discussion, and also the conclusion. The Introduction states the overview of the current state in the subject area and what it will contribute to the field. The methodology includes the methods used to get the purpose. Results and discussions show the results that you achieved, preferable in the graph, figure and table and offer an interpretation of those results. And the conclusion summarizes your key findings and further implications for the field.
The full paper should be uploaded via http://icvee.conference.unesa.ac.id/registration/ according to your abstract ID submission. To upload your full paper: you just clicked the title of your abstract submission and then submitted the full article. After you have uploaded your full article, you must click finish submission and the status of your ID article is paper in review

If you have already uploaded your full papers via http://icvee.conference.unesa.ac.id/registration/
just ignore this email.

if you have any questions Please don't hesitate to contact: icvee@unesa.ac.id

We wish you safety and good health during this strange time of the COVID-19 outbreak.

Thank you very much for your participation

Best regards

ICVEE committee

2 lampiran

Conference-template-A4(4).doc
63K

525_2020 ICVEE - LoA Abstract(525).pdf
80K

Ubhara Surabaya

Amirullah Ubhara Surabaya <amirullah@ubhara.ac.id>

The last REMINDER to submit ICVEE Full Paper (abstract ID # 525)

2 pesan

ICVEE UNESA <icvee@unesa.ac.id> 17 Agustus 2020 pukul 12.47
Bcc: amirullah@ubhara.ac.id

Dear ICVEE participant,

Your abstract ID **#525** entitled: **"A Dual UPQC to Mitigate Sag/Swell, Interruption, and Harmonics on Three Phase Low Voltage Distribution System"** has been accepted for continuing to be submitted to the full paper.

The full article should be submitted before **August 19, 2020** . Please follow the guidelines IEEE template in the attachment file when submitting your full article and make sure you have checked your paper thoroughly. A brief paper must not exceed 6 pages of formatted text in the IEEE two-column style.

Please pay more attention to the grammar, communication/presentation skills and scientific contributions to the field that have been explored clearly. The paper also includes tables, graphs, figures, and equations with good resolution and it has been explained with clarity in the article. Please make sure that your full paper submission has a similarity score of less than 20%.

The full paper should include the introduction, method, results & discussion, and also the conclusion. The Introduction states the overview of the current state in the subject area and what it will contribute to the field. The methodology includes the methods used to get the purpose. Results and discussions show the results that you achieved, preferable in the graph, figure and table and offer an interpretation of those results. And the conclusion summarizes your key findings and further implications for the field.
The full paper should be uploaded via http://icvee.conference.unesa.ac.id/registration/ according to your abstract ID submission. To upload your full paper: you just clicked the title of your abstract submission and then submitted the full article. After you have uploaded your full article, you must click finish submission and the status of your ID article is paper in review

If you have already uploaded your full papers via http://icvee.conference.unesa.ac.id/registration/
just ignore this email.

if you have any questions Please don't hesitate to contact: icvee@unesa.ac.id

We wish you safety and good health during this strange time of the COVID-19 outbreak.

Thank you very much for your participation

Best regards

ICVEE Committe

Amirullah Ubhara Surabaya <amirullah@ubhara.ac.id> 17 Agustus 2020 pukul 12.55
Kepada: ICVEE UNESA <icvee@unesa.ac.id>

Dear ICVEE Commitee

Thanks a lot for your information.

Dr. Amirullah
ICVEE Author
[Kutipan teks disembunyikan]

Ubhara Surabaya

Amirullah Ubhara Surabaya <amirullah@ubhara.ac.id>

[icvee2020] Submission Upload Acknowledgement on Paper ID: #525

1 pesan

2020 ICVEE <icvee@unesa.ac.id> 21 Agustus 2020 pukul 18.56
Kepada: Amirullah Amirullah <amirullah@ubhara.ac.id>

Amirullah Amirullah:

Thank you for uploading your full paper, "A Dual UPQC to Mitigate Sag/Swell, Interruption, and Harmonics on Three Phase Low Voltage Distribution System" on Paper ID: #525 to The 3rd International Conference on Vocational Education and Electrical Engineering (ICVEE) 2020. With the online conference management system that we are using, you will be able to track its progress through the editorial process by logging in to the conference web site:

Submission URL:
http://icvee.conference.unesa.ac.id/ocs/index.php/icvee2020/icvee2020/author/submission/525
Username: amirullah

If you have any questions, please contact me. Thank you for considering this conference as a venue for your work.

2020 ICVEE
The 3rd International Conference on Vocational Education and Electrical Engineering (ICVEE) 2020

2020 The Third International Conference on Vocational Education and Electrical Engineering (ICVEE)

icvee@unesa.ac.id

Ubhara Surabaya

Amirullah Ubhara Surabaya <amirullah@ubhara.ac.id>

[icvee2020] Editorial Decision on Paper ID: #525

1 pesan

ICVEE Unesa <icvee@unesa.ac.id> 4 September 2020 pukul 06.21
Kepada: Amirullah Amirullah <amirullah@ubhara.ac.id>
Cc: Adiananda Adiananda <adiananda@ubhara.ac.id>, Ontoseno Penangsang <Zenno_379@yahoo.com>, Adi Soeprijanto <adisup@ee.its.ac.id>

Amirullah Amirullah:
Congratulations, your full paper with paper ID: #525, entitled:" A Dual UPQC to Mitigate Sag/Swell, Interruption, and Harmonics on Three Phase Low Voltage Distribution System " has been accepted and will be considered for presentation on ICVEE conference. The 3rd International Conference on Vocational Education and Electrical Engineering (ICVEE) 2020 will be held on 2020-10-03 at in the virtual event.

We will submit your full article to IEEE X-plore after completing the revision process (the better in the word format to make it easy for editing). The reviewers make some inputs and comments for your article (see below). Please revise your article (as the timeline September 7,2020) based on reviewer inputs.

You also have to convert your file to the pdf express, send the copyright, make registration to the conference and attend the presentation on ICVEE conference.

To convert your article to IEEE PDF eXpress, you can visit the website of IEEE PDF eXpress at:
https://www.pdf-express.org/

First time users should do the following:
Select the New Users
Enter the following:50212X for the conference ID

Please complete the payment fee of your article according to the timeline, status of the first author and also based on where your article will be published.

Please make sure that your next full paper submission has a similarity score of less than 20%.

If you have any question don't hesitate to contact: icvee@unesa.ac.id
Thank you very much and we looking forward to your participation in this event.

ICVEE Unesa
Unesa
icvee@unesa.ac.id

Reviewer A:

The article was relevant to the ICVEE topic.:
Very relevant (4)

The ability to communicate to the reader (grammar and communication skills):

many grammatically error and lack clarity in communication (1)

The originality and scientific contributions to the field.:
Some originality and scientific shown (4)

Literature review, theory, methodology and discussion/analysis for the purposed study given clearly:
Marginal Fair of presentation (3)

The paper includes table,graph, figures, and equation with good resolution and it has been explained with clarity in the article:
Satisfied in resolution but some figures are not cited (4)

The conclusions consistent with the evidence and the references provides sufficient:
Good (4)

This paper is recommended for the best paper awards:
Weak reject (3)

Overal Rating acceptance of the article:
Accept (+2)

Comments to the Author:

"The weakness of the UPQC is unable to overcome the disturbance caused by interruption voltage on the source bus so that the load bus experiences blackouts. " Is this your own sentences or from previous study? If it is not your own sentence please cite it in the reference.

"There are six disturbance scenarios i.e. (1) S-Swell-NL, (2) S-Sag-NL, (3) S-Inter-NL, (4) Dis-Swell-NL, (5) Dis-Sag-NL, and (6) Dis-Inter-NL. " Has it discussed in the previous references? or is it your own sentence? All of statement that is not your own sentence, please cite it.

What is SeAf1 and ShAF in your purpose model?

Reviewer B:

The article was relevant to the ICVEE topic.:
Very relevant (4)

The ability to communicate to the reader (grammar and communication skills):

less grammatically error and less clarity in communication (2)

The originality and scientific contributions to the field.:
Adequate originality and scientific shown (3)

Literature review, theory, methodology and discussion/analysis for the purposed study given clearly:
Good presentation (4)

The paper includes table,graph, figures, and equation with good resolution and it has been explained with clarity in the article:
Very satisfied in resolution and all the figures are cited and explained (5)

The conclusions consistent with the evidence and the references provides sufficient:
Marginal Fair (3)

This paper is recommended for the best paper awards:

Weak reject (3)

Overal Rating acceptance of the article:
Accept (+2)

Comments to the Author:

Fig 6 consist of some sub figures. Please make explanation of the sub figures. It would be better if you just write (a),(b),(c)...in the middle bottom of the figure and give the caption of the sub figure together with the caption of the figure.

"Table 3 and Figure 8 also show that in the D-Inter-NL scenario, a dual UPQC circuit is also capable of resulting in a smaller percentage of load voltage disturbance of 14%, compared to a single UPQC circuit of 43.88%." Why it can be happened?.

Reviewer C:

The article was relevant to the ICVEE topic.:
Very relevant (4)

The ability to communicate to the reader (grammar and communication skills):

less grammatically error and less clarity in communication (2)

The originality and scientific contributions to the field.:
Adequate originality and scientific shown (3)

Literature review, theory, methodology and discussion/analysis for the purposed study given clearly:
Good presentation (4)

The paper includes table,graph, figures, and equation with good resolution and it has been explained with clarity in the article:
Satisfied in resolution but some figures are not cited (4)

The conclusions consistent with the evidence and the references provides sufficient:
Marginal Fair (3)

This paper is recommended for the best paper awards:
Accept (4)

Overal Rating acceptance of the article:
Weak Accept (+1)

Comments to the Author:

How is your method to overcome the voltage interruption on the source bus?

It would be better if the number of page max 6. Table 1 and 2 are out of the margin. Please improve it. You can only show the important part of this table that only give the important information to the reader.

2020 The Third International Conference on Vocational Education and Electrical Engineering (ICVEE)

icvee@unesa.ac.id

Ubhara Surabaya

Amirullah Ubhara Surabaya <amirullah@ubhara.ac.id>

ICVEE information

1 pesan

ICVEE UNESA <icvee@unesa.ac.id> 7 September 2020 pukul 11.03
Bcc: amirullah@ubhara.ac.id

Dear Author ICVEE

We would like to inform you that our conference will be held on **October 3, 2020**.
And all of the file bellows should be accepted before September 10, 2020

Please note the following important dates:

1. **Formatting Instructions**
Please submit your final paper as a PDF file in the IEEE conference proceedings in a two-column format (the IEEE format). Papers can be 4 to 6 pages in length.

You can submit your revised article by adding the reviewer inputs at least September 8, 2020, by clicking the **title** on OCS of ICVEE
Click Add a Supplementary File , fill the file title (example revision file/coppyright/pdf express) and then upload your file and **save.**

You can also submit your file by clicking the below link:

http://icvee.conference.unesa.ac.id/ocs/index.php/icvee2020/icvee2020/author/submissionReview/376/2

by adding the number ID of your conference slash 2 at the end of the link.
You can upload the revised article, copyright, the final version (pdf express) in the menu: **Upload Author Version**

2. **Copyright Notice**

Before submitting your final article, you must add the copyright notice

If needed, the IEEE copyright form is available online in PDF here :

http://icvee.conference.unesa.ac.id/wp-content/uploads/2020/04/IEEE-Copyright-Form.pdf

The example of copyright can be found in the attachment file.

3**. PDF eXpress Plus Online File Conversion/PDF Validation Tool**

All papers submitted for publication must meet the IEEE standards. Access to PDF eXpress Plus site, the IEEE's online file conversion/PDF validation tool, will assist authors in preparing suitable electronic files of

their final papers. PDF eXpress Plus helps authors convert their papers into IEEE Xplore-compatible PDF files (conversion function) or to check their own PDF files for IEEE Xplore compatibility (PDF validation function).

Important: After using PDF eXpress Plus, you will still need to submit the IEEE Xplore compatible PDF file of your final paper in the submission link.

a) Proofread your source document thoroughly to confirm it requires no revision

b) PDF eXpress Plus:

Visit the website of IEEE PDF eXpress at https://www.pdf-express.org/
Enter the following:
– 50212X for the Conference ID

Creating your PDF eXpress Account
Log in to the IEEE PDF eXpress Plus site
First-time users should do the following:
1. Select the New Users - Click Here link.
2. Enter the following:
· 50212X for the Conference ID
· your email address
· a password
3. Continue to enter information as prompted.
An Online confirmation will be displayed and an email confirmation will be sent verifying your account setup.

Previous users of PDF eXpress or IEEE PDF eXpress Plus need to follow the above steps, but should enter the same password that was used for previous conferences. Verify that your contact information is valid.

IMPORTANT: Authors must check their final PDF files before submission to verify that all fonts have been properly embedded and subset. Some font manufacturers now flag their fonts to not embed. These fonts must be avoided.

c) You will receive an email with your checked pdf or IEEE pdf eXpress-converted PDF attached. If you submitted a pdf for checking, the email will show if your file passed or failed. In case you submitted a pdf file that failed the check, please address the required issue and submit a new file for checking

IMPORTANT: Any changes made to a PDF after IEEE PDF eXpress Plus conversion or PDF checking may invalidate Xplore compatibility. This includes headers, page numbers, copyright notice, watermarks, etc. If any of these elements are desired, they should be added to the document before a PDF is created.

The certified acceptable file you receive from PDF eXpress will be given a filename in the form PID123456.pdf. You should rename this exact file to conform to the following naming convention:

Lastname-paperID.pdf, where the last name is the last name of the first author and paper ID is ICVEE paper ID is assigned to the submission.

Deadline for Final paper submission: 10th of September 2020. This is a hard deadline for final papers to be included in the 2020 ICVEE Proceedings.

4**. Payment information**

Please transfer your payment to:
Bank BTN swift code BTANIDJA
IJC UNESA
Virtual Account : 9422091517209150106
(IJC: International Joint Conference UNESA)

for attention: ICVEE Code 3

The nominal payment according to the current position of the **first author** (not the co-author)
Example:

International participant: add comma and 3 to the end of the nominal payment
Early Bird : conference fee $75 ; you should transfer $75,3

Indonesian participant: add 3 to the end of the nominal payment
Early Bird : conference fee Rp 500.000 ; you should transfer Rp 500.003

You should fill the following google form after you transfer your payment:
bit.ly/2020-the-3rd-ICVEE-payment

The information of the payment fee of the ICVEE can be found on the home menu in the http://icvee.conference.unesa.ac.id/

Thank you very much for all your participation and corporation

Best Regards

ICVEE committee

Ubhara Surabaya

Amirullah Ubhara Surabaya <amirullah@ubhara.ac.id>

[icvee2020]

2 pesan

Amirullah Amirullah <icvee@unesa.ac.id> 11 September 2020 pukul 06.39
Kepada: ICVEE Unesa <icvee@unesa.ac.id>
Cc: amirullah@ubhara.ac.id

Dear ICVEE 2020 Admin,

I have send 2 final revised file ICVEE 2020 (in word and PDF express) paper number 525 on Friday 11 Sep 2020 by using add file suplementary menu.

Please ignore the revised (in word) file which I had sent on Thursday because it still not fully edited and I can not delete it manually in submission ICVEE system.

Dr. Amirullah, ST, MT.
Electrical Engineering (Power Quality and RE Research)
Universitas Bhayangkara Surabaya

2020 The Third International Conference on Vocational Education and Electrical Engineering (ICVEE)

icvee@unesa.ac.id

Amirullah Amirullah <icvee@unesa.ac.id> 11 September 2020 pukul 06.47
Kepada: ICVEE Unesa <icvee@unesa.ac.id>
Cc: amirullah@ubhara.ac.id

Dear ICVEE 2020 Admin,

I have send 2 final revised file ICVEE 2020 (in word and PDF express) paper number 525 on Friday 11 Sep 2020 by using add file suplementary menu.

Please ignore the revised (in PDF express) file which I had sent on Thursday

10 Sep 2020 because it still not fully edited and I can not delete it manually in submission ICVEE system.

This is revised email by me this morning and I apologize for this.

[Kutipan teks disembunyikan]

Ubhara Surabaya

Amirullah Ubhara Surabaya <amirullah@ubhara.ac.id>

#525 ICVEE registration information

ICVEE UNESA <icvee@unesa.ac.id> 19 September 2020 pukul 14.52
Bcc: amirullah@ubhara.ac.id

Dear Authors,

Congratulations, your article will continue to be presented on " 2020 the third International Conference on Vocational Education and Electrical Engineering (ICVEE) ". The conference will be held on October 3-4,2020

The letter of acceptance of the full paper can be shown in the attachment file. Please prepare the video presentation and complete the registration form by filling the following google form: https://forms.gle/wNXWzwze16tjDYAV8

The Google form must be submitted at least on September 23, 2020

Video requirements:
1. Duration: 14-15 minutes
2. It is highly recommended to show the talking head during the presentation, at least showing the face during the initial narrative.
3. Free video format, recommended .mp4

Reference recording video presentation:

Make videos using powerpoint
https://www.youtube.com/watch?v=D8JV3w4TOVw

make videos using a zoom
https://www.youtube.com/watch?v=EJUXIL3rHzA

make videos using OBS
https://www.youtube.com/watch?v=zTjVBInEiNI

Please submit your article by following the IEEE template for the margin, spacing, and font. Please consider the reviewers' input and pay attention to the grammar. Please be sure that your article has similarity less than 20%

Thank you for your cooperation and participation.

ICVEE Committee

525.pdf
72K

Ubhara Surabaya

Amirullah Ubhara Surabaya <amirullah@ubhara.ac.id>

Time table and Schedule of the ICVEE

1 pesan

ICVEE UNESA <icvee@unesa.ac.id> 1 Oktober 2020 pukul 19.47
Bcc: amirullah@ubhara.ac.id

Dear ICVEE author

We inform you about the schedule of 2020 the third International Conference on Vocational Education and Engineering on October 3, 2020.

For the first session, we will conduct International Joint Conference for three big conferences, including Mathematics, Informatics, Science, and Education International Conference (MISEIC), International Conference on Vocational Education and Electrical Engineering (ICVEE), and International Conference on Research and Academic Community Services (ICRACOS) and then continue by the ICVEE organizer

For the joint conference, the author should follow the opening and rules guidance for the Virtual Conference. Here the link of the joint conference:

You are invited to a Zoom webinar.
When: Oct 3, 2020 07:00 AM Bangkok
Topic: International Joint Conference on Science and Technology 2020

Please click the link below to join the webinar:
https://zoom.us/j/92651561129?pwd=V2FTSGYyamxKTjlNR2FSbmtXc3EzUT09

Passcode: unesa1
Or iPhone one-tap :
US: +13017158592,,92651561129#,,,,,,0#,,556399# or +13126266799,,92651561129#,,,,,,0#,,556399#
Or Telephone:
Dial(for higher quality, dial a number based on your current location):
US: +1 301 715 8592 or +1 312 626 6799 or +1 346 248 7799 or +1 646 558 8656 or +1 669 900 9128 or +1 253 215 8782
Webinar ID: 926 5156 1129
Passcode: 556399
International numbers available: https://zoom.us/u/agBbCyA7x

After the joint conference, the participant should joint the parallel session by following the ICVEE zoom link:

2020 the third ICVEE is inviting you to a scheduled Zoom meeting.

Topic: 2020 the third ICVEE
Time: Oct 3, 2020 11:00 AM Jakarta

Join Zoom Meeting
https://zoom.us/j/95365318582?pwd=MXZKWUpiL2FDOFJNcHZ4VExnNTBpZz09

Meeting ID: 953 6531 8582
Passcode: 127139

Especially for IEEE participants, The IEEE reserves the right to exclude or remove a paper from IEEE Xplore® **if the paper is not presented at the conference**.

Although the presentation of the paper is recorded before the conference day, the presenter must be present at the designated time slot during the video playback as well as the Q&A session on the day of the conference.

Here in the attachment file is the schedule and timeline of the ICVEE conference.

Thank you very much for your attention

ICVEE committee

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2 lampiran

ICVEE Time table_.docx
65K

PARALLEL SESSION TIMETABLE ICVEE.pdf
450K

Ubhara Surabaya

Amirullah Ubhara Surabaya <amirullah@ubhara.ac.id>

ICVEE background for zoom

ICVEE UNESA <icvee@unesa.ac.id> 3 Oktober 2020 pukul 11.10
Bcc: amirullah@ubhara.ac.id

Dear ICVEE participant

We apologize that we have not finished making the book program. Here in the attachment file is the book program that is still in process. The AP abstract article is still in process. After the conference is finished we will resend the complete version to the author. Here in the attachment file is the background of ICVEE..

Thank you very much

2 lampiran

Background ICVEE.jpeg
127K

AProgram_Book_ICVEE_2020_tiga.pdf
4812K

Ubhara Surabaya

Amirullah Ubhara Surabaya <amirullah@ubhara.ac.id>

PAYMENT RECIEPT

1 pesan

ICVEE UNESA <icvee@unesa.ac.id> 3 Oktober 2020 pukul 21.00
Kepada: Amirullah Ubhara Surabaya <amirullah@ubhara.ac.id>, Adiananda Adiananda <adiananda@ubhara.ac.id>, Ontoseno Penangsang <Zenno_379@yahoo.com>, Adi Soeprijanto <adisup@ee.its.ac.id>

Thank you for registering in 2020 Third Internasional Conference on Vocational Education and Electrical Engineering (ICVEE). This receipt acknowledges that your payment has been received.

By this notice based on payment amount, participant are eligible and
Entitled to:
1. Present the paper(s)
2. Get the Paper(s) Published
We attach herewith the receipt as proof of payment

Payment was received by: ICVEE Unesa
For all logistical questions regarding the event or registration, please contact icvee@unesa.ac.id

PAYMENT RECEIPT ID #525_ Amirullah.docx
41K

Ubhara Surabaya

Amirullah Ubhara Surabaya <amirullah@ubhara.ac.id>

e-copyright request

ICVEE UNESA <icvee@unesa.ac.id> 5 Oktober 2020 pukul 06.50
Bcc: amirullah@ubhara.ac.id

Dear IEEE author

Could you please fill the electronic copyright from IEEE. You can search and check the e-copyright from your email around September 29,2020. The username and the password for the e-copyright has been shown in your email. We are waiting for it.

https://ecopyright.ieee.org/ECTT/login.do

If you have filled the e-copyright application please ignore this email

Thank you very much

Best regards

ICVEE committee

Ubhara Surabaya

Amirullah Ubhara Surabaya <amirullah@ubhara.ac.id>

#522 Certificate and Program book

2 pesan

ICVEE UNESA <icvee@unesa.ac.id> 7 Oktober 2020 pukul 06.06
Kepada: Amirullah Ubhara Surabaya <amirullah@ubhara.ac.id>

Dear Author

Here in the attachment file is the ICVEE certificate and program book.

The proceeding is still in the process to be submitted to IEEE and AP.

Thank you very much for your participation

Best regards
ICVEE committee

3 lampiran

#525.pdf
460K

Amirullah Amirullah.pdf
472K

#0Program_Book_ICVEE_2020.pdf
6275K

Amirullah Ubhara Surabaya <amirullah@ubhara.ac.id> 19 Januari 2021 pukul 10.16
Kepada: reviews@publons.com
Cc: Amirullah Ubhara Surabaya <amirullah@ubhara.ac.id>
Bcc: Amirullah Ubhara Surabaya <amirullah@ubhara.ac.id>

Dear Publons Admin,

Here I send you the certificate as a reviewer of 2nd ICVEE 2020.

Web of Science ResearcherID
AAB-9567-2021

https://publons.com/researcher/4182659/amirullah-amirullah/

Dr. Amirullah
Universitas Bhayangkara Surabaya
[Kutipan teks disembunyikan]

3 lampiran

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Amirullah Amirullah.pdf
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#0Program_Book_ICVEE_2020.pdf
6275K

Ubhara Surabaya

Amirullah Ubhara Surabaya <amirullah@ubhara.ac.id>

ICVEE

1 pesan

ICVEE UNESA <icvee@unesa.ac.id> 15 November 2020 pukul 10.27
Kepada: Amirullah Ubhara Surabaya <amirullah@ubhara.ac.id>

Dear ICVEE participant

Congratulations! 2020 Third International Conference on Vocational Education and Electrical Engineering (ICVEE) has been posted to the IEEE *Xplore* digital library effective 2020-11-03.

Here is the link:

https://ieeexplore.ieee.org/xpl/conhome/9243082/proceeding

Thank you very much for all your participation

best regards

ICVEE committee

3 lampiran

ICVEE_2020_paper_525.pdf
782K

#525.pdf
476K

Amirullah Amirullah.pdf
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Ubhara Surabaya

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ICVEE : Front matters of IEEE Proceeding

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Lampiran 2

Bukti Pendukung

Lampiran 2.1

Letter of Acceptance Abstrak

2020 The 3rd International Conference on
Vocational Education and Electrical Engineering (ICVEE)
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Letter of Acceptance for Abstract

Dear Authors: Amirullah Amirullah, Adiananda Adiananda, Ontoseno Penangsang, Adi Soeprijanto

We are pleased to inform you that your abstract (Abstract ID #525), entitled:

A Dual UPQC to Mitigate Sag/Swell, Interruption, and Harmonics on Three Phase Low Voltage Distribution System

has been reviewed and accepted for continuing to be submitted to full paper. 2020 the third International Conference on Vocational Education and Electrical Engineering (ICVEE) will be held on 3 to 4 October 2020 in the virtual event.

Please submit your full paper before the deadlines, visit our website for more information.

Thank you,

Best regrads,

Prof. Dr. Bambang Suprianto, M.T
Conference Chair
e-mail: icvee@unesa.ac.id

Lampiran 2.2

Naskah makalah submitted

A Dual UPQC to Mitigate Sag/Swell, Interruption, and Harmonics on Three Phase Low Voltage Distribution System

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The Unified Power Quality Conditioner (UPQC) is a combination of a series active filter (SeAF) and a shunt active filter (ShAF) connected in parallel by a DC link capacitor. This device is able to mitigate power quality problems i.e. sag/swell, harmonics, and unbalance on source and load bus of three phase three wire (3P3W) on low voltage distribution systems simultaneously. The disadvantage of UPQC is that it is unable to overcome the voltage interruption so that the source can not deliver power to the load. This paper proposes a dual UPQC model to overcome the voltage interruption on the source bus so that the load bus continues to get power supply. There are six disturbance scenarios i.e. sinusoidal supply-sag-non-linear load (S-Sag-NL), sinusoidal supply-swell-NL (S-Swell-NL), sinusoidal-interruption-NL (S-Inter-NL), distorted supply-sag-non-linear load (Dis-Sag-NL), distorted supply-swell-NL (Dis-Swell-NL), and distorted supply-interruption-NL (Dis-Inter-NL). Proportional Integral (PI) method is used to control the SeAF and the ShAF in dual UPQC circuit model. The simulation results show that in the D-Inter-NL scenario, a Dual UPQC model is able to maintain a load voltage magnitude of 266.60 V (voltage drop only of 14%), higher compared to a Single UPQC model of 173.97 V (voltage drop of 43.88%). In the same scenario, a dual UPQC model is capable of resulting an average total harmonics distortion (THD) of load voltage of 10.10%, lower compared to a single UPQC model of 26.70%.

Keywords—Dual/Single UPQC, Sag/Swell, Interruption, Harmonics.

I. INTRODUCTION

In recent decades, the use of non-linear loads by customers has contributed to a decrease in power quality (PQ) in power system, causing current distortion i.e. current harmonics and unbalanced current in the load buses. On the other hand, the presence of sensitive loads and voltage distortion on the source bus, also causes a number of voltage disturbances, thereby also causing a decrease in voltage quality i.e. voltage sag/swell voltage, voltage harmonics, and unbalanced voltage. To solve the problem of worsening PQ due to the use of sensitive loads or non-linear loads on the load bus and voltage distortion on the source bus, a power electronics device is proposed, namely Unified Power Quality Conditioner (UPQC) [1]. The UPQC consists of a SeAF and a ShAF connected in parallel via a DC-link capacitor and serves to mitigate a number of power quality problems on the source and load sides simultaneously [2]. The SeAF functions to reduce a number of disturbances on the source side i.e. sag/swell voltage, flickers, unbalanced voltage, and source voltage harmonics. Meanwhile, The ShAF functions to overcome current quality problems i.e. low power factor, load current harmonics, and unbalanced current [3].

To anticipate failure of both inverters in a single UPQC circuit, a dual UPQC model was developed. The advantage of a dual UPQC is that it has a more reliable inverter circuit structure and control, because if there is a disturbance in one of the inverters, the UPQC system is still able to operate normally [4]. The dual or interline UPQC consists of two active filters, namely SeAF and ShAF (parallel active filters), used to reduce harmonics and voltage/current imbalances. Different from the single UPQC, the dual UPQC has a SeAF which is controlled as a sinusoidal current source and a ShAF which is controlled as a sinusoidal voltage source. Thus the dual UPQC pulse width modulation (PWM) control is related to the frequency spectrum, because it is controlled using a sinusoidal reference voltage and current, in contrast to a single UPQC which is still controlled using a non-sinusoidal reference voltage and current.

Implementation of dual UPQC circuit and control, to improve power quality on the source and load side of the low voltage distribution system has been done and discussed in a several papers. The simplification technique UPQC control have been proposed in [5] and developed on ABC reference frame using sinusoidal reference synchronization theory, without the need to use coordinate transformation and digital control implementation. In [6], a comparison of two different controls has been carried out to generate the PWM reference signal using the α-β and d-q reference frames, respectively. PWM control using the α-β reference frame is more efficient than d-q, because it is able to produce a more stable load

voltage and source current with lower harmonic values. The comparison of operation performance of single UPQC and dual UPQC in a 3 phase 3 wire (3P3W) system under static disturbances (harmonics/imbalance of source voltage and load current harmonics), as well as dynamic disturbances (sags/swell voltage and load changes) has been carried out through simulations [7] and experiments [8]. The simulation and experiment results verify that a dual UPQC is capable of producing better static and dynamic performance than single UPQC. The improvement of power quality using dual UPQC under conditions of sudden load changes has been done by [9]. The simulation results confirm that the dual UPQC is able to result constant source current due to nonlinear load and constant load voltages due to voltage dip (sag) in one of phases on source side. However, the research has not been able to provide verification of the value of improvement of source harmonic currents due to non-linear loads and load voltage harmonics due to voltage dip on the source side.

The study, analysis, and implementation of dual UPQC model that can be connected to a 3P3W or three phase four wire (3P4W) [10] and 3P4W distribution system [11] with proportional integral (PI) control have been applied to improve power quality system. The dual UPQC using series-ShAFs on 3P3W and 3P4W systems using PI controller are able to keep the source current and load voltage balanced and sinusoidal. The analysis to balance reactive power between series and ShAFs on a dual UPQC using power angle control has been carried out by [12]. The simulation results show that the power angle control method is able to determine load power angle between load voltage and source voltage. This method is also able to evenly divide reactive power of load according to reactive power of series and ShAFs. However, this research does not discuss the effect of implementing power angle control on the improvement of power quality due to static and dynamic disturbances.

The weakness of the UPQC is that it is unable to overcome the disturbance caused by interruption voltage on the source bus so that the load bus experiences blackouts. The paper proposes a dual UPQC model to overcome interruption voltage in the source bus so that the load bus still gets power supply. Apart from interruption voltage disturbance, the research analysis also focuses on the main function of this model in mitigating power quality problems i.e. improve the magnitude and harmonics of the load voltage due to sag/swell voltage and harmonics distortion of source voltage, and reduce the harmonics of source current due to non-linear loads. To provide a performance advantage, the simulation results of all parameters in the dual UPQC model are further validated with a single UPQC model. This paper is presented as follows. Section 2 explains proposed method, a dual UPQC model, parameter simulation, dual SeAF and ShAF control, as well as implementation of PI controller. Section 3 shows results and discussion of magnitude of source voltage, harmonics voltage, magnitude of load voltage, harmonics load voltage, and percentage of drop voltage. In this section, six disturbance scenarios are presented and the results are verified with Matlab/Simulink. Finally, this paper is concluded in Section 4.

II. RESEARCH METHOD

A. *Proposed Method*

This research aims to mitigate interruption voltage, sag/swell voltage, and harmonics in the 3P3W distribution system using a dual UPQC model. This power electronic device is used to overcome the weakness of a single UPQC in maintaining magnitude of load voltage, so that load bus is still supplied with power if interruption voltage happens on the source bus. The dual UPQC circuit is located between load bus and connected to source bus (PCC) via a 380 kV (L-L) low-voltage distribution line with a frequency of 50 Hz. The Proportional Integral (PI) control method is used in dual UPQC circuit model.

There are six disturbance scenarios i.e. (1) S-Swell-NL, (2) S-Sag-NL, (3) S-Inter-NL, (4) Dis-Swell-NL, (5) Dis-Sag-NL, and (6) Dis-Inter-NL. In scenario 1, the model is connected to a non-linear load and the sinusoidal source experiences a swell voltage of 50%. In scenario 2, the model is connected to a non-linear load and the sinusoidal source experiences a sag voltage of 50%. In scenario 3, the model is connected to a non-linear load and the sinusoidal source experiences an interruption voltage of 100%. In scenario 4, the model is connected to a non-linear load, the source generates 5th and 7th odd-order harmonic components with individual harmonic distortion values of 5% and 2% respectively, as well as experiences a swell voltage of 50%. In scenario 5, the model is connected to a non-linear load, the source generates 5th and 7th odd-order harmonic components with individual harmonic distortion values of 5% and 2% respectively, as well as experiences a sag voltage of 50%. In scenario 6, the model is connected to a non-linear load, the source generates 5th and 7th odd-order harmonic components with individual harmonic distortion values of 5% and 2% respectively, as well as experiences an interruption voltage of 100%. The total simulation time for all disturbance scenarios is equal to 0.7 s with disturbance duration of 0.3 s between t = 0.2 s to t = 0.5 s. Mitigation analysis of power quality problems in this paper i.e. improve load voltage magnitude and harmonics due to interruption voltage, sag/swell voltage, and source voltage harmonic distortion, as well as reduction of source current harmonics due to non-linear loads. Finally, the simulation results of all parameters in the dual UPQC model are then validated with a single UPQC model to provide an overview of the performance advantages of the proposed model. Figure 1 shows proposed model of a dual UPQC connected to 3P3W distribution system.

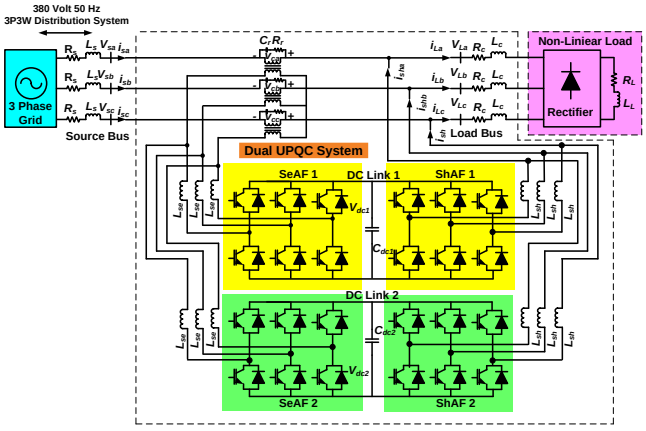

Fig. 1 Proposed model of a dual UPQC connected to 3P3W system

. Figure 2 and Figure 3 show proposed model of a single and a dual UPQC in single phase system.

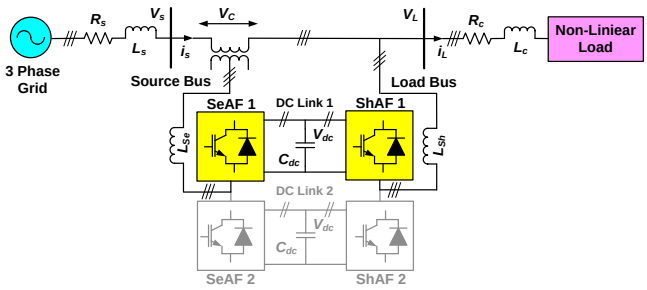

Fig. 2. Model of a single UPQC in single phase system

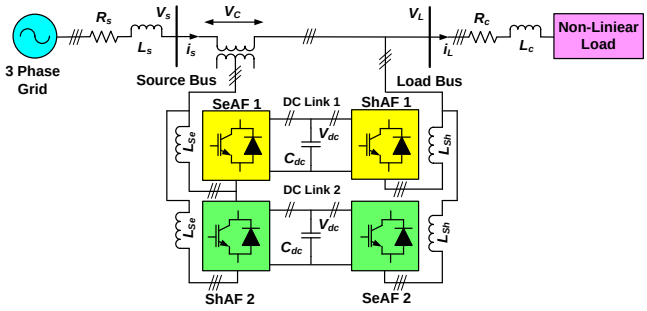

Fig. 3. Model of a dual UPQC in single phase system.

B. *Control of Dual Series Active Filter*

The SeAF control circuit of dual UPQC is twice a single UPQC control circuit while still using one series of three-phase transformers and then called by dual SeAF control. The main function of dual SeAF control is to protect sensitive load from a number of voltage disturbance at PCC bus. The algorithm of source voltage and load voltage control strategies in dual SeAF circuit is shown in Fig. 4. This control strategy generates the unit vector template from a distorted input source. The template is expected to be an ideal sinusoidal signal with an unity amplitude. Then, the distorted source voltage is measured and divided by peak amplitude of base input voltage V_m as stated in Eq. (1) [13].

$$V_m = \sqrt{\frac{2}{3}(V_{sa}^2 + V_{sb}^2 + V_{sc}^2)} \qquad (1)$$

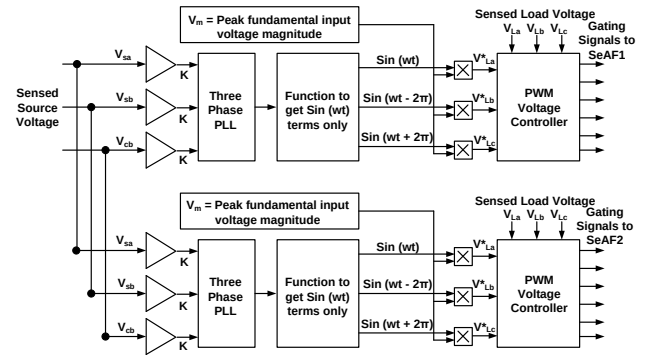

Fig. 4 Dual series active filter control

A three phase PLL is used to produce sinusoidal unit vector templates with phase lagging through the use of sine function. The load voltage of reference signal is determined by multiplying unit vector templates by the peak value of base input voltage amplitude V_m . The load reference voltage $(V_{La}^*, V_{Lb}^*, V_{Lc}^*)$ is then compared with sensed load voltage(V_{La}, V_{Lb}, V_{Lc}) with a PWM controller which is used to generate the desired trigger signal in SeAF.

C. *Control of Dual Shunt Active Filter*

The ShAF control circuit of dual UPQC is twice a single UPQC control circuit and then called by dual ShAF control. The main function of ShAF is to mitigate PQ problems on the load side. The control method of ShAF is that the absorbed current from PCC bus is a balanced positive sequence current including an unbalanced sag voltage on PCC bus, an unbalanced, or a non-linear load. In order to obtain satisfactory compensation caused by interference due to non-linear load, many algorithms have been used in some references. This research uses the method of instantaneous reactive power theory theory or "p-q" theory. The voltages and currents in Cartesian coordinates can be transformed into Cartesian coordinates αβ as stated in Eq. (2) and Eq. (3) [13].

$$\begin{bmatrix} v_\alpha \\ v_\beta \end{bmatrix} = \begin{bmatrix} 1 & -1/2 & -1/2 \\ 0 & \sqrt{3}/2 & -\sqrt{3}/2 \end{bmatrix} \begin{bmatrix} V_a \\ V_b \\ V_c \end{bmatrix} \qquad (2)$$

$$\begin{bmatrix} i_\alpha \\ i_\beta \end{bmatrix} = \begin{bmatrix} 1 & -1/2 & -1/2 \\ 0 & \sqrt{3}/2 & -\sqrt{3}/2 \end{bmatrix} \begin{bmatrix} i_a \\ i_b \\ i_c \end{bmatrix} \qquad (3)$$

Calculation of real power (p) and imaginary power (q) is shown in Eq. (9). Real and imaginary power are measured instantaneously power and expressed in matrix form. The presence of mean and fluctuating component in instantaneous component is shown in Eq. (4) [14].

$$\begin{bmatrix} p \\ q \end{bmatrix} = \begin{bmatrix} v_\alpha & v_\beta \\ -v_\beta & v_\alpha \end{bmatrix} \begin{bmatrix} i_\alpha \\ i_\beta \end{bmatrix} \qquad (4)$$

$$p = \bar{p} + \tilde{p} \;\; ; \;\; q = \bar{q} + \tilde{q} \qquad (5)$$

Where $\bar{p}$ = the average component of real power, $\tilde{p}$ = the fluctuating component of real power, $\bar{q}$ = the average component of imaginary power, $\tilde{q}$= the fluctuating component of imaginary power. The total imaginary power (q) and fluctuating component of real power $(\tilde{p})$ are selected as power references and current references and are utilized through the use of Eq. (5) to compensate for harmonics and reactive power [15].

$$\begin{bmatrix} i_{c\alpha}^* \\ i_{c\beta}^* \end{bmatrix} = \frac{1}{v_\alpha^2 + v_\beta^2} \begin{bmatrix} v_\alpha & v_\beta \\ v_\beta & -v_\alpha \end{bmatrix} \begin{bmatrix} -\tilde{p} + \bar{p}_{loss} \\ -q \end{bmatrix} \qquad (6)$$

Fig. 5 shows dual ShAF control.

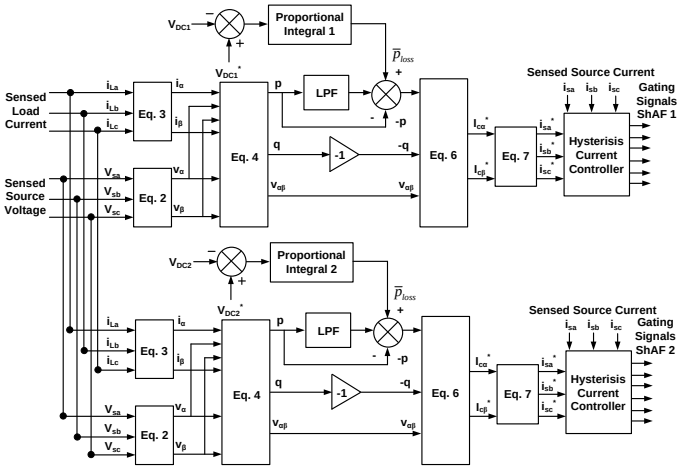

Fig. 5. Dual shunt active filter control

The $\bar{p}_{loss}$ signal is obtained from the voltage regulator and is used as average real power. It can also be expressed as instantaneous active power associated with resistive losses and switching losses from dual UPQC. The error is obtained by comparing the actual value of each DC-link capacitor voltage with the reference value processed using a PI controller 1 and 2, driven by a closed voltage control to minimize steady state errors from voltage through DC-link circuit 1 and 2 to zero. The compensation current ($i^*_{c\alpha}, i^*_{c\beta}$) is needed to meet load power demand as shown in Eq. (6). The current is expressed in coordinates $\alpha - \beta$. The compensation current is used to obtain source phase current by using Eq. (7) for compensation. The source phase current ($i^*_{sa}, i^*_{sa}, i^*_{sa}$) is expressed in the abc axis obtained from the compensation current in $\alpha - \beta$ coordinates and is presented in Eq. 7 [15] .

$$\begin{bmatrix} i^*_{sa} \\ i^*_{sb} \\ i^*_{sc} \end{bmatrix} = \sqrt{\frac{2}{3}} \begin{bmatrix} 1 & 0 \\ -1/2 & \sqrt{3}/2 \\ -1/2 & -\sqrt{3}/2 \end{bmatrix} \begin{bmatrix} i^*_{c\alpha} \\ i^*_{c\beta} \end{bmatrix} \quad (7)$$

In order to operate properly, The dual UPQC must have a minimum DC-link voltage(V_{dc}). The general DC-link voltage value depends on the instantaneous energy that can be generated by UPQC which is defined in Eq.8 [16]:

$$V_{dc} = \frac{2\sqrt{2V_{LL}}}{\sqrt{3}m} \quad (8)$$

Where m is the modulation index and V_{LL} is the voltage of dual UPQC. Considering modulation index of 1 and the grid voltage between line-line ($V_{LL} = 380\ V$) , V_{dc} is obtained 620.54 V and chosen as 650 V.

The input of dual ShAF shown in Fig. 6 is DC voltage 1 (V_{dc1}) dan DC voltage reference 1 (V^*_{dc1}) as well as DC voltage 2 (V_{dc2}) dan DC voltage reference 2 (V^*_{dc2}) while the output is P_{loss} using the PI controller 1 and PI controller 2. Furthermore, P_{loss} of the input variables produce a reference source current ($i^*_{sa}, i^*_{sa}, i^*_{sa}$) . Then, the reference source current output is compared with current source(i_{sa}, i_{sb}, i_{sc}) by hysteresis current controller to generate a trigger signal in IGBT circuit of ShAF 1 and ShAF 2. In this paper, PI controller 1 and PI controller 2 as a DC voltage 1 and DC voltage 2 control algorithm on ShAF 1 and ShAF 2 are proposed.

D. Percentage of Sag/Swell and Interruption Voltage

The recommended standard of practice on monitoring sag/swell and interruption voltage as a part of power quality parameters is IEEE 1159-1995 [17]. This standard presents definition and table of voltage sag/voltage and interruption base on catagories (instantaoeous, momentary, and temporary) typical duration, and typical magnitude. The percentage of disturbances i.e. sag/swell and interruption voltage are proposed by authors in Eq. (9) below:

$$Disturb\ Voltage\ (\%) = \frac{|Vpre\_disturb - V\_disturb|}{Vpre\_disturb} \quad (9)$$

III. RESULT DAN DISCUSSION

The analysis of proposed model is carried out by determining two UPQC models, i.e. single UPQC and dual UPQC. There are six disturbance scenarios in each UPQC i.e. (1) S-Swell-NL, (2) S-Sag-NL, (3) S-Inter-NL, (4) Dis-Swell-NL, (5) Dis-Sag-NL, and (6) Dis -Inter-NL. By using Matlab/Simulink, the model is run based on selected scenario to get the magnitude of source voltage *(V_S)*, load voltage *(V_L)*, source current *(I_S)*, and load current *(I_L)*, as well as their average values. Furthermore, THD of source voltage, THD of load voltage THD of source current, and THD of load current in each phase, and their average value are also determined based on the curves obtained previously. The total simulation period lasts 0.7 seconds with a duration of disturbance between 0.2-0.5 s. The THD of voltage and current in each phase is determined in one cycle starting at t = 0.35 s. Based on the load voltage value, then disturbance voltage percentage value (%) is obtained using equation (9), with pre-disturbance voltage of 310 V. The simulation results of voltage and current magnitudes, THD of voltage and current, and percentage of load voltage disturbances are presented in Table 1, Table 2, and Table 3 respectively. Figure 6 and Figure 7 show single UPQC and dual UPQC performance respectively in D-Inter-NL scenario.

TABLE I. MAGNITUDE OF VOLTAGE AND CURRENT USING SINGLE UPQC AND DUAL UPQC ON SIX DISTURBANCE SCENARIOS

Scenarios	Source Voltage V_S (Volt)				Load Voltage V_L (Volt)				Source Current I_S (Ampere)				Load Current I_L (Ampere)			
	Ph A	Ph B	Ph C	Avg	Ph A	Ph B	Ph C	Avg	Ph A	Ph B	Ph C	Avg	Ph A	Ph B	Ph C	Avg
Single UPQC																
S-Swell-NL	464.4	464.6	464.6	**464.53**	310.0	309.9	309.9	**309.93**	8.381	8.382	8.379	**8.381**	8.586	8.584	8.585	**8.585**
S-Sag-NL	153.4	153.4	153.4	**153.40**	310.1	310.1	310.1	**310.10**	16.61	16.38	16.42	**16.470**	8.588	8.586	8.589	**8.588**
S-Inter-NL	0.9984	0.8963	1.022	**0.97**	172.2	161.5	173.3	**169.00**	9.345	8.621	9.13	**9.032**	4.647	4.356	4.606	**4.536**
D-Swell-NL	464.6	464.6	464.6	**464.60**	320.2	322.8	326.9	**323.30**	8.732	8.697	8.723	**8.717**	8.927	8.974	8.991	**8.964**
D-Sag-NL	153.7	153.8	153.7	**153.73**	295.6	296	297.5	**296.37**	13.97	13.45	14	**13.807**	8.245	8.17	9.097	**8.504**
D-Inter-NL	0.9641	1.136	0.8586	**0.99**	173.7	179.6	168.6	**173.97**	8.601	10.27	8.507	**9.126**	5.105	4.561	4.589	**4.752**
Dual UPQC																
S-Swell-NL	464.8	464.8	464.8	**464.80**	310.4	310.4	310.5	**310.43**	10.45	10.46	10.44	**10.450**	8.605	8.604	8.604	**8.604**
S-Sag-NL	154.1	154.1	154.1	**154.10**	309.4	309.5	309.4	**309.43**	13.84	13.9	13.92	**13.887**	8.567	8.557	8.574	**8.566**
S-Inter-NL	1.728	1.634	1.868	**1.74**	256.5	245	268.1	**256.53**	16.61	15.42	19.94	**17.323**	7.323	6.8	7.192	**7.105**
D-Swell-NL	464.8	464.8	464.8	**464.80**	318.9	321.9	325.9	**322.23**	10.97	10.86	10.92	**10.917**	8.916	8.934	8.934	**8.928**
D-Sag-NL	154.3	154.3	154.2	**154.27**	297.3	299	295.6	**297.30**	12.12	12.68	12.68	**12.493**	8.286	8.342	8.098	**8.242**
D-Inter-NL	1.404	1.473	1.621	**1.50**	266.4	267.1	266.3	**266.60**	12.66	13.27	16.71	**14.213**	7.018	7.441	7.365	**7.275**

TABLE II. THD OF VOLTAGE AND CURRENT USING SINGLE UPQC AND DUAL UPQC ON SIX DISTURBANCE SCENARIOS

Scenarios	Source Voltage THD (%)				Load Voltage THD (%)				Source Current THD (%)				Load Current THD (%)			
	Ph A	Ph B	Ph C	Avg	Ph A	Ph B	Ph C	Avg	Ph A	Ph B	Ph C	Avg	Ph A	Ph B	Ph C	Avg
Single UPQC																
S-Swell-NL	0.79	0.78	0.79	**0.79**	1.24	1.23	1.24	**1.24**	11.63	11.57	11.57	**11.59**	22.30	22.30	22.30	**22.30**
S-Sag-NL	0.98	0,98	0.98	**0.65**	0.49	0.49	0.48	**0.49**	11.68	11.68	11.59	**11.65**	22.28	22.29	22.28	**22.28**
S-Inter-NL	83.18	109.82	87.01	**93.34**	23.84	24.37	21.02	**23.08**	20.66	19.45	12.23	**17.45**	26.84	21.48	17.66	**21.99**

D-Swell-NL	3.63	3.67	3.71	**3.67**	4.90	6.42	7.69	**6.34**	11.63	11.42	11.71	**11.59**	22.46	21.82	22.47	**22.25**
D-Sag-NL	11.07	10.9	10.76	**10.91**	8.41	7.80	7.09	**7.77**	11.14	12.93	11.76	**11.94**	21.76	23.42	21.77	**22.32**
D-Inter-NL	1756.97	1463	1917	**1712.32**	21.53	31.74	26.82	**26.70**	17.16	21.84	26.31	**21.77**	24.96	31.51	24.62	**27.03**
Dual UPQC																
S-Swell-NL	1.35	1.36	1.36	**1.36**	2.06	2.08	2.07	**2.07**	36.9	36.91	37.09	**36.97**	22.36	22.35	22.37	**22.36**
S-Sag-NL	2.47	2.44	2.49	**2.47**	1.24	1.22	1.26	**1.24**	24.07	23.98	24.14	**24.06**	22.36	22.35	22.38	**22.36**
S-Inter-NL	147.28	154.6	132.19	**144.69**	16.53	13.1	18.56	**16.06**	21.00	16.69	19.94	**19.21**	24.30	22.91	22.82	**23.34**
D-Swell-NL	3.68	3.82	3.98	**3.83**	5.36	6.55	8.16	**6.69**	36.71	36.46	37.11	**36.76**	22.40	22.17	22.54	**22.37**
D-Sag-NL	10.87	10.97	11.64	**11.16**	6.92	7.12	8.86	**7.63**	28.85	26.10	29.88	**28.28**	22.15	23.19	23.14	**22.83**
D-Inter-NL	1211.59	1139.13	1053.34	**1134.69**	11.21	11.64	7.45	**10.10**	24.82	21.50	16.71	**21.01**	22.07	22.65	22.13	**22.28**

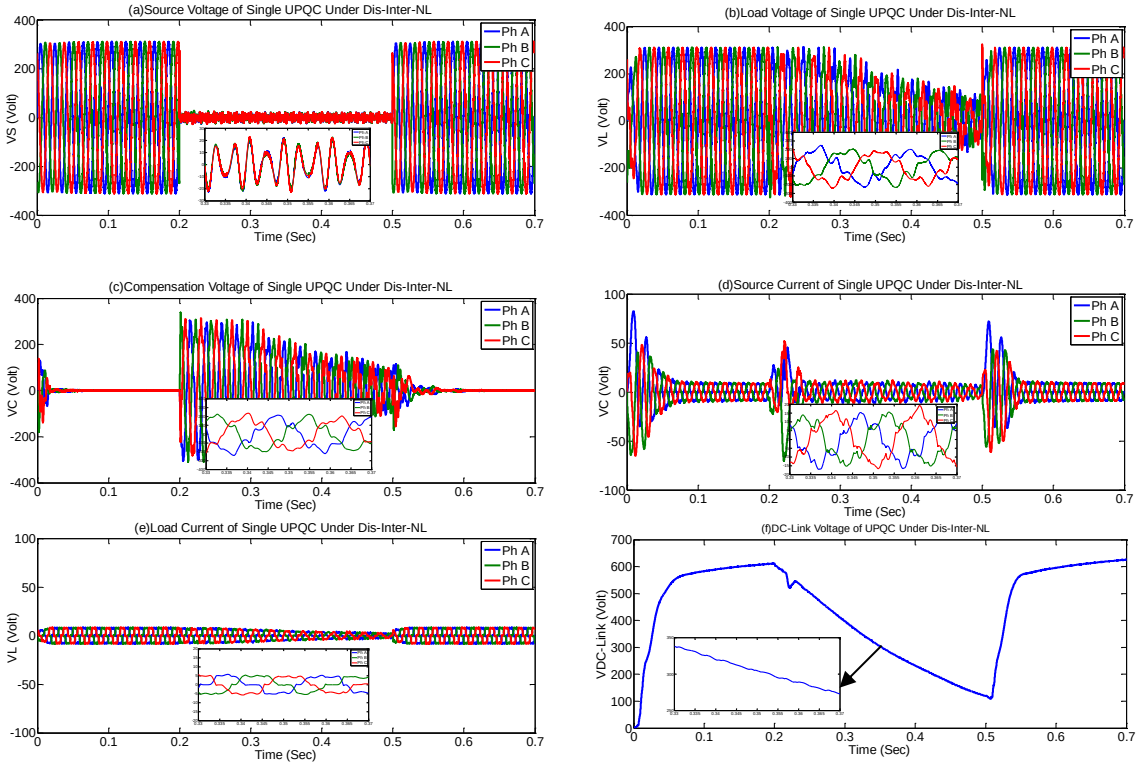

Fig. 6. Performance of single UPQC under Dis-Inter-NL scenario

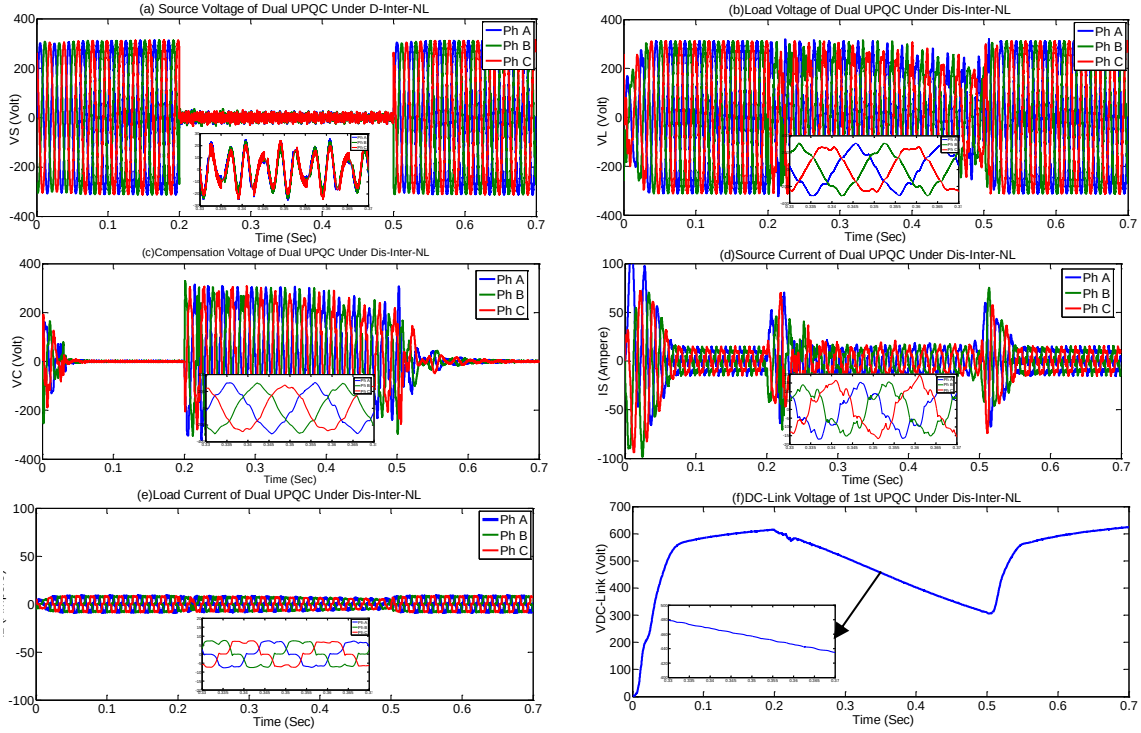

Fig. 7. Performance of dual UPQC under Dis-Inter-NL scenario *(continue)*

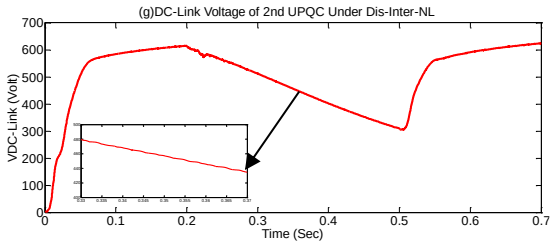

Fig. 7. Performance of dual UPQC under Dis-Inter-NL scenario

TABLE III. PERCENTAGE OF LOAD VOLTAGE IN SIX DISTURBANCE

No.	Scenarios	Load Voltage S-UPQC (%)	Load Voltage D-UPQC (%)
1	S-Swell-NL	0.02	0.14
2	S-Sag-NL	0.03	0.18
3	S-Inter-NL	45.48	17.25
4	D-Swell-NL	4.29	3.95
5	D-Sag-NL	4.40	4.10
6	D-Inter-NL	43.88	14.00

Figure 8, Figure 9, and Figure 10 show comparison performance of load voltage, load voltage harmonics, and source current harmonics between S-UPQC and D-UPQC, respectively.

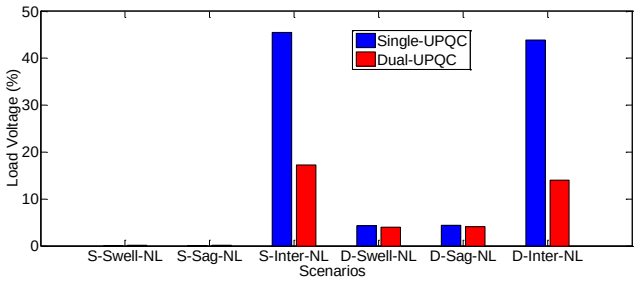

Fig. 8. Comparison performance of load voltage percentage between S-UPQC and D-UPQC

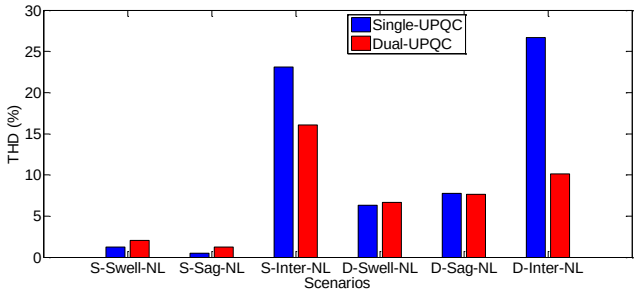

Fig. 9. Comparison performance of load voltage harmonics between S-UPQC and D-UPQC

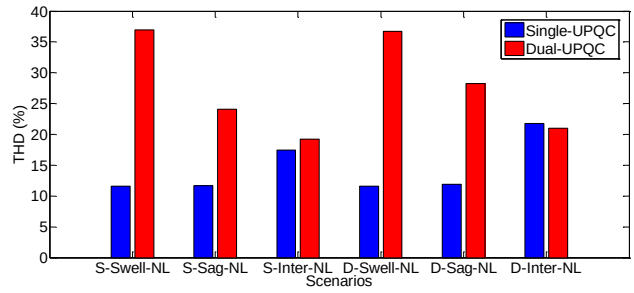

Fig. 10. Comparison performance of source current harmonics between S-UPQC and D-UPQC

Table 1 and Figure 8 show that in both S-Sag/Swell-NL and D-Sag/Swell-NL scenarios, the implementation of a dual UPQC model results in a slightly higher percentage of load voltage disturbance than a single UPQC model. In the D-Inter-NL scenario, a dual UPQC model is able to maintain a more stable load voltage of 266.60 V compared to a single UPQC model of 173.97 V. Table 3 and Figure 8 also show that in the D-Inter-NL scenario, a dual UPQC circuit is also capable of resulting in a smaller percentage of load voltage disturbance of 14%, compared to a single UPQC circuit of 43.88%.

Table 2 and Figure 9 show that in both S-Sag/Swell-NL and D-Sag/Swell-NL fault scenarios, the implementation of a dual UPQC model results in a slightly higher average THD of the load voltage than a single UPQC model. In the D-Inter-NL scenario, a dual UPQC circuit is able to produce a much lower load voltage average THD of 10.10% compared to a single UPQC circuit of 26.70 V.

Table 2 and Figure 10 show that in S-Sag/Swell-NL and D-Sag/Swell-NL scenarios, the implementation of a dual UPQC model produces higher source current average THD than a single UPQC model. In the D-Inter-NL fault scenario, a dual UPQC circuit is is able to produce a slightly higher source current average THD of 21.01% compared to a single UPQC circuit of 19.21%.

IV. CONCLUSION

The implementation of UPQC to mitigate power quality problems i.e. sag/swell, interruption, and harmonics on source and load bus of 3P3W on low voltage distribution system simultaneously has been presented. There are six disturbance scenarios i.e. S-Sag-NL, S-Swell-NL, S-Inter-NL, Dis-Sag-NL, Dis-Swell-NL, and Dis-Inter-NL. The PI method is used to control SeAF and ShAF in dual UPQC circuit model. The simulation results show that in the D-Inter-NL scenario, a dual UPQC model is able to maintain a load voltage magnitude, higher compared to a single UPQC model. In D-Inter-NL scenario, a dual UPQC circuit is also capable of resulting in a smaller percentage of load voltage disturbance compared to a single UPQC circuit. In the same scenario, a dual UPQC model is capable of resulting an average total harmonics distortion THD of load voltage, lower compared to a single UPQC model.

In the D-Inter-NL scenario, percentage of load voltage disturbance on a 3P3W system using a dual UPQC still has not reached the limit below 10 percent. The harmonic values of load voltage and source current also still exceed IEEE-519 standard. The implementation of generators based on renewable energy source i.e. photovoltaic and wind turbine and advanced control based on artificial intelligence on ShAF circuits i.e. fuzzy logic, neural network, or ANFIS, then can be selected as future work to overcome this problem.

APPENDIX

Three-phase source: RMS voltage 380 volt (L-L), 50 Hz, line impedance: R_S = 0.1 Ohm L_S = 15 mH; series and shunt active filter: series inductance L_{Se} = 0.015 mH; shunt inductance L_{Sh} = 15 mH; injection transformers: rating 10 kVA, 50 Hz, turn ratio (N_1/N_2) = 1:1; sensitive load: resistance R_L = 60 ohm, inductance L_L = 0.15 mH, load impedance R_C = 0.4 ohm and L_C = 15 mH; unbalance load: resistance R_1 = 24 ohm, R_2 = 12 ohm, and R_3 = 6 ohm, capacitance C_1, C_2, C_3 = 2.2 μF; DC-link 1 and 2: DC voltage 1 and 2 V_{dc} = 650 volt and capacitance 1 and 2 C_{dc} = 3000 μF; PI controller and 2: K_P = 0.2, K_I = 1.5; input: $V_{dc-error}$ and $\Delta V_{dc-error}$; output: instantaneous of power losses ($\bar{p}_{loss}$).

ACKNOWLEDGMENTS

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Lampiran 2.3

Bukti Submission Makalah

#525 Summary

SUMMARY REVIEW

Submission

Authors	Amirullah Amirullah, Adiananda Adiananda, Ontoseno Penangsang, Adi Soeprijanto
Title	A Dual UPQC to Mitigate Sag/Swell, Interruption, and Harmonics on Three Phase Low Voltage Distribution System
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Supp. files	525-813-1-SP.PDF 2020-09-10 525-821-1-SP.DOCX 2020-09-11 525-822-1-SP.PDF 2020-09-11
Submitter	Amirullah Amirullah
Date submitted	August 21, 2020 - 06:56 PM
Track	Electricals
Director	ICVEE Unesa (Director)
Author comments	I hope ICVEE Unesa 2020 goes according to plan.

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Submission Metadata

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Title and Abstract

Title: A Dual UPQC to Mitigate Sag/Swell, Interruption, and Harmonics on Three Phase Low Voltage Distribution System

Abstract

The Unified Power Quality Conditioner (UPQC) is a combination of a series active filter and a shunt active filter connected in parallel by a DC link capacitor. This device is able to mitigate power quality problems i.e. sag/swell, harmonics, and unbalance simultaneously on source and load bus of three phase three wire (3P3W) on low voltage distribution systems simultaneously. The disadvantage of UPQC is that it is unable to overcome the voltage interruption so that the source can not deliver power to the load. This paper proposes a dual UPQC model to overcome the voltage interruption on the source bus so that the load bus continues to get power supply. There are six disturbance scenarios i.e. sinusoidal supply-sag-non-linear load (S-Sag-NL), sinusoidal supply-swell-NL (S-Swell-NL), sinusoidal-interruption-NL (S-Inter-NL), distorted supply-sag-non-linear load (Dis-Sag-NL), distorted supply-swell-NL (Dis-Swell-NL), and distorted supply-interruption-NL (Dis-Inter-NL). Proportional Integral (PI) method is used to control the series active filter and the shunt active filter in dual UPQC circuit model. The simulation results show that in the D-Inter-NL scenario, a Dual UPQC model is able to maintain a higher load voltage magnitude of 266.60 V (voltage drop only of 14%), compared to a Single UPQC model of 173.97 V (voltage drop of 43.88%). In the same scenario, a dual UPQC model is capable of resulting an average total harmonics distortion (THD) of load voltage of 10.10%, lower compared to a single UPQC model of 26.70%.

Indexing

Keywords: Dual/Single UPQC, Sag/Swell, Interruption, Harmonics

Language: en

Supporting Agencies

Agencies: Direktorat Jenderal Penguatan Riset dan Pengembangan, DRPM Kementerian Riset dan Teknologi/BRIN

Lampiran 2.5

Revisi pertama makalah

A Dual UPQC to Mitigate Sag/Swell, Interruption, and Harmonics on Three Phase Low Voltage Distribution System

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The Unified Power Quality Conditioner (UPQC) is a combination of a series active filter (SeAF) and a shunt active filter (ShAF) connected in parallel by a DC link capacitor. This device is able to mitigate power quality problems i.e. sag/swell, harmonics, and unbalance on source and load bus of three phase three wire (3P3W) on low voltage distribution systems simultaneously. The disadvantage of UPQC is that it is unable to overcome the voltage interruption so that the source can not deliver power to the load. This paper proposes a dual UPQC model to overcome the voltage interruption on the source bus so that the load bus continues to get power supply. There are six disturbance scenarios i.e. sinusoidal supply-sag-non-linear load (S-Sag-NL), sinusoidal supply-swell-NL (S-Swell-NL), sinusoidal-interruption-NL (S-Inter-NL), distorted supply-sag-non-linear load (Dis-Sag-NL), distorted supply-swell-NL (Dis-Swell-NL), and distorted supply-interruption-NL (Dis-Inter-NL). Proportional Integral (PI) method is used to control the SeAF and the ShAF in dual UPQC circuit model. The simulation results show that in the D-Inter-NL scenario, a Dual UPQC model is able to maintain a load voltage magnitude of 266.60 V (voltage drop only of 14%), higher compared to a Single UPQC model of 173.97 V (voltage drop of 43.88%). In the same scenario, a dual UPQC model is capable of resulting an average total harmonics distortion (THD) of load voltage of 10.10%, lower compared to a single UPQC model of 26.70%.

Keywords—Dual/Single UPQC, Sag/Swell, Interruption, Harmonics.

I. INTRODUCTION

In recent decades, the use of non-linear loads by customers has contributed to a decrease in power quality (PQ) in power system, causing current distortion i.e. current harmonics and unbalanced current in the load buses. On the other hand, the presence of sensitive loads and voltage distortion on the source bus, also causes a number of voltage disturbances, thereby also causing a decrease in voltage quality i.e. voltage sag/swell voltage, voltage harmonics, and unbalanced voltage. To solve the problem of worsening PQ due to the use of sensitive loads or non-linear loads on the load bus and voltage distortion on the source bus, a power electronics device is proposed, namely Unified Power Quality Conditioner (UPQC) [1]. The UPQC consists of a SeAF and a ShAF connected in parallel via a DC-link capacitor and serves to mitigate a number of power quality problems on the source and load sides simultaneously [2]. The SeAF functions to reduce a number of disturbances on the source side i.e. sag/swell voltage, flickers, unbalanced voltage, and source voltage harmonics. Meanwhile, The ShAF functions to overcome current quality problems i.e. low power factor, load current harmonics, and unbalanced current [3].

To anticipate failure of both inverters in a single UPQC circuit, a dual UPQC model was developed. The advantage of a dual UPQC is that it has a more reliable inverter circuit structure and control, because if there is a disturbance in one of the inverters, the UPQC system is still able to operate normally [4]. The dual or interline UPQC consists of two active filters, namely SeAF and ShAF (parallel active filters), used to reduce harmonics and voltage/current imbalances. Different from the single UPQC, the dual UPQC has a SeAF which is controlled as a sinusoidal current source and a ShAF which is controlled as a sinusoidal voltage source. Thus the dual UPQC pulse width modulation (PWM) control is related to the frequency spectrum, because it is controlled using a sinusoidal reference voltage and current, in contrast to a single UPQC which is still controlled using a non-sinusoidal reference voltage and current.

Implementation of dual UPQC circuit and control, to improve power quality on the source and load side of the low voltage distribution system has been done and discussed in a several papers. The simplification technique UPQC control have been proposed in [5] and developed on ABC reference frame using sinusoidal reference synchronization theory, without the need to use coordinate transformation and digital control implementation. In [6], a comparison of two different controls has been carried out to generate the PWM reference signal using the α-β and d-q reference frames, respectively. PWM control using the α-β reference frame is more efficient

than d-q, because it is able to produce a more stable load voltage and source current with lower harmonic values. The comparison of operation performance of single UPQC and dual UPQC in a 3 phase 3 wire (3P3W) system under static disturbances (harmonics/imbalance of source voltage and load current harmonics), as well as dynamic disturbances (sags/swell voltage and load changes) has been carried out through simulations [7] and experiments [8]. The simulation and experiment results verify that a dual UPQC is capable of producing better static and dynamic performance than single UPQC. The improvement of power quality using dual UPQC under conditions of sudden load changes has been done by [9]. The simulation results confirm that the dual UPQC is able to result constant source current due to nonlinear load and constant load voltages due to voltage dip (sag) in one of phases on source side. However, the research has not been able to provide verification of the value of improvement of source harmonic currents due to non-linear loads and load voltage harmonics due to voltage dip on the source side.

The study, analysis, and implementation of dual UPQC model that can be connected to a 3P3W or three phase four wire (3P4W) [10] and 3P4W distribution system [11] with proportional integral (PI) control have been applied to improve power quality system. The dual UPQC using series-ShAFs on 3P3W and 3P4W systems using PI controller are able to keep the source current and load voltage balanced and sinusoidal. The analysis to balance reactive power between series and ShAFs on a dual UPQC using power angle control has been carried out by [12]. The simulation results show that the power angle control method is able to determine load power angle between load voltage and source voltage. This method is also able to evenly divide reactive power of load according to reactive power of series and ShAFs. However, this research does not discuss the effect of implementing power angle control on the improvement of power quality due to static and dynamic disturbances.

The weakness of the UPQC is that it is unable to overcome the disturbance caused by interruption voltage on the source bus so that the load bus experiences blackouts [3]. The paper proposes a dual UPQC model to overcome interruption voltage in the source bus so that the load bus still gets power supply. Apart from interruption voltage disturbance, the research analysis also focuses on the main function of this model in mitigating power quality problems i.e. improve the magnitude and harmonics of the load voltage due to sag/swell voltage and harmonics distortion of source voltage, and reduce the harmonics of source current due to non-linear loads. To provide a performance advantage, the simulation results of all parameters in the dual UPQC model are further validated with a single UPQC model. This paper is set out as follows. Section 2 describes proposed process, a dual UPQC model, simulation of parameters, dual SeAF and ShAF control as well as PI controller implementation. Section 3 displays outcomes and description of source voltage magnitude, harmonic voltage, load voltage magnitude, load voltage harmonics, and drop voltage percentage. Six perturbance scenarios are described in this segment, and Matlab/Simulink verifies the results. This paper is eventually concluded in Section 4.

II. RESEARCH METHOD

A. *Proposed Method*

This research aims to mitigate interruption voltage, sag/swell voltage, and harmonics in the 3P3W distribution system using a dual UPQC model. This power electronic device is used to overcome the weakness of a single UPQC in maintaining magnitude of load voltage, so that load bus is still supplied with power if interruption voltage happens on the source bus. The dual UPQC circuit is located between load bus and connected to source bus (PCC) via a 380 kV (L-L) low-voltage distribution line with a frequency of 50 Hz. The Proportional Integral (PI) control method is used in dual UPQC circuit model.

There are six disturbance scenarios i.e. (1) S-Swell-NL, (2) S-Sag-NL, (3) S-Inter-NL, (4) Dis-Swell-NL, (5) Dis-Sag-NL, and (6) Dis-Inter-NL. In scenario 1, the model is connected to a non-linear load and the sinusoidal source experiences a swell voltage of 50%. In scenario 2, the model is connected to a non-linear load and the sinusoidal source experiences a sag voltage of 50%. In scenario 3, the model is connected to a non-linear load and the sinusoidal source experiences an interruption voltage of 100%. In scenario 4, the model is connected to a non-linear load, the source generates 5th and 7th odd-order harmonic components with individual harmonic distortion values of 5% and 2% respectively, as well as experiences a swell voltage of 50%. In scenario 5, the model is connected to a non-linear load, the source generates 5th and 7th odd-order harmonic components with individual harmonic distortion values of 5% and 2% respectively, as well as experiences a sag voltage of 50%. In scenario 6, the model is connected to a non-linear load, the source generates 5th and 7th odd-order harmonic components with individual harmonic distortion values of 5% and 2% respectively, as well as experiences an interruption voltage of 100%. The total simulation time for all disturbance scenarios is equal to 0.7 s with disturbance duration of 0.3 s between t = 0.2 s to t = 0.5 s. The mitigation analysis of power quality problems in this paper i.e. improve load voltage magnitude and reduce harmonics due to interruption voltage, sag/swell voltage, and source voltage harmonic distortion, as well as reduce source current harmonics due to non-linear loads. Finally, the simulation results of all parameters in a dual UPQC model are then validated with a single UPQC model to provide an overview of the performance advantages of the proposed model. Figure 1 shows proposed model of a dual UPQC connected to 3P3W distribution system.

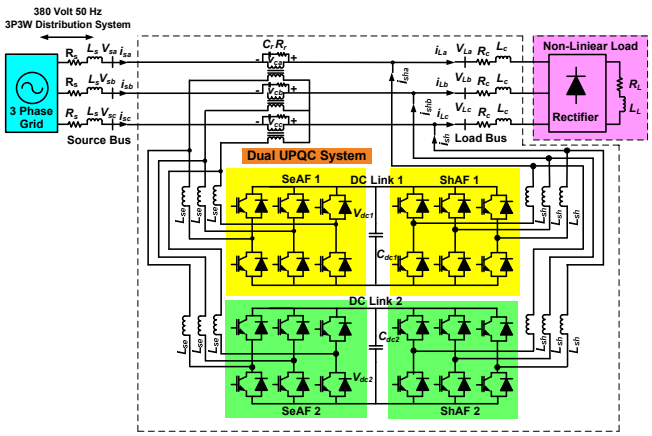

Fig. 1 Proposed model of a dual UPQC connected to 3P3W system

. Figure 2 and Figure 3 show proposed model of a single and a dual UPQC in single phase system.

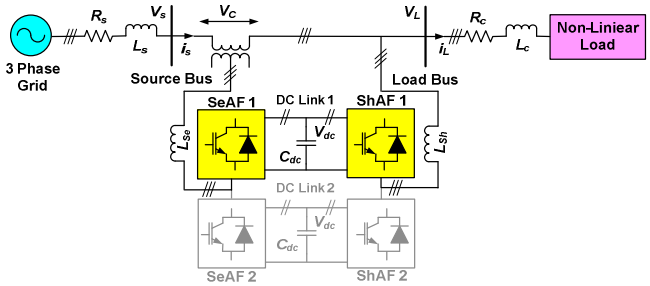

Fig. 2. Model of a single UPQC in single phase system

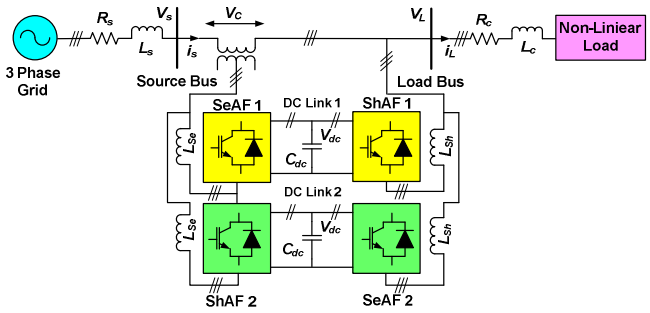

Fig. 3. Model of a dual UPQC in single phase system.

B. *Control of Dual Series Active Filter*

The SeAF control circuit of dual UPQC is twice a single UPQC control circuit while still using one series of three-phase transformers and then called by dual SeAF control.

The key role of dual SeAF control is to protect sensitive load at PCC bus from a range of voltage disturbances. The source voltage and load voltage control strategies algorithm in dual SeAF circuit is shown in Fig. 4. This control strategy generates the unit vector template from a distorted input source, and is then named by method of unit vector templates generating unit (UVTG). The model should be an ideal sinusoidal signal with an amplitude of unity. Then the distorted source voltage is calculated and divided by the base input voltage peak amplitude V_m , as described in Eq. (1) [13].

$$V_m = \sqrt{\frac{2}{3}(V_{sa}^2 + V_{sb}^2 + V_{sc}^2)} \qquad (1)$$

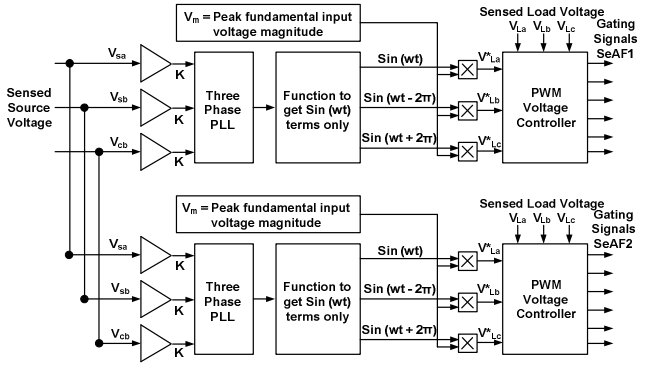

Fig. 4 Dual series active filter control

Using sine function, a three-phase PLL is used to generate sinusoidal vector unit models, with phase lagging. The load voltage of the reference signal is determined by the multiplication of unit vector templates by the base maximum value input of voltage amplitude V_m . The load reference voltage $(V_{La}^*, V_{Lb}^*, V_{Lc}^*)$ is then compared with sensed load voltage(V_{La}, V_{Lb}, V_{Lc}) with a PWM controller which is used to generate the desired trigger signal in SeAF.

C. *Control of Dual Shunt Active Filter*

The ShAF control circuit of dual UPQC is twice a single UPQC control circuit and then called by dual ShAF control. The ShAF's key role is to alleviate load-side problems with the PQ. The ShAF's control method is that the absorbed current from the PCC bus is a balanced positive sequence current which includes an unbalanced sag voltage on the PCC bus, an unbalanced or non-linear load. In order to obtain adequate compensation caused by non-linear load disturbance, several methods have been used in some references. This research is using the method of the theory of instantaneous reactive power, or "p-q" theory. In Cartesian coordinates, the voltages and currents can be converted into coordinates αβ as indicated in Eq. (2) and Eq. (3) [13].

$$\begin{bmatrix} v_\alpha \\ v_\beta \end{bmatrix} = \begin{bmatrix} 1 & -1/2 & -1/2 \\ 0 & \sqrt{3}/2 & -\sqrt{3}/2 \end{bmatrix} \begin{bmatrix} V_a \\ V_b \\ V_c \end{bmatrix} \qquad (2)$$

$$\begin{bmatrix} i_\alpha \\ i_\beta \end{bmatrix} = \begin{bmatrix} 1 & -1/2 & -1/2 \\ 0 & \sqrt{3}/2 & -\sqrt{3}/2 \end{bmatrix} \begin{bmatrix} i_a \\ i_b \\ i_c \end{bmatrix} \qquad (3)$$

The calculation of true power (p) and imaginary power (q) is shown in Eq. (9). The true power and imaginary power are instantaneously evaluated and expressed in matrix form. In Eq. (4), the presence of mean and fluctuating component in instant component is seen [14].

$$\begin{bmatrix} p \\ q \end{bmatrix} = \begin{bmatrix} v_\alpha & v_\beta \\ -v_\beta & v_\alpha \end{bmatrix} \begin{bmatrix} i_\alpha \\ i_\beta \end{bmatrix} \qquad (4)$$

$$p = \bar{p} + \tilde{p} \;\; ; \;\; q = \bar{q} + \tilde{q} \qquad (5)$$

Where $\bar{p}$ = the average component of true power, $\tilde{p}$ = the fluctuating component of true power, $\bar{q}$ = the average component of imaginary power, $\tilde{q}$= the fluctuating component of imaginary power. The total imaginary power (q) and fluctuating component of true power $(\tilde{p})$ are chosen as power references and current references and are used by using Eq. (5) to balance thw harmonics and reactive power [15].

$$\begin{bmatrix} i_{c\alpha}^* \\ i_{c\beta}^* \end{bmatrix} = \frac{1}{v_\alpha^2 + v_\beta^2} \begin{bmatrix} v_\alpha & v_\beta \\ v_\beta & -v_\alpha \end{bmatrix} \begin{bmatrix} -\tilde{p} + \bar{p}_{loss} \\ -q \end{bmatrix} \qquad (6)$$

Fig. 5 shows dual ShAF control.

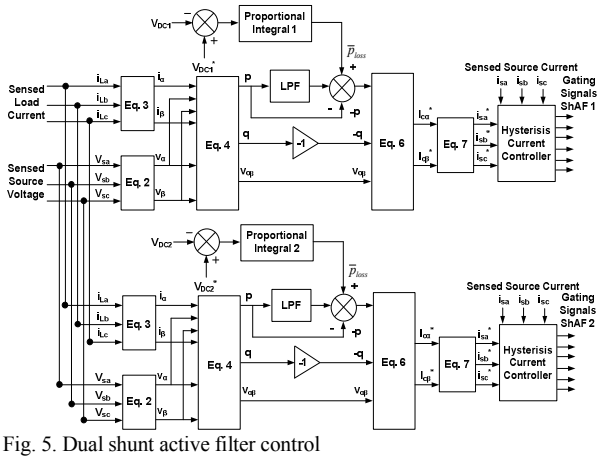

Fig. 5. Dual shunt active filter control

The $\bar{p}_{loss}$ signal is received from the voltage regulator and is used as average true power. It can also be expressed as instantaneous active power associated with resistive losses and switching losses from dual UPQC. The error is obtained by comparing the actual value of each DC-link capacitor voltage with the reference value, measured using a PI controllers 1 and 2, and managed by a closed voltage control to minimize steady state errors from voltage through DC-link circuits 1 and 2 to zero. The compensation current ($i^*_{c\alpha}$, $i^*_{c\beta}$) is needed to meet load power demand as shown in Eq. (6). The current is expressed in coordinates $\alpha\beta$. The current compensation is used to gain source phase current by using Eq. (7) for compensation. The source phase current ($i^*_{sa}, i^*_{sa}, i^*_{sa}$) is stated in the abc axis gained from the compensation current in $\alpha\beta$ coordinates and is expressed in Eq. 7 [15] .

$$\begin{bmatrix} i^*_{sa} \\ i^*_{sb} \\ i^*_{sc} \end{bmatrix} = \sqrt{\frac{2}{3}} \begin{bmatrix} 1 & 0 \\ -1/2 & \sqrt{3}/2 \\ -1/2 & -\sqrt{3}/2 \end{bmatrix} \begin{bmatrix} i^*_{c\alpha} \\ i^*_{c\beta} \end{bmatrix} \quad (7)$$

In order to operate properly, the dual UPQC must have a minimum DC-link voltage (V_{dc}) . The value of DC-link voltage depends on the instantaneous supply that can be raised by UPQC which is stated in Eq.8 [16]:

$$V_{dc} = \frac{2\sqrt{2V_{LL}}}{\sqrt{3}m} \quad (8)$$

Where m is the modulation index and V_{LL} is the voltage of dual UPQC. Considering modulation index of 1 and the grid voltage between line-line ($V_{LL} = 380\ V$) , V_{dc} is obtained 620.54 V and chosen as 650 V.

The input of dual ShAF shown in Fig. 6 is DC voltage 1 (V_{dc1}) dan DC voltage reference 1 (V^*_{dc1}) as well as DC voltage 2 (V_{dc2}) dan DC voltage reference 2 (V^*_{dc2}) while the output is P_{loss} using the PI controller 1 and PI controller 2. Furthermore, P_{loss} of the input variables produce a reference source current ($i^*_{sa}, i^*_{sa}, i^*_{sa}$) . Then, the reference source current output is compared with current source(i_{sa}, i_{sb}, i_{sc}) by hysteresis current controller to generate a trigger signal in IGBT circuit of ShAF 1 and ShAF 2. In this paper, PI controller 1 and PI controller 2 as a DC voltage 1 and DC voltage 2 control algorithm on ShAF 1 and ShAF 2 are proposed.

D. Percentage of Sag/Swell and Interruption Voltage

The recommended standard of practice on monitoring sag/swell and interruption voltage as a part of power quality parameters is IEEE 1159-1995 [17]. This standard presents definition and table of voltage sag/voltage and interruption base on catagories (instantaoeous, momentary, and temporary) typical duration, and typical magnitude. The percentage of disturbances i.e. sag/swell and interruption voltage are proposed by authors in Eq. (9) below:

$$Disturb\ Voltage\ (\%) = \frac{|Vpre\_disturb - V\_disturb|}{Vpre\_disturb} \quad (9)$$

II. RESULT AND DISCUSSION

The analysis of proposed model is carried out by determining two UPQC models, i.e. single UPQC and dual UPQC. There are six disturbance scenarios in each UPQC i.e. (1) S-Swell-NL, (2) S-Sag-NL, (3) S-Inter-NL, (4) Dis-Swell-NL, (5) Dis-Sag-NL, and (6) Dis -Inter-NL. By using Matlab/Simulink, the model is run based on selected scenario to get the magnitude of source voltage *(V_S),* load voltage *(V_L),* source current *(I_S),* and load current *(I_L),* as well as their average values. Furthermore, THD of source voltage, THD of load voltage THD of source current, and THD of load current in each phase, and their average value are also determined based on the curves obtained previously. The total simulation period lasts 0.7 s with a duration of disturbance between 0.2-0.5 s. The THD of voltage and current in each phase is determined in one cycle starting at t = 0.35 s. Based on the load voltage value, then disturbance voltage percentage value (%) is obtained using equation (9), with pre-disturbance voltage of 310 V. The simulation results of voltage and current magnitudes, THD of voltage and current, and percentage of load voltage disturbances in six scenarios (scns) are presented in Table 1, Table 2, and Table 3 respectively. Figure 6 and Figure 7 show single UPQC and dual UPQC performance respectively in D-Inter-NL scenario.

TABLE I. MAGNITUDE OF VOLTAGE AND CURRENT USING SINGLE UPQC AND DUAL UPQC ON SIX DISTURBANCE SCENARIOS

Scns	Source Voltage V_S (Volt)				Load Voltage V_L (Volt)				Source Current I_S (Ampere)				Load Current I_L (Ampere)			
	Ph A	*Ph B*	*Ph C*	*Avg*	*Ph A*	*Ph B*	*Ph C*	*Avg*	*Ph A*	*Ph B*	*Ph C*	*Avg*	*Ph A*	*Ph B*	*Ph C*	*Avg*
Single UPQC																
1	464.4	464.6	464.6	**464.53**	310.0	309.9	309.9	**309.93**	8.381	8.382	8.379	**8.381**	8.586	8.584	8.585	**8.585**
2	153.4	153.4	153.4	**153.40**	310.1	310.1	310.1	**310.10**	16.61	16.38	16.42	**16.470**	8.588	8.586	8.589	**8.588**
3	0.9984	0.8963	1.022	**0.970**	172.2	161.5	173.3	**169.00**	9.345	8.621	9.130	**9.032**	4.647	4.356	4.606	**4.536**
4	464.6	464.6	464.6	**464.60**	320.2	322.8	326.9	**323.30**	8.732	8.697	8.723	**8.717**	8.927	8.974	8.991	**8.964**
5	153.7	153.8	153.7	**153.73**	295.6	296.0	297.5	**296.37**	13.97	13.45	14.00	**13.807**	8.245	8.17	9.097	**8.504**
6	0.9641	1.136	0.8586	**0.990**	173.7	179.6	168.6	**173.97**	8.601	10.27	8.507	**9.126**	5.105	4.561	4.589	**4.752**
Dual UPQC																
1	464.8	464.8	464.8	**464.80**	310.4	310.4	310.5	**310.43**	10.45	10.46	10.44	**10.450**	8.605	8.604	8.604	**8.604**
2	154.1	154.1	154.1	**154.10**	309.4	309.5	309.4	**309.43**	13.84	13.9	13.92	**13.887**	8.567	8.557	8.574	**8.566**
3	1.728	1.634	1.868	**1.74**	256.5	245	268.1	**256.53**	16.61	15.42	19.94	**17.323**	7.323	6.8	7.192	**7.105**
4	464.8	464.8	464.8	**464.80**	318.9	321.9	325.9	**322.23**	10.97	10.86	10.92	**10.917**	8.916	8.934	8.934	**8.928**
5	154.3	154.3	154.2	**154.27**	297.3	299	295.6	**297.30**	12.12	12.68	12.68	**12.493**	8.286	8.342	8.098	**8.242**
6	1.404	1.473	1.621	**1.50**	266.4	267.1	266.3	**266.60**	12.66	13.27	16.71	**14.213**	7.018	7.441	7.365	**7.275**

TABLE II. THD OF VOLTAGE AND CURRENT USING SINGLE UPQC AND DUAL UPQC ON SIX DISTURBANCE SCENARIOS

Scns	Source Voltage THD (%)				Load Voltage THD (%)				Source Current THD (%)				Load Current THD (%)			
	Ph A	*Ph B*	*Ph C*	*Avg*	*Ph A*	*Ph B*	*Ph C*	*Avg*	*Ph A*	*Ph B*	*Ph C*	*Avg*	*Ph A*	*Ph B*	*Ph C*	*Avg*
Single UPQC																
1	0.79	0.78	0.79	**0.79**	1.24	1.23	1.24	**1.24**	11.63	11.57	11.57	**11.59**	22.30	22.30	22.30	**22.30**
2	0.98	0,98	0.98	**0.65**	0.49	0.49	0.48	**0.49**	11.68	11.68	11.59	**11.65**	22.28	22.29	22.28	**22.28**
3	83.18	109.82	87.01	**93.34**	23.84	24.37	21.02	**23.08**	20.66	19.45	12.23	**17.45**	26.84	21.48	17.66	**21.99**

4	3.63	3.67	3.71	**3.67**	4.90	6.42	7.69	**6.34**	11.63	11.42	11.71	**11.59**	22.46	21.82	22.47	**22.25**
5	11.07	10.9	10.76	**10.91**	8.41	7.80	7.09	**7.77**	11.14	12.93	11.76	**11.94**	21.76	23.42	21.77	**22.32**
6	1756.97	1463	1917	**1712.32**	21.53	31.74	26.82	**26.70**	17.16	21.84	26.31	**21.77**	24.96	31.51	24.62	**27.03**
Dual UPQC																
1	1.35	1.36	1.36	**1.36**	2.06	2.08	2.07	**2.07**	36.9	36.91	37.09	**36.97**	22.36	22.35	22.37	**22.36**
2	2.47	2.44	2.49	**2.47**	1.24	1.22	1.26	**1.24**	24.07	23.98	24.14	**24.06**	22.36	22.35	22.38	**22.36**
3	147.28	154.6	132.19	**144.69**	16.53	13.1	18.56	**16.06**	21.00	16.69	19.94	**19.21**	24.30	22.91	22.82	**23.34**
4	3.68	3.82	3.98	**3.83**	5.36	6.55	8.16	**6.69**	36.71	36.46	37.11	**36.76**	22.40	22.17	22.54	**22.37**
5	10.87	10.97	11.64	**11.16**	6.92	7.12	8.86	**7.63**	28.85	26.10	29.88	**28.28**	22.15	23.19	23.14	**22.83**
6	1211.59	1139.13	1053.34	**1134.69**	11.21	11.64	7.45	**10.10**	24.82	21.50	16.71	**21.01**	22.07	22.65	22.13	**22.28**

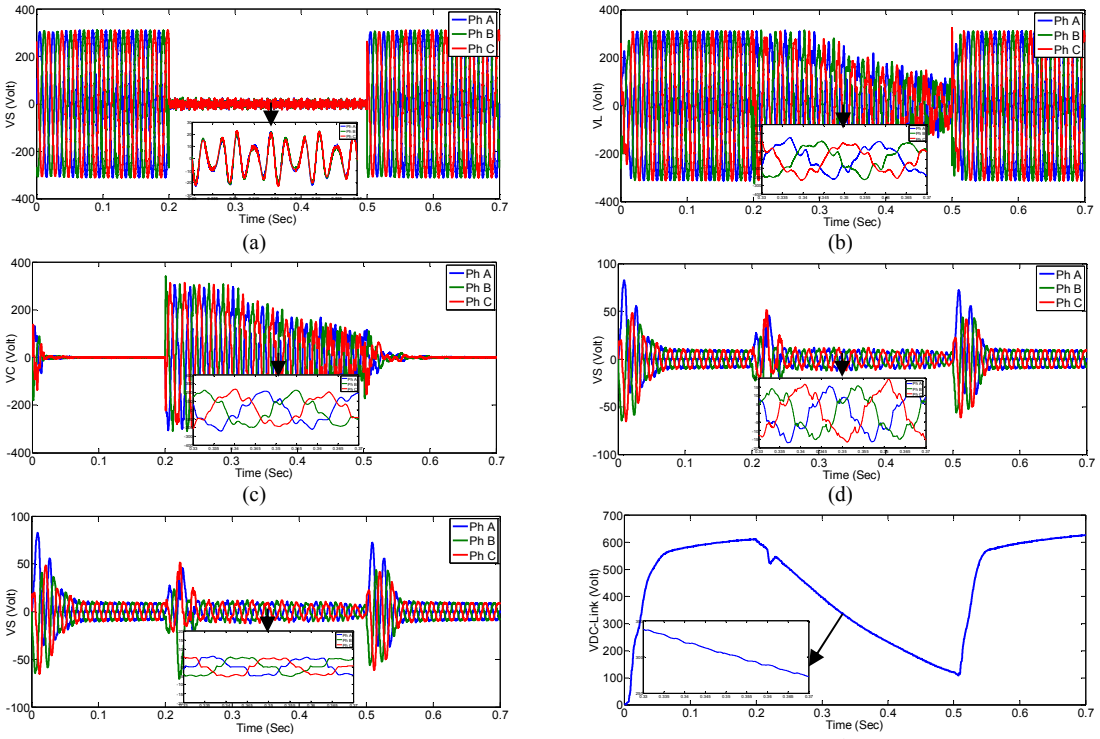

Fig. 6. Performance of single UPQC under Dis-Inter-NL scenario: (a) source voltage; (b) load voltage; (c) compensation voltage; (d) source current; (e) load current; (f) DC-link voltage

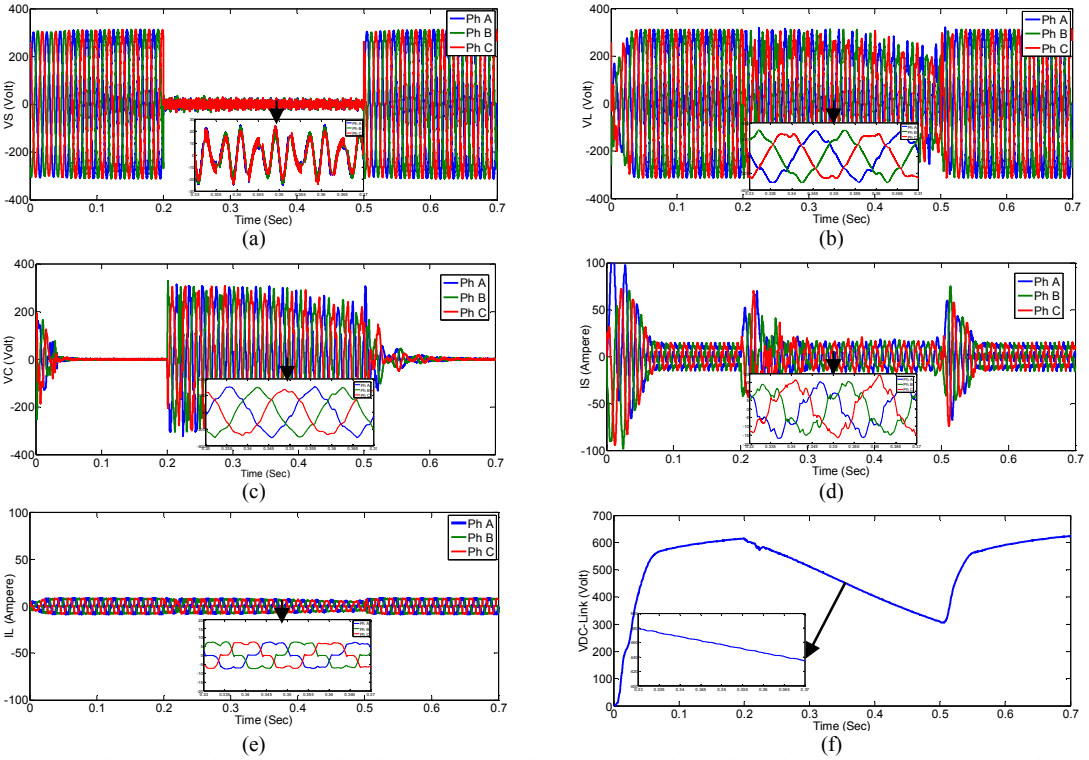

Fig. 7. Performance of dual UPQC under Dis-Inter-NL scenario: (a) source voltage; (b) load voltage, (c) compensation voltage; (d) source current; (e) load current; (f) 1st DC-link voltage; (g) 2nd DC-link voltage *(continue)*

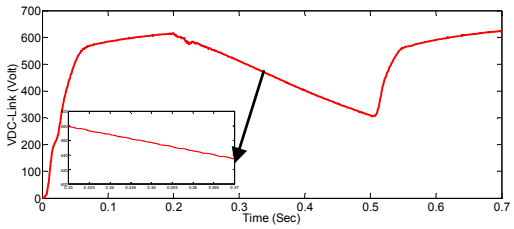

Fig. 7. Performance of dual UPQC under Dis-Inter-NL scenario: (a) source voltage; (b) load voltage, (c) compensation voltage; (d) source current; (e) load current; (f) 1st DC-link voltage; (g) 2nd DC-link voltage

TABLE III. PERCENTAGE OF LOAD VOLTAGE IN SIX DISTURBANCE

Scns	Load Voltage	
	S-UPQC (%)	*D-UPQC (%)*
1	0.02	0.14
2	0.03	0.18
3	45.48	17.25
4	4.29	3.95
5	4.40	4.10
6	43.88	14.00

Figure 8, Figure 9, and Figure 10 show comparison performance of load voltage, load voltage harmonics, and source current harmonics between S-UPQC and D-UPQC, respectively.

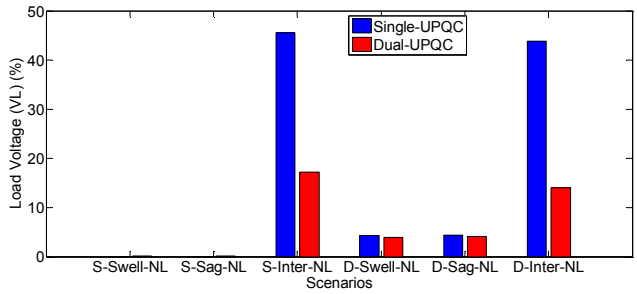

Fig. 8. Comparison performance of load voltage percentage between S-UPQC and D-UPQC

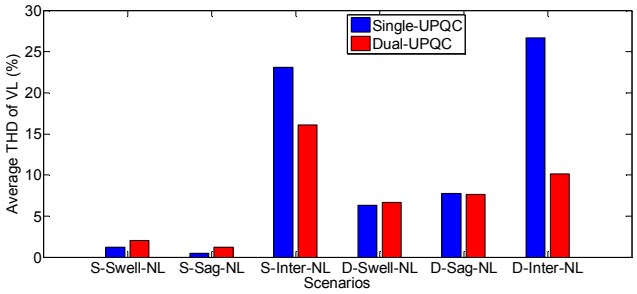

Fig. 9. Comparison performance of load voltage harmonics between S-UPQC and D-UPQC

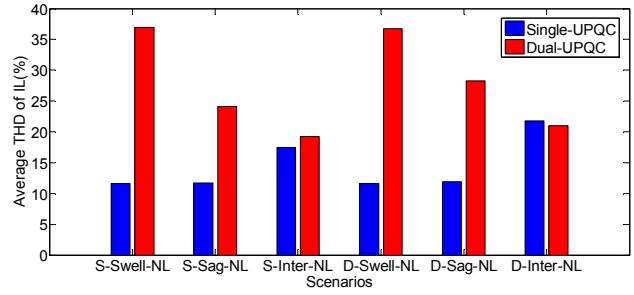

Fig. 10. Comparison performance of source current harmonics between S-UPQC and D-UPQC

Table 1 and Figure 8 show that in both S-Sag/Swell-NL and D-Sag/Swell-NL scenarios, the implementation of a dual UPQC model results in a slightly higher percentage of load voltage disturbance than a single UPQC model. In the D-Inter-NL scenario, a dual UPQC model is able to maintain a more stable load voltage of 266.60 V compared to a single UPQC model of 173.97 V. Table 3 and Figure 8 also show that in the D-Inter-NL scenario, a dual UPQC circuit is also capable of resulting in a smaller percentage of load voltage disturbance of 14%, compared to a single UPQC circuit of 43.88%. In this case, the SeAF circuit on a Dual UPQC with PI controller is able to of inject a larger series power, so that it is also able to produce a higher load voltage and a lower percentage of load voltage disturbance than a single UPQC.

Table 2 and Figure 9 show that in both S-Sag/Swell-NL and D-Sag/Swell-NL fault scenarios, the implementation of a dual UPQC model results in a slightly higher average THD of the load voltage than a single UPQC model. In the D-Inter-NL scenario, a dual UPQC circuit is able to produce a much lower load voltage average THD of 10.10% compared to a single UPQC circuit of 26.70 %. In this case, the SeAF circuit on a dual UPQC with PI controller is able to inject a larger series compensation voltage, so that it is also able to reduce the harmonics content of load voltage and result the average THD value is smaller than a single UPQC.

Table 2 and Figure 10 show that in S-Sag/Swell-NL and D-Sag/Swell-NL scenarios, the implementation of a dual UPQC model produces higher source current average THD than a single UPQC model. In the D-Inter-NL scenario, a dual UPQC circuit is is able to produce a slightly higher source current average THD of 21.01% compared to a single UPQC circuit of 19.21%. In this case, the ShAF circuit on a dual UPQC with PI controller is able to inject a slightly larger shunt compensation current, so that it is also able to reduce the harmonics content of source current, and result the average THD value is slightly smaller than a single UPQC.

IV. CONCLUSION

The implementation of UPQC to mitigate power quality problems i.e. sag/swell, interruption, and harmonics on source and load bus of 3P3W on low voltage distribution system simultaneously has been presented. There are six disturbance scenarios i.e. S-Sag-NL, S-Swell-NL, S-Inter-NL, Dis-Sag-NL, Dis-Swell-NL, and Dis-Inter-NL. The PI method is used to control SeAF and ShAF in dual UPQC circuit model. The simulation results show that in the D-Inter-NL scenario, a dual UPQC model is able to maintain a load voltage magnitude, higher compared to a single UPQC model. In D-Inter-NL scenario, a dual UPQC circuit is also capable of resulting in a smaller percentage of load voltage disturbance compared to a single UPQC circuit. In the same scenario, a dual UPQC model is capable of resulting an average THD of load voltage,

lower compared to a single UPQC model. In the D-Inter-NL scenario, percentage of load voltage disturbance on a 3P3W system using a dual UPQC still has not reached the limit below 10 percent. The THD of load voltage and source current also still exceed IEEE-519 standard. The implementation of generators based on renewable energy source i.e. photovoltaic and wind turbine and advanced control based on artificial intelligence on ShAF circuits i.e. fuzzy logic, neural network, or ANFIS, then can be selected as future work to overcome this problem.

APPENDIX

Three-phase source: RMS voltage 380 volt (L-L), 50 Hz, line impedance: R_S = 0.1 Ohm L_S = 15 mH; series and shunt active filter: series inductance L_{Se} = 0.015 mH; shunt inductance L_{Sh} = 15 mH; injection transformers: rating 10 kVA, 50 Hz, turn ratio (N_1/N_2) = 1:1; sensitive load: resistance R_L = 60 ohm, inductance L_L = 0.15 mH, load impedance R_C = 0.4 ohm and L_C = 15 mH; unbalance load: resistance R_1 = 24 ohm, R_2 = 12 ohm, and R_3 = 6 ohm, capacitance C_1, C_2, C_3 = 2.2 µF; DC-link 1 and 2: DC voltage 1 and 2 V_{dc} = 650 volt and capacitance 1 and 2 C_{dc} = 3000 µF; PI controller and 2: K_P = 0.2, K_I = 1.5; input: $V_{dc-error}$ and $\Delta V_{dc-error}$; output: instantaneous of power losses ($\bar{p}_{loss}$).

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Lampiran 2.5

Letter of Acceptance

Full Paper

2020 The 3rd International Conference on
Vocational Education and Electrical Engineering (ICVEE)
http://icvee.conference.unesa.ac.id

Letter of Acceptance for Full Paper

Dear Authors: Amirullah

We are pleased to inform you that your full paper (Abstract ID #525), entitled:

A Dual UPQC to Mitigate Sag/Swell, Interruption, and Harmonics on Three Phase Low Voltage Distribution System

has been reviewed and accepted for continuing to be presented to " 2020 the third International Conference on Vocational Education and Electrical Engineering". The ICVEE conference will be held from 3 to 4 October 2020 in the virtual event. Your article will be submitted to the IEEE X-plorer.

Please complete your registration before the deadlines

Thank you for your participation,

Best regrads,

Surabaya September 18,2020

Prof. Dr. Bambang Suprianto, M.T
Conference Chair
e-mail: icvee@unesa.ac.id

Lampiran 2.6

Bukti pembayaran makalah

2020 The 3rd International Conference on
Vocational Education and Electrical Engineering (ICVEE)
http://icvee.conference.unesa.ac.id

Payment Receipt

The organizing committee of ICVEE 2020 acknowledges the following payment for

Abstract ID Abstract ID #525

Title A Dual UPQC to Mitigate Sag/Swell, Interruption, and Harmonics on Three Phase Low Voltage Distribution System

Authors Amirullah

Paid Amount **Rp. 1.500.000,-**

Thank You

Best Regards

Surabaya September 25, 2020

Prof. Dr. Bambang Suprianto, M.T
Conference Chair
e-mail: icvee@unesa.ac.id

Lampiran 2.7

Time Table ICVEE 2020

TIMETABLE ICVEE

Saturday, October 3, 2020

No	Activity	Time	Duration	PIC	Necessity
Plenary Session Sat, Oct 3					
1	Online Registration (Technical meeting Preparation and On the Spot registration)	07.30 – 08.00	30 minutes	Committee	**Laptop, internet**
2	Opening and Rules Guidance for the Virtual Conference	08.00 – 08.10	10 minutes	Committee	**Laptop, file, documentation**
3	Viewing Profile Video of Universitas Negeri Surabaya, Listening Indonesia National Anthem, and Listening Mars of Universitas Negeri Surabaya	08.10 – 08.30	20 minutes	Committee	**Laptop, file, documentation**
4	Welcoming Session	08.30 – 08.50	20 minutes	**Prof. Dr. Nurhasan, M.Kes**., Rector of Universitas Negeri Surabaya	**Laptop, file**
5	Keynote Speaker 1 (ICVEE)	09.00 – 09.30	30 minutes	**Prof. Takeshi Fukusako,** Professor at Kumamoto University, Japan	**Laptop, file**
6	Keynote Speaker 2	09.30 – 10.00	30 minutes	**Prof. Dr. Hadi Susanto**, Professor at University of Essex, UK and Khalifa University, UAE	**Laptop, file**
7	Keynote Speaker 3	10.00 – 10.30	30 minutes	**Prof. Johan Pion**, Professor at HAN University	
8	Live Discussion (Question and Answer)	10.30 – 11.15	45 minutes	Plenary Moderator	

No	Activity	Time	Duration	PIC	Necessity
Roundtable Discussion, Sat Oct 3, 2020 (ICVEE)					
9	Welcoming session from ICVEE chair	12.00-12.10	10 minutes	**Prof Bambang Suprianto., MT**	**Laptop, file**
10	Invited Speaker I	12.10 – 12.35	25 minutes	**Prof. Madya. Ir. Dr. Abd Kadir bin Mahamad** **Universiti Tun Hussein Onn Malaysia (UTHM) (Malaysia)**	**Laptop, file**
11	Invited Speaker II	12.35 – 13.00	25 minutes	**Prof. Mingchang Wu., Ph.D.** **National Yunlin University of Science and Technology (Taiwan)**	**Laptop, file**
12	Live Discussion (Question and Answer)	13.00 – 13.30	30 minutes	Plenary Moderator	
13	Rules Guidance for the Roundtable Discussion	13.30 – 13.45	15 minutes	Committee (IEEE-AP) (IEEE for room 1-8) (AP for room 9-11)	**Laptop, file**
14	Session of Roundtable Discussion	14.30 – 17.00		Room 1 – Room 11 (13.45-14.00) Room 1 – Room 11 (14.00-14.15) Room 1 – Room 11 (14.15-14.30) Room 1 – Room 11 (14.30-14.45) **Break (30 minutes)** Room 1 – Room 11 (15.15-15.30) Room 1 – Room 11 (15.30-15.45) Room 1 – Room 11 (15.45-16.00) Room 1 – Room 11 (16.00-16.15) Room 1 – Room 11 (16.15-16.30) Room 1 – Room 11 (16.30-16.45)	**Laptop, file**
15	**Announcement best paper/presenter and reviewer** **Closing speech**	**17.00 – 17.30**	**30 minutes**	**Room 1**	**Laptop, internet**

Organized by:
Department of Electrical Engineering
Faculty of Engineering , Universitas Negeri Surabaya
e-mail: icvee@unesa.ac.id

Lampiran 2.8

Front matter ICVEE proceeding

PROCEEDING

UNESA

IEEE
INDONESIA SECTION

ICVEE

2020 the third International Conference on Vocational Education and Electrical Engineering (ICVEE)

Strengthening the framework of Society 5.0 through Innovations in Education, Electrical, Engineering and Informatics Engineering

IEEE Catalog Number : CFP20X27-ART
ISBN : 978-1-7281-7434-1

3-4 OCTOBER 2020
UNIVERSITAS NEGERI SURABAYA

VITUAL EVENT
SURABAYA - INDONESIA

http://icvee.conference.unesa.ac.id

2020 the third International Conference on Vocational Education and Electrical Engineering (ICVEE)

Proceeding

2020 the third International Conference on Vocational Education and Elecrical Engineering (ICVEE) on October 3-4, 2020 in the virtual event, Surabaya, Indonesia.

IEEE catalog number : CFP20X27-ART
ISBN : 978-1-7281-7434-1

Conference Record Number 50212

Message from the General Chair

It gives me great pleasure to all of the keynote/invite speakers, distinguished guests, and ICVEE participants, welcome to 2020 the third International Conference on Vocational Education and Electrical Engineering (ICVEE). Due to the COVID-19 ICVEE conference which is organized by the Department of Electrical Engineering and Departement of Informatics, Universitas Negeri Surabaya and technical sponsorship IEEE Indonesia section hold the conference in the virtual event. The theme of our conference is " Strengthening the framework of Society 5.0 through Innovations in Education, Electrical Engineering, and Informatics Engineering".

This year we receive 134 articles and resulted in 71 articles that have been presented at this conference and will be submitted to the IEEE explorer. The article comes from some domestics and international universities. The International author and co-author come from Brazil, Jerman, Philippines, Japan, Taiwan, Singapore, Malaysia, Thailand, Saudi Arabia, and Australia. We would like to appreciate all of the keynotes and invite speakers, reviewers, committees, and participants for all the support and participation. We would like to give gratitude to the Universitas Negeri Surabaya as the organizer and IEEE Indonesian Section as a technical Co-sponsorship.

Finally, I wish all participants always successful and enjoy this conference. I hope this program will be interesting and useful for all the ICVEE participants.

Prof. Dr. Bambang Suprianto., MT

General Chair

Organizer and committee

2020 the third International Conference on Vocational Education and Electrical Engineering (ICVEE)

Organized by

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- Marisa, S.E

General and Paralel Program Schedule

General Timetable ICVEE
Saturday, October 3-4, 2020

No	Activity	Time	Duration	PIC	Necessity
Plenary Session Sat, Oct 3					
1	Online Registration (Technical meeting Preparation and On the Spot registration)	07.30 – 08.00	30 minutes	Committee	**Laptop, internet**
2	Opening and Rules Guidance for the Virtual Conference	08.00 – 08.10	10 minutes	Committee	**Laptop, file, documentatio**
3	Viewing Profile Video of Universitas Negeri Surabaya, Listening Indonesia National Anthem, and Listening Mars of Universitas Negeri Surabaya	08.10 – 08.30	20 minutes	Committee	**Laptop, file, documentatio**
4	Welcoming Session	08.30 – 08.50	20 minutes	**Prof. Dr. Bambang Yulianto**., **M.Pd** Vice Rector I of Universitas Negeri Surabaya	**Laptop, file**
5	Keynote Speaker 1 (ICVEE)	09.00 – 09.30	30 minutes	**Prof. Takeshi Fukusako,** Professor at Kumamoto University, Japan	**Laptop, file**
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Roundtable Discussion, Sat Oct 3, 2020 (ICVEE)					

No	Activity	Time	Duration	PIC	Necessity
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11	Invited Speaker II	12.35 – 13.00	25 minutes	**Prof. Mingchang Wu., Ph.D.** **National Yunlin University of Science and Technology (Taiwan)**	**Laptop, file**
11	Invited Speaker III	13.00 – 13.30	30 minutes	**Prof. Wisnu Jatmiko., Ph.D** **Universitas Indonesia (UI)** **(IEEE Indonesian Section chair)**	**Laptop, file**
10	Live Discussion (Question and Answer)	13.30 – 14.15	45 minutes	Plenary Moderator	
13	Rules Guidance for the Roundtable Discussion	14.15 – 14.30	15 minutes	Committee (IEEE-AP) (IEEE for room 1-8)	**Laptop, file**
14	Session of Roundtable Discussion	14.30 – 17.00		Room 1 – Room 8 (14.30-14.45) Room 1 – Room 8 (14.45-15.00) Room 1 – Room 8 (15.00-15.15) Room 1 – Room 8 (15.15-15.30) **Break (30 minutes)** Room 1 – Room 8 (16.00-16.15) Room 1 – Room 8 (16.15-16.30) Room 1 – Room 8 (16.30-16.45) Room 1 – Room 8 (16.45-17.00) Room 1 – Room 8 (17.00-17.15) Room 1 – Room 8 (17.15-17.30)	**Laptop, file**

No	Activity	Time	Duration	PIC	Necessity
				Break (30 minutes)	
15	**Announcement best paper/presenter and reviewer** **Closing speech**	**18.00 – 18.30**	**30 minutes**	**Room 1**	**Laptop, internet**

PARALLEL SESSION TIMETABLE ICVEE

Saturday, October 3, 2020

Room 1

Moderator 1 IGP Asto Buditjahjanto

2 Lilik Anifah

No	Paper ID	Paper Title	Time (GMT +7)
1	266	Differences Between Students from Senior High School and Vocational School in the Learning Outcomes of Electrical Engineering Students	14.30-14.45
2	270	absent	
3	276	Combining the Unsupervised Discretization Method and the Statistical Machine Learning for the Modeling of the Students' Performance	15.00-15.15
4	294	The effect of changing the type of lamp, lighting power and adding light points to the strength of the lighting in the Classroom and Reading Room of the Postgraduate Program at the Bung Hatta Building, Jakarta State University	15.15-15.30
	BREAK		14.45-15.15
5	352	absent	16.00-16.15
6	362	absent	16.15-16.30
7	363	Google Classroom Effectiveness and Efficiency as Alternative Online Learning Media to Overcome Physical Distancing in Lectures as a result of the Covid-19 pandemic: Student Perspectives	16.30-16.45
8	367	Effectiveness of Mobile Learning Implementation in Increasing Student Competence and Preventing the Spread and Impact of COVID-19	16.45-17.00
9	368	The Effect of Participation in Scientific Research and Conference on Vocational Teachers' Competencies	17.00-17.15
10	412	Evaluation of Indonesian Technical and Vocational Education in Addressing the Gap in Job Skills Required by Industry	17.15-17.30

Room 2

Moderator 1 Hapsari P A Tjahyaningtijas

2

No	Paper ID	Paper Title	Time (GMT +7)
1	413	Semantic Web Ontology for Vocational Education Self-Evaluation System	14.30-14.45
2	416	The impact of The COVID-19 Pandemic in Indonesia (Face to face versus Online Learning)	14.45-15.00
3	425	absent	15.00-15.15
4	459	DESIGN OF COMPETENCY TEST MODEL FOR ELECTRICAL INSTALLATION AUTOMATION BASED ON PROJECT LEARNING FOR ELECTRICAL ENGINEERING STUDENTS	15.15-15.30
	BREAK		14.45-15.15
5	474	EFFECTIVENESS THE USE OF INTERACTIVE MULTIMEDIA LEARNING MEDIA IN FACIAL SKIN CARE COURSES	16.00-16.15
6	476	The Effect of the Android based Mobile-Learning Models on Student Learning Outcomes in Research Methodology Courses in the Cosmetology and Beauty Department	16.15-16.30
7	489	The Marketing of Teaching Factory Product Through Online E-Commerce at Fashion Design Vocational High Schools	16.30-16.45
8	507	absent	16.45-17.00
9	330	FACTOR ANALYSIS THAT INFLUENCES CPL/PILOT LICENSE COMMERCIAL PHASE TECHNICAL KNOWLEDGE OF CADETS OF OFFICIAL AVIATION SCHOOL VOCATIONAL EDUCATION	17.00-17.15
10	347	Measurement Model of Employability Skills of Vocational High School Student in East Java Using Structural Equation Model (SEM)	17.15-17.30

Room 3

Moderator **1** **Naim Rochmawati**

2 **Yeni Anistyasari**

No	Paper ID	Paper Title	Time (GMT +7)
1	231	Learning Solutions for Multi Interaction-Based Computer Network Devices with Mobile Augmented Reality (Effectiveness, Interface, and Experience Design)	14.30-14.45
2	236	The Concept of Using TOLSYASUPI-EduMed in Basic Programming Learning with Problem-Posing Interaction Flow	14.45-15.00
3	238	E-Voting on Blockchain using Solidity Language	15.00-15.15
4	303	Risk Analysis of Cloud Computing in the Logistics Process	15.15-15.30
	BREAK		14.45-15.15
5	382	absent	16.00-16.15
6	433	Deep Learning Implementation of Facemask and Physical Distancing Detection with Alarm Systems	16.15-16.30
7	430	Covid Symptom Severity Using Decision Tree	16.30-16.45
8	462	An Enhanced Cryptographic Algorithm in Securing Healthcare Medical Records	16.45-17.00
9	538	Detecting SQL Injection On Web Application Using Deep Learning Techniques: A Systematic Literature Review	17.00-17.15
10	554	Integration of FAHP and COPRAS Method for New Student Admission Decision Making	17.15-17.30

Room 4

Moderator **1** **Salamun Rohman Nudin**

2 **Ricky Eka Putra**

No	Paper ID	Paper Title	Time (GMT +7)
1	568	Non-Proliferative Diabetic Retinopathy Classification Based on Hard Exudates Using Combination of FRCNN, Morphology, and ANFIS	14.30-14.45
2	406	A New Adaptive Online Learning using Computational Intelligence	14.45-15.00
3	420	The design and implementation of web crawler distributed news domain detection system	15.00-15.15
4	427	High Availability in Software-Defined Networking using Cluster Controller: A Simulation Approach	15.15-15.30
	BREAK		14.45-15.15
5	435	Pneumonia and COVID-19 Detection using Convolutional Neural Networks	16.00-16.15
6	354	What's in a Caption?: Leveraging Caption Pattern for Predicting the Popularity of Social Media Posts	16.15-16.30
7	372	Fractional Gradient Descent Optimizer for Linear Classifier Support Vector Machine	16.30-16.45
8	411	The Identification of the Apples (Malus Sylvestris) Skin Wax Coating Using the Edge Detection Method	16.45-17.00
9	453	Key Rate Enhancement by Using the Interval Approach in Symmetric Key Extraction Mechanism	17.00-17.15
10	484	EnORS: An Enhanced Object Relationship Schema	17.15-17.30
11	450	Development of Mapping Area Software for Dismissal people affected by Covid 19	17.3--17.45

Room 5

Moderator **1** **Reza Rahmadian**

2 **Rifqi Firmansyah**

No	Paper ID	Paper Title	Time (GMT +7)
1	298	Validation of Voice Recognition in Various Google Voice Languages using Voice Recognition Module V3 Based on Microcontroller	14.30-14.45
2	322	Texture Analysis of Knee Osteoarthritis Using Contrast Limited Adaptive Histogram Based Gray Level Co-occurrent Matrix	14.45-15.00
3	334	Design of Model Predictive Control for Stability of Two Stage Inverted Pendulum	15.00-15.15
4	358	Hydrothermal Growth Temperature Dependence of Nanostructured Nickel Oxide Transparency	15.15-15.30
	BREAK		14.45-15.15
5	359	Designing Automatic Dispensers for the Blind People based on Arduino Mega using DS18B20 Temperature Sensor	16.00-16.15
6	365	Effects of Precursor Concentration on the Transparency of Hydrothermally Grown Zinc Oxide	16.15-16.30
7	525	A Dual UPQC to Mitigate Sag/Swell, Interruption, and Harmonics on Three Phase Low Voltage Distribution System	16.30-16.45
8	370	Design and Implementation of IoT System for Aeroponic Chamber Temperature Monitoring	16.45-17.00
9	397	Autonomous Robotics in Agriculture: A Review	17.00-17.15
10	401	Design of Fire Detection Equipment Due to the Arc-Fault Series on Low Voltage Networks Based on Internet of Things (IoT)	17.15-17.30

Room 6

Moderator **1** **Arif Widodo**

2 **Unit Three K**

No	Paper ID	Paper Title	Time (GMT +7)
1	466	A Hybrid Classification Based on Machine Learning Classifiers to Predict Smart Indonesia Program	14.30-14.45
2	272	Optimization of Water Level Control Systems Using ANFIS and Fuzzy-PID Model	14.45-15.00
3	384	[Design And Development Of Student Absention Application Prototype Using Android-Based Flutter: A Case Study In Electro Engineering Department Of Mataram University	15.00-15.15
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7	369	Performance Evaluation of ESP8266 for Wireless Nurse Call System	16.30-16.45
8	374	A current mode ACG base on Sub-threshold MOS Translinear Principle	16.45-17.00
9	424	Combination of Fuzzy C-Means and Simple Additive Weighting Using Partition Coefficient Index	17.00-17.15
10	485	A Neuro-Fuzzy Approach for Cacao Bean Grading Classification Process	17.15-17.30

Room 7

Moderator **1** **Mahendra Widyartono**

2 **Widi Aribowo**

No	Paper ID	Paper Title	Time (GMT +7)
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2	293	SETTING COORDINATION RELAY PROTECTION ON MULTYLOOP MODEL DISTRIBUTION ELECTRICAL POWER SYSTEM SISTEM USING FIREFLY ALGORITHM	14.45-15.00
3	300	HYBRID MODEL FOR THE NEXT HOURLY ELECTRICITY LOAD DEMAND FORECASTING BASED ON CLUSTERING AND WEATHER DATA	15.00-15.15
4	402	Partial Shading Effect on I-V Characteristic and Maximum Power of a Photovoltaic Array	15.15-15.30
	BREAK		14.45-15.15
5	428	Effect of Combination Fractional Slot Number and Slotting Tecnique on the Cogging Torque in Permanent Magnet Machines	16.00-16.15
6	267	absent	16.15-16.30
7	361	Research on the Influencing Factors of Industrial Designers' Potential Traits on Career Planning	16.30-16.45
8	442	DESIGN OF AERIAL ROBOT AS TEACHING MEDIA WITH EDUCATIONAL ROBOTIC BASED LEARNING SYSTEM	16.45-17.00
9	454	The Roles of Information Technology Knowledge and Online Learning in Learning Environment Changes at Vocational Education System	17.00-17.15
10			17.15-17.30

Room 8

Moderator **1** **Eppy Yundra**

2 **Nurhayati**

No	Paper ID	Paper Title	Time (GMT +7)
1	280	Motion Sensing for Wireless Body Area Networks Based on Android Using Wi-Fi Direct Transmission	14.30-14.45
2	316	Impact of Nonlinear Distortion with the Rapp Model on the GFDM System	14.45-15.00
3	319	The New Intelligent Wireless Sensor Network using Artificial Intelligence for Building Fire Disasters	15.00-15.15
4	327	A Vivaldi Antenna Palm Tree Class with Koch Square Fractal Slot Edge for Near-Field Microwave Biomedical Imaging Applications	15.15-15.30
	BREAK		14.45-15.15
5	336	Decision Support System Cattle Weight Prediction using Artificial Selected Weighting Method	16.00-16.15
6	349	Design of X-Band Microstrip Antenna for Circularly Polarized Synthetic Aperture Radar (CP-SAR) System	16.15-16.30
7	371	Design of Horizontal Polarization Microstrip Patch Antenna with Bandwidth Enhancement at C-band Frequency	16.30-16.45
8	376	Comparison Study of Hilbert Sierpinski and Koch Fractal on Coplanar Vivaldi Antenna for L and S band application	16.45-17.00
9	410	Design of a Microstrip Line Quad-band Bandpass Filter based on Fibonacci geometric sequence	17.00-17.15
10	461	Potentials of metasurface technology on antennas and propagation	17.15-17.30

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ICVEE

PARALLEL SESSION TIMETABLE ICVEE

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2 **Lilik Anifah**

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3	276	Combining the Unsupervised Discretization Method and the Statistical Machine Learning for the Modeling of the Students' Performance	14.15-14.30
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7	363	Google Classroom Effectiveness and Efficiency as Alternative Online Learning Media to Overcome Physical Distancing in Lectures as a result of the Covid-19 pandemic: Student Perspectives	15.45-16.00
8	367	Effectiveness of Mobile Learning Implementation in Increasing Student Competence and Preventing the Spread and Impact of COVID-19	16.00-16.15
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4	459	DESIGN OF COMPETENCY TEST MODEL FOR ELECTRICAL INSTALLATION AUTOMATION BASED ON PROJECT LEARNING FOR ELECTRICAL ENGINEERING STUDENTS	14.30-14.45
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7	489	The Marketing of Teaching Factory Product Through Online E-Commerce at Fashion Design Vocational High Schools	15.45-16.00
8	507	The development of the sub instruments of digital literacy on the subjects of electronics circuit in Vocational School	16.00-16.15
9	330	FACTOR ANALYSIS THAT INFLUENCES CPL/PILOT LICENSE COMMERCIAL PHASE TECHNICAL KNOWLEDGE OF CADETS OF OFFICIAL AVIATION SCHOOL VOCATIONAL EDUCATION	16.15-16.30
10	347	Measurement Model of Employability Skills of Vocational High School Student in East Java Using Structural Equation Model (SEM)	16.30-16.45

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2 **Yeni Anistyasari**

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2 **Ricky Eka Putra**

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6	354	What's in a Caption?: Leveraging Caption Pattern for Predicting the Popularity of Social Media Posts	15.30-15.45
7	372	Fractional Gradient Descent Optimizer for Linear Classifier Support Vector Machine	15.45-16.00
8	411	The Identification of the Apples (Malus Sylvestris) Skin Wax Coating Using the Edge Detection Method	16.00-16.15
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2 **Rifqi Firmansyah**

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4	358	Hydrothermal Growth Temperature Dependence of Nanostructured Nickel Oxide Transparency	14.30-14.45
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5	359	Designing Automatic Dispensers for the Blind People based on Arduino Mega using DS18B20 Temperature Sensor	15.15-15.30
6	365	Effects of Precursor Concentration on the Transparency of Hydrothermally Grown Zinc Oxide	15.30-15.45
7	525	A Dual UPQC to Mitigate Sag/Swell, Interruption, and Harmonics on Three Phase Low Voltage Distribution System	15.45-16.00
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2 **Unit Three K**

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3	384	[Design And Development Of Student Absention Application Prototype Using Android-Based Flutter: A Case Study In Electro Engineering Department Of Mataram University	14.15-14.30
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2 **Widi Aribowo**

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6	267	Deformation of 3D Object of Human Body Internal Organs Using Finite Element Method Approach Accelerated by GPU	15.30-15.45
7	361	Research on the Influencing Factors of Industrial Designers' Potential Traits on Career Planning	15.45-16.00
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2 **Rahardian Bisma**

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6	458	Work Analysis of Constant Current Regulator BF 1200 With Current Loop dan Gauss Jordan Method as Learning Media for Cadets	15.30-15.45
7	463	A Review on Quantum Cryptography: Application to Online Voting, Its Advantages and Issues	15.45-16.00
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Lampiran 2.10

Program Book ICVEE

Program Book

2020 The Third International Conference on Vocational Education and Electrical Engineering (ICVEE)

http://icvee.conference.unesa.ac.id

October 3-4, 2020 Virtual Event
Surabaya, Indonesia

2020 The Third International Conference on Vocational Education and Electrical Engineering (ICVEE)

Conference Record Number 50212

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Message from the General Chair

It gives me great pleasure to all of the keynote speakers, distinguished guests, and ICVEE participants, welcome to you to 2020 the third International Conference on Vocational Education and Electrical Engineering (ICVEE). Due to the COVID-19 ICVEE conference which is organized by the Departement of Electrical Engineering and Departement of Informatics, Universitas Negeri Surabaya and technical sponsorship IEEE Indonesia section hold the conference in the virtual event. The theme of our conference is Strengthening the framework of Society 5.0 through Innovations in Education, Electrical Engineering, and Informatics Engineering.

This year we receive 135 articles and selected 81 articles to be present in this conference and submit to the IEEE and some of the articles will be submitted to the Atlantic Press. The article comes from some university domestics and international such as Brazil, Jerman, Philippines, Japan, Taiwan, Singapore, Malaysia, Thailand, Saudi Arabia, and Australia. We would like to appreciate all of the keynote speakers, reviewers, committees, and participants for support and participation. We would like to give gratitude to the Universitas Negeri Surabaya as the organizer and IEEE Indonesian Section as a technical sponsorship.

Finally, I wish all participants a successful and enjoyable conference. I hope you will find this program interesting, useful, and stimulating.

Prof Bambang Suprianto
General Chair

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- Rahardian Bisma, S.Kom.,M.Kom
- Mahendra Widyartono, ST., MT
- Widi Ariwibowo, S.T., M.T.
- Dr. Joko, S.Pd., M.Pd.
- Drs. Bambang Sujatmiko.,M.T.
- Reza Rahmadian, S.ST., MengSc
- Miftahur Rohman, S.T.,M.T
- Fendi Ahmad, S.Pd.,M.Pd.
- L. Endah Cahya Ningrum, S.Pd.,M.Pd.
- Rindu P, S.Kom.,M.Kom.
- Syarifuddin Zuhri., S.Pd.,M.T.
- Subuh Isnur Haryudo, S.T., M.T.
- Marisa, S.E

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Technical Program

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TIMETABLE ICVEE
Saturday, October 3, 2020

No	Activity	Time	Duration	PIC	Necessity
Plenary Session Sat, Oct 3					
1	Online Registration (Technical meeting Preparation and On the Spot registration)	07.30 – 08.00	30 minutes	Committee	Laptop, internet
2	Opening and Rules Guidance for the Virtual Conference	08.00 – 08.10	10 minutes	Committee	Laptop, file, documentation
3	Viewing Profile Video of Universitas Negeri Surabaya, Listening Indonesia National Anthem, and Listening Mars of Universitas Negeri Surabaya	08.10 – 08.30	20 minutes	Committee	Laptop, file, documentation
4	Welcoming Session	08.30 – 08.50	20 minutes	Prof. Dr. Nurhasan, M.Kes., Rector of Universitas Negeri Surabaya	Laptop, file

No	Activity	Time	Duration	PIC	Necessity
5	Keynote Speaker 1 (ICVEE)	09.00 – 09.30	30 minutes	Prof. Takeshi Fukusako, Professor at Kumamoto University, Japan	Laptop, file
6	Keynote Speaker 2	09.30 – 10.00	30 minutes	Prof. Dr. Hadi Susanto, Professor at University of Essex, UK and Khalifa University, UAE	Laptop, file
7	Keynote Speaker 3	10.00 – 10.30	30 minutes	Prof. Johan Pion, Professor at HAN University	
8	Live Discussion (Question and Answer)	10.30 – 11.15	45 minutes	Plenary Moderator	
Roundtable Discussion, Sat Oct 3, 2020 (ICVEE)					
9	Welcoming session from ICVEE chair	12.00-12.10	10 minutes	Prof Bambang Suprianto., MT	Laptop, file

No	Activity	Time	Duration	PIC	Necessity
10	Invited Speaker I	12.10 – 12.35	25 minutes	Prof. Madya. Ir. Dr. Abd Kadir bin Mahamad Universiti Tun Hussein Onn Malaysia (UTHM) (Malaysia)	Laptop, file
11	Invited Speaker II	12.35 – 13.00	25 minutes	Prof. Mingchang Wu., Ph.D. National Yunlin University of Science and Technology (Taiwan)	Laptop, file
11	Invited Speaker III	13.00 – 13.30	30 minutes	Prof. Wisnu Jatmiko., Ph.D Universitas Indonesia (UI) (IEEE Indonesian Section chair)	Laptop, file
10	Live Discussion (Question and Answer)	13.30 – 14.15	45 minutes	Plenary Moderator	
13	Rules Guidance for the Roundtable Discussion	14.15 – 14.30	15 minutes	Committee (IEEE-AP) (IEEE for room 1-8) (AP for room 9-11)	Laptop, file
14	Session of Roundtable Discussion	14.30 – 17.00		Room 1 – Room 11 (14.30-14.45)	Laptop, file

No	Activity	Time	Duration	PIC	Necessity
				Room 1 – Room 11 (14.45-15.00) Room 1 – Room 11 (15.00-15.15) Room 1 – Room 11 (15.15-15.30) Break (30 minutes) Room 1 – Room 11 (16.00-16.15) Room 1 – Room 11 (16.15-16.30) Room 1 – Room 11 (16.30-16.45) Room 1 – Room 11 (16.45-17.00) Room 1 – Room 11 (17.00-17.15) Room 1 – Room 11 (17.15-17.30) Break (30 minutes)	
15	Announcement best paper/presenter and reviewer Closing speech	18.00 – 18.30	30 minutes	Room 1	Laptop, internet

PARALLEL SESSION TIMETABLE ICVEE

Saturday, October 3, 2020

Room 1

Moderator 1 IGP Asto Buditjahjanto

2 Lilik Anifah

No	Paper ID	Paper Title	Time (GMT +7)
1	266	Differences Between Students from Senior High School and Vocational School in the Learning Outcomes of Electrical Engineering Students	14.30-14.45
2	270	Students' Scientific Literacy In The Concept Of Sutami Hydroelectric Power Plant In Brantas Generator Unit	14.45-15.00
3	276	Combining the Unsupervised Discretization Method and the Statistical Machine Learning for the Modeling of the Students' Performance	15.00-15.15
4	294	The Effect Of Changing The Type Of Lamp, Lighting Power And Adding Light Points To The Strength Of The Lighting In The Classroom And Reading Room Of The Postgraduate Program At The Bung Hatta Building, Jakarta State University	15.15-15.30
	BREAK		14.45-15.15
5	352	Analysis of Online Learning Implementation In Undergraduate Students of Building Construction Education in the Pandemic COVID-19	16.00-16.15
6	362	Effectiveness of Online Learning of Construction Equipment Courses During the COVID-19 pandemic	16.15-16.30
7	363	Google Classroom Effectiveness and Efficiency as Alternative Online Learning Media to Overcome Physical Distancing in Lectures as a result of the Covid-19 pandemic: Student Perspectives	16.30-16.45
8	367	Effectiveness of Mobile Learning Implementation in Increasing Student Competence and Preventing the Spread and Impact of COVID-19	16.45-17.00
9	368	The Effect of Participation in Scientific Research and Conference on Vocational Teachers' Competencies	17.00-17.15

No	Paper ID	Paper Title	Time (GMT +7)
10	412	Evaluation of Indonesian Technical and Vocational Education in Addressing the Gap in Job Skills Required by Industry	17.15-17.30

Room 2

Moderator 1 Hapsari P A Tjahyaningtijas

2

No	Paper ID	Paper Title	Time (GMT +7)
1	413	Semantic Web Ontology for Vocational Education Self-Evaluation System	14.30-14.45
2	416	The impact of The COVID-19 Pandemic in Indonesia (Face to face versus Online Learning)	14.45-15.00
3	425	The Effect Of Learning Policy From Home Due To The Existence Of Covid-19 Pandemies On Student Learning Strategy	15.00-15.15
4	459	Design Of Competency Test Model For Electrical Installation Automation Based On Project Learning For Electrical Engineering Students	15.15-15.30
	BREAK		14.45-15.15
5	474	Effectiveness The Use Of Interactive Multimedia Learning Media In Facial Skin Care Courses	16.00-16.15
6	476	The Effect of the Android based Mobile-Learning Models on Student Learning Outcomes in Research Methodology Courses in the Cosmetology and Beauty Department	16.15-16.30
7	489	The Marketing of Teaching Factory Product Through Online E-Commerce at Fashion Design Vocational High Schools	16.30-16.45
8	507	The Development Of The Sub Instruments Of Digital Literacy On The Subjects Of Electronics Circuit In Vocational School	16.45-17.00
9	330	Factor Analysis That Influences Cpl/Pilot License Commercial Phase Technical Knowledge Of Cadets Of Official Aviation School Vocational Education	17.00-17.15
10	347	Measurement Model of Employability Skills of Vocational High School Student in East Java Using Structural Equation Model (SEM)	17.15-17.30

Room 3

Moderator 1 Naim Rochmawati

2 Yeni Anistyasari

No	Paper ID	Paper Title	Time (GMT +7)
1	231	Learning Solutions for Multi Interaction-Based Computer Network Devices with Mobile Augmented Reality (Effectiveness, Interface, and Experience Design)	14.30-14.45
2	236	The Concept of Using TOLSYASUPI-EduMed in Basic Programming Learning with Problem-Posing Interaction Flow	14.45-15.00
3	238	E-Voting on Blockchain using Solidity Language	15.00-15.15
4	303	Risk Analysis of Cloud Computing in the Logistics Process	15.15-15.30
	BREAK		14.45-15.15
5	382	Analysis Of The Use Of Virtual Meeting Platforms For Proposal / Thesis Exams During The Covid-19 Pandemic	16.00-16.15
6	433	Deep Learning Implementation of Facemask and Physical Distancing Detection with Alarm Systems	16.15-16.30
7	430	Covid Symptom Severity Using Decision Tree	16.30-16.45
8	462	An Enhanced Cryptographic Algorithm in Securing Healthcare Medical Records	16.45-17.00
9	538	Detecting SQL Injection On Web Application Using Deep Learning Techniques: A Systematic Literature Review	17.00-17.15
10	554	Integration of FAHP and COPRAS Method for New Student Admission Decision Making	17.15-17.30

Room 4

Moderator 1 Salamun Rohman Nudin

2 Ricky Eka Putra

No	Paper ID	Paper Title	Time (GMT +7)
1	568	Non-Proliferative Diabetic Retinopathy Classification Based on Hard Exudates Using Combination of FRCNN, Morphology, and ANFIS	14.30-14.45
2	406	A New Adaptive Online Learning using Computational Intelligence	14.45-15.00
3	420	The design and implementation of web crawler distributed news domain detection system	15.00-15.15
4	427	High Availability in Software-Defined Networking using Cluster Controller: A Simulation Approach	15.15-15.30
	BREAK		14.45-15.15
5	435	Pneumonia and COVID-19 Detection using Convolutional Neural Networks	16.00-16.15
6	354	What's in a Caption?: Leveraging Caption Pattern for Predicting the Popularity of Social Media Posts	16.15-16.30
7	372	Fractional Gradient Descent Optimizer for Linear Classifier Support Vector Machine	16.30-16.45
8	411	The Identification of the Apples (Malus Sylvestris) Skin Wax Coating Using the Edge Detection Method	16.45-17.00
9	453	Key Rate Enhancement by Using the Interval Approach in Symmetric Key Extraction Mechanism	17.00-17.15
10	484	EnORS: An Enhanced Object Relationship Schema	17.15-17.30

Room 5

Moderator 1 Reza Rahmadian

2 Rifqi Firmansyah

No	Paper ID	Paper Title	Time (GMT +7)
1	298	Validation of Voice Recognition in Various Google Voice Languages using Voice Recognition Module V3 Based on Microcontroller	14.30-14.45
2	322	Texture Analysis of Knee Osteoarthritis Using Contrast Limited Adaptive Histogram Based Gray Level Co-occurrent Matrix	14.45-15.00
3	334	Design of Model Predictive Control for Stability of Two Stage Inverted Pendulum	15.00-15.15
4	358	Hydrothermal Growth Temperature Dependence of Nanostructured Nickel Oxide Transparency	15.15-15.30
	BREAK		14.45-15.15
5	359	Designing Automatic Dispensers for the Blind People based on Arduino Mega using DS18B20 Temperature Sensor	16.00-16.15
6	365	Effects of Precursor Concentration on the Transparency of Hydrothermally Grown Zinc Oxide	16.15-16.30
7	525	A Dual UPQC to Mitigate Sag/Swell, Interruption, and Harmonics on Three Phase Low Voltage Distribution System	16.30-16.45
8	370	Design and Implementation of IoT System for Aeroponic Chamber Temperature Monitoring	16.45-17.00
9	397	Autonomous Robotics in Agriculture: A Review	17.00-17.15
10	401	Design of Fire Detection Equipment Due to the Arc-Fault Series on Low Voltage Networks Based on Internet of Things (IoT)	17.15-17.30

Room 6

Moderator 1 Arif Widodo

2 Unit Three K

No	Paper ID	Paper Title	Time (GMT +7)
1	466	A Hybrid Classification Based on Machine Learning Classifiers to Predict Smart Indonesia Program	14.30-14.45
2	272	Optimization of Water Level Control Systems Using ANFIS and Fuzzy-PID Model	14.45-15.00
3	384	[Design And Development Of Student Absention Application Prototype Using Android-Based Flutter: A Case Study In Electro Engineering Department Of Mataram University	15.00-15.15
4	480	Simulation And Performance Evaluation Of Fiber Optic Sensor For Detection Of Salinity In Prawn Pond Application	15.15-15.30
	BREAK		14.45-15.15
5	488	Microcontroller And Wireless Communication Based Smart Laboratory Box System Implementation	16.00-16.15
6	491	Management of Empty Parking Spot Based On Computer Vision	16.15-16.30
7	369	Performance Evaluation of ESP8266 for Wireless Nurse Call System	16.30-16.45
8	374	A current mode ACG base on Sub-threshold MOS Translinear Principle	16.45-17.00
9	424	Combination of Fuzzy C-Means and Simple Additive Weighting Using Partition Coefficient Index	17.00-17.15
10	485	A Neuro-Fuzzy Approach for Cacao Bean Grading Classification Process	17.15-17.30

Room 7

Moderator 1 Mahendra Widyartono

2 Widi Aribowo

No	Paper ID	Paper Title	Time (GMT +7)
1	269	Tuning of Power System Stabilizer Using Cascade Forward Backpropagation	14.30-14.45
2	293	Setting Coordination Relay Protection On Multyloop Model Distribution Electrical Power System Sistem Using Firefly Algorithm	14.45-15.00
3	300	Hybrid Model For The Next Hourly Electricity Load Demand Forecasting Based On Clustering And Weather Data	15.00-15.15
4	402	Partial Shading Effect on I-V Characteristic and Maximum Power of a Photovoltaic Array	15.15-15.30
	BREAK		14.45-15.15
5	428	Effect of Combination Fractional Slot Number and Slotting Tecnique on the Cogging Torque in Permanent Magnet Machines	16.00-16.15
6	267	Deformation of 3D Object of Human Body Internal Organs Using Finite Element Method Approach Accelerated by GPU	16.15-16.30
7	361	Research on the Influencing Factors of Industrial Designers' Potential Traits on Career Planning	16.30-16.45
8	442	Design Of Aerial Robot As Teaching Media With Educational Robotic Based Learning System	16.45-17.00
9	454	The Roles of Information Technology Knowledge and Online Learning in Learning Environment Changes at Vocational Education System	17.00-17.15

Room 8

Moderator 1 Eppy Yundra

2 Nurhayati

No	Paper ID	Paper Title	Time (GMT +7)
1	280	Motion Sensing for Wireless Body Area Networks Based on Android Using Wi-Fi Direct Transmission	14.30-14.45
2	316	Impact of Nonlinear Distortion with the Rapp Model on the GFDM System	14.45-15.00
3	319	The New Intelligent Wireless Sensor Network using Artificial Intelligence for Building Fire Disasters	15.00-15.15
4	327	A Vivaldi Antenna Palm Tree Class with Koch Square Fractal Slot Edge for Near-Field Microwave Biomedical Imaging Applications	15.15-15.30
	BREAK		14.45-15.15
5	336	Decision Support System Cattle Weight Prediction using Artificial Selected Weighting Method	16.00-16.15
6	349	Design of X-Band Microstrip Antenna for Circularly Polarized Synthetic Aperture Radar (CP-SAR) System	16.15-16.30
7	371	Design of Horizontal Polarization Microstrip Patch Antenna with Bandwidth Enhancement at C-band Frequency	16.30-16.45
8	376	Comparison Study of Hilbert Sierpinski and Koch Fractal on Coplanar Vivaldi Antenna for L and S band application	16.45-17.00
9	410	Design of a Microstrip Line Quad-band Bandpass Filter based on Fibonacci geometric sequence	17.00-17.15
10	461	Potentials of metasurface technology on antennas and propagation	17.15-17.30

Room 9

Moderator 1 Farid Baskoro

2 Rahardian Bisma

No	Paper ID	Paper Title	Time (GMT +7)
1	318	Problem Based Learning Model In Analysis Of User	14.30-14.45
2	321	Application Of Retrieval Information On Android-Based Online Music Course Application	14.45-15.00
3	328	A Study On Transformational Leadership Manner And	15.00-15.15
4	329	Influences Of Skill, Knowledge, Attitude, And Morality	15.15-15.30
	BREAK		14.45-15.15
5	343	A Study on the Life-Story and Mindsets of Successful Women Leaders in Educational Settings	16.00-16.15
6	346	A study on the youngsters' cultural awareness and community identity ~case study of a local cultural festival in Taitung County	16.15-16.30
7	373	Automatic Hand Sanitizer Container to Prevent The Spread of Corona Virus Disease	16.30-16.45
8	392	Curriculum Development Is Conducted To Improve Competencies Of Air Transportation Managemental Study Program For Cadets Of Aviation Polytechnique Surabaya	16.45-17.00
9	393	Implementation of Google Classroom-based Learning Management System on the Subject Digital Signal Processing and Propagation Antennas as One of the Effective Learning Media in the Middle of Pandemic COVD-19	17.00-17.15
10	394	Diverse Forms of V-learning Students' Acceptability During the Pandemic Covid-19	17.15-17.30
11	518	Effectiveness of Job Readiness Applications (JRA) to Determine the Working Readiness for Diploma Student	17.30-17.45

Room 10

Moderator 1 Aditya Candra H

2

No	Paper ID	Paper Title	Time (GMT +7)
1	230	Design and Implementation of Various Types of Intelligent Trash Bodies Systems in a Smart Campus Environment	14.30-14.45
2	253	A study on the formulation and transformation of nursing ladies work values	14.45-15.00
3	264	Early Warning System For Flood Disaster Using Internet of Things	15.00-15.15
4	348	The Impacts of Culture Shock on the Open-Mindedness of Indonesian Students in Taiwan	15.15-15.30
	BREAK		14.45-15.15
5	273	Automatic Hand Sanitizer Container to Prevent The Spread of Corona Virus Disease	16.00-16.15
6	281	New Smart Virtual Content for Hanzi Characters in Mandarin Laboratories	16.15-16.30
7	290	Sea Wave Power Hybrid Power Generation Through Utilization of Wave and Wind Energy as Renewable Electric Energy Sources for Leading, Outermost and Disadvantaged Areas	16.30-16.45
8	295	Development of student adversity quotient instruments: questionnaire	16.45-17.00
9	299	Automatic Control Based On Voice Commands And Arduino	17.00-17.15
10	306	Conceptual Study Of The Relationship Problem Solving	17.15-17.30
11	505	Design And Development Of Chatbot Using Dialogflow In Surya Sembada Pdam Surabaya City	17.30-17.45

Room 11

Moderator 1 Lusia Rakhmawati

2

No	Paper ID	Paper Title	Time (GMT +7)
1	405	The Effect Of Project Based Learning (Pjbl) And Direct Instruction (Di) Learning Models On Learning Outcomes Of The Basics Of Building Construction And Survey Engineering From Student Learning Motivation	14.30-14.45
2	418	Schoology and Slido; The Perfect Combination for Distance Learning during the Covid-19 Pandemic	14.45-15.00
3	434	The Implementation Of Project Based Learning Model Towards The Learning Result Of Subject Wood Structure I	15.00-15.15
4	445	The Design of covid19 drone for Disinfectant Sprayers in order to Prevent Corona Virus Spread	15.15-15.30
	BREAK		14.45-15.15
5	452	Analysis of Electrical Engineering Student Skill to Make Robot Based on Contextual Teaching and Learning with Structural Equation Modeling	16.00-16.15
6	458	Work Analysis of Constant Current Regulator BF 1200 With Current Loop dan Gauss Jordan Method as Learning Media for Cadets	16.15-16.30
7	463	A Review on Quantum Cryptography: Application to Online Voting, Its Advantages and Issues	16.30-16.45
8	464	Secure Data Storage in Cloud Computing using Cryptographic Algorithm	16.45-17.00
9	487	Blood Donor Fitting Information Systems And Determining Tools For Blood Groups And Human Rhesus Based On IoT	17.00-17.15
10	494	Home Monitoring and Control Using Smartphone and Speech Processing	17.15-17.30
11	503	The Effects Of Self-Efficacy On The Competency Of Cadets In Aviation Polytechnic Of Surabaya	17.30-17.45

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ARTICLE THAT WILL BE SUBMITED TO IEEE

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Paper ID 266

Differences Between Students from Senior High School and Vocational School in the Learning Outcomes of Electrical Engineering Students

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***Abstract*— Aquaponics is a cultivation technology that combines fish farming with plants. The degree of acidity (pH) and total dissolved solids (TDS) must be monitored for optimal fish and vegetable growth. In this research, a monitoring system designed for pH and TDS in aquaponics and automation of fish feeding based on scheduling and level of need. Monitoring of pH and TDS as well as automation of fish feeding is done through an Android-based application. Fish feeding is carried out according to a schedule with a specified feed weight. The monitoring system for pH and TDS are carried out in real time. The sensors used in this research are a pH sensor to measure pH values and an analogue TDS sensor to measure total TDS. The communication system used is based on IoT technology. Based on the test results, it is found that the average difference between the readings of the pH sensor and the pH meter is 0.66% and the average difference between the readings of the TDS sensor and the TDS meter is 2.588%. The system has been able to provide fish feed according to a set schedule automatically and with a feed weight as needed with an error rate of only 1%.**

***Keywords*— Learning Outcomes, Senior High School, Vocational High School, School Origin, GPA**

Paper ID 270

STUDENTS' SCIENTIFIC LITERACY IN THE CONCEPT OF SUTAMI HYDROELECTRIC POWER PLANT IN BRANTAS GENERATOR UNIT

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***Abstract*— The Sutami Hydroelectric Power Plant is a Hydropower Center that utilizes the potential of the Kali Brantas River. Located in Sumberpucung Subdistrict south of Malang City in the direction of Blitar, with a height of 278 m above sea level. Dam construction and hydroelectric power plants are operated by the Brantas River Area Development Project under the name Karangkates Multipurpose Project. This study aims to strengthen the students' cognition, especially apprehension about hydroelectric power plants, and define the students' literacy competence towards hydroelectric power plants and their utilization. The subjects of this study were the sophomore undergraduate students of Electrical Engineering Education, especially majoring in Power Electrical Engineering. The results showed the participation and willingness rate of students to ask questions and field observations in the area of Hydro Power Plants was 85% on a scale of 0-100 (very high). The results of this study can be used as a foundation for developing teaching materials in the Power Generation course at the UNESA Campus to enhance the scientific literacy of Electrical Engineering students.**

***Keywords*-Literacy, Hydroelectric Power Generation, Enrichment Subjects**

Paper ID 276

Combining the Unsupervised Discretization Method and the Statistical Machine Learning on the Students' Performance

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***Abstract*— The suitability of the data with the method in the process of data mining is very important to increase the process performance. However, In Educational Data Mining (EDM), not much research has focused on this field. Therefore, this study proposes to combine an unsupervised discretization method called "equal width interval" and logistic regression as statistical machine learning to improve the performance of the model relating to students' performance. The discretization method is performed on student data with several intervals, namely: 3-interval, 4-interval, and 5-interval. Then, these intervals are combined with logistic regression in two regularizations, namely: lasso and ridge. Evaluation is carried out on all combinations. The experimental results indicate that the highest performance, in terms of the accuracy level, is achieved by the model combining a 3-interval and logistic regression on all regularization. This combination can increase the model performance based on the average accuracy level of about 4.08-8.49 on the ridge regularization and about 4.28-8.6 on the lasso regularization.**

***Keywords*—students' performance, data mining, machine learning, logistic regression, discretization**

Paper ID 294

The effect of changing the type of lamp, lighting power, and adding light points to the strength of the lighting in the Classroom and Reading Room of the Postgraduate Program at the Bung Hatta Building, Universitas Negeri Jakarta

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***Abstract*— This research was conducted to determine the effect of changing the type of lamp, the addition of power, and the number of lighting points to the strength of the lighting in the Classroom and Reading Room of the Postgraduate Program at the Bung Hatta Building, Jakarta State University. This research was conducted because the room has strong lighting that is too large during the day and too low at night. This research uses a quantitative approach with a descriptive engineering method through three stages of engineering namely manual measurement using Luxmeter, manual calculations based on SNI standards, and simulations. The results showed that when the treatment has not been done, the average value of the measured illumination and based on the simulation results in the reading room (6th floor) and lecture room (7th and 8th floor) do not meet SNI 03-6197: 2011 Standards. Through changing the type of lamp, the addition of power, and the number of points 15 rooms meet the standards with an average optimization presentation of 20% to 88%.**

***Keywords*— strong lighting, classroom, lamp type, lamp type**

Paper ID 352

Analysis of Online Learning Implementation In Undergraduate Students of Building Construction Education in the Pandemic COVID-19

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***Abstract*—Surabaya State University (Unesa) as an educational actor limits physical distance by implementing online learning activities to break the spread of COVID-19. Online learning is usually carried out at a maximum of three meetings and combined with face-to-face. However, in the even semester 2019/2020 Unesa conducted full online learning starting on March 14, 2020. Full online learning demands lecturers' creativity in using appropriate learning methods and media. In line with this, it is necessary to analyze the implementation of online learning. This study aims to analyze the implementation of online learning that was carried out on students during the COVID-19 Pandemic. This research is a descriptive study with a quantitative approach. The respondents of this study were students in the S1 Building Engineering Education study program (PTB) at the Faculty of Engineering, Unesa. Data collection using a questionnaire with a Likert scale. Data analysis techniques using quantitative descriptive techniques. The results showed that (1) students still felt less interested in online learning; (2) independent learning makes students not understand the material; (3) the method deemed most appropriate according to students is to use online discussion and guidance; and (4) the biggest obstacle in online learning is the condition of the weak internet network in the student area. The constraints experienced in online learning are the internet network and the difficulty of controlling student activity, honesty, and authenticity in improving student learning outcomes.**

***Keywords*—analysis, COVID-19, implementation, online learning, students of Building Engineering Education**

Paper ID 362

Effectiveness of Online Learning of Construction Equipment Courses during the COVID-19 Pandemic

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***Abstract*—The whole society is affected by the pandemic of coronavirus or COVID-19, even in Indonesia's education sector. One of the government's policies to constrict the spread of COVID-19 is by physical distancing. The education sector's impact is which must be using an online learning platform, which is also implemented by Universitas Negeri Surabaya. Online learning tends to be sudden, so it is necessary to identify online learning's effectiveness, both about the use of media and the methods used. This study aims to analyze the effectiveness of online learning implementation in a civil engineering construction equipment course during COVID-19. This study is descriptive with a quantitative approach. The respondents of this study were students who carried out online learning of construction equipment courses. The data collection used a questionnaire and the data analysis by quantitative descriptive analysis. The results of student responses show that of the six components, there are three components to get good effectiveness criteria: Motivation, Method, and Problem of Online Learning. Furthermore, other components that get great the effectiveness criteria are the Implementation, the Suitability, and the Advantages of Online Learning. It can conclude that there are no component criteria that have excellent effectiveness.**

Keywords—COVID-19, Online Learning, Social Distancing, Construction Equipment

Paper ID 363

The Effectiveness and Efficiency of Google Classroom as an Alternative Online Learning Media to Overcome Physical Distancing in Lectures Due to the Covid-19 pandemic: Student Perspectives

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***Abstract*— In mid-March 2020, WHO declared Covid-19 a global pandemic that all countries must pay attention to prevent wider transmission. Therefore, the Indonesian government appealed to the public to exercise physical distance and appeal to work from home to prevent the spread of the virus. Google provides facilities that can be used as online learning with a virtual classroom concept that can be used for distance learning between lecturers and students. In this research, we will discuss the level of effectiveness and efficiency of an online learning application called Google Classroom. The data used to analyze the effectiveness and efficiency of online learning with Google Classroom came from a student perspective questionnaire using the Likert scale method for positive questions and specific questions for theoretical subjects with 120 respondents from the UNESA electrical engineering department. We also propose blended learning signs when this pandemic has ended. The results obtained are according to the cumulative calculations that have been described in the graphical modeling, namely the highest percentage of 88% of students stated their agreement with the efficiency of online learning on time availability. Meanwhile, the level of effectiveness of online learning on the ease of the GC user interface with a majority percentage of 85% agreed. But if online learning refers to learning targets, the percentage obtained from a student's perspective is 37%, which is still low. If the pandemic has ended, we also get data results on blended learning planning on the use of GC, the majority of 60% of students agree.**

***Keywords*- Google Classroom, Online Learning, Likert Scale**

Paper ID 367

Effectiveness of Mobile Learning Implementation in Increasing Student Competence and Preventing the Spread and Impact of COVID-19

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Astract*—To prevent the spread and impact of COVID-19, and effective learning, one attempt is to conduct m-learning. The purpose of this study is to analyze: student supporting and inhibiting factors, the effectiveness of m-learning, preventing the spread and impact of COVID-19. The research was conducted through quasi-experimental. A sample of 116 Surabaya State University students. Data on supporting and inhibiting factors, data on the prevention of the spread-impact were obtained through online surveys, and data on the effectiveness of M-Learning using the pretest-posttest results. The data analysis used descriptive, t-test, gain tests. The novelty of this research involves supporting and inhibiting factors, and variables preventing the spread-impact of COVID-19. The results of the study: Supporting factors the suitability of m-learning-RPS-material-video-interactive modules-evaluation-time duration, have adequate supporting tools, the ability to access information-online materials and use collaborative software, the discipline of the COVID-19 protocol, parental support, happy, e-learning platform compatible with mobile phones, smooth internet, mobile screen size, ability to communicate via email-WhatsApp, accuracy in completing assignments-evaluations, relax, ability to plan-use time policies, conducive environment. Factors that hinder the ability to understand English content; M-learning can prevent the spread and impact of COVID-19, 100% of students are not exposed and are not affected by COVID-19; M-Learning is effective in improving student competence in terms of the gain is quite high 0.49, the mean pretest 38.41 is significantly different from posttest 76.38. The research results can contribute to developing a distance-learning model in abnormal conditions.

***Keywords*—COVID-19, m-learning, effectiveness, competence.**

Paper ID 368

The Effect of Participation in Scientific Research and Conference on Vocational Teachers' Competence

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***Abstract*— Teacher competencies can be influenced by several factors, but not all factors that affect teacher competencies can be well described. This research attempts to answer some of the problems through differences analysis, which is the effect of participation in scientific research and conference on vocational teachers' competencies. A total of 77 vocational school teachers in Indonesia's East Java province were used as samples and research data were obtained from participants of vocational teacher competency tests. This research uses a survey method through expose facto research with a quantitative approach. The data obtained are then analyzed by analysis of variance techniques. The results of the study conclude: 1) teacher's participation in scientific forums has no significant effect on vocational teacher competency, 2) teacher's participation status in scientific forums, between participants, presenters, and has a non-significant effect on vocational teacher competencies, 3) the frequency of writing articles has no significant effect on the competency of vocational teachers. The results of the study are expected to be input for improving the competence of vocational teachers in Indonesia.**

***Keywords*— participation, scientific research, conferences, vocational teacher competencies**

Paper ID 412

Evaluation of Indonesia Technical and Vocational Education in Addressing the Gap in Job Skills Required by Industry

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***Abstract*— The demand for labor change in the industrial revolution 4.0 era has become a fundamental challenge for Technical Vocational Education and Training (TVET) to quickly and efficiently meet the needs of changing economic skills and especially in the field of electrical engineering. Indonesian Central Bureau of Statistics released data on unemployment rates in Indonesia is still relatively high and dominated by vocational education graduates. It is ironic considering that vocational education is designed to prepare graduates who are ready to work. It is allegedly due to the lack of links and matches between TVET and the world of work and industry. This article will comprehensively evaluate the relationship and compatibility between TVET and the world of work in the field of electrical engineering. The research uses a qualitative approach based on observation, interviews, and discussion with practitioners of TVET in electrical industries. The findings of this study indicate a substantial mismatch between TVET and the needs of the business and industrial world, especially in the electrical engineering field. Most TVET Institutions in Indonesia have limitations in terms of quality human resources, facilities, and infrastructure that meets standards, lack of cooperation with industry, curricula that are in line with work needs, and weak in modern work culture on campus. Based on data analysis and findings, recommendations for a framework to strengthen relations between TVET providers and the manufacturing sector have been proposing for use by education planners in building or improving existing TVET.**

***Keywords*— evaluation TVET, job skill, skill gap**

Paper ID 413

Semantic Web Ontology for Vocational Education Self-Evaluation System

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***Abstract*—Self-evaluation is one of the most important activities undertaken by vocational high schools to improve internal and external conditions related to the performance and preparation of future work programs. In practice, self-evaluation always requires much data relating to the school. One issue that was released was that the data needed was still scattered on separate systems. Various methods are used to integrate manual and computer-aided, but it is very troublesome and requires a long time. One way to overcome this problem is to develop a self-assessment system using semantic web technology, correctly, ontology from related data. In this paper, we aim to develop VISION, a semantic web-based ontology to improve vocational education self-evaluation systems. The method used is system development, which consists of 5 stages, namely 1) analysis, 2) design, 3) development, 4) implementation, and 5) evaluation. This paper focuses on the analysis, design, and developing a prototype of a self-evaluation system for Vocational Schools based on semantic web ontology. The results show that the concept of web semantic technology can improve the effectiveness and efficiency of self-evaluation in vocational schools in Indonesia.**

***Keywords*—ontology, self-evaluation, vocational high school**

Paper ID 416

The Impact of the COVID-19 Pandemic in Indonesia (Face to face versus Online Learning)

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***Abstract*— Covid-19 pandemic is an international disaster that is experienced by almost all countries in the world. This has an impact on all lines of the life of each country. Among them is the education sector. Aside from efforts to solve this co-19 problem, the state must continue to maintain the stability and sustainability of the learning process that is the right of all citizens. Indonesia experienced the same thing. face to face learning "shock" and immediately take the fastest action by utilizing existing technology, but not all of them are ready. Using survey methods and adopting the theories of Delon and McLean, this study aims to determine the readiness of organizers, lectures, and students for current conditions, their readiness in undergoing the learning process while maintaining the quality of education and user satisfaction (instructors and students) towards learning. The results of this study prove that we all tend to be unprepared but strangely, on the other hand, the fact is that the positive things from this pandemic actually prove that education practitioners in Indonesia are better prepared by online learning because they are more comfortable and satisfied with online learning while supported by the government and a good system (96% of respondents) compared to face to face (4% of respondents).**

***Keywords*—pandemic Covid-19, face to face learning, online learning, student profile.**

Paper ID 425

The Effect of Learning Policy from Home due to Existence of Covid-19 Pandemies on Student Learning Strategy

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***Abstract*— The emergence of covid-19 pandemic in Indonesia affected the education. The learning that usually done face-to-face in class, now must be done in online learning. This is due to the provisions in social distancing, so the government provides policies for students to carry out learning activities from home. Thus the purpose of the research to be carried out is to find out the influence of learning policies from home due to the covid-19 pandemic on student learning strategies. In this research used quantitative descriptive method. In this approach, each variable will be explained and described using numbers. Respondents in this study were vocational teachers and students who doing learning activities from home. Data collection obtained from respondents was done using a questionnaire that was compiled based on a grid that refers to the theory. The questionnaire that distributed to respondents was a learning policy questionnaire from home and a learning strategy questionnaire. The results of the research conducted indicate that the existence of home learning policies implemented affects the learning strategies that students must used. The learning strategy used can be chosen by considering the students characters. Thus students can carry out effective learning after using appropriate learning strategies as long as home learning policies are still applied until the specified time limit.**

***Keywords*—learning activities from home, learning strategies, covid-19 pandemic**

Paper ID 459

Design of Competency Test Model for Electrical Installation Automation Based Project Learning for Electrical Engineering Students

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***Abstract*-This study aims to produce a competencytest model of electrical installation automation expertise based on project learning, and determine the characteristics of its application in learning. The competency test model was developed using the R&D method by following the 4-D model design. The competency test model was developed based on the competency requirements of the business world/industrial business (DUDI) as a graduate user. The test instrument was analyzed for validity and reliability. The model test goes through 2 stages, first the competency test (UKK) model assessment of the Electrical Installation Automation by integrating from authentic assessment methods, namely knowledge, skills and attitudes. The second stage is the assessment of the characteristics of the model through user responses in this case students. Data analysis is quantitative in order to determine the effectiveness and implementation by taking into account the level of inter-reliability agreement using the Cohhen 'kappa (κ) coefficient. Analysis of authentic reliability assessment shows very good with the average effectiveness value of 3.84 and the average performance of 3.88. The results of the assessment analysis of the achievement of good student competencies (competent) with mean values: cognitive (7.21), psychomotor (7.13), and affective (8.75). It needs to be improved cognitive and psychomotor abilities to be comparable to the affective. These results indicate that the Project Based Learning Automation competency test model based on feasible can be widely used.**

***Keywords*-competency test model, project based learning, electrical installation automation**

The Effectiveness of the Use of Learning Media of Interactive Multimedia in Facial Skin Care Courses

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***Abstract*—Facial Skin Care Subjects are compulsory courses in cosmetology education study programs. The problem with facial skincare courses is that students have difficulty understanding the material and applying it. They are resulting in low student grades and learning activities. For this reason, learning media are needed. It can help students understanding the subject. The role of lecturers is needed to create learning media under technological developments that can improve student competency. Interactive multimedia is one of the media that can be used by students to study independently. The research method used was the IDI (Instructional Development Institute) model. The IDI model establishes the principles of a systematic approach, which includes three stages, namely the analysis phase, the design stage, the development stage, the evaluation stage. Media validation has been assessed by the validators of various experts, media experts, material experts, individual tests, and limited group trials. It is hoped that learning media of interactive multimedia will be increasingly enhanced to create the quality of graduates. The result of the effectiveness of the media developed for students seen from the learning activities of students after learning by using Interactive Multimedia indicators of students present in lectures by 97.2% or very good category. The active aspect gave a response score of 69.44% or in the good category. The on-time aspect of doing the task got a score of 83.88% or in the very good category. Overall, student activities obtained an average score of 83.88% or in the very good category. It showed that the effectiveness of the learning process in terms of learning activities is "very effective" and Based on the effectiveness of student learning outcomes after learning by using Interactive Multimedia. The number of students who achieved completion scores was 80%, with an average student score of 83,62 or in the very good category. It showed that the effectiveness of learning in terms of learning outcomes is "very effective."**

***Keywords*— effectiveness, interactive multimedia, facial skincare subjects**

The Effect of Mobile-Learning Models on Students' Learning Outcomes of Research Methodology Courses at the Cosmetology and Beauty Department

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***Abstract*— This study identified learning outcomes for students using Android-based mobile learning models as compared to student learning outcomes using conventional learning models. It determined how much influence the Android-based mobile learning model has on student learning outcomes at the Makeup and Cosmetology Department Research Methodology course. This study used a quasi-experimental design method with a non-equivalent control group design. The population was makeup and beauty students who took research methodology courses in the July-December 2019 semester, totaling 94 students consisting of 3 classes. The sampling technique used in this study was cluster sampling from 3 classes; two classes were taken randomly. From the two classes, there was an experimental group for 30 students and as a control group for 31 students. The experimental class applied the Android-based mobile learning model of learning media, and the control class applied the conventional learning model. Research data collection used tests and documentation. The data collected were pretest and posttest data. The techniques of data analysis used quantitative descriptive. The hypothesis testing method used was the t-test analysis. The results showed that two crucial points. First, the calculation of scores on student learning outcomes has an increase in classes that applied an Android-based learning model. Second, the t-test results showed this study succeeded in applying the Android-based learning model to affect learning outcomes and effectively improve student learning outcomes in research methodology courses in the Department of Make-Up and Cosmetology.**

***Keywords*—Mobile learning, android-based learning model, learning outcomes**

The Marketing of Teaching Factory Product Through Online E-Commerce at Fashion Design Vocational High Schools

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***Abstract*—There are several options for the teaching factory program, namely smart school, tourism promotion, and digital e-commerce. The program selection is adjusted to the conditions of the school that will implement the teaching factory and the objectives to be achieved in teaching factory learning. E-commerce is a teaching factory program that markets products with various kinds of online marketing. The basis for product-based teaching factory learning. Products must be sold in the market. Products marketed online. This study examines; 1) product teaching factory fashion design expertise program. 2) Online-e-commerce marketing for teaching factory products. Data collection techniques using questionnaires and observations. The sample is a vocational high school fashion design expertise program that implements the teaching factory in East Java. Observations were made by researchers and teachers to obtain information about products launched in e-commerce, and product e-commerce. Data were analyzed by descriptive quantitative. The results showed that the students' products in teaching-learning were very good to be marketed by e-commerce. Products that are marketed through various online marketing and e-commerce, the results are more effective in reaching consumers and introducing student products to the wider community**

***Keywords*- online marketing, e-commerce, products, teaching factory.**

The Development Of The Sub Instruments Of Digital Literacy On The Subjects Of Electronics Circuit In Vocational School

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***Abstract*- In this study has the objective to develop sub instruments digital literacy of subjects of electronics circuit in vocational school students. The resulting sub instrument is used to measure the competency of students with the three domains such as affective, cognitive, and psychomotor. This study uses the method of scientific studies obtained from some research experts, so that by scientific experts that can be developed into an sub instrument that is used in vocational schools as an assessment of the competence of the students. This research resulted in several indicators as much as 3 kinds of skills, the first indicator produces 3 categories of capabilities, indicators that both produce 3 categories of ability, the third indicator get 3 categories of ability and indicators fourth produce 3 categories; while in developing the sub instrument obtained 10 sub instruments that will be used in measuring the competence of vocational school students**

***Keywords*- digital literacy, competency, sub instrument**

FACTOR ANALYSIS THAT INFLUENCES CPL/PILOT LICENSE COMMERCIAL PHASE TECHNICAL KNOWLEDGE OF CADETS OF OFFICIAL AVIATION SCHOOL VOCATIONAL EDUCATION

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***Abstract*— Ability competencies conduct performances based on knowledges, skills and attitudes according to performances required. The research analyze the factors that can influence CPL/pilot license commercial phase technical knowledge of cadets of official aviation school vocational education. The research uses quantitative approach by using Data Analysis Technique of factor analysis. The population in this research consist of cadets available in Indonesian Aviation Academy and Indonesian Aviation Polytechnique Curug as 180 cadets, whereas the sample technique uses total sampling as 180 cadets. The data collection uses questionnaires. The results in this research find five factors, they are performance ability factors, performance attitude and communication factors, performance moral factor, performance factual factor, and performance mental factor.**

***Keywords*-Competency, Performance Ability, Performance Attitude and Communication**

Measurement Model of Employability Skills of Vocational High School Student in East Java Using Structural Equation Model (SEM)

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***Abstract*—This paper examines the measurement model of student employability-skills of the state vocational high school with their actual performance. Our study aims to evaluate the student employability-skills in the field of electrical power installation competencies. Data were collected from 447 students of both genders, purposive sampling selected from the third years of Electrical Power Installation Competencies (EPIC) State Vocational High School (SVHS) students in East Java Province. We analyzed their employability skills in electrical power installation competencies. An adapted questionnaire was used to measure employability skills (X^2 = 4347.813, p= .000). This shows that the model fit significantly with the data. The data were analyzed using descriptive statistics and the structural equation model (SEM). The analysis of the data indicated that students' level of employability skills is high (mean=163.22). The results of the fit analysis, the GFI of .654 (<.95) means that the model does not fit into the data, but the NFI, CFI, and RMSEA values are .699, .736, and .878, respectively, indicating that the model is fitted with the data. All standardized regression coefficients are estimated to be statistically significant (>.2). This means that the observed variable is a good indicator of the latent variable of employability skills. Item-total correlation coefficients for all items ranging from .300 to .742 (> .2) and MNSQ for weight-fit ranging from .55 to 1.39 (.5 < MNSQ for weight-fit <1.5). So it can be concluded that all employability skill items are good categories so that it can be used for the data collection process.**

***Keywords*—employability-skills, electrical power installation engineering, vocational high school, structural equation model**

Learning Solutions for Multi Interaction-Based Computer Network Devices with Mobile Augmented Reality (Effectiveness, Interface, and Experience Design)

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***Abstract*—Application of Mobile Augmented Reality (AR) as a learning solution in innovation facing the education era 5.0. for vocational students on the computer network device topic, we promote in this paper. The purpose of this study is to apply AR technology-based applications by maximizing all of its interactions in the learning process about computer network devices so that students can know and understand their functions, then conduct an assessment of User Interface (UI) and User Experience (UX). The detection approach uses a marker-based tracking method, by bringing up 3D objects, rotating and touching, information and tool functions in the form of text, and producing sounds as information clues. A total of 30 students from one of the vocational high schools have been involved to use this application. After being analyzed for the current situation the students were very enthusiastic in following the learning process, then in the analysis of student understanding results obtained an average value of N-Gain was 67.41 which was proven that AR application could improve learning effectiveness, the results of the UI assessment with a value of 98.70% have a very strongly agree predicate to the application interface has been met, and the results of the assessment of the experience of users with a value of 98.94% have a very strongly agree predicate to the experience of using the application has been fulfilled.**

***Keywords*—augmented reality, education era 5.0, human-computer interaction, user experience, user interface**

The Concept of Using Interactive Educational Media with Problem-Posing Interaction Flow in Basic Programming Learning

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***Abstract*—In this paper, we introduce the use of interactive educational media technology called TOLSYASUPI-EduMed with desktop-based development. It is recommended to help Vocational High School students with ICT expertise to learn the topic of branching control structures in basic programming classes. The open-posing type of problem-posing learning model has been embedded in the flow of system interaction, which consists of three system frameworks, namely (1) students submit a problem and answer recommendations, (2) the teacher checks recommendations and places them in the question bank, and (3) students solve problems and answers (compile the correct program code in order). A total of 36 students in the real class were involved. The result of the usage evaluation is that they enjoy using it, find it useful, solve useful problems, and prefer desktop-based. Then the justification for the influence that has been felt with an average value of 4.98 is Strongly Agree. Future work will be to develop mobile-based applications, improve application interaction and capabilities, and utilize log data for further analysis.**

***Keywords*—interactive educational media, problem-posing interaction, problem-solving, programming learning**

E-Voting on Blockchain using Solidity Language

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***Abstract*—Electronically voting process without paper and the ballot box, namely electronic voting (e-voting), required some improvement, especially in terms of security elements. This is against the anonymize properties of the e-voting system. Therefore, a blockchain e-voting system was proposed which have a secure and transparency features to deploy during the Student Representative Council (SRC) election in Universiti Tun Hussein Onn Malaysia (UTHM). Blockchain technology ensured all aspects such as transparency, security, and auditability were achieved without sacrificing the privacy of voters. In this study, e-voting using a blockchain system was developed to detect the fraud that occurs during the voting session using Solidity language. A total of 3 cases were analyzed and a questionnaire was done to evaluate the proposed system. Analysis of respondents gave positive perception with a mean value of 4.5, 4.6, and 4.9, for 1st, 2nd, and 3rd Case respectively. To sum up, the proposed system can shorter the time for the voting process and diminishes the expense because of no need to print out the ballot.**

***Keywords*—e-voting, blockchain, solidity language**

Risk Analysis of Cloud Computing in the Logistics Process

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***Abstract*— In the era of the fourth industrial revolution or industry 4.0, one of the foundations is the application of Cloud Computing. Currently, many logistics industries have implemented cloud computing in their logistics processes. Logistic processes are activities carried out to run the logistics business, which is better known as logistic activities, such as integrating supply chains, providing warehousing services, transportation. How big is the risk value faced by business players in the logistics industry who implement cloud computing to support this logistics activity, so it is important to know the risk value of each logistic activity based on the probability and impact risk that exists. This study uses a qualitative approach where the researcher in collecting data, the researcher uses questions that are asked to respondents that are flexible. Respondents who are the object of this research are several companies/industries that have logistics services to support their company's business. The method used in this research is risk analysis based on ISO 31000. The results of this study provide an overview of the risk value in 13 (thirteen) logistic activities, namely: Procurement activities have the highest risk value, and customer service activities have the most risk value lowers (1), while for 11 (eleven) other logistic activities the risk value is medium.**

***Keywords*—Cloud Computing, logistics activity, Risk Analysis, the risk value**

Analysis of The Use of Virtual Meeting in The Implementation of Proposal/Thesis Examination During Covid-19 Pandemic

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***Abstract*— In the early 2020s, Indonesia was shocked by the Coronavirus Disease (Covid-19) outbreak which struck almost all parts of the world. The Indonesian government spontaneously implemented a policy of learning from home, working from home, and worship at home. All face-to-face activities are diverted online. In the field of education, both universities and schools need to strengthen online learning during this time. Universitas Negeri Surabaya has an alternative in carrying out a proposal / thesis seminar by using virtual meetings. The virtual meetings used include: meeting.unesa.ac.id, rv.unesa.ac.id, zoom, google meets, Webex and others. This study aims to determine students' perceptions of the virtual meeting features as a means of online proposal / thesis examination in the middle of a pandemic. This study can be a reference whether the use of virtual meetings as an alternative in carrying out a seminar proposal / thesis is effectively implemented. The research focuses on students' opinions on the usability factor (PU) and convenience factor (PEOU) in virtual meeting features following the Technology Acceptance Model theory. This research was conducted by quantitative methods. The sample used in this study were students of Universitas Negeri Surabaya who were taking the thesis. Data collection techniques using a questionnaire with a Likert scale. Then the results of the questionnaire data are processed using the Structural Equation Model (SEM) with SPSS tools. The results of the study stated that the research indicators related to user satisfaction in utilizing virtual meetings as an alternative for implementing seminar proposals / theses passed the validity, reliability, and linearity tests. Validity test value> r table. The value of the alpha reliability test was between 0.70 - 0.90. While the linearity test value> 0.05.**

***Keywords*—Technology Acceptance Model, virtual meeting, Covid-19**

Deep Learning Implementation of Facemask and Physical Distancing Detection with Alarm Systems

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***Abstract*— COVID-19 or Severe Acute Respiratory Syndrome Corona virus-2 is an extremely transmissible virus that is discharged through breathing droplets released from an infected individual who is talking, sneezing, or coughing. Close interaction with a person infected or through touching a contaminated surface and object can spread the virus rapidly. As of now, there is no vaccine to combat the COVID-19, and the best way to protect the person from a virus is to avoid being exposed to it. Wearing a facemask that covers the nose and mouth in a public setting and repeatedly cleansing of hands or the use of at least 70% alcohol-based disinfectants is a practice to avoid virus exposure. Deep Learning technology has demonstrated its achievement in recognition and classification by processing images. The research study uses deep learning techniques that identify if the person is wearing a facemask or not and check if the persons in the area observe physical distancing. The collected image data contains 20,000 images, uniformly crop images in 224x224 pixels, and attained an accuracy rate of 97% during the training of the model. The developed system is implemented using Python and OpenCV through TensorFlow that recognizes persons wearing a facemask or not wearing and measures the physical distance between each person. It signals an alarm and captures facial images upon detecting persons not wearing a mask and does not observe physical distancing. This study is beneficial in combating the spread of the virus and avoiding contact with the virus.**

***Keywords*—Facemask Detection, Physical Distancing Detection, Alarm System, COVID-19, Deep Learning**

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Covid Symptom Severity Using Decision Tree

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***Abstract*— Corona is a very contagious virus. In a pandemic like this, people often worry whether they are infected or not. When they cough, they often worry whether it is a sign of covid-19 or an ordinary cough. From the clinical symptoms can actually be known whether someone has Covid or not. In this study, a clinical symptom dataset will be used to classify the symptoms using a Decision Tree algorithm. The decision trees used in this research are J48 and Hoeffding Tree. Decision Tree is one of the most popular classification methods because it is easy to interpret by Humans. the prediction model uses a hierarchical structure. The concept is to convert data into decision trees or decision rules. the result of J48 were slightly better than the Hoeffding tree in terms of accuracy, precision, and recall. Meanwhile, from the tree view results, the Hoeffding Tree is simpler and the number of nodes is less than J48.**

***Keywords*— decision tree, corona, covid, covid-19, corona, symptoms, prediction, decision rules**

An Enhanced Cryptographic Algorithm in Securing Healthcare Medical Records

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***Abstract*— E-health is used in a variety of digital technologies. The internet, for example, enables users of e-health to connect to health workers via e-mail, access medical records, examine health data, and exchange useful information on an individual basis. As e-health deals with highly sensitive information, it is important to implement robust cryptographic algorithms to enhance its security. Cryptography is a vital component of all information security systems to protect private information from unauthorized access, ensuring confidentiality, data integrity, authentication and other tasks. This paper proposes a modified version of the hill cipher by implementing a double encryption and decryption process with an integration of non-linear operations such as transposition, substitution, circular bit shifting, and exclusive-OR operation to strengthen the key security used during the encryption of healthcare data content and to boost the unpredictability of the ciphertext, which enhances data protection across unsecured networks. The results of experiments conducted on 336 medical records validate the enhanced method's favorable performance as it improved in key security with an avalanche effect average of 52.45% and the unpredictability of the ciphertext which also achieved an average entropy index of 7.01%.**

***Keywords*—cryptography, hill cipher, e-health, data security, encryption.**

Detecting SQL Injection On Web Application Using Deep Learning Techniques: A Systematic Literature Review

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***Abstract*—Based on the Open Web Application Security Project (OWASP), code injection is one of the top list of security risks. Structured Query Language (SQL) Injection is one of these types of attacks. SQL injection attack is an attack by spoofing the server to execute malicious code. The main object of this paper is to identify relevant works about deep learning methods to detect SQL-Injection on web application. To achive that, we conduct a survey review of the literature. In this study we provide a review on 14 studies using deep learning algorithms to detect SQL Injection on web application and it provides a comparison between them. Deep learning has great potential in threat intelligence detection.**

***Keywords*— SQL Injection, Web Application, Deep Learning**

Integration of FAHP and COPRAS Method for New Student Admission Decision Making

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***Abstract* – Madrasah Tsanawiyah (MTs) is a level of education equivalent to Junior High School. Not only prioritizing academic values, MTs also prioritizing non-academic values. In determining the admission of new students, a selection process is necessary. There are many criteria that are considered in selecting new students, so the Multi Criteria Decision Making (MCDM) method is needed. The MCDM method used in this research is the integration of the Fuzzy Analytical Hierarchy Process (FAHP) and Complex Proportional Assessment (COPRAS) methods. The indicators used include prayer reading, prayer movements, fluency in reading Al-Quran, makhraj, recitation, shohih writing Al-Quran, neatness of Al-Quran writing, and the average value of report cards. Fuzzy AHP method was chosen because of the consistency of the index in determining the weight. The COPRAS method was chosen because of its simple calculation process. Based on the test results, it shows that the Fuzzy AHP-COPRAS method can be used in the decision support system for new student admissions based on Consistency Ratio (CR) = 0.005 with an accuracy rate of 97.25% and using data on new student admissions for the 2019-2020 academic year.**

***Keywords* - Integration, selection, Multi Criteria Decision Making, FAHP, COPRAS, FAHP-COPRAS.**

Non-Proliferative Diabetic Retinopathy Classification Based on Hard Exudates Using Combination of FRCNN, Morphology, and ANFIS

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***Abstract*—One of retinal eye disease caused by complications of diabetes mellitus is Diabetic Retinopathy. This disease consists of several levels. Severe diabetic retinopathy can cause blindness for the sufferer. The presence of hard exudate in the retinal fundus image is one symptom of diabetic retinopathy. That lesions are utilized to categorize two severity levels in diabetic retinopathy. Those are the severe and moderate Non-Proliferative Diabetic Retinopathy (NPDR). This research is using Faster Region-based Convolutional Neural Network (FRCNN) to remove the optic disk, mathematical morphology method to process hard exudates segmentation and Adaptive Neuro Fuzzy Inference System (ANFIS) method to process the classification. The accuracy level of the classification system in this research was 83.54 %. The result of this research can be utilized as additional decision support for the ophthalmologist. This research is expected to help the ophthalmologist and the community in the prevention of diabetic retinopathy. So, this research is also expected to reduce the level of blindness caused by diabetic retinopathy.**

***Keywords*—NPDR classification, retinal fundus image, hard exudates, FRCNN, morphology, ANFIS.**

A New Adaptive Online Learning using Computational Intelligence

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***Abstract*— This study aimed to develop an online learning system that was adaptive to students who wished to learn electrical machine modules based on their abilities. Adaptive use of online learning functioned to determine the category of students' ability to access modules in online learning. Online learning was also able to provide the determination of modules which can then be done by students, so students can learn independently. Adaptive capabilities in online learning were implemented by utilizing computational intelligence algorithms, namely Naive Bayes and Bayes Network. Naive Bayes was tasked with processing students 'pre-test data in adaptive online learning for the classification of students' abilities so that after the results of the pretest appeared, students will be given modules that matched their abilities. Whereas Bayes Network used to process student post-test data after students worked on the modules that have been given, adaptive online learning provided the next module to work according to the abilities and desires of students. The testing results of the use of Naive Bayes and Bayes Network on Adaptive Online Learning obtained an average accuracy of 85%.**

***Keywords*—adaptive, online learning, Bayes network, naive Bayes.**

The Design and Implementation of Web Crawler Distributed News Domain Detection System

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***Abstract*—Text is a one of huge type data in the big data era today. It can be processed to be valuable information with Natural Language Processing approach, such as Automated Text Summarization. This study aims to purpose the text summarization automatically for multiple text documents with graph approach at once. The graph approach that purposed in this research as methodology is Bellman- Ford algorithm. This research uses scientific journal articles documents in Indonesian language as the case study. The result of this research is the logical framework based on literature review ana analysis of Bellman-Ford algorithm for automated text summarization. This framework can be implemented and evaluated in the further works.**

***Keywords*— web crawler, news domain, distributed, focus crawler**

High Availability in Software-Defined Networking using Cluster Controller: A Simulation Approach

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***Abstract*—Conventional static networks have begun to be replaced with dynamic systems that are programmable. Software-Defined Network (SDN) is one example of the development of dynamic networks that are programmable with a new paradigm to provide convenience to users in designing, building, and managing computer networks. A software-defined network provides a centralized network distribution to facilitate network services to be more efficient. In SDN, the controller holds control of the control plane of the device while the data plane is distributed through the OpenFlow Switch. A centralized control plane on the controller can cause overhead when the number of users increasing in the network. Overhead on the controller results in service interruptions or even the controller fails to provide services on the net. The availability of a controller is essential to guarantee the availability of network services. High availability on the controller is achieved through the cluster controller. This paper discusses the performance of networks that implement high availability solutions on SDN. As a comparison in the experiment comparing the performance of using a cluster-controller with a multi-controller. The results are based on QoS parameters, and the average CPU load performance of the cluster controller is better than using a multi-controller.**

***Keywords*— Software-Defined Network, multi-controller, cluster-controller**

Pneumonia and COVID-19 Detection using Convolutional Neural Networks

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***Abstract*— COVID-19 also known as Severe Acute Respiratory Syndrome Corona virus-2 is a contagious disease that is released from tiny droplets containing saliva or mucus from respiratory system of a diseased person who talks, sneeze, or cough. It spreads rapidly through close contact with somebody who is infected or tapping or holding a virus contaminated objects and surfaces. Another infectious illness known as Pneumonia is often caused by infection due to a bacterium in the alveoli of lungs. When an infected tissue of the lungs has inflammation, it builds-up pus in it. To find out if the patient has these diseases, experts conduct physical exams and diagnose their patients through Chest X-ray, ultrasound, or biopsy of lungs. Misdiagnosis, inaccurate treatment, and if the disease is ignored will lead to the patient's loss of life. The progression of Deep Learning contributes to aid in the decision-making process of experts to diagnose patients with these diseases. The study employs a flexible and efficient approach of deep learning applying the model of CNN in predicting and detecting a patient unaffected and affected with the disease employing a chest X-ray image. The study utilized a collected dataset of 20,000 images using a 224x224 image resolution with 32 batch size is applied to prove the performance of the CNN model being trained. The trained-model produced an accuracy rate of 95% during the performance training. Based on the result of testing conducted, the research study can detect and predict COVID-19, bacterial, and viral-pneumonia diseases based on chest X-ray images.**

***Keywords*— Pneumonia Detection, COVID-19 Detection, Deep Learning, VGG-16, Convolutional Neural Networks**

What's in a Caption?: Leveraging Caption Pattern for Predicting the Popularity of Social Media Posts

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***Abstract*—In the past few years, social media has become an integral part of everyday life. It also has surfaced as an influential tool that helps a business or individual in gaining identity and reputation. Predicting the popularity of social media posts before they are published thus may have a profound impact to reveal individual preference and public attention. However, an accurate prediction is a challenging task, mainly due to the number of factors that play a part in this process. Previous research, although it achieves promising results, neglects one distinctive characteristic of semantics in textual metadata, i.e., the language modeling, to better model the context information of a post. To that end, we propose to use language modeling features together with user profile and post metadata features to predict a concise popularity score. The language model features are extracted by utilizing the probability of word occurrence, while the user profile and post metadata features are provided as attributes by the original data source. Several state-of-the- art predictive modeling techniques are employed to investigate the performance of our proposed features on different estimation procedures. Experiments on a large-scale Flickr dataset show the benefits of the proposed features on the performance of social media post popularity prediction.**

***Keyword*—popularity prediction, social media, textual pat-tern, affective computing**

Fractional Gradient Descent Optimizer for Linear Classifier Support Vector Machine

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***Abstract*—Supervised learning is one of the activities in data mining that aims to classify or predict data. One of the powerful supervised learning algorithms is the Support Vector Machine which is included in the linear classifier. In data prediction activities, efforts are needed to improve the accuracy of predictions by optimizing parameters in the classification algorithm. In this study, the proposed Fractional Gradient Descent as an unconstraint optimization algorithm on objective functions in the SVM classifier. With Fractional Gradient Descent as an optimizer classification model in training data activities to improve the accuracy of prediction models. Fractional Gradient Descent optimizes the SVM classification model using fractional values so that it has small steps with a small learning rate in the process of reaching global minimums, and achieving convergence with lower iterations. With a learning rate of 0.0001 SVM Classifier with fractional gradient descent have error rate = 0.273083, at learning rate 0.001 with error rate = 0.273070, and at learning rate 0.01 with error rate = 0.273134. The results of the SVM Classifier with stochastic gradient descent optimization reach the convergence point at iteration 350. With fractional gradient descent optimization, it reaches a convergence point of 50 iterations smaller than the SVM Classifier with stochastic gradient descent.**

***Keywords*—Support Vector Machine, Fractional Gradient Descent, Optimization, Supervised learning, Data Mining.**

The Identification of the Apples (Malus Sylvestris) Skin Wax Coating Using the Edge Detection Method

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***Abstract*— Wax coating is generally used for the post-harvesting process of Malang apples (malus sylvestris). So far, the process of examining the wax coating still uses the sense of touch, which is found difficult to do. This research aims to identify the layers of wax using a computerized process. The edge detection method was tested in order to recognize the patterns on the wax coated and uncoated apples skin. This method was possible to use since the wax coating is sensitive to light although it is transparent. It makes the wax coated apples skin tend to be shinier than the uncoated one. After recognizing the patterns, the standard deviation of the edge detection results was measured. The results showed that uncoated apples had a standard deviation value between 17.4992 and 42.2488. Whereas the wax coated apple had a standard deviation value between 32.7809 and 64.2292. The deviation appeared to be between 5.1079 to 39.3531. These results indicated that the standard deviation value for wax coated apples tended to be higher than the uncoated ones. Based on these results, it was shown that the edge detection method was able to show the significance patterns in order to identify the presence of the wax coating on the apples skin.**

***Keywords*— Malang Apple (malus sylvestris), wax, edge detection**

Key Rate Enhancement by Using the Interval Approach in Symmetric Key Extraction Mechanism

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***Abstract*—Wireless security is confronted with the complexity of the secret key distribution process, which is difficult to implement on an Ad Hoc network without a key management infrastructure. The symmetric key extraction mechanism from a response channel in a wireless environment is a very promising alternative solution with the simplicity of the key distribution process. Various mechanisms have been proposed for extracting the symmetric key, but many mechanisms produce low rates of the symmetric key due to the high bit differences that occur. This led to the fact that the reconciliation phase was unable to make corrections, as a result of which many key bits were lost, and the time required to obtain a symmetric key was increased. In this paper, we propose the use of an interval approach that divides the response channel into segments at specific intervals to reduce the key bit difference and increase the key rates. The results of tests conducted in the wireless environment show that the use of these mechanisms can increase the rate of the keys up to 35% compared to existing mechanisms**

***Keywords*—wireless security, symmetric key extraction mechanism, interval approach, key bit difference, key rate.**

EnORS: An Enhanced Object Relationship Schema

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***Abstract*— The data model is a primary factor in creating databases. Moreover, it also shows the connection between different data features involved in the information system. A system that has a robust database structure leads to a strong information system. Hence, a poor database structure may result in a half-baked approach. However, creating a good data model is confusing and complicated. This study focuses on creating a more improved database structure that is simple and less complex. This is done by integrating the object relational schema (ORS) proposed by Sinha and the enhanced relational model (ERM) introduced by Villari. Formulating a new structure results in an Enhanced Object Relationship Scheme (EnORS). The improved diagram illustrates not only the entity objects involved in a database but also the data objects that are interrelated within the information system. This new approach was implemented in creating an enhanced object-relational schema database structure in the Health Center Information System. It shows a more simplified process in creating an efficient database. However, this study only limits to generate improved object-relational schema. More extensive research can be conducted to test its reliability as compared with other existing methodologies.**

***Keywords*— data model, ER model, entity relationship schema, object-oriented schema, relational databases**

Paper ID 450

Development Of Mapping Area Software For Dismissal People Affected By Covid-19

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***Abstract*— The spread of the Convid-19 Virus which has a major impact on various sectors of human life, from health problems that have caused many deaths and also economic impacts. The decline in people's purchasing power has caused the industry to experience a decrease in sales turnover, causing business actors to carry out budget efficiency by terminating employment. In terms of assisting government programs in assisting victims of layoffs, a system for mapping the locations of these victims is needed. In building a mapping system for the location of victims of layoffs using the xp method which is part of agille. The system can display the location area down to the kelurahan level. By using a system of mapping the locations of dismissed communities, it can assist in data collection and distribution of assistance.**

***Keywords*—mapping, XP, PHK, Covid-19**

Validation of Voice Recognition in Various Google Voice Languages using Voice Recognition Module V3 Based on Microcontroller

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***Abstract*—Nowadays, one of the dynamic technological development is Voice Recognition. Voice Recognition can recognize someone's voice which can be used to facilitate work efficiently. Voice recognition helps the user match the voice which has been validated before and verify the compatibility of the sound with the user's voice so that it meets the biometric identification requirements. The purpose of this study is to determine the success rate of giving orders to the prototype of an automatic lamp using Voice Recognition Module V3. This research uses google voice with various languages by using the voice command "lights on" which means turning on the lights automatically, and "lights off" means turning off the lights automatically. Voice commands are taken in 9 random languages based on the availability of Google Voice. Also, this study aims to determine the effect of volume and distance on the performance of Voice Recognition Module V3. This study uses the distance between the microphone and the speaker in the range of about 5 cm, 10 cm, and 15 cm and also the volume of voice commands on google voice by 30%, 50%, and 100%. The results show that the volume of google voice on the cell phone is directly proportional to the percentage of the success rate of voice commands. While the results of testing the distance of the microphone with Google voice is inversely proportional. In conclusion, the Voice Recognition Module V3 can function well at a distance of 5 cm even with a google voice volume of 30%. Except in Chinese, because the vowel pronunciation of the word sounds faint. Vocal clarity of voice command pronunciation affects the success rate of voice commands.**

***Keywords*—voice recognition, google voice, various languages**

Texture Analysis of Knee Osteoarthritis Using Contrast Limited Adaptive Histogram Equalization Based Gray Level Co-occurrent Matrix

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***Abstract*— Osteoarthritis (OA) is a joint disease associated with degenerative damage to joint cartilage. WHO reports that 40% of the world's population will suffer from OA, in which 80% of them have limited motion. due to the number of osteoarthritis sufferers is increasing and in the detection of osteoarthritis orthopedic doctors use manual x-ray images, detection of osteoarthritis using x-ray image input is necessary. This study uses x-ray image processing using the CLAHE method which is used for image enhancement to analyze bone texture using GLCM. The results showed that the accuracy rate of KL-0 was 20%, KL-1 5%, KL-2 20%, KL-3 55%, and KL-4 5%. Based on these results, adding methods will give better results**

***Keywords*— Osteoarthritis; GLCM; image processing**

Design of Model Predictive Control to stabilize Two-Stage Inverted Pendulum

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***Abstract*— Model predictive control (MPC) defines as a controller algorithm utilizing optimal computation. The method of MPC has given numerous effect to the quality of some applications such as petrochemical plant, electronic devices, power electronics, robotics, and unmanned aerial vehicle. All of the MPC design in the literature has been successfully implemented and have given excellent performance for the systems. However, the MPC has been only designed for systems which have state variables under four variables. In this paper, an MPC method for the system that has state variables over 4 variables is proposed. The proposed MPC has been designed to stabilize two-stage inverted pendulum that has higher-order, nonlinear, very unstable, multivariable and 6 state variables. The MPC method is designed through the dynamic model of that pendulum employing Euler-Lagrange Equation. Then, the method is evaluated under several conditions to figure out the performance using MATLAB Simulink software. The result shows that the three parameters of the system namely the parameter prediction horizon *Np*, the parameter tuning r_w and the parameter control horizon *Nc* can influence the system output. The modification of N_p has influenced the speed of the output system. The modification of N_c and r_w has influenced the maximum of pendulum angle deviation.**

***Keywords*—Model Predictive Control Method, Two-Stage Inverted Pendulum, Stability Control**

Hydrothermal Growth Temperature Dependence of Nanostructured Nickel Oxide Transparency

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***Abstract*— Oxide semiconductors are promising materials for various electronic devices ranging from the gas sensor, to photodetector. Nickel oxide (NiO) is particularly interesting to be one of the few p-type oxide semiconductors. In NiO, p-type semiconductivity arises from the hole generation due to the existence of Nickel vacancy. NiO is visibly transparent owing to a wide bandgap of ~3.6 eV. The capability to synthesize the p-type oxide semiconductor is detrimental in realizing important future applications such as the transparent solar cell and transparent devices for wearable or skin electronics. However, very few reported on a cost-efficient synthesis of NiO or correlated the growth parameter to the optical transparency. This work presents a successful synthesis of nanostructured NiO by hydrothermal growth employing nickel (II) nitrate hexahydrate and hexamethylenetetramine as the precursors. Growth time was set to 3 hours and the transparent c-sapphire was used as the substrate. The effects of growth parameters, i.e. growth temperature and precursor ratio on the transparency were thoroughly evaluated. The correlation between the growth parameters to transparency was established and it was found that the transparency decreases with increasing temperature. Increased rate of reaction probably occurred at higher temperatures promoting more material deposition which led to a reduced transparency. The growth mode and sample morphology were significantly affected by the precursor ratio. Scanning Electron Microscopy (SEM) images revealed that the deposited NiO morphology was in the form of a flaky nanostructure. The morphology changed into microrod structure with the use of a low Ni precursor concentration.**

Keywords—nickel oxide; oxide semiconductor; hydrothermal; transparent

Design Automatic Dispenser for Blind People based on Arduino Mega using DS18B20 Temperature Sensor

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***Abstract*—People with visual disabilities, who had limited vision, would experience many obstacles in carrying out activities and social interaction. Equipment in general was not still user friendly for blind people. The purpose of this research was to create an automatic dispenser design that provided convenience and safety for visually impaired people when taking hot water to the dispenser. This research used Arduino Mega microcontroller as the main control, proximity sensor to detect the presence of the glass, and the HC-SR04 ultrasonic sensor as a determinant of high water levels and SD Card Module to play sound. This research used Research and Development (RnD) method. The results of this study were an automatic dispenser that could fill glasses automatically with a glass 8 cm, 10 cm, and 12 cm in height. This dispenser could automatically inform blind people when the glass was full and turn off the tap when the water reached 1-2 cm from the surface of the glass so that the water in the glass did not spill. Based on the test results, this automatic dispenser could detect glass of any color and made it from melamine, plastic ceramic, iron. However, this automatic dispenser cannot detect glass made of glass and transparent colored glass. When going to use hot water, blind people could choose a temperature with a setpoint of 50ºC, 70ºC, 80ºC. The results of testing the tool using hot water show that the temperature of the water in the glass has a difference of 1°C - 3° C with a setpoint.**

Keywords— Arduino Mega, Blind, Sensor DS18B20, Water Dispenser

Effects of Precursor Concentration on the Transparency of Hydrothermally Grown Zinc Oxide

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***Abstract*— The electronic gas sensor is an essential aspect of operational safety in the industry as well as in personal settings. Efforts in developing electronic gas sensors have been focused on improving the device's sensitivity and selectivity. Nanostructured oxide semiconductors, including Zinc Oxide (ZnO), have been considered to be one of the most promising materials for gas detection. The strong surface interaction with the target gas combined with a high surface area per unit mass is among its merits. Hydrothermal growth using Zinc acetate dihydrate (ZAD) was suggested to be an economically viable approach to produce ZnO with minimum impurity. However, such reports are very limited. This work aims to grow and characterize nanostructured ZnO suitable for electronic gas sensor. Hydrothermal growths were performed by employing ZAD and Hexamethylenetetramine (HMTA) precursors for 3 hours at 90°C on sapphire (001) substrate. The effects of total solution concentration and precursor concentration ratio on the ZnO transparency were systematically investigated. UV-vis spectrophotometry results indicated that transmittance in the visible wavelength region (transparency) slightly decreased with an increased total concentration from 0.05 M to 0.1 M. This was attributed to the increase of supersaturation which drives nucleation and crystal growth as Scanning Electron Microscopy (SEM) images showed an increased density of ZnO microrod. At a total concentration of 0.1 M, ZAD:HMTA concentration ratios were set to 1:3, 1:1, and 3:1 and a transparency maxima of 87% occurred at a 1:1 precursor concentration ratio. Images obtained by SEM showed that ZnO microrods were grown towards [001] on sapphire with a hexagonal cross-section, consistent to ZnO crystal structure.**

***Keywords*— zinc oxide; oxide semiconductor; hydrothermal; zinc acetate dihydrate; transparent**

A Dual UPQC to Mitigate Sag/Swell to Mitigate Sag/Swell, Interruption, and Harmonics on Three Phase Low Voltage Distribution System

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***Abstract*- The Unified Power Quality Conditioner (UPQC) is a combination of a series active filter (SeAF) and a shunt active filter (ShAF) connected in parallel by a DC link capacitor. This device is able to mitigate power quality (PQ) problems i.e. sag/swell, harmonics, and unbalance on the source and load bus of three-phase three-wire (3P3W) on low voltage distribution systems simultaneously. The disadvantage of UPQC is that it is unable to overcome the voltage interruption so that the source can not deliver power to the load. This paper proposes a dual UPQC model to overcome the voltage interruption on the source bus so that the load bus continues to get power supply. There are six disturbance cases i.e. sinusoidal supply-sag-non-linear load (S-Sag-NL-L), sinusoidal supply-swell-NL-L (S-Swell-NL-L), sinusoidal-interruption-NL-L (S-Inter-NL-L), distorted supply-sag-NL-L load (D-Sag-NL-L), distorted supply-swell-NL-L (D-Swell-NL-L), and distorted supply-interruption-NL-LL (D-Inter-NL-L). The proportional Integral (PI) method is used to control the SeAF and the ShAF in the dual UPQC circuit model. The simulation results show that in the D-Inter-NL-LL case, a Dual UPQC model is able to maintain a load voltage magnitude of 266.60 V (voltage drop only of 14%), higher compared to a Single UPQC model of 173.97 V (voltage drop of 43.88%). In the same case, a dual UPQC model is capable of resulting in an average total harmonics distortion (THD) of load voltage of 10.10%, lower compared to a single UPQC model of 26.70%.**

***Keywords*—Dual/Single UPQC, Sag/Swell, Interruption, Harmonics.**

Design and Implementation of IoT System for Aeroponic Chamber Temperature Monitoring

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***Abstract*— Urban farming lifestyle has gained traction in recent years as society started to pay more attention to the quality of the produce being consumed. Aeroponic is one of the urban farming techniques which employs air as the growing medium. Aeroponic allows a significant reduction in water usage with increased produce as compared to hydroponic or conventional farming. However, optimum aeroponic farming requires precise control of the cultivation environment. This work presents a design and implementation of a lab-scale aeroponic system that employs the Internet of Things (IoT) for online and automated monitoring capability. An aeroponic system that consists of a growth chamber and a root chamber was built for 6 vegetable plants. The root chamber was designed as a closed and dark space resembling that of the soil. The temperature in this chamber was carefully monitored by using the DHT-11 sensor connected to the internet through the Wemos-D1-mini integrated microprocessor and Wifi module. Actuators, i.e. a Peltier cell, fans, and mist makers were placed to control the temperature and to supply nutrients to the roots. Considering the ideal growth environment for the plant, the required temperature was in the range of 25-30°C with a humidity level above 60%. The chamber was placed indoor with a certain exposure to sunlight where the recorded temperature variation was from *29-32.9°C*. Application of a simplified temperature control system with 2 set points at 25°C and 29°C successfully decreased the root chamber temperature to an average of 28.8°C, ideal for vegetable plant growth.**

***Keywords*— aeroponic, internet of things, online and automated monitoring, control system**

Autonomous Robotic in Agriculture: A Review

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***Abstract*—The development of modern technology has brought the Robotic system to the Agricultural sector that helps to increase productivity and efficiency. Numerous research has been conducted to improve the capability of the robots in assisting agricultural operation that leads to the development of autonomous robots in Agriculture. Thus, this development provides an option of reducing errors and/or inefficiency caused by humans, as well as reducing the operators and workers for farming operations. This paper review three important developments that guide researchers for the future development of autonomous robotic in agriculture. The first important development is navigation, which includes the uses of GPS technology and vision-based navigation to guide the robot through the agricultural fields. The second is the development of harvesting systems on the robot that describes sensors uses for harvesting, and actuators to control harvesting devices. The third development is soil analysis system that gives farmer information about the condition of the land. Successful research and applications are presented. Additional research and development are needed to bring this technology to developing countries, in which the technology is rarely used in agricultural area.**

***Keywords*— Precision Agriculture, Autonomous Navigation, Harvesting System, Soil Analysis, Robot Agriculture.**

Design of Fire Detection Equipment Due to The Arc-Fault Series on Low Voltage Networks Based on Internet of Things (IoT)

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***Abstract*— Electrical Energy is a source of energy which is currently a basic requirement in everyday life. Electricity is generated from the generator site and then distributed through the transmission system and distributed to each customer. Viewed from another perspective the increase in the use of electricity in Indonesia is very rapid every year, and this data is directly proportional to the electrification ratio that has been targeted by the State Electricity Company (PLN) which here is an Indonesian state electricity company. The state electricity company (PLN) is also targeting the PLN electrification ratio to reach 100% by 2024, automatically the level of disturbance that will be caused to the low voltage level system will also increase, this is the rate of fire occurrence is very large. With such a large number of customers it can cause many problems starting from the customer and PLN side. The fault that often occurs at low voltage levels, namely arc fault (short circuit) and can also overload. This is due to the lack of protection used, in this case the protective equipment used by the MCB. However, the reality is that the equipment only works when the load is over. Therefore, in this study will make arc fault identification equipment at low voltage levels based on the Internet of Things by utilizing the characteristics of the interference signal that has been obtained. So that cases of fires that occur at low voltage levels due to interference arc fault that because sparks can be protected and not happen again.**

***Keywords*— Fire, Protection, Arc Fault, Internet of Things**

A Hybrid Classification Based on Machine Learning Classifiers to Predict Smart Indonesia Program

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***Abstract*— Data Mining applies mining techniques to learning-related data. Predicting students who are eligible for the Smart Indonesia Program (PIP) is complicated because several important components can be taken into consideration in deciding whether or not the student deserves. To help this, a survey was conducted to obtain a clear view. This survey was conducted with the help of accuracy in predicting students who were eligible for the PIP. There are two factors involved in this determination process such as attributes for prediction and prediction methods. The core purpose of this study is to predict students who are eligible for the Smart Indonesia Program (PIP) using the mining method idea. This paper is focused on the comparison and study of a hybrid method of classification and machine learning algorithms based on decision tree, artificial neural network, Naïve Bayes, etc. The paper discusses a hybrid classification model using machine learning algorithms using voting that can be used to analyze the performance to predict students who are eligible for the Smart Indonesia Program (PIP). In this study, we compared the percentage of accuracy with different data mining methods. The findings of this paper reveal that the hybrid method of classification able to predict the feasible receiver of PIP with accuracy 89.38 percent and the best accuracy is ANN method. In deep, the system of a hybrid algorithm is better and robust than other classification algorithms with F1 measure 94 percent.**

***Keywords*—machine learning, decision tree, naïve bayes, k-nearest neighbor, ann, hybrid classification, data mining**

Optimization of Water Level Control Systems Using ANFIS and Fuzzy-PID Model

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***Abstract*— Water flow measurements have been needed by controllers in industrial processes. The quantity of water must be determined to control the volume of water used in the storage tank. Water flow performance control models based on tanks are required using a Proportional-Integral-Derivative (PID) control system. This system uses a flow0sensor to detect the speed of an actuator. Actuators stabilize the output0water speed per minute at a certain point. Manually determining the value of a PID constant will be very difficult and not optimal. Then we need an automatic and accurate control method. This study focuses on four comparisons of designed methods related to water level without0control, standard PID method, Fuzzy Logic method, Fuzzy-PID method, and Adaptive Neuro-Fuzzy Inference System (ANFIS) method. The simulation results found that the four control models have different performance. The PID-ANFIS model obtained the smallest overshot value in the PID-ANFIS model of 0.5135 pu, the smallest undershot in PID-ANFIS was 0.5291 pu. Current Output Output obtains the smallest overshot value in the PID-ANFIS model of 0.0023 pu, the smallest undershot in the PID-ANFIS model is 0.0014 pu.**

***Keywords*—ANFIS, Fuzzy Logic, PID, Water Level**

DESIGN AND DEVELOPMENT OF ATTENDENCE SYSTEM APPLICATION USING ANDROID-BASED FLUTTERS

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Abstract—Student attendance application prototype using Android-based flutter: a case study in the electrical engineering department of the University of Mataram is an application whose purpose is used in student attendance activities by preventing cheating at Electiral Engineering, University of Mataram (JTE-UNRAM). This application is equipped with a validation feature using a QR code and geolocation to overcome student cheating during attendance activities. This application development using FLUTTER sdk. This application development is used by two users that are students and lecturers, students use the application for attendance facilities, lecturers use the application to set open or close sessions, and check attendance. Tests carried out on the application are installation, application usage, QR code scanning methods, geolocation features, and MOS (Mean Opinion Score). As a result of the development of this application, the application can be used in simulating absentee activities in the class attended by 15 students and 1 lecturer event even though it has not gone well.

***Keyword*—attendance, Android Application, QR code, geolocation**

Simulation and Performance Evaluation of Fiber Optic Sensor for Detection of Salinity in Prawn Pond Application

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***Abstract*— The captivity and aquaculture in Indonesia are very potential to be developed due to a lot of resources including marine and freshwater. The suitable water condition for the pond requires lower salt content than seawater around to 0.5 to 30 gram/liter. This study aims to determine the value of the wavelength of the light source that produces significant power losses so that the optical fiber can be used as a sensor to detect the salinity in the water. The method used in this study is a simulation method using the Lumerical MODE Solutions software. The parameters used in the simulation include the value of light source wavelength, length, and diameter of cladding and concentration value of pond water solution from 0.5% to 3% (5000 ppm to 30000 ppm). The results show that the light wavelength of 1550 nm can generate significant power losses than 1310 nm so that it is more suitable for optical fiber sensors. Also, the higher value of the concentration of the salt solution the greater the power losses, because the value of electricity in the core-cladding limit is large. The sensor sensitivity value at a wavelength of 1550 nm is 2.26×10^{-6} Vm^{-1}/ppm was obtained.**

***Keywords*— Fiber optic sensor, salinity, prawn pond**

Microcontroller and Wireless Communication based Smart Laboratory Box System Implementation

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***Abstract*— In many cases, the process of borrowing tools at the engineering laboratory usually occurs problems. This is due to the process of taking and returning the equipment which is still not monitored so that it often makes mistakes when returning goods. To solve this problem, an appropriate technology will be built. One of them is the development of technology which aims to create a monitoring system "MICROCONTROLLER AND WIRELESS COMMUNICATION BASED SMART LABORATORY BOX SYSTEM IMPLEMENTATION" which uses wireless sensors and RFID as support. Information in real time will be displayed on a large LCD connected to the server which is the result of monitoring the locker status. In this study, using a wireless sensor network as a communication system between the smart box and the server, the LDR and RFID sensors to determine the status of the smart box. To ensure the desired data information in accordance with the type of tool, RFID Tags are used as a differentiator of each tool. After finish doing some analysis it will be concluded the quality of this simple technology that was created. From the experimental results, it is found that the system between the node and the server runs according to planning with a varying delay. The LAN network system built excels in packet loss although both have the value of 0% without changing the locker status. The delay of the LAN network system is better than the WLAN network system, both the conditions for the locker status are not changed and the locker status is changed.**

***Keywords*— RFID, Network Topology, Wireless Sensor Network, Wireless Communication**

Parking Management by Means of Computer Vision

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***Abstract*— Car park management currently relies on parking attendants to show where empty parking lots are by monitoring all available parking areas. In some shopping centers sometimes do not have information about parking conditions, whether parking is full or empty. This condition causes the driver to have difficulty finding a parking space. When drivers are looking for a parking space, many cars are milling about causing congestion and wasting time. This paper presents a new breakthrough to make it easier for drivers to find an empty parking space with builds a car parking monitoring and management system based on computer vision. The system input is a camera that is installed in the center of the parking area. The HAAR Cascade Classifier method detects and counts the cars that are parked and then compared with the available parking slots using. If the number of cars currently parked is less than the slots provided, the parking area will inform you that it is still empty along with the number of available slots. Detection of available parking spaces is based on coordinates that have been determined manually on the camera. A total of five slot areas are determined by this camera. The result of this research shows the system accuracy is 90% for the available car parking.**

***Keywords*— HAAR Cascade Classifier, parking management, computer vision, car detection**

Performance Evaluation of ESP8266 for Wireless Nurse Call System

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***Abstract*—Previous studies of the nurse call system have not yet explored the use of Wi-Fi as its base, although Wi-Fi networks are common in hospitals. This study wants to explore the performance of the ESP8266 Wi-Fi module as a node in the nurse call system. Several criteria such as maximum distance, signal strength, delay time, and power consumption will be evaluated. The results of this study indicate that the ESP8266 module can be used up to a distance of 25 m with an RSSI value of 80.4 dBm. This module only uses 0.6 watts when transmitting and receiving data with a maximum delay of 1711 ms. Therefore, it can be concluded that the ESP8266 module can be effectively used as a node in the nurse call system.**

***Keywords*— evaluation, ESP8266, wireless, nurse call system, node**

A Current-mode ACG base on Sub-threshold MOS Translinear Principle

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***Abstract*— This paper presents a current mode automatic gain control (AGC). The proposed AGC is designed on the basis of the principle of sub-threshold MOS translinear. It consists of a current-mode exponential amplifier, a precision rectifier, a low pass filter, and an integrator. The AGC's performance is demonstrated by PSPICE simulations in 0.18 µm TSMC CMOS technology. The simulation results of the proposed circuit at the supply voltage of ±1.2V show that the settling time is 4ms and the maximum power consumption is 1.27mW**

Keywords—current-mode, AGC, sub-threshold

Combination of Fuzzy C-Means and Simple Additive Weighting Using Partition Coefficient Index

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***Abstract*— In the selection of palm oil tree seedlings, it is necessary to consider the determinants of alternatives and criteria to produce an optimal choice of seedlings corresponds to land suitability. At the moment, the selection process is still not using any determining factors. This study aims to show the best cluster ranks to solve the problem of seedling selection. This research was conducted with Decision Support System of palm oil tree seedling selection by proposing the Fuzzy C - Means method and Simple Additive Weighting using Partition Coefficient Index. The Fuzzy C Means method is used for data grouping whereas the Partition Coefficient Index is used to find the best cluster selection and Simple Additive Weighting is used for ranking cluster data selection. Based on the results of the research, it is known that the method can be applied to the Decision Support System of palm oil tree seedling selection by producing more objective and precise decisions. The sensitivity test then proves that the proposed method, Fuzzy C - Means method and Simple Additive Weighting using Partition Coefficient Index, in term of consistency to the effect of changing criteria is better, affected only 1 time out of 6 tests, compared to the method of Fuzzy C Means and Simple Additive Weighting using Xie Beni Index that affected by changing criteria in 3 times out of 6 tests.**

***Keywords*-Decision Support System, Fuzzy C-Means, Partition Coefficient Index, Simple Additive Weighting**

Adaptive Neuro-Fuzzy Approach for Cacao Bean Grading Classification Process

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***Abstract*— The current procedure of fermented cacao bean grade classification in the Philippines is somewhat particular and restricted in its capability to calculate bean quality. Thus, the study explores the image processing technique and the Adaptive Neuro-fuzzy Inference System (ANFIS) to automate the process. The proposed approach has two phases; it starts with the bean classification process using an image processing technique to identify and classify the bean input sample if it is moldy, slaty, and defected. The second phase is the Grading process to determine the samples submitted for categorization according to their grade level value (Grade 1A, 1B, 1C, 2A, 2B, 2C, and Sub-standard) using the Adaptive Neuro-Fuzzy Inference System. In the second phase, two hundred samples from the image processing phase were utilized as sample data. The sample data were fed to MATLAB software using the ANFIS technique for the Grading classification process. Eighty (80%) percent of the samples were utilized for training, and the remaining twenty (20) percent were used for checking. During the training, the accuracy rate projected value resulted in 99.71%, and the said technique outperforms the KNN method for cacao bean sorting and grading classification. With the results obtained, the ANFIS technique is a technique that can be applied effectively to categorize the quality standard of the cacao bean samples submitted for the Grading categorization process.**

***Keywords*—Cacao Bean, Cacao Grading, Cacao Classification, Cacao Categorization, MatLab, ANFIS**

Tuning of Power System Stabilizer Using Cascade Forward Backpropagation

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***Abstract*—The Cascade Forward Backpropagation Neural Network Method was presented in this research to the optimization parameter of Power System Stabilizers in a power system. The Overshoot and time settling of the electromechanical is a serious problem for tuning PSS. Cascade Forward Back Propagation structure is like to Feed Forward Back Propagation Structure. It is using Backpropagation to updating weights. The network has each layer of neurons relates to all previous layer neurons. The cascade networks are dynamic. Stead of cascade forward backpropagation is provided the nonlinear link between input and output by not obliterating the linear link. The research was implemented to oppose conventional PSS (C-PSS) and Cascade Forward Backpropagation Neural Networks (CFBNN-PSS). The focus of the research was on rotor angle and angular frequency. The result of the proposed CFBNN has better performance to reduce overshoot angular frequency and rotor angle. The CFBNN PSS can reduce overshoot of angular frequency until 90.7% with faster time-settling**

***Keywords*— PSS, Artificial Intelligence, Cascade Forward Backpropagation, Neural Network, Heffron Phillips**

Setting Coordination Relay Protection On Multiloop Model Distribution Electrical Power System Using Firefly Algorithm

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***Abstract*— The purpose of this paper was to obtain a setting relay coordination on a multiloop model power distribution system using the firefly algorithm. Continuity of electrical power system distribution must be maintained. Electric power system network models have been updated starting from the radial, loop and the new one is the multiloop system. Multiloop system was also very suitable for systems that have been integrated with distributed generation (DG). DG is a combination of small-scale power plants with the main source and is placed scattered, such as unrenewable and renewable energy such as photovoltaics, wind turbines, and micro-hydro. But the problem of extinction due to external interference can be suppressed to a minimum with good and fast coordination of the relay. Setting Relay coordination on multiloop systems, it is more complex than the radial and loop system. To get a fast and optimal setting relay on a multiloop system, we can calculate relay settings uses an optimization algorithm. One of them is the firefly optimization algorithm. The firefly algorithm is an algorithm that applies the behavior of fireflies based on the intensity of the light. By using a firefly optimization algorithm to get the value of the relay protection coordination settings will shorten the manual calculation, get the value of the setting quickly, and the most optimal. From the optimization results using the firefly algorithm obtained relay settings with an operating time of 14 relays reaching 3.717 seconds faster than 4.339 seconds compared to manual calculations.**

***Keywords*- Multiloop, firefly Algorithm, distributed generation.**

Hybrid Model For The Next Hourly Electricity Load Demand Forecasting Based on Clustering and Weather Data

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***Abstract*— This research presents about short term load demand customer- prediction model for the supply system based on clustering used to secure the electricity load an industrial customer. The customer-based load hybrid using Part Swarm Optimization Backpropagation prediction method is built on forecasting generation capacity and demands in the next 1 hours ahead. To sustain the forecast model results, the daily clustering and weather forecasts supplied by local authorities, are incorporated in our hybrid model. The model's simulation was tested by calculating the Mean Absolute Percent Error (MAPE) value 0.01% for the electricity load demand forecasted data business rate and 0.005% for the industry rates.**

***Keywords*—customer baseline load, industry, PSO, backpropagation, forecasting**

Partial Shading Effect on I-V Characteristic and Maximum Power of a Photovoltaic Array

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***Abstract*—Photovoltaic (PV) is a technology that can directly convert solar energy into DC electricity by using semiconductors. The performance of PV modules is highly dependent on solar irradiance and temperature. In practice, solar irradiance can be blocked by moving clouds, trees, other buildings, or dust that accumulates so that it will cast shadows on the PV module. If the sun's irradiance is blocked or shading, the performance of the PV module will also be affected. In densely populated areas such as in large cities where there are many tall buildings and do not have enough land or area to install PV arrays, shading problems cannot be avoided. This study uses modeling of partial shading and shading heaviness on one or several PV modules to determine its effect on global I-V characteristics and maximum power generated from PV arrays. Six PV modules are modeled and simulated using MATLAB in this study. The results of this study conclude that the I-V characteristic and the global maximum power output of the PV modules affected by partial shading are better arranged in series in one string then connected parallel with the inverter compared to shaded PV modules which are arranged in different string then connected parallel to an inverter. This study can be used by PV arrays designers to build a PV system in a limited area that is reliable, safe, and can still produce high maximum power under partial shading conditions.**

***Keywords*—Photovoltaic, Partial Shading, I-V Characteristic, PV Module, PV Array**

Effect of Combination Fractional Slot Number and Slotting Technique on the Cogging Torque in Permanent Magnet Machines

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Abstract— The purpose of this study is to find out the effect of the integration of both fractional slot number technique and the slotting by one step in the magnet edge on the cogging torque mitigation in a permanent magnet generator. The powerfulness of the method was approved using numerical analysis and analytically. To compare the performance result of the permanent magnet generator, three distinct structures of permanent magnet generators have been investigated and analyzed. In our study, the original structure of the permanent magnet machines has assumed as the base of permanent magnet generator performance. The magnet rotor was fully cover without any slotting, while the stator core is also without any slotting. Since the magnet was a full cover, the height of the magnet in all parts was the same. The magnet height in the edge is the same within the center of the magnet. At the beginning of the analysis, the structure of fractional slot numbers with 24 slots and 14 poles was selected. The result of both two cogging torque decrement techniques was investigated and the cogging torque subtraction result was contrasted with the initial cogging torque peak value. For the detailed examination of this study, it has been applied FEMM 4.2. It is obtained the cogging torque value of the proposed machine structure of 97.27 % contrasted with the original machine model.

***Keywords*— Cogging Torque, Permanent Magnet Machines, Slotting, Magnetic Flux Density**

Deformation of 3D Object of Human Body Internal Organs Using *Finite Element Method* Approach Accelerated by GPU

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***Abstract*—In last decade, there are many research about virtual surgery that still continuous in doing. One of them is deformable object. The deformable object is the one important part that is modelling an object resemble original shape of an object. The objective of this research is to continue previous research that have been there before especially in term of deformable 3D object by using game engine Unity / OpenGL and as well as startup especially in Indonesia in term of soft body simulation. In making a deformable object, one of the numeric approach methods would be used i.e. Finite Element Method. Finite Element Method (FEM) approach is quite widely used by other researchers because it is more stable and more detail in modeling an object. The Finite Element Method (FEM) approach would be implemented on OpenGL GPU-based with eight kernels or functions. Result of this research show that this simulation of 3D of human body internal organs object produces the good FPS of simulation with 3.07 times faster rather than not using GPU.**

***Keywords*- spring mass; finite element method; deformation; game engine; virtual surgery; simulation; gpu**

A Research on the Influencing Factors of Industrial Designers' Potential Traits on Career Planning

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***Abstract*—Industrial designers often play an important role in the development of new products for the company and create huge economic benefits for the company. Industrial designers need to spend a huge amount of time and expense in the learning and training process, as well as purchasing expensive personal equipment for professional skills training, but the salary of the employment environment is not high. Therefore, this research uses the in-depth interview method to interview two industrial designers who have been employed in the workplace for more than five years to understand their growth background and analyze their career satisfaction. It is found that the growth stages of industrial designers can be roughly divided into three periods; the first is the period of interest germination, the second is the period of career enlightenment, and the third is the period of ideal realization. The training process of industrial designers takes a lot of time, spirit, financial resources, and material resources, but it is not proportional to their social status and salary income. Supporting industrial designers to continue to work hard in the workplace, the main reason can be found in industry Designers have four characteristics: the discoverer of the problem, the solver of the problem, the inspirer of fashion, and the builder of a better society. Through this research, it can be found that students who possess the characteristics of industrial designers during their study period should receive professional training early to avoid wasting educational resources.**

***Keywords*—Industrial designer, Personality traits, Career planning**

Design of Aerial Robot As Teaching Media With Educational Robotic Based Learning System

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***Abstract*- This study was conducted by applying a research and development design with the aim of producing a learning tool in the form of Aerial robot module and kit with educational robotic based learning system at the Department of Electrical Engineering to improve the students' skills. This was a development research adopting 4-D model, proposed by Thiagarajan and Semmel (1974) that consisted of four stages: Define, Design, Develop, and Disseminate. Data of the Indonesia Robot Contest during the period 2009-2015 reveals that the developed modules have reached the fourth stage of 4-D research model that is dissemination thus, the module is considered perfect, ready to be duplicated and distributed as a learning device for Intelligence robotics courses. While, the developed module was validated with the average assessment score of 3.34. The module is expected to be able to produce Intelligence Robot Tool for teaching based on Contextual Teaching and Learning to improve the students' skills to be applied in the field. In the results, students also showed positive responses on the robotics module and Contextual Teaching and Learning strategy.**

***Keywords*- intelligence robot, teaching media, contextual teaching and learning, learning tool, robotics course**

The Role of Information Technology Knowledge and Online Learning on Learning Environmental Changes in Vocational Education

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***Abstract*— This study aims to know the changes that happened in the learning environment caused by the information technology development applied in online learning during the pandemic COVID-19. The rapid changes in information technology has affected many learning strategies and environments, and also improved teacher and student capabilities in information technology. To obtain the solution, this study uses a qualitative descriptive approach as a method. The objects in this research are teacher and students in Aviation Polytechnic of Surabaya, a vocational college that implemented a ruled-boarding school system. The pandemic condition has changed the learning system from face-to-face traditional learning into online learning from their home. The result shows that information technology has successfully shifts the student tendency to do face-to-face learning system. This situation also encourages teachers to be able to choose and use information technology as a learning medium for student learning success. In this study, it was stated that teachers, students and the Aviation Polytechnic of Surabaya as a vocational school institution need to make some adjustments in learning techniques to accommodate a pandemic learning environment. The learning design allows many models, methods, and medias in the online learning system to facilitate the distance learning process to reach certain goals. The implication of this COVID-19 online study-research is a shift in the learning environment caused by the knowledge level of information technology.**

***Keywords*— Information Technology, Online Learning, Learning Environment, Vocational Education, Boarding School**

Motion Sensing for Wireless Body Area Networks Based on Android Using Wi-Fi Direct Transmission

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***Abstract*—Wireless sensor networks (WSN) applications were developed with a wide variety of applications. Wireless body area network (WBAN) was one of the implementations of WSN. The implementation used a sensor that was attached to the body to monitor body motion. In this article, we present our research about motion sensing for wireless body area networks (WBAN) that used Wi-Fi direct transmission. This article proposed a motion-sensing for wireless body area networks (MOSBAN) with Wi-Fi direct transmission based on android to send the value of accelerometer and gyroscope from smartphone to smartphone. MOSBAN is expected can send the value of sensors accurately with Wi-Fi direct transmission. This article presented a comprehensive result of 50 meters distance from smartphone1 to smartphone 2. The validity of MOSBAN is proven by exacted 100% of data transmission using Wi-Fi Direct.**

***Keywords*—Wireless sensor networks, MOSBAN, Accelerometer, Gyroscope**

Impact of Nonlinear Distortion with the Rapp Model on the GFDM System

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***Abstract*— The fifth-generation (5G) mobile communication system has various types of applications, with each application requiring different requirements. The characteristic of this system is flexible architecture. Generalized Frequency Division Multiplexing (GFDM) fulfills these requirements. However, as with other multicarrier systems, GFDM is also sensitive to nonlinear distortion due to a High Power Amplifier (HPA). In this paper, we investigate the nonlinear distortion effect of the Rapp model on GFDM. We investigate 3 parameters namely Bit Error Rate (BER), signal spectrum, and Peak Average Power Ratio (PAPR). Simulation results show that PAPR on GFDM is more resistant to nonlinear distortion due to pulse shaping. The PAPR GFDM value with the Rapp Model is around 3dB, better than the Saleh Model. PSD on GFDM has not changed much due to nonlinear distortion, out-of-band (OOB) values from GFDM are still good around -90 dB. But, BER performance on GFDM is very bad if given nonlinear distortion, At the time of Eb / No 20 dB, the BER achieved was less than 10-1.**

Keywords—5G, GFDM, HPA, Rapp Model, nonlinear distortion

Filtered The New Intelligent Wireless Sensor Network using Artificial Intelligence for Building Fire Disasters

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***Abstract*— This research was aimed to develop an intelligent system for Wireless Sensor Network (WSN) to determine fire disasters in buildings. The parameters used in determining the disasters in the building were temperature level, smoke level, gas content level, the amount of water available, and the number of people per room in the building. There were 3 levels to determine fire disasters, namely: normal, early warning, and fire. The determination of building fire disasters was done by WSN using artificial intelligence with 3 parameters. The Test results in this study obtained an average accuracy rate of 91,8% by utilizing the artificial intelligence algorithm on WSN.**

***Keywords*—WSN, fire, disaster, artificial intelligent**

A Vivaldi Antenna Palm Tree Class with Koch Square Fractal Slot Edge for Near -Field Microwave Biomedical Imaging Application

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***Abstract*— This article presents the modeling of an antipodal Vivaldi antenna (AVA), Palm Tree Class, with radiating fractal slot edge (FSE), in the form of a Koch Square Fractal (SK), labeled as SK-FSE-AVA. The surface currents of the proposed antenna are analyzed, as well as the return loss, directivity, squint, side lobe level (SLL), and Main Lobe (ML) gain. Improvement on directivity is observed when compared to an AVA, with 8.41 dB of gain in the main lobe at 4 GHz, SLL of -11.70 dB, and the squint of 0.10º. SK-FSE-AVA has 9.23 dB of gain in the main lobe at 4 GHz, SLL of –13.50 dB, and the squint of 0.2º. This antenna could be used in ultra-wideband (UWB) systems for applications on Near-Field Microwave Imaging (NMI). To show the feasibility of this application, a 3D numerical simulation of a model containing lung tissue with a malignant tumor is presented, using the proposed antenna and the respective imaging results.**

***Keywords*—Ultra Wide-Band (UWB), Vivaldi Antennas, fractal slot edge (FSE).**

Decision Support System Cattle Weight Prediction using Artificial Selected Weighting Method

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***Abstract*—Animal agriculture in Indonesia is a very important need. Beef production in Indonesia experienced fluctuations from 2015 to 2019. In that period, 2016 reached its highest point with 518,484 tons. Even so, the use of technology for animal husbandry is needed to help farmers improve the quality and quantity of livestock products. One of the needs of farmers is cattle scales. This scale is expensive so not all farmers can afford this. They weighing cattle by bringing it to the cattle market or a place that has been facilitated by the government. This causes farmers have to require transportation just only weighing cows. Another way is approximating the weight, but this method can only be done by someone who has high experienced. The aim of this paper to propose a system for predicting the weight of cattle using a novel artificial selected weighting method. This method is based on hybrid image processing results combined with Danish Schoorl, Schoorl Indonesia, Winter Europe/Scheiffer, and Winter Indonesia calculations. The initial stage is image processing, the results of the parameters obtained will be calculated using Denmark Schoorl, Schoorl Indonesia, Winter Europe/Scheiffer, and Winter Indonesia formula. Calculation obtained will be learned by comparing it with the actual weight of livestock. The results of this learning process obtained weights that can be used to predict cattle weight. The results show using an artificial selected weighting method, accurate of prediction can be increased.**

***Keywords*—DSS, cattle, weight, predict, weighting**

Design of X-Band Microstrip Antenna for Circularly Polarized Synthetic Aperture Radar (CP-SAR) System

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***Abstract*—Microstrip antenna is useful for radar applications, communication satellites, and various cellular wireless systems because of their advantages in small size, lightweight, and flexibility in the choice of polarization types. The aim of this study is to design a circular polarization microstrip antenna that can be used in the Circularly Polarized Synthetic Aperture Radar (CP-SAR) system. This X-band microstrip antenna is used for satellite data communication. This satellite function as a monitoring tool for global land deformation. The X-Band microstrip antenna in this paper was designed and simulated using CST Studio Suite. The antenna design is using a double layer of RO4350B substrate. The frequency range of the antenna is 8.0 - 8.4 GHz. The simulation results show that parameters are according to specifications such as low return loss, high gain, directional radiation pattern, and circular polarization with an axial ratio of less than 3 dB.**

***Keywords*—microstrip antenna, CP-SAR, X-band frequency, circular polarization, directional radiation pattern**

Design of Horizontal Polarization Microstrip Patch Antenna with Bandwidth Enhancement at C-Band Frequency

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***Abstract*— Microstrip antennas nowadays widely used in wireless communication systems because microstrip antenna has several advantages such as lightweight, easy to fabrication, and relatively low cost. However, the microstrip antenna also has a disadvantage, like a narrow bandwidth. The purpose of this study is to enhance the microstrip antenna bandwidth by adding the Split Ring Resonator (SRR) metamaterial with a directional radiation pattern. First, we conduct a literature study to determine the dimensions and the specification of the antenna. Then we simulate the antenna using CST Studio Suite. The simulation results show that the antenna bandwidth with SRR metamaterial increases almost 400% rather than the conventional microstrip antenna. The gain of the proposed antenna is more than 2 dBi with directional radiation pattern and horizontal polarization.**

***Keywords*—Microstrip Antenna, Bandwidth, Enhancement, C-Band Frequency, Horizontal Polarization**

Comparison Study of Hilbert Sierpinski and Koch Fractal Structure on Coplanar Vivaldi Antenna for L/S band Application

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***Abstract*—This article presents the comparison study of fractal structure on the Coplanar Vivaldi antenna. We compare the fractal structure i.e: Hilbert, Sierpinski, and Koch to the Coplanar Vivaldi element that operated at L/S-band application. By keeping the dimension of the element we compare seven types of elements to get the performance of return loss, directivity, and sidelobe level at 0.5 to 5.5 GHz of frequency. From the simulation, we found that by adding the fractal structure, the performance of return loss and radiation pattern can be improved. The best return lost in the lowest frequency is grasped for Koch fractal at 0.92 GHz while in conventional at 1.3 GHz. The directivity improvement is achieved for Hilbert, Koch, Sierpinski, and conventional as 10,02 dBi, 8.62 dBi, 7.79 dBi, and 7,02 dBi respectively at 5 GHz. While at 3.5 GHz by adding a Sierpinski structure, the directivity of antenna improves as 4 dBi, if it is compared to conventional ones. At 3 GHz the increases of SLL also observed for Hilbert structure as -13.28 dB while conventional element as -5.6 dB. The fractal structure can enhance return loss and radiation pattern performance on Coplanar Vivaldi antenna**

***Keywords*—Vivaldi, Hilbert, Koch, Sierpinski, Fractal**

Design of a Microstrip Line Quad-band Bandpass Filter based on Fibonacci geometric sequence

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***Abstract*—The following paper presents the development of a set of filters developed with microstrip line technology and dimensions based on the initial terms of the fibonacci sequence. Simulations of four versions of this filter are made in a circuit analysis tool and they are compared with each other, in order to choose one of these as the one that offers better attributes. The fourth version of the filter has characteristics of a quadband band passband filter. Finally, the authors expose the results of the simulation, proposing the narrowing of the selectivity factor of the designed filter through other simulations before measurement of experimental results. The best transmission levels at those four bandwidths are 0.17 dB for 581 MHz in the first bandwidth, 0.52 dB for 1021 MHz in the second, 0.17 dB for 1504 MHz in the third and 0.20 dB for 2210 MHz in the fourth.**

***Keywords*— Quad-band passband filters; microstrip line; electromagnetism.**

Potentials of Metasurface Technology on Antennas and Propagation

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***Abstract*—In this talk, some potentials of metasurface tech-nology for antennas and propagation technology is presented. As the beginning part, some metasurface techniques and applications are reviewed. After that, some interesting techniquesare presented, including some study examples in the authors'group. A metasurface (MS) has periodic arangment of unit cells in a planar shape. Such arrangements can have an artificial magnetic conductor (AMC) characteristics with an in-phase reflection coefficient at a particular frequency. Many studies on AMCs have been conducted for realizing low-profile antennas and extending the bandwidth. AMCs have been applied to expand the impedance bandwidth. In addition to the AMC characteristics, the AR bandwidth can be extended with an MS that converts linear polarization (LP) to circular polarization (CP) in the off-band for 3-dB AR. Conversion techniques of polarization to cross-polarization and from LP to CP have been extensively studied. In addition to the reviews mentioned above, some recent techniques on MS will be presented. They are mainly the projects in the authors 'group that are relevant to such as broadband antenna designs, polarizers, and propagation with MIMO. For example, the edge design of the finite size of metasurface gives a significant effect on the broadband polarization conversion techniques. Potentially the available bandwidth at a center frequency reaches 40%. Furthermore, using a metasurface can enhance channel capacity on MIMO. Some future scope of MS will be discussed.**

***Keywords*—metasurfaces, antennas, broadband characteristics, propagation**

ARTICLE THAT WILL BE SUBMITED TO AP

Paper ID 318

PROBLEM BASED LEARNING MODEL IN ANALYSIS OF USER SATISFACTION MEDIA OF RADIO AIDS NAVIGATION LEARNING FOR CADETS D3 AIR NAVIGATION TECHNIQUE USING MACROMEDIA FLASH 8

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***Abstract*— User satisfaction is one thing that becomes a measuring tool in the success of a system. One system that can be measured to assess the success of the system is the application as a medium for spreading information and is very easily accessed. The learning model applied is Problem Based Learning. The subjects in this study were the Air Navigation Engineering Cadets of the XI Surabaya Polytechnic, totaling 23 cadets. Data collection techniques are through documentation and questionnaire techniques. Data analysis techniques use data from product reviews and trials as a basis for media improvement. Furthermore, respondents' assessment questionnaire related to the effectiveness of instructional media on the satisfaction of using Radio Aids Navigation learning media. Measurement of user satisfaction on this issue uses the Creative, Effective, Efficient, Attractive and Interactive Individual Learning Media Assessment (KEEMI) method. Based on research that has been done, the value of the evaluation results of the Creative Aspect is 3.4528, the Effective Aspect is 3.4456, the Efficient Aspect is 3.4022, the Attractive Aspect is 3.8405 and the Interactive Aspect is 3.4582. In accordance with the results of the evaluation, it was found that the evaluation value of the five indicators> 3.1. This shows that overall, Cadets was very satisfied with the Macromedia Flash 8 application that was implemented in Surabaya Aviation Polytechnic.**

***Keywords*— Problem Based Learning, Media Improvement, Learning Media, Macromedia Flash 8 and Satisfaction**

Application Of Retrieval Information On Android-Based Online Music Course Application

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***Abstract*— This research was conducted to develop a basic design of an android-based online music course application, and to implement an Information Retrieval system to search and find data located on the online music course application. This application was designed using Android Studio software, and thus can only be used for Android-based platforms. In this application, there are 2 choices of musical instrument classes namely piano and guitar. Each class has some materials in the form of videos and images that can be accessed using the internet network, and is equipped with Information Retrieval or search engine features that allow users to search for material in the form of the desired chord images. This information retrieval does index keywords (queries) into documents stored in the Firebase database and the query is processed to display data or information accordingly. The data displayed in the application is in the form of a chord image containing the name and position of the finger in playing the chord on each musical instrument. The accuracy test in this study got 100% results. The test was done by entering the name or title of the chord as a keyword and the results obtained in the form of a chord image from the title. This research is expected to help the general public to easily recognize and learn musical instruments, especially guitar and piano.**

***Keywords*— Android Studio, Firebase, Information Retrieval, Query**

Paper ID 328

A Study on Transformational Leadership Manners and Attitudes of Leaders in Elite Communities of University and Polytechnic : A Case Study in Indonesia

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Abstract **- In transformational leadership, university and polytechnic department heads work to clarifying their manners, attitudes, self-views, and realistic behavior to the community. Then share it with their community, maintain it over the long term, and increase the motivation and team cooperation both from subordinates and the heads of departments at university and polytechnic. The research purpose to perceive the ways of the heads of departments they perceive their positions, the ways self-manage, and the subordinates in the teams. Then and the ways treat associates in private and the team at university and polytechnic. This research is qualitative. The method in this research was in-depth interviews with six heads of the departments at university and polytechnic in Indonesia. Our research results showed that when the leaders clarify and share information about manners, attitudes, self-views, and realistic behavior, based on interviews with heads of the department, their leader figure perceived as a pilot leader, a flexible leader, a good sample for subordinates. Then responsible, form a reliable work team, always communicate, coordinate, collaborate, discuss, build values and ethics, and assciate appreciation and opportunities. This study shows that the participants need a leader figure, such as manners, attitudes, self-view, and realistic behavior relevant to characteristic transformational leaders. The latter can change the perceptions and actions of subordinates. These indicate that transformational leadership is not only whether it increases motivation and cooperation both from the heads of departments and subordinate at university and polytechnic. Transformational leadership also influences motivation and collaboration both from the leaders of departments and subordinate university and polytechnic.**

Keywords **- transformational leadership, majors' elite community, manners, attitudes.**

Influences Of Skill, Knowledge, Attitude, And Morality On Job Achievement

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***Abstract*- Vocational education as one of the important role holders in preparing the workforce is demanded to be able to keep up with the changing and developing market demands. Vocational education is a part of national education system that has very strategic roles for forming skillful employees. However, in reality it shows that not all vocational education is capable of producing quality graduates as evidenced by the lack of knowledge and skills possessed. The purpose in this research is for analyzing the influences of skill, knowledge, attitude, and morality toward achievement. This research is causal research type by quantitative approach. The population in this research is 278 people at government agencies as user of graduated student from the college under supervision of Center for Human Resources Development on Civil Aviation (CHRDCA). The sample technique uses total sampling. Data collection uses questionnaires. The data analysis technique used is multiple linear regression analysis. As the results of this research there are significant and positive influences of skill, knowledge, attitude, and morality on job achievement.**

***Keywords*-Skill, Knowledge, Attitude, Morality, Achievement**

Paper 343

A Study on the Life-Story and Mindsets of Successful Women Leaders in Educational Settings

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***Abstract*-This qualitative study aims to identify the main factors facilitating career success in women who have successfully created change especially in educational settings. Using semi-structured open-ended interviews, we studied five women leaders came from universities and polytechnics in Indonesia. The researchers spent one to three days with each participant in their environment and utilized semi structured, open-ended interviews that lasted one to four hours. The researchers found 8 overall conclusions about the data. (a) family, including parents, spouse, and children, impacted each woman's decisions for her education, and career choices; (b) education is a strong value; (c) each participant has at least one mentor and/or networking relationship; (d) Well communicate with team members; (e) having support from somewhere is extremely important to serve in their roles; (f) Support members with high motivation and contribution and allow members with various ideas; (g) Formulate the plans pursuing the team goals previous to the discussions with members (i) their past events have had a huge influence on their success.**

***Keywords*-women's leadership, career success, educational settings**

Paper 346

A Study on The Teenagers' Cultural Awareness And Community Identity

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***Abstract*—"Firecrackers at the Master Han Dan" during Taitung Lantern Festival represents the local culture with religious activities, and it is the event most attracting people around the world. People throw firecrackers toward the naked Master Han Dan in order to get rid of bad lock and celebrate for new lives. The man, decorated as the Master Han Dan, is almost naked with only a pair of red shorts, red scarf, and twined a yellow ribbon surrounding his waist during the event. And general publics, typically youngsters, try very hard throwing firecrackers toward the naked the Master Han Dan, and the firecrackers will explode on the Master Han Dan's body with smoke surrounding his body. From the traditional religion perspective, such behavior is to get rid of bad lock and celebrate for new lives Many people feel very curious about this special ceremony with mysterious religious characteristics though many people may get hurt by participating this activity. Anyhow, it becomes not only a local specialty but also a traditional culture in Taitung. Every year, more and more people are attracted to Taitung to participate this festival. With the help of the Tourism Bureau, this has become one of the most important Lantern Festivals in Taiwan.Drawn from the data collected by qualitative observations and analyses, the following findings are provided: (1)The teenagers in Taitung generally possess intensive interests in this local festival with special cultural characteristics. This cultural festival strengthens their identity and sense of community affinity; (2) The teenagers in Taitung generally support this activity of " Firecrackers at the Master Han Dan", which should be protected as a cultural festival and continued to carry forward this glorious tradition.**

***Keywords*—Master Han Dan, identity, Promotion of culture**

Automatic Hand Sanitizer Container to Prevent The Spread of Corona Virus Disease

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***Abstract*— COVID pandemic has influenced human life in various sectors. Various attempts were made to reduce the virus transferring by work from home, social distancing, and also including hand hygiene. So far, most of the available hand sanitizers do not operate automatically. This article aims to make an automatic hand sanitizer where soap and water can come out automatically. Besides that, automated hand sanitizer will make notification to the owner, if the liquid has run out to the smartphone. The infrared (IR) will sense the presence of heat and motion of the object with the distance up to 50mm. It send data to the Arduino Nano to activate the pump. If the ultrasonic sensor detect the distance of water to he sensor 35 cm it will send data to node MCU that connect to Blink server. It can transfer the data to the output devices such as smartphones or PC based on the Internet of Things (IoT). The results of the hand sanitizer testing that the system can run smoothly with a minimum detection error of transferring data.**

***Keywords*— Automatic hand sanitizer, Infrared sensor, Ultrasonic sensor**

Paper ID 392

CURRICULUM DEVELOPMENT IS CONDUCTED TO IMPROVE COMPETENCIES OF AIR TRANSPORTATION MANAGEMENTAL STUDY PROGRAM FOR CADETS OF AVIATION POLYTECHNIQUE SURABAYA

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***Abstract*— The purpose of this study is to provide an analysis of the effect of curriculum development on air transportation management competencies by contributing to cadets at Surabaya Aviation Polytechnic. The design of this study uses quantitative research methods that emphasize numerical data analysis such as collecting data to the appearance of results. The population in this study were cadets in Surabaya Aviation Polytechnic as many as 96 cadets. The operational definition is carried out to measure and see the dimensions of behavior, aspects, or nature in which this research uses curriculum development which is measured based on several indicators, namely the principle of relevance, the principle of flexibility, the principle of continuity, the principle of efficiency, and the principle of effectiveness. Besides, there are management competencies that are measured in several indicators such as work skills, work knowledge, work attitudes, and morale at work. Primary data is the source of data from this research in the form of data collection using a questionnaire. The data analysis technique used is linear regression analysis with the help of the SPSS for the windows computer program in the acquisition of its calculation results. The results show that there is a significant influence between curriculum development on air transportation management competencies wherein curriculum development is stated to be very important in improving competence. The curriculum becomes a guideline because it contains material, objectives, methods, and time allocation regarding air transportation management competencies possessed by Surabaya Aviation Polytechnic cadets.**

***Keywords*— Curriculum, Air Transportation Management Competence, Air Transportation Management**

Paper ID 394

Diverse Forms of V-learning Students' Acceptability During the Pandemic Covid-19

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***Abstract*— Covid-19 pandemic encourages online learning to prevent wider spread. Various types of learning platforms was implemented, but there needs to be an evaluation of student acceptance of the platforms. This study aims to assess the impact of v-learning on student acceptance during a pandemic. The vlearning analyzed is limited to Vilearning Unesa (VU), Google Meet (GM), and Zoom. The information-gathering procedure is implemented through Google Forms and distributed through a WA link. The study is analyzed by a Likert scale for student acceptance, involving easy accessibility, peer instruction, and user experience. Multiple regressions was analyzed by following participant information. The findings indicate discrepancies in student acceptance of the v-learning being applied. VU offers the advantage of incorporating the system into academic services for students, while Zoom has easy and smooth access to the network. Increased primary education learning results are b1: 0.518; b2: 0.119. In other words, although GM lacks personalization facilities, nearly 80% of respondents can accept it. That concludes GM is superior to VU and Zoom according to user satisfaction due to the streamlined infrastructure with GM that Google offers. Future studies are expected to involve observations not only for students but also by lecturer feedback.**

***Keywords*—Covid-19; student acceptance; V-learning; Vilearning Unesa (VU); and Google Classroom (GC); Zoom**

Paper ID 518

Effectiveness of Job Readiness Applications (JRA) to Determine the Working Readiness for Diploma Student

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***Abstract*—The dynamic development of the industrial world requires changes in various aspects. One of them is related to improving the quality of Human Resources. Excellent human resources are needed to be able to compete in all challenges. The current condition shows that the rapid development of the industrial world has not been fully offset by the rapid movement of institution to preparing graduates ready for work. In 2019 the unemployment rate for diploma graduates reach 5.99%. By developing Job Readiness Applications (JRA), diploma student's work readiness levels are known before entering the industry. This research is quantitative descriptive. The purpose of this study is to determine the effectiveness of using Job Readiness Applications (JRA) related to diploma student work readiness. Based on the analysis results it is known that the use of Job Readiness Applications (JRA) related to diploma student work readiness is quite effective.**

***Keywords*—Job Readiness Applications (JRA); Working readiness, Diploma.**

Paper ID 230

Design and Implementation of Different Types of Smart Dustbins System in Smart Campus Environments

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***Abstract*—In Indonesia, waste is still a very serious problem. Garbage causes bad odors, air pollution, disease, and even flooding. Whenever and wherever each individual produces waste, waste can come from households and industries which have various types and forms. Public awareness to dispose of trash in the right place tends to be very lacking, laziness is increasingly formed when dustbins are not widely available, very dirty, the open and close system is still manual so that the hands can easily catch bacteria when interacting with the trash. This study aims to start from a small scope, namely implementing smart dustbins for the campus environment and educating the campus community so that their interest in disposing of garbage in the right place is higher. The recommended smart dustbin system has various types, namely mini-smart dustbin and super-smart dustbin. The waterfall method is used for the process of designing and implementing the system. Methods of data collection using observation, interviews, literature study, and questionnaires. The test results state that the smart dustbin system can function as expected. A total of 50 respondents were involved in evaluating the application of smart dustbin, with the result of an average score of 87.80% who stated strongly agree that the existence of this smart dustbin provides benefits and attracts interest in awareness of throwing garbage in the right place. Furthermore, it is recommended to improve the system and better cooperation by all campus communities which are a shared responsibility.**

***Keywords*—smart dustbin, smart campus, smart city, smart environment, smart system**

A Study On The Development And Transformation Of Caregivers' Work Values (Dynamic Changes Of Nurse-Patient Relationship From Laboring, Nursing, And Caregiving)

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***Abstract*- The caregivers play a crucial role in maintaining the health and happiness of patients, typically losing their selfmanagement abilities. This society should appreciate their work; people in the academic world should envision their work values as well as their inner mindsets in order to provide meaningful rewards and build a favorable nurse-patient relationship. This study, taking qualitative research approaches, was conducted to in-depth understand the caregivers' sense of work value through interviewing both the caregivers and patients and observing interaction behaviors with patients and their families. Authentic data resulted from a series of interviews accompanying on-site observations were analyzed and validated with triangulation according to research purpose. Finally, this study drew the following conclusions: 1. The caregivers generally possessed hearty patient-centered work values perceiving patients as friends, even family members; 2. Their hard work and enthusiastic dedication built the imperative trust as well as respect from patients and hospital professionals, which reciprocally enhanced the caregivers' selfrecognition and work values from laboring up to actualization of social contribution; 3. The caregivers transformed their sense of work values through self-recognition, enthusiastic dedication, affable interaction with colleagues and patients, and selfrespect to the work and people. Caregivers work very hard in workplace, they get positive feedback, and build colorful lives of the patients, their family, and even their own.**

***Keywords*- the caregivers, work values, dynamic changes, nurse-patient relationship**

Paper ID 264

Early Warning System For Flood Disasters Using the Internet of Things

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***Abstract*— Floods are one of the most frequently occurring natural disasters in Indonesia. It is therefore of special concern to reduce the risk of flood fatalities and other damage. The purpose of this study is to design a flood early warning system based on the Internet of Things (IoT). In this work, we use an ultrasonic HC-SR04 sensor to collect information about water levels. Further, we use an MCU8266 node as a microcontroller to analyze the sensor data and test it using a fuzzy inference system (FIS). To monitor the server activities, a Blink application is used as an iCloud IoT to hook up to smartphone devices. The test results show that all the devices function properly and that the system can classify water levels into normal, standby, alert, and danger categories in real time. Thus, the server can send information to the output device before a flood disaster occurs.**

***Keywords*— flood, early warning system, MCU8266, fuzzy inference system, HC-SR04**

Paper ID 348

"The Contributions of Culture-shock to Open-Mindedness for International Students in Engineering and Social Science College in Taiwan"

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***Abstract*- This study aims to understand culture shock and identify various stressors that could cause culture shock among Indonesian students. The various coping strategies used by different cultures to cope with culture shock are also to be identified. A semi-structured interview pattern was used to interview six Indonesian students at the National Yunlin University of Science and Technology who have at least completed their second semester. They were interviewed to identify the stressors that caused them to stress within their first month of their arrival in the new country. Their coping strategy to cope with stress is also identified. The same interview questions were repeated to identify the change in the stress levels and coping strategies in their present context. Stages of culture shock were identified and analyzed from the interviews. The five factors, as identified by the researcher, were put forth to the interviewees to observe their views on these factors that would help them to moderate the effects of stress. The factors that could cause stress are perceived differently, and it varies within the level of Education.**

***Keywords*- Culture shock, Stress, Coping Strategy**

Paper ID 281

New Smart Virtual Content for Hanzi Characters in Mandarin Laboratories

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***Abstract*—Industrial technology is developing rapidly accompanied by learning technology, especially in some virtual applications. Virtual Laboratory is one of the virtual learning applications that is currently being developed in the 4.0 industrial revolution. The use of virtual laboratories in Revolution 4.0 made major contributions in several educational institutions especially inadequate facilities and infrastructure. Recent years of virtual laboratory research have been carried out. Media, models, and materials in the laboratory are some of the things that are mostly developed in virtual laboratories, but the learning developed is limited to one direction. One weakness is the user/user cannot develop content in a virtual laboratory. This research develops intelligent virtual content for virtual laboratories. This intelligent virtual content is developed based on content material that matches the capabilities and expectations of users in the virtual laboratory. Virtual laboratory users are lecturers, students, and third parties. Test smart virtual content in virtual laboratories at Chinese Language University Malang State University students with Hanzi Character material. The results of trials using intelligent virtual content in this virtual laboratory obtain an accuracy value of 90.4%.**

***Keywords*—Virtual Content, virtual Laboratory.**

Paper ID 290

Design of Sea Wave Power Hybrid Power Generation Through Utilization of Wave and Wind Energy as Renewable Electric Energy Sources for Leading, Outermost and Disadvantaged Areas

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***Abstract*— This study conducts the design of sea wave hybrid power plants by combining wave energy with wind energy. Vertical energy of ocean waves is converted into pressurized water energy to rotate turbines connected to direct current generators, while wind energy uses wind turbines connected to direct current generators, the energy produced by both direct current generators will improve the fluctuations in electrical energy that have been faced by ocean wave energy generator. using research and development methods. The wave power generation unit consists of a buffer, piston and cylinder, inlet and outlet valves, reserviors, wind turbines and direct current generators, while wind power consists of wind turbine units, gears and direct current generators. Electrical energy generated by the two units is combined in the control module. This research produces energy that is quite stable and is very suitable to be used as an electricity supply for fishermen in Bagan and the leading, outermost and lagging regions of Indonesia, which has been struggling to get electricity supply.**

Keywords— Hybrid sistem, wave energy, wind energy, leading, outermost and underdeveloped.

Paper ID 295

DEVELOPMENT OF STUDENT ADVERSITY QUOTIENT INSTRUMENTS: QUESTIONNAIRE

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Abstract*— This paper describes the steps in developing an adversity quotient instrument, especially related to determining aspects of student adversity quotient that can be used as a basis for formulating the indicators of adversity quotient, which includes four dimensions including Control, Origin-ownership, Reach, and Endurance. Based on the four dimensions of adversity quotient, several indicators of student adversity quotient will be formulated. These indicators will later be used as a basis for formulating statement items contained in a questionnaire as an instrument for measuring student adversity quotient. The Adversity Quotient instrument is a questionnaire using a Likert scale. with a range of 1-4 with a positive statement that will be answered by students with alternative answers with an answer score: Strongly Agree (SS) = 4; Agree (S) = 3; Disagree (TS) = 2; Strongly Disagree (STS) = 1. The quality of student response questionnaires is determined through validation by three validators. The results of the validation by the experts are included in the validation sheet and given access to comment for the improvement of the instrument, if any. Based on the data it can be concluded that (1) Adversity quotient is a measure of a person's ability to overcome the difficulties he faces into an opportunity to solve them. In other words the concept of adversity quotient is understanding how a person will react to challenges and difficulties in all aspects of his life. (2) Steps that have been taken in the process of developing this Adversity Quotient instrument, (3) Adversity quotient dimensions include control, ownership, reach and endure. Of the four dimensions, several indicators will be formulated which will be used as a reference to develop statements that can be used as questionnaire instruments to explore students' abilities in facing difficulties.

***Keywords*— adversity quotient, developing instrument**

Paper ID 299

Automatic Control Based on Voice Commands and Arduino

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***Abstract*— Control that is widely used today was control by voice commands. This study aimed to determine the application of voice and Arduino-based control automation which had been developed from 2014-2020 based on 25 journals that would be studied. Journal assessments were carried out by taking into account the similarities or differences in each journal. The research method used in this research was literature review by reviewing 25 journals. The results obtained from the journal review showed that the developed voice control consists of 2 types, namely voice recognition and speech recognition. Voice recognition used an easy VR hardware device and a microcontroller, while speech recognition used an application installed on Android, controlling can also be done remotely using bluetooth and the internet. The way the voice control system works was that the user given voice commands via a microphone, then the command would be converted by the voice control module on the EasyVR module or the voice recognition module. The conversion results were sent to the microprocessor and activate the controlled device. Whereas in remote control, the data resulting from the conversion was also sent to the bluetooth module or NodeMCU module which was sent to the microprocessor to activate the controlled device. The factors that affect the voice control system were clear pronunciation, pitch and sound, microphone distance, sound source, intonation and noise level.**

***Keywords*—automation, voice recognition, speech recognition**

Paper ID 306

Conceptual Study Of The Relationship Problem Solving Skills To Critical Thinking Skills In Aircraft Maintenance

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***Abstract*—Aircraft safety and security is a major factor in aviation. Therefore, ensure the aircraft maintenance and repairs carried out correctly, effectively, and efficiency needed to support these factors. This study aims to explain the importance of an aircraft mechanic to have critical thinking skills and the ability to solve the problems in aircraft maintenance. Aircraft mechanics are required to have critical thinking skills that are strictly related to problem-solving skills that are components in the 21st-century intelligence issue. The results of this study found an interrelated relationship between the critical thinking skill and problem-solving in carrying out aircraft maintenance which leads to the ability to think critically, laterally, and systemically, especially in the context of problem-solving and exploring various alternative ways or solutions**

Keywords—critical thinking skill, problem-solving skill, aircraft maintenance

Paper ID 505

DESIGN AND DEVELOPMENT OF CHATBOT USING DIALOG FLOWIN SURYA SEMBADA PDAM SURABAYA CITY

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***Abstract*— Surya Sembada City Surabaya Water Supply Company is a company that provides clean water production. In its service, many complaints are obtained from customers. During this time complaints are carried out manually, of course, less effective. With the development of information technology, the chatbot was born. Chatbot acts as an automated conversation agent. Making this chatbot using the Dialog flow platform with a database stored in the cloud. The design starts with the collection of data obtained from the customer service, followed by making use case diagrams, system architecture, interface design, and chatbot design. The results of this project will be in the form of a chatbot for PDAM Surya Sembada, Surabaya City, which is integrated with Telegram to help optimize company services.**

***Keywords*— chatbot, Dialog flow, customer service**

THE EFFECT OF PROJECT BASED LEARNING (PjBL) AND DIRECT INSTRUCTION (DI) LEARNING MODELS ON LEARNING OUTCOMES OF THE BASICS OF BUILDING CONSTRUCTION AND SURVEY ENGINEERING FROM STUDENT LEARNING MOTIVATION

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***Abstract*-This study aims to: (1) obtain information on differences in learning outcomes, between students who use the project based learning model and the direct instruction model in DKTB, (2) answer the differences in learning outcomes of participants students who have high motivation to learn and students who have low motivation in the subjects of the DKTB, and (3) obtain information on the interaction between the model with learning motivation on student learning outcomes in the subject of DKTB. The research used in this study was quasi experimental, using the control class and the experimental class. The experimental group is a class that uses the PjBL learning model and the control class uses the DI learning model. The research design used was factorial design with hypothesis analysis using two-away ANAVA, the prerequisite test used was homogeneity and normality. The results of processing through SPSS 24 are: (1) there is a difference in learning outcomes of students who use the PjBL learning model the mean value is 82.8 and the DI value is 67.5; (2) there are differences in learning outcomes of students who have high learning motivation of 83.72 and low learning motivation of 74.00; and (3) there is an interaction between the model and students' learning motivation, in the use of the PjBL model of students who have high learning motivation the learning outcomes are high but in the DI model of students who have low learning motivation the learning outcomes are low.**

***Keywords*-Project Based Learning (PjBL) Learning Model, Direct Instruction(DI), and student motivation.**

Paper ID 418

Schoology and Slido; The Perfect Platform Combination for Distance Learning during the Covid-19 Pandemic

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***Abstract*— The Covid-19 pandemic that occurred worldwide caused a social policy for all citizens to break this Covid-19 chain. However, this policy impacts all aspects of life, including the field of education in Indonesia. The government decided to move the learning process from face-to-face learning to online learning from home, called distance learning. This study aims to put forward the Schoology and Slido platform as a perfect combination for teachers during distance learning in the Covid-19 pandemic, compared to platforms that have been used by teachers in general. This study used a descriptive qualitative to 120 teachers from various levels of education in Indonesia. The results show that the most widely used platform is Google Classroom (44.17%), in which 37 people said Google Classroom was effective, and 16 people said it was not. The second most used platform is WhatsApp Group (31.67%), in which eight people said WhatsApp Group was effective, and 30 people said it was not. This result brings up the teacher training in how to use Schoology and Slido as a perfect platform combination for distance learning during the Covid-19 Pandemic. Schoology is an application that consists of full features needed in the learning process. At the same time, Slido is a question and answer platform also polling platform that will make fun interaction in learning. Schoology and Slido can improve the quality of education and interaction between the teachers and students.**

Keywords—distance learning, e-learning, learning media, online education, platform variation

Paper ID 434

The Implementation of Project Based Learning Model Towards The Learning Outcome of Subject Wood Structure I

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***Abstract*—This study aims to compare student learning outcomes using two different tasks in the Project Based Learning (PBL) learning model in a wooden structure course 1. The research method used is Quasi Experiment with pretest-posttest design conducted in 4 meetings. The subjects of this study were 36 UNJ Civil Engineering study program students, who were divided into two groups and then given a pretest related to material about the roof truss. Then the first group (experimental class) 18 people were given the task of making a roof truss construction model while the other group (control class) compiled a report planning the roof truss construction. Then both groups were given a post test. The results showed that based on the independent T test, obtained -3.11 and the value of the T table was 2.306 so it can be said that there was no difference in learning outcomes with two different assignments in the Project Based learning model.**

***Keywords*—PBL, Learning Outcome, Wood Structure**

Paper ID 458

Work Analysis of Constant Current Regulator BF 1200 with Current Loop and Gauss Jordan Method as Learning Media for Cadets

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***Abstract*—Runway lights at the airport are 1-5 km in length, which always connected in series so the pilots look the same bright lights from the beginning of runway until the end of runway. The same bright lights will be on if runway lights connected in series and every lamp obtains the same current flow. The device used to manage every runway in receiving the same current is Constant Current Regulator. Each light is installed a transformator by comparing of primary winding : Primary winding is 1:1 so if there is a lights "Off" while other lights that connected in series are "On". this paper present a CCR Electromagnetic type BF 1200 that will be analyzed how it works with series resonant principle. It can be proven that the basic CCR briefly connected then the magnitude of current is constant, although it is added by compensator, it is not a matter how much the value of load resistance (runway lamp) will still evoke current load. This compensator will absorb current lagging or in other word is to supply current leading. Compensator will carry out the best function if its reactance is as great as reactance. By using current loop and Gaus Jordan methods have found the similarity which reveals the relation between the current with load and can be stated that is not a matter how the load resistance is, will still flow the current load at constant value. Compensator just results the diminished current imaginary on the source side, means that compensator reduce the current source but does not change the current load. Therefore, Constant Current Regulator has changed the constant voltage power supply to be a constant current power supply. The aim of this paper is to define to the cadets about the application of the series resonance theory (voltage resonance), a high voltage producing from this series resonance will be flowed into electrical circuit at runway lights with constant current in accordance with the desired brightness.**

Keywords—Constant Current Regulator, Current Loop Method, Gaus Jordan Method

Data Security and Privacy in Public Cloud Infrastructure using Cryptographic Algorithm

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***Abstract*— Cloud infrastructure is a platform where customers can setup their servers, storage, databases, networking, software, analytics and intelligence via Internet which makes it possible and accessible in any location. It became the trend nowadays and many organizations upload their data storage to cloud. Despite the fact that cloud computing has various advantages one of the biggest problems is data security issue like data loss, breaches and malicious attacks and privacy protection most specially in using the public cloud infrastructure. This are different kinds issues in data security and privacy protection in a cloud computing and with these issues this paper proposes using cryptographic algorithm in terms of data transition while authentication, authorization and confidentiality is intended for privacy protection to be implemented in the proposed system. 128 AES Encryption algorithm is used to encrypt data which will increase data security and confidentiality while the authentication and authorization must be done through user verification which will serve a more secure and reliable system.**

***Keywords*—cloud infrastructure, cloud computing, AES, encryption**

Paper ID 487

Blood Donor Matching Information Systems And Determining Tools For Blood Cluster And Human Rhesus Based On IoT

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***Abstract*— Until now, the process of testing human blood groups is still done manually by mixing blood and antisera. Testing is done by observing the agglutination reaction of blood samples. Then the testing process takes a long time, without storing donor data. this is less effective if the blood is tested a lot and in an emergency. This study aims to create a system that can provide blood donor match information and can determine the blood type and rhesus of humans automatically. This research uses the ABO system method and the rhesus system. The data input of this study uses the LDR voltage values illuminated by LEDs. Furthermore, the voltage value is processed by Arduino Uno. The data output is displayed on the LCD and android smartphone application, using the NodeMCU WiFi module ESP8266. The application comes with a data store called Microsoft Excel. Based on test results, the system is able to determine blood groups with a voltage range detecting agglutination LDR1 = 0-1,3345 Volts, LDR2 = 0-1,2955 Volts and LDR3 = 0-1,183 Volts. While the voltage range does not detect agglutination LDR1 = 1.3345-2.2 Volts, LDR2 = 1.2955-2.2 Volts and LDR3 = 1.183-2.2 Volts. The percentage of system accuracy is 97.5%, with an average detection time of 02.43 seconds for the instrument and 20.33 seconds for the application.**

Keywords— Blood Type, Blood Donor, Internet of Things

Paper ID 494

Home Monitoring and Control Using Smartphone and Speech Processing

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***Abstract*— Monitoring and control of home electronic equipment in general is still done manually, this is less efficient if we are not at home but want to monitor the condition of the electronic equipment. With the remote control using a smartphone can be a solution to simplify the control system and monitoring of electronic equipment. In this study, we propose to use voice input to control electronic equipment based on speech commands in a smartphone application. The method used in recognizing sound uses Dynamic Time Wrapping. After several tests, the results of the detection of speech commands in the form of "letters / characters" have a high success rate of 100%, while the "word" command tests have a success rate of 87% and the results of tests of commands in the form of pronouncing "sentences" have a success rate of 57 %. So that from the system that has been made, the more sentences are spoken, the accuracy is low.**

***Keywords*— Home Monitoring, Smartphone Control, Speech Processing, Dynamic Time Warping**

THE EFFECTS OF SELF-EFFICACY ON THE COMPETENCY OF CADETS IN AVIATION POLYTECHNIC OF SURABAYA

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***Abstract*— This study aims to analyze the effects of selfefficacy on the Competency of Cadets in Surabaya Aviation Polytechnic. This study is causal research with a quantitative approach. As the object of this study, the researcher decided to use a polytechnic institution located in Surabaya namely Surabaya Aviation Polytechnic which has competence in air flights. The population taken for this study is a total of 96 cadets, with a saturated sampling technique in which the researcher will be able to get a sample of all 96 cadets from the population pool. To collect the data, the researcher uses a questionnaire that is distributed to respondents by the specified number of samples. The analysis technique used in this study is a simple linear regression in which the results of the questionnaire are processed into quantitative values using a choice of questionnaires using a Likert value scale. The results show that significant value in the F-test selfefficacy variable of 0,031 or smaller than the level of significance (α) which is 0,05. The influence of these two variables is positive, which means that the higher the selfefficacy, the higher the Competency. Based on the results and the research discussion can be concluded that there are significant positive effects of Self Efficacy towards Competency in Surabaya Aviation Polytechnic.**

***Keywords*— Self Efficacy, Competency, Saturated Sampling**

Lampiran 2.11

Sertifikat Pemakalah

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CERTIFICATE

TO:

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A Dual UPQC to Mitigate Sag/Swell, Interruption, and Harmonics on Three Phase Low Voltage Distribution System

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Abstract-The Unified Power Quality Conditioner (UPQC) is a combination of a series active filter (SeAF) and a shunt active filter (ShAF) connected in parallel by a DC link capacitor. This device can mitigate power quality (PQ) problems i.e. sag/swell, harmonics, and unbalance on the source and load bus of three-phase three-wire (3P3W) on low voltage distribution systems simultaneously. The disadvantage of UPQC is that it is unable to overcome the voltage interruption so that the source can not deliver power to the load. This paper proposes a dual UPQC model to overcome the voltage interruption on the source bus so that the load bus continues to get power supply. There are six disturbance cases i.e. sinusoidal supply-sag-non-linear load (S-Sag-NL-L), sinusoidal supply-swell-NL-L (S-Swell-NL-L), sinusoidal-interruption-NL-L (S-Inter-NL-L), distorted supply-sag-NL-L load (D-Sag-NL-L), distorted supply-swell-NL-L (D-Swell-NL-L), and distorted supply-interruption-NL-LL (D-Inter-NL-L). The proportional Integral (PI) method is used to control the SeAF and the ShAF in the dual UPQC circuit model. The simulation results show that in the D-Inter-NL-LL case, a Dual UPQC model can maintain a load voltage magnitude of 266.60 V (voltage drop only of 14%), higher compared to a Single UPQC model of 173.97 V (voltage drop of 43.88%). In the same case, a dual UPQC model is capable of resulting in an average total harmonics distortion (THD) of load voltage of 10.10%, lower compared to a single UPQC model of 26.70%.

Keywords—Dual/Single UPQC, Sag/Swell, Interruption, Harmonics.

I. INTRODUCTION

In recent decades, the use of NL-Ls by customers has contributed to a decrease in the PQ in power system, causing current distortion in the load buses. On the other hand, the presence of sensitive loads and voltage distortion on the source bus also causes several voltage disturbances, thereby also causing a decrease in voltage. To solve the problem of worsening PQ due to the use of sensitive loads/NL-Ls and voltage distortion, a single UPQC is proposed [1]. The single UPQC consists of a SeAF and a ShAF connected in parallel via a DC-link capacitor and serves to mitigate a number of PQ problems on the source and load sides simultaneously [2]. The SeAF functions to reduce several of voltage disturbances on the source bus. Meanwhile, the ShAF functions to overcome several current quality problems on the load bus [3].

To anticipate the failure of both inverters in a single UPQC circuit, a dual UPQC model was developed. The advantage of a dual UPQC is that it has a more reliable inverter circuit structure and control because if there is a disturbance in one of the inverters, the UPQC system is still able to operate normally [4]. The dual or interline UPQC consists of two active filters, namely SeAF and ShAF (parallel active filters). Different from the single UPQC, the dual UPQC has a SeAF which is controlled as a sinusoidal current source, and a ShAF which is controlled as a sinusoidal voltage source. Thus the dual UPQC with pulse width modulation (PWM) control is controlled using a sinusoidal reference, in contrast to a single UPQC which is still controlled using a non-sinusoidal reference.

Implementation of dual UPQC circuit and control, to improve PQ on the source and load side of the low voltage distribution system has been discussed in several papers. The simplification technique UPQC control has been proposed in [5] and developed on the ABC reference frame using the sinusoidal reference synchronization theory. In [6], a comparison of two different controls has been carried out to generate the PWM reference signal using the α-β and d-q reference frames, respectively. The comparison of the operating performance of single UPQC and dual UPQC in a 3 phase 3 wire (3P3W) system under static and dynamic disturbances has been carried out through simulations [7] and experiments [8]. The improvement of PQ using dual UPQC under conditions of sudden load changes has been done by [9]. The study, analysis, and implementation of the dual UPQC model that can be connected to a 3P3W or three-phase four-wire (3P4W) [10] and 3P4W distribution system [11] with PI control have been applied. The analysis to balance reactive power between SeAF and ShAF on a dual UPQC using power angle control has been carried out in [12]. The weakness of the UPQC is that it is unable to overcome the disturbance caused by interruption voltage on the source bus so that the load bus experiences blackouts [3].

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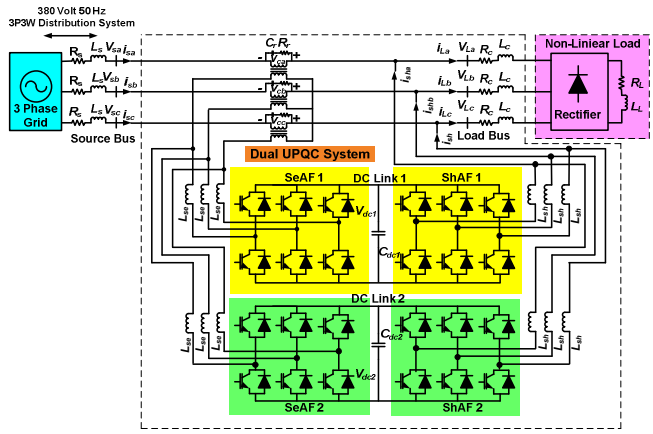

Fig. 1 Proposed model of a dual UPQC connected to 3P3W system

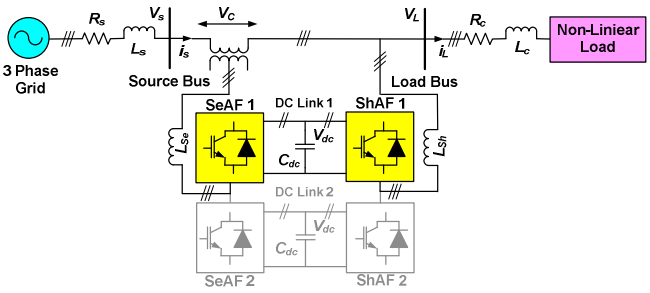

Fig. 2. Model of a single UPQC in single phase system

The paper proposes a dual UPQC model to overcome interruption voltage in the source bus so that the load bus still gets power supply. To provide a performance of the proposed model, the simulation parameter results of the dual UPQC model are further validated with a single UPQC model.

II. RESEARCH METHOD

A. *Proposed Method*

This research aims to mitigate interruption voltage, sag/swell voltage, and harmonics in the 3P3W distribution system using a dual UPQC model. This power electronic device is used to overcome the weakness of a single UPQC in maintaining the magnitude of load voltage so that the load bus is still supplied with power if interruption voltage happens on the source bus. The dual UPQC circuit is located between the load bus and connected to the source bus (PCC) via a 380 V (L-L) low-voltage distribution line with a frequency of 50 Hz. The PI controller is used in a dual UPQC circuit model. There are six disturbance cases i.e. (1) S-Swell-NL-L, (2) S-Sag-NL-L, (3) S-Inter-NL-L, (4) D-Swell-NL-L, (5) D-Sag-NL-L, and (6) D-Inter-NL-L.

In case 1, the system is connected to a NL-L and the sinusoidal source runs into a swell voltage of 50%. In case 2, the system is connected to a NL-L and the sinusoidal source runs into a sag voltage of 50%. In case 3, the system is connected to a NL-L and the sinusoidal source runs into an interruption voltage of 100%. In case 4, the system is connected to a NL-L, the source generates 5th and 7th odd-order harmonic components with individual harmonic distortion each of 5% and 2%, as well as runs into a swell voltage of 50%. In case 5, the system is connected to a NL-L,

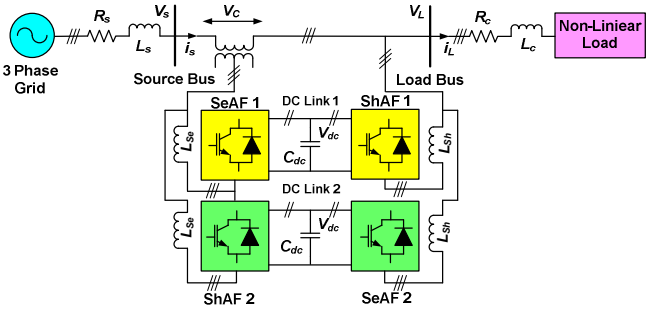

Fig. 3. Model of a dual UPQC in single phase system.

the source generates 5th and 7th odd-order harmonic components with individual harmonic distortion values each of 5% and 2%, as well as runs into a sag voltage of 50%. In case 6, the system is connected to a NL-L, the source generates 5th and 7th odd-order harmonic components with individual harmonic distortion each of 5% and 2%, as well as runs into interruption voltage of 100%. The total simulation time for all disturbance cases is equal to 0.7 s with a disturbance duration of 0.3 s between t = 0.2 s to t = 0.5 s.

The mitigation analysis of PQ problems in this paper i.e. improve load voltage magnitude and reduce harmonics due to interruption voltage, sag/swell voltage, and source voltage harmonic distortion, as well as reduce source current harmonics due to NL-Ls. Finally, the simulation results of all parameters in a dual UPQC model are then validated with a single UPQC model to provide an overview of the performance advantages of the proposed model. Figure 1 shows the proposed model of a dual UPQC connected to a 3P3W distribution system. Figure 2 and Figure 3 show the proposed model of a single and a dual UPQC in a single-phase system. The parameter of the proposed model is shown in Appendix I.

B. *Control of Dual Series Active Filter*

The SeAF control on a single UPQC has been fully described in [13]. Based on this circuit model, the SeAF control circuit on the dual UPQC is arranged by duplicating a single SeAF control circuit while still using one series of three-phase series transformers. Then based on this procedure, the authors further propose complete control of the dual UPQC whose model is shown in Figure 4. The distorted source voltage is calculated and divided by the base input voltage peak amplitude V_m , as described in Eq. (1) [14].

$$V_m = \sqrt{\frac{2}{3}(V_{sa}^2 + V_{sb}^2 + V_{sc}^2)} \quad (1)$$

C, *Control of Dual Shunt Active Filter*

The ShAF control on a single UPQC has been described in detail in [13]. Based on this circuit model, the dual UPQC ShAF control circuit is arranged by duplicating the control circuit on a single ShAF. Using the "p-q" method, the voltages and currents can be transformed into the $\alpha - \beta$. The axis as indicated in Eq. (2) and Eq. (3) [15].

$$\begin{bmatrix} v_\alpha \\ v_\beta \end{bmatrix} = \begin{bmatrix} 1 & -1/2 & -1/2 \\ 0 & \sqrt{3}/2 & -\sqrt{3}/2 \end{bmatrix} \begin{bmatrix} V_a \\ V_b \\ V_c \end{bmatrix} \quad (2)$$

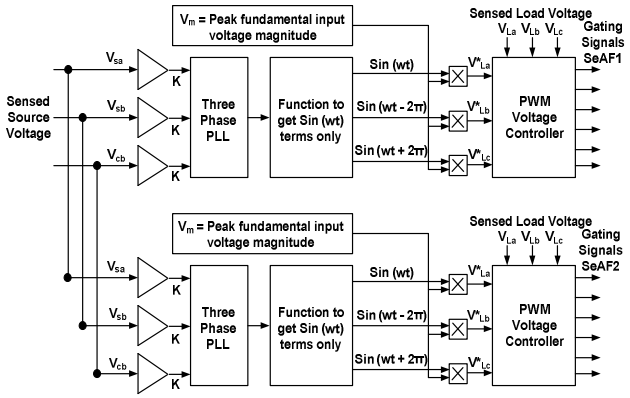

Fig. 4 Dual series active filter control

$$\begin{bmatrix} i_\alpha \\ i_\beta \end{bmatrix} = \begin{bmatrix} 1 & -1/2 & -1/2 \\ 0 & \sqrt{3}/2 & -\sqrt{3}/2 \end{bmatrix} \begin{bmatrix} i_a \\ i_b \\ i_c \end{bmatrix} \quad (3)$$

The computation of true power (p) and imaginary power (q) is presented in Eq. (4)[14].

$$\begin{bmatrix} p \\ q \end{bmatrix} = \begin{bmatrix} v_\alpha & v_\beta \\ -v_\beta & v_\alpha \end{bmatrix} \begin{bmatrix} i_\alpha \\ i_\beta \end{bmatrix} \quad (4)$$

$$p = \bar{p} + \tilde{p} \;;\; q = \bar{q} + \tilde{q} \quad (5)$$

The total imaginary power (q) and fluctuating component of true power $(\tilde{p})$ are chosen as power references and current references and are used by using Eq. (5) to balance the harmonics and reactive power [16].

$$\begin{bmatrix} i^*_{c\alpha} \\ i^*_{c\beta} \end{bmatrix} = \frac{1}{v_\alpha^2 + v_\beta^2} \begin{bmatrix} v_\alpha & v_\beta \\ v_\beta & -v_\alpha \end{bmatrix} \begin{bmatrix} -\tilde{p} + \bar{p}_{loss} \\ -q \end{bmatrix} \quad (6)$$

The authors propose a model of a dual ShAF control presented in Figure 5.

The $\bar{p}_{loss}$ parameter is collected from the voltage controller and is used as average true power. The compensation current $(i^*_{c\alpha}, i^*_{c\beta})$ is used to fulfill load power consumption as presented in Eq. (6). The current is stated in coordinates $\alpha - \beta$. The current compensation is needed to gain source current in each phase by using Eq. (7). The source current in each phase $(i^*_{sa}, i^*_{sa}, i^*_{sa})$ is stated in the ABC coordinates gained from the compensation current in $\alpha\beta$ axis and is expressed in Eq. 7 [16].

$$\begin{bmatrix} i^*_{sa} \\ i^*_{sb} \\ i^*_{sc} \end{bmatrix} = \sqrt{\frac{2}{3}} \begin{bmatrix} 1 & 0 \\ -1/2 & \sqrt{3}/2 \\ -1/2 & -\sqrt{3}/2 \end{bmatrix} \begin{bmatrix} i^*_{c\alpha} \\ i^*_{c\beta} \end{bmatrix} \quad (7)$$

To operate properly, the dual UPQC must have a minimum DC-link voltage(V_{dc}) stated in Eq.8 [17]:

$$V_{dc} = \frac{2\sqrt{2}V_{LL}}{\sqrt{3}m} \quad (8)$$

Using the modulation value (m) equal to 1 and the line to line source voltage (V_{LL}) of 380 V, V_{dc} was calculated to be equal to 620.54 V and set at 650 V. The dual ShAF input indicated in Fig. 6 is DC voltage 1 (V_{dc1}) and reference of DC

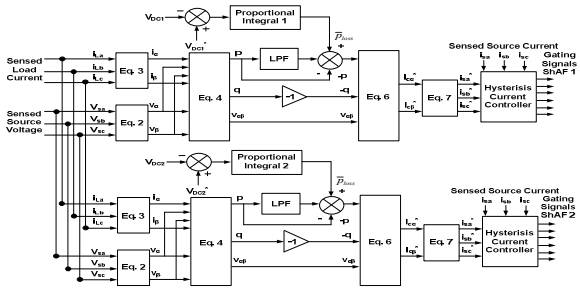

Fig. 5. Dual shunt active filter control

voltage 1 (V^*_{dc1}) as well as DC voltage 2 (V_{dc2}) and reference of DC voltage 2 (V^*_{dc2}), while P_{loss} is selected as the output using the PI controllers 1 and 2. Furthermore, P_{loss} will be an input variable to generate the reference source currents $(i^*_{sa}, i^*_{sa}, i^*_{sa})$. Then, the reference source currents output is compared with the current sources (i_{sa}, i_{sb}, i_{sc}) by hysteresis current regulator to result in a trigger signal in the IGBT circuit of ShAF 1 and ShAF 2. In this paper, the PI controllers 1 and 2 are proposed as the control algorithms of the DC voltages 1 and 2 on ShAF 1 and ShAF 2, respectively.

D. Percentage of Sag/Swell and Interruption Voltage

The standard of monitoring sag/swell and interruption voltage as a part of PQ parameters is IEEE 1159-1995 [18]. This standard presents a definition and table of voltage sag/voltage and interruption base on categories (instantaneous, momentary, and temporary) typical duration, and typical magnitude. The percentage of disturbances i.e. sag/swell and interruption voltage are proposed by authors in Eq. (9) below:

$$Disturb\ Voltage\ (\%) = \frac{|Vpre\_disturb - V\_disturb|}{Vpre\_disturb} \quad (9)$$

II. RESULT AND DISCUSSION

The proposed model analysis is carried out by set two UPQC models, i.e. single UPQC and dual UPQC. There are six disturbance cases in each UPQC i.e. (1) S-Swell-NL-L, (2) S-Sag-NL-L, (3) S-Inter-NL-L, (4) D-Swell-NL-L, (5) D-Sag-NL-L, and (6) D-Inter-NL-L. Using Matlab/Simulink, the model is run based on selected cases to get the magnitude of source voltages (V_{Sa}, V_{Sa}, V_{Sa}), load voltages (V_{La}, V_{Lb}, V_{Lc}), source currents (I_{Sa}, I_{Sb}, I_{Sc}), and load currents (I_{La}, I_{Lb}, I_{Lc}) as well as their average values. Furthermore, THD of source voltage, THD of load voltage THD of source current, and THD of load current in each phase, and their average value are also determined based on the curves obtained previously. The total simulation period lasts 0.7 s with a duration of disturbance between 0.2-0.5 s. The THD of voltage and current in each phase is determined in one cycle starting at t = 0.35 s. Based on the load voltage value, then disturbance voltage percentage value (%) is obtained using equation (9), with a pre-disturbance voltage of 310 V. The simulation results of voltage and current magnitudes, THD of voltage and current, and percentage of load voltage disturbances in six cases are presented in Table 1, Table 2, (Appendix II) and Table 3 respectively. Figure 6 and Figure 7 (Appendix III) show the performance of a single UPQC and a dual UPQC respectively, in the D-Inter-NL-L case.

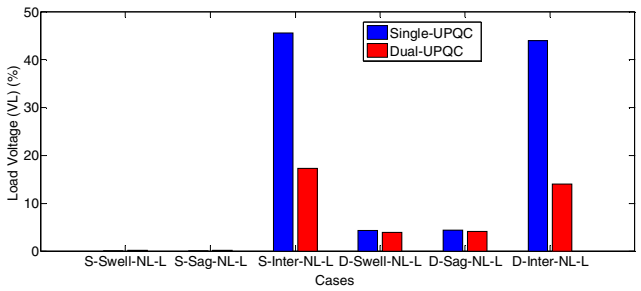

Fig. 8. Performance of the load voltage percentage between a Single-UPQC and a Dual-UPQC

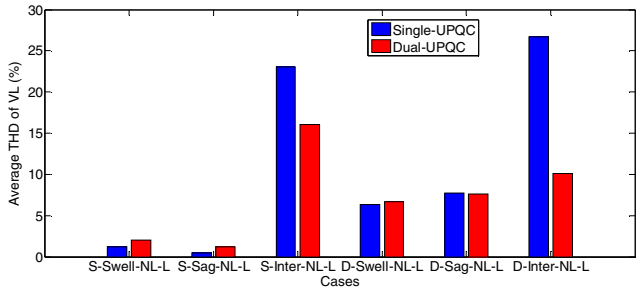

Fig. 9. Performance of the average load voltage harmonics between a Single -UPQC and a Dual-U

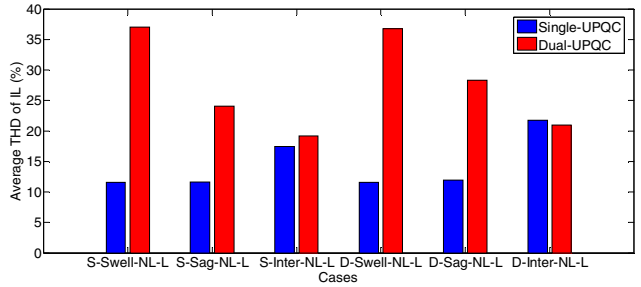

Fig. 10. Performance of the average source current harmonics between a Single-UPQC and a Dual-UPQC

Table 1 and Figure 8 show that in both S-Sag/Swell-NL-L and D-Sag/Swell-NL-L cases, the implementation of a dual UPQC model results in a slightly higher percentage of load voltage disturbance than a single UPQC model. In the D-Inter-NL-L case, a dual UPQC model is able to maintain a more stable load voltage of 266.60 V compared to a single UPQC model of 173.97 V. Table 3 and Figure 8 also show that in the D-Inter-NL-L case, a dual UPQC circuit is also capable of resulting in a smaller percentage of load voltage disturbance of 14%, compared to a single UPQC circuit of 43.88%. In this case, the SeAF circuit on a Dual UPQC with PI controller can inject a larger series power, so that it is also able to produce a higher load voltage and a lower percentage of load voltage disturbance than a single UPQC.

Table 2 and Figure 9 show that in both S-Sag/Swell-NL-L and D-Sag/Swell-NL-L fault cases, the implementation of a dual UPQC model results in a slightly higher average THD of the load voltage than a single UPQC model. In the D-Inter-NL-LL case, a dual UPQC circuit can produce a much lower load voltage average THD of 10.10% compared to a single UPQC circuit of 26.70 %. In this case, the SeAF circuit on a dual UPQC with PI controller can inject a larger series compensation voltage, so that it is also able to reduce the harmonics content of load voltage and result in the average THD value is smaller than a single UPQC.

Table 2 and Figure 10 show that in S-Sag/Swell-NL-L and D-Sag/Swell-NL-L cases, the implementation of a dual UPQC model produces higher source current average THD than a single UPQC model. In the D-Inter-NL-L case, a dual UPQC circuit can produce a slightly lower source current average THD of 21.01% compared to a single UPQC circuit of 21.77%. In this case, the ShAF circuit on a dual UPQC with PI controller is able to inject a slightly larger shunt compensation current, so that it is also able to reduce the harmonics content of source current, and result in the average THD value is slightly smaller than a single UPQC.

IV. Conclusion

The implementation of UPQC to mitigate PQ problems i.e. sag/swell, interruption, and harmonics on the source and load bus of 3P3W on low voltage distribution system simultaneously has been presented. There are six disturbance cases i.e. S-Sag-NL-L, S-Swell-NL-L, S-Inter-NL-L, D-Sag-NL-L, D-Swell-NL-L, and D-Inter-NL-L. The PI method is used to control SeAF and ShAF in the dual UPQC circuit model. The simulation results show that in the D-Inter-NL-L case, a dual UPQC model is able to maintain a load voltage magnitude, higher compared to a single UPQC model. In the D-Inter-NL-L case, a dual UPQC circuit is also capable of resulting in a smaller percentage of load voltage disturbance compared to a single UPQC circuit. In the same case, a dual UPQC model is capable of resulting in an average THD of load voltage, lower compared to a single UPQC model. In the D-Inter-NL-L case, the percentage of load voltage disturbance on a 3P3W system using a dual UPQC still has not reached the limit below 10 percent. The THD of load voltage and source current also still exceed the IEEE-519 standard. The implementation of renewable energy generators i.e. a photovoltaic and/or a wind turbine as well as advanced control based on artificial intelligence on ShAF circuits i.e. fuzzy logic, neural network, or ANFIS, then can be selected as future work to overcome this problem.

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APPENDIX I

The 3P3W source: root means square voltage 380 V (line to line), 50 Hz, line impedance: R_S = 0.1 ohm, L_S = 15 mH; SeAF and ShAF: series inductance L_{Se} = 0.015 mH; shunt inductance L_{Sh} = 15 mH; compensation transformer: rating 10 kVA, 50 Hz, transformation ratio (N_1/N_2) = 1:1; NL-L: resistance R_L = 60 ohm, inductance L_L = 0.15 mH, load impedance R_C = 0.4 ohm and L_C = 15 mH; DC-link 1 and 2: DC voltage 1 and 2 V_{dc} = 650 volt and capacitance 1 and 2 C_{dc} = 3000 µF; PI controller 1 and 2: K_P = 0.2, K_I = 1.5; input: $V_{dc-error}$ and $\Delta V_{dc-error}$; output: power losses ($\bar{p}_{loss}$).

APPENDIX II

TABLE I. MAGNITUDE OF VOLTAGE AND CURRENT USING SINGLE UPQC AND DUAL UPQC ON SIX DISTURBANCE CASES

Case	Source Voltage V_S (V)				Load Voltage V_L (V)				Source Current I_S (A)				Load Current I_L (A)			
	A	*B*	*C*	*Avg*	*A*	*B*	*C*	*Avg*	*A*	*B*	*C*	*Avg*	*A*	*B*	*C*	*Avg*
Single UPQC																
1	464.4	464.6	464.6	**464.53**	310.0	309.9	309.9	**309.93**	8.381	8.382	8.379	**8.381**	8.586	8.584	8.585	**8.585**
2	153.4	153.4	153.4	**153.40**	310.1	310.1	310.1	**310.10**	16.61	16.38	16.42	**16.470**	8.588	8.586	8.589	**8.588**
3	0.9984	0.8963	1.022	**0.970**	172.2	161.5	173.3	**169.00**	9.345	8.621	9.130	**9.032**	4.647	4.356	4.606	**4.536**
4	464.6	464.6	464.6	**464.60**	320.2	322.8	326.9	**323.30**	8.732	8.697	8.723	**8.717**	8.927	8.974	8.991	**8.964**
5	153.7	153.8	153.7	**153.73**	295.6	296.0	297.5	**296.37**	13.97	13.45	14.00	**13.807**	8.245	8.17	9.097	**8.504**
6	0.9641	1.136	0.8586	**0.990**	173.7	179.6	168.6	**173.97**	8.601	10.27	8.507	**9.126**	5.105	4.561	4.589	**4.752**
Dual UPQC																
1	464.8	464.8	464.8	**464.80**	310.4	310.4	310.5	**310.43**	10.45	10.46	10.44	**10.450**	8.605	8.604	8.604	**8.604**
2	154.1	154.1	154.1	**154.10**	309.4	309.5	309.4	**309.43**	13.84	13.9	13.92	**13.887**	8.567	8.557	8.574	**8.566**
3	1.728	1.634	1.868	**1.74**	256.5	245	268.1	**256.53**	16.61	15.42	19.94	**17.323**	7.323	6.8	7.192	**7.105**
4	464.8	464.8	464.8	**464.80**	318.9	321.9	325.9	**322.23**	10.97	10.86	10.92	**10.917**	8.916	8.934	8.934	**8.928**
5	154.3	154.3	154.2	**154.27**	297.3	299	295.6	**297.30**	12.12	12.68	12.68	**12.493**	8.286	8.342	8.098	**8.242**
6	1.404	1.473	1.621	**1.50**	266.4	267.1	266.3	**266.60**	12.66	13.27	16.71	**14.213**	7.018	7.441	7.365	**7.275**

TABLE II. THD OF VOLTAGE AND CURRENT USING SINGLE UPQC AND DUAL UPQC ON SIX DISTURBANCE CASES

Case	Source Voltage THD (%)				Load Voltage THD (%)				Source Current THD (%)				Load Current THD (%)			
	A	*B*	*C*	*Avg*	*A*	*B*	*C*	*Avg*	*A*	*B*	*C*	*Avg*	*A*	*B*	*C*	*Avg*
Single UPQC																
1	0.79	0.78	0.79	**0.79**	1.24	1.23	1.24	**1.24**	11.63	11.57	11.57	**11.59**	22.30	22.30	22.30	**22.30**
2	0.98	0,98	0.98	**0.65**	0.49	0.49	0.48	**0.49**	11.68	11.68	11.59	**11.65**	22.28	22.29	22.28	**22.28**
3	83.18	109.82	87.01	**93.34**	23.84	24.37	21.02	**23.08**	20.66	19.45	12.23	**17.45**	26.84	21.48	17.66	**21.99**
4	3.63	3.67	3.71	**3.67**	4.90	6.42	7.69	**6.34**	11.63	11.42	11.71	**11.59**	22.46	21.82	22.47	**22.25**
5	11.07	10.9	10.76	**10.91**	8.41	7.80	7.09	**7.77**	11.14	12.93	11.76	**11.94**	21.76	23.42	21.77	**22.32**
6	1756.97	1463	1917	**1712.32**	21.53	31.74	26.82	**26.70**	17.16	21.84	26.31	**21.77**	24.96	31.51	24.62	**27.03**
Dual UPQC																
1	1.35	1.36	1.36	**1.36**	2.06	2.08	2.07	**2.07**	36.9	36.91	37.09	**36.97**	22.36	22.35	22.37	**22.36**
2	2.47	2.44	2.49	**2.47**	1.24	1.22	1.26	**1.24**	24.07	23.98	24.14	**24.06**	22.36	22.35	22.38	**22.36**
3	147.28	154.6	132.19	**144.69**	16.53	13.1	18.56	**16.06**	21.00	16.69	19.94	**19.21**	24.30	22.91	22.82	**23.34**
4	3.68	3.82	3.98	**3.83**	5.36	6.55	8.16	**6.69**	36.71	36.46	37.11	**36.76**	22.40	22.17	22.54	**22.37**
5	10.87	10.97	11.64	**11.16**	6.92	7.12	8.86	**7.63**	28.85	26.10	29.88	**28.28**	22.15	23.19	23.14	**22.83**
6	1211.59	1139.13	1053.34	**1134.69**	11.21	11.64	7.45	**10.10**	24.82	21.50	16.71	**21.01**	22.07	22.65	22.13	**22.28**

APPENDIX III

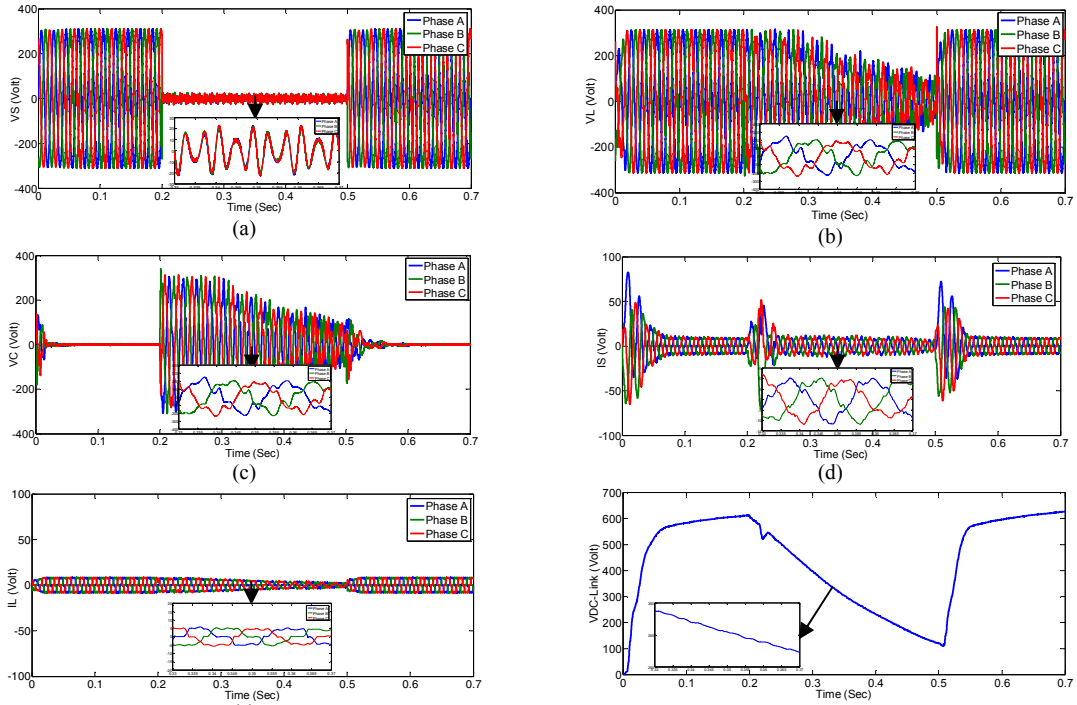

Fig. 6. Performance of a single UPQC under Dis-Inter-NL-L case: (a) source voltages (V_{Sa}, V_{Sa}, V_{Sa}); (b) load voltages (V_{La}, V_{Lb}, V_{Lc}); (c) compensation voltages (V_{Ca}, V_{Cb}, V_{Cc}); (c) source currents (I_{Sa}, I_{Sb}, I_{Sc}); load currents (I_{La}, I_{Lb}, I_{Lc}); and DC-link voltage $(V_{DC-Link})$

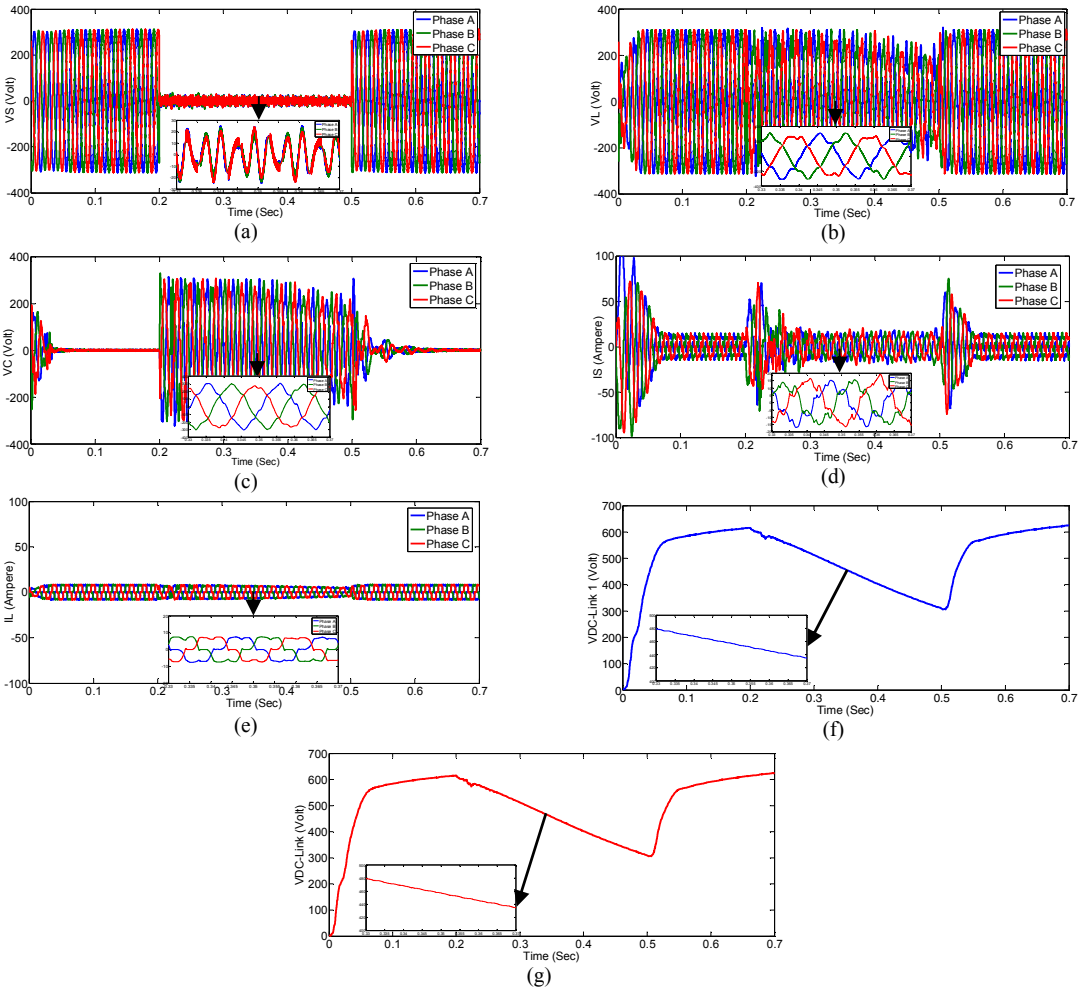

Fig. 7. Performance of a dual UPQC under Dis-Inter-NL-L case: (a) source voltages (V_{Sa}, V_{Sa}, V_{Sa}); (b) load voltages (V_{La}, V_{Lb}, V_{Lc}); (c) compensation voltages (V_{Ca}, V_{Cb}, V_{Cc}); (d) source currents (I_{Sa}, I_{Sb}, I_{Sc}); (e) load currents (I_{La}, I_{Lb}, I_{Lc}); (f) DC-link voltage 1 $(V_{DC-Link1})$; and (g) DC-link voltage 2 $(V_{DC-Link2})$