

**Program Book**

**ICWT 2019**  
**5<sup>th</sup> International Conference on**  
**Wireless and Telematics**  
<http://icwt-seei.org/2019/>

July 25 – 26, 2019  
Sahid Jaya Hotel & Convention  
Yogyakarta, Indonesia

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5<sup>th</sup> International Conference Wireless and Telematics (ICWT) 2019

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**Conference Record Number 47785**

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## Message from the General Chair



It gives me a great pleasure to welcome you to the 5th International Conference on Wireless and Telematics (ICWT) 2019. ICWT is one of the conferences which are organized by Telecommunications Engineering Research Group, School of Electrical Engineering and Informatics, Institut Teknologi

Bandung (STEI–ITB). This year, the 5th ICWT 2019 is held in the special region of Yogyakarta, Indonesia.

ICWT has been expected to become one of the important conferences in Indonesia on the area of information and communications technology. This conference provides a forum for universities, industries, government, and public sectors to expose and exchange their innovative ideas and methods.

Since 2015, this conference has brought together a tremendous and rich diversity of authors and speakers to share ideas and new perspectives on a wide range of research on information and communication technologies topics. This year, we have more than 80 submissions whose authors span not only from domestic universities but also from our overseas colleagues, such as: Srilangka, China, Saudi Arabia, and Netherland.

The 5th ICWT 2019 is honored to have distinguished keynote speaker, Mr. Anang Achmad Latif Director of the Indonesia Universal Service Obligation Agency (BAKTI—*Badan Aksesibilitas Telekomunikasi dan Informasi*). He will share his vision and talk about achievement and priority programs of his

agency. Therefore, I would like to thank our keynote speaker Mr. Anang Achmad Latief for accepting my invitation.

The 5th ICWT 2019 will not happen without the hard work of the organizers behind the scenes. We had an excellent team that has worked very hard to organize ICWT 2019. I would like to thank Universitas Islam Negeri Sunan Gunung Djati as our co-host, the steering committee especially the Dean of STEI – ITB; International advisory committee; Our Sponsors; and particularly I want to thank all members of the Technical Program Committee for their hard work in providing thorough and insightful reviews in timely manner. Special thanks also go to all authors since ICWT 2019 would not be possible without the contributions of the authors.

Finally, I wish all participants a successful and fruitful conference. I hope you will find this program interesting, useful, and stimulating. Do not forget to enjoy Yogyakarta, the beautiful paradise of Indonesia.

Prof. Dr. Ir. Nana Rachmana Syambas  
General Chair

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and Informatics  
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## **Technical Program**

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## 5<sup>th</sup> ICWT 2019 Conference Program – at a Glance

| <b>Thursday, 25 July 2019 (Day 1)</b> |   |
|---------------------------------------|---|
| 08.00 - 09.00                         | <b>REGISTRATION</b>   |
| 09.00 - 09.05                         | <b>General Chair Report</b><br>Prof. Dr. Ir. Nana Rachmana Syambas, M.Eng.<br>General Chair 5 <sup>th</sup> ICWT 2019 |
| 09.05 - 09.10                         | <b>Welcome Remarks</b><br>Dean of Faculty of Science and Technology of UIN  |
| 09.10 - 09.15                         | <b>Opening Speech</b><br>Dean of STEI ITB   |
| 09.15 - 09.40                         | <b>Keynote Speech</b><br>Anang Ahmad Latif  |
| 09.40 - 09.55                         | <b>Patron Speech</b><br>Iforte  |
| 09.55 - 10.05                         | <b>Photo Session</b>  |
| 10.05 - 10.30                         | <b>COFFEE BREAK</b>   |

| <b>Thursday, 25 July 2019 (Day 1)</b> |                             |  |  |
|---------------------------------------|-----------------------------|--|--|
|                                       | <b>PARALLEL SESSIONS</b>    |  |  |
|                                       | <i>Room 1</i>               | <i>Room 2</i>  | <i>Room 3</i>  |
|                                       | <b>Track:<br/>Education</b> | <b>Track: Software<br/>Engineering and<br/>Information<br/>System (pt.1)</b> | <b>Track: Hardware<br/>and RF Devices<br/>(pt.1)</b> |
| 10.30 - 10.45                         | Paper ID 050202             | Paper ID 050219  | Paper ID 050213                                      |
| 10.45 - 11.00                         | Paper ID 050326             | Paper ID 050222  | Paper ID 050328                                      |
| 11.00 - 11.15                         | Paper ID 050245             | Paper ID 050325  | Paper ID 050130                                      |
| 11.15 - 11.30                         | Paper ID 050148             | Paper ID 050227  | Paper ID 050235                                      |
| 11.30 - 11.45                         | Paper ID 050267             | Paper ID 050231  | Paper ID 050241                                      |
| 11.45 - 12.00                         | Paper ID 050268             | Paper ID 050242  | Paper ID 050244                                      |
| 12.00 - 12.15                         | Paper ID 050273             | Paper ID 050243  | Paper ID 050252                                      |
| 12.15 - 13.15                         | <b>LUNCH</b>                |  |  |

| <b>Thursday, 25 July 2019 (Day 1)</b> |   |  |  |  |
|---------------------------------------|---|--|--|--|
|                                       | <b>PARALLEL SESSION</b>                               |  |  | <b>POSTER</b>  |
|                                       | <i>Room 1</i>   | <i>Room 2</i>  | <i>Room 3</i>                                      | <i>Ballroom</i>  |
|                                       | <b>Track: Wireless and Mobile Communication</b>       | <b>Track: Software Engineering and Information System (pt.2)</b> | <b>Track: IoT and Emerging Technologies (pt.1)</b> | Paper ID (05xxxx)  |
| 13.15 - 13.30                         | Paper ID 050208                                       | Paper ID 050251  | Paper ID 050203                                    | -  |
| 13.30 - 13.45                         | Paper ID 050018                                       | Paper ID 050257  | Paper ID 050206                                    | -  |
| 13.45 - 14.00                         | Paper ID 050023                                       | Paper ID 050259  | Paper ID 050207                                    | -  |
| 14.00 - 14.15                         | Paper ID 050224                                       | Paper ID 050260  | Paper ID 050210                                    | 0350, 0256, 0261, 0262, 0075, 0076, 0077, 0079, 0080, 0081, 0082, 0083, 0084, 0085, 0086, 0087, 0088, 0089, 0090, 0091, 0092 |
| 14.15 - 14.30                         | Paper ID 050046                                       | Paper ID 050270  | Paper ID 050211                                    |  |
| 14.30 - 14.45                         | Paper ID 050078                                       | Paper ID 050271  | Paper ID 050217                                    |  |
| 14.45 - 15.00                         | -   | Paper ID 050074  | Paper ID 050229                                    |  |
| 15.00 - 15.30                         | <b>COFFEE BREAK</b>                                   |  |  |  |
|                                       | <b>PARALLEL SESSION</b>                               |  |  |  |
|                                       | <i>Room 1</i>   | <i>Room 2</i>  | <i>Room 3</i>                                      |  |
|                                       | <b>Track: Multimedia, Modeling, and IT Governance</b> | <b>Track: Hardware and RF Devices (pt.2)</b>                     | <b>Track: IoT and Emerging Technologies (pt.2)</b> |  |
| 15.30 - 15.45                         | Paper ID 050209                                       | Paper ID 050253  | Paper ID 050032                                    |  |
| 15.45 - 16.00                         | Paper ID 050134                                       | Paper ID 050254  | Paper ID 050033                                    |  |
| 16.00 - 16.15                         | Paper ID 050037                                       | Paper ID 050255  | Paper ID 050036                                    | -  |
| 16.15 - 16.30                         | Paper ID 050240                                       | Paper ID 050158  | Paper ID 050238                                    | -  |
| 16.30 - 16.45                         | Paper ID 050263                                       | Paper ID 050266  | Paper ID 050249                                    | -  |
| 16.45 - 17.00                         | Paper ID 050264                                       | Paper ID 050072  | Paper ID 050269                                    | -  |
| <b>END OF CONFERENCE</b>              |   |  |  |  |

| <b>Thursday, 25 July 2019 Room 1: 10.30 – 12.15</b> |  |             |
|---|--|-------------|
| <b>Track : Education</b>                            |  |             |
| <b>Time</b>   | <b>Title / Author</b>  | <b>Page</b> |
| 10.30 - 10.45<br>Paper ID<br>050202                 | <b>Making Augmented Reality Learning Media In Conformation of Alkane and Cycloalkane Concepts</b><br><i>Masmui, Ferli Septi Irwansyah, Neneng Windayani</i>  | 30          |
| 10.45 - 11.00<br>Paper ID<br>050326                 | <b>The challenges and recommendations to interdisciplinary research and educational: A Joint Venture between Electrical Engineering and Biochemistry</b><br><i>Zeina Al Natour and Mahmoud Al Ahmad</i>        | 31          |
| 11.00 - 11.15<br>Paper ID<br>050245                 | <b>Literature Review on Gamification for Educational Content</b><br><i>Rinaldi Daniel, Ferdiana Ridi, Selo</i>   | 32          |
| 11.15 - 11.30<br>Paper ID<br>050148                 | <b>A Systematic Literature Review on Virtual Reality for Learning</b><br><i>Candra Kurniawan, Yusep Rosmansyah and Budiman Dabarsyah</i>   | 33          |
| 11.30 - 11.45<br>Paper ID<br>050267                 | <b>The Effectiveness of Using Edmodo as Online Media on Students' Outcome in Reading Course</b><br><i>Hapid Ali, Gojali, Wahyudin Darmalaksana, A.H. Fathonih, Sajidin Sajidin and Teti Ratnasih</i>           | 34          |
| 11.45 - 12.00<br>Paper ID<br>050268                 | <b>The Application of Assignment Problem Optimal Solution Using Ones Assignment Method in the Curriculum Developer Team</b><br><i>Elis Ratna Wulan, Dindin Jamaluddin, A. Heris Hermawan and Teti Ratnasih</i> | 35          |
| 12.00 - 12.15<br>Paper ID<br>050273                 | <b>Quizizz Online Digital System Assessment Tools</b><br><i>Nur Rahmah, Alia Lestari, Lisa Aditya Dwiwansyah Musa, and Hamdan Sugilar</i>  | 36          |

| <b>Thursday, 25 July 2019 Room 1: 10.30 – 12.15</b>               |  |             |
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| <b>Time</b>   | <b>Title / Author</b>  | <b>Page</b> |
| 10.30 - 10.45<br>Paper ID<br>050219                               | <b>Game Refinement Settings on Idle Games</b><br><i>Yoppy Sazaki, Anggina Primanita, Siti Zaiton<br/>Mohd Hashim and Indri Dwi Ayu</i>   | 38          |
| 10.45 - 11.00<br>Paper ID<br>050222                               | <b>Polling Stations Secure Scheme For e-Voting System</b><br><i>Slamet Risnanto, Yahaya Bin Abdul Rohim and<br/>Nanna Suryana Herman</i>   | 39          |
| 11.00 - 11.15<br>Paper ID<br>050325                               | <b>Electronic Intelligence Construction Scheduling System Based on Physiological and Environment Conditions</b><br><i>Soha Ahmed, Razan Saif, Hamad Al Jassmi,<br/>and Mahmoud Al Ahmad</i>  | 40          |
| 11.15 - 11.30<br>Paper ID<br>050227                               | <b>A Novel Approach to Calculating Yaw Angles Using an Accelerometer Sensor</b><br><i>Abdurrahman Nurhakim, Mufid Ridlo Effendi,<br/>Hendri Maja Saputra, Rina Mardiati, Tedi<br/>Priatna and Nanang Ismail</i>                            | 41          |
| 11.30 - 11.45<br>Paper ID<br>050231                               | <b>e-Dokuw is A Smart Wallet Identifying Nominal Money Using Homography Estimation Methodes</b><br><i>Raden Wahyu Tri Hartono , Dwi S. Wibowo, M.<br/>Yusuf Fadhlán, Fajri Habibie Suwanda, Ani W.<br/>Fauziah, and Jericho P. Tarigan</i> | 42          |
| 11.45 - 12.00<br>Paper ID<br>050242                               | <b>Security Implementation of the Internet of Things Using the Advanced Encryption Standard (AES) Algorithm</b><br><i>Diana Nurmallasari, Edi<br/>Mulyana, and Mohammad Irfan</i>  | 43          |
| 12.00 - 12.15<br>Paper ID<br>050243                               | <b>Improving Arabic Stemmer: ISRI Stemmer</b><br><i>Mochamad Gilang Syarief, Arief Fatchul Huda,<br/>Opik Taupik Kurahman and Wahyudin<br/>Darmalaksana</i>  | 44          |



| <b>Thursday, 25 July 2019 Room 3: 10.30 – 12.15</b> |   |             |
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| <b>Time</b>   | <b>Title / Author</b>   | <b>Page</b> |
| 10.30 - 10.45<br>Paper ID<br>050213                 | <b>The Design and Realization of the Yagi-Uda Antenna for Communication System between Ground Control Station (GCS) and Atmospheric Ballon</b><br><i>Akhmad Fauzi Ikhsan, Ica Khoerunnisa, Ade Rukmana, Teddy Mulyadi Hidayat</i>               | 54          |
| 10.45 - 11.00<br>Paper ID<br>050328                 | <b>The Behavioral Study of an Optical Injection-Locked Semiconductor Laser under the Influence of Intensity and Phase Noise</b><br><i>Gresha Samarakkody, Dushani Munasinghe, Sachinthani Alahakoon, Ajith Kumarayapa and Ruwan Weerasuriya</i> | 55          |
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| 11.15 - 11.30<br>Paper ID<br>050235                 | <b>Rectangular Microstrip Yagi Array Antenna for Wifi Applications</b><br><i>Nanang Ismail, Folin Oktafiani, Deni Permana, and Siti Sarah Hardianti</i>   | 57          |
| 11.30 - 11.45<br>Paper ID<br>050241                 | <b>Microstrip Hairpin Bandpass Filter for S-Band Radar with Dumbbell-Defected Ground Structure (DGS)</b><br><i>Nanang Ismail, Siti Mariah Ulfah, Innel Lindra, Asep Solih Awalluddin, Ida Nuraida and Muhammad Ali Ramdhani</i>                 | 58          |
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| 12.00 - 12.15<br>Paper ID<br>050252                 | <b>Effect of DGS Utilization on Characteristics of Square shaped CSRR-Based Substrate Integrated Waveguide BPF</b><br><i>Abdul Latip, Nanang Ismail, and Achmad Munir</i>   | 60          |

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| 13.15 - 13.30<br>Paper ID<br>050208                 | <b>Indoor Signal Quality Improvement using Coverage Planning Method in Indoor Building Coverage Simulation</b><br><i>Hajjar Yuliana and Sofyan Basuki</i>  | 68          |
| 13.30 - 13.45<br>Paper ID<br>050018                 | <b>Data Communication Design and Implementation for Marine Radio Using UHF Spectrum</b><br><i>Kurniawan Cahyo Hardiyanto, Iskandar Iskandar, Ian Joseph Matheus Edward, and Tutun Juhana</i>     | 69          |
| 13.45 - 14.00<br>Paper ID<br>050023                 | <b>Marine Radio for Voice Communication System on Very High Frequency (VHF) Spectrum</b><br><i>D.F. Hariyanto, Iskandar Iskandar, Ian Joseph Matheus Edward, and Tutun Juhana</i>                | 70          |
| 14.00 - 14.15<br>Paper ID<br>050224                 | <b>Broadband Access Using Ethernet over PDH Based Microwave Radio Link for Rural Area</b><br><i>Sutrisno and Hanny Madiawati</i>   | 71          |
| 14.15 - 14.30<br>Paper ID<br>050046                 | <b>Indoor Propagation Environmental Profile Analysis at 2300 MHz</b><br><i>Sandryones Palinggi and Iskandar</i>  | 72          |
| 14.30 - 14.45<br>Paper ID<br>050078                 | <b>Design of Power Amplifier and Filter Circuits on Voice Radio Communication for Very High Frequency Spectrum</b><br><i>Iskandar, Ian Joseph Matheus Edward, Tutun Juhana, Ghufran Musta'an</i> | 73          |

| <b>Thursday, 25 July 2019 Room 2: 13.15 – 15.00</b>               |   |             |
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| 13.30 - 13.45<br>Paper ID<br>050257                               | <b>Feature Selection using k-Medoid Algorithm for Categorization of Hadist Translation in English</b><br><i>Firda Ayu Setiawati, Qonita Umami Safitri, Arief Fatchul Huda, Aep Saepuloh and Wahyudin Darmalaksana</i>                       | 46          |
| 13.45 - 14.00<br>Paper ID<br>050259                               | <b>Analysis Clustering Using k-Means Algorithm with Hybrid Feature Extraction for Hadiths Translation Data Text</b><br><i>Nanda Priatna, Arief Fatchul Huda, Qonita Umami Safitri and Wahyudin Darmalaksana</i>                             | 47          |
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| 13.15 - 13.30<br>Paper ID<br>050203                 | <b>Design of Bag Monitoring Security System Base on Internet of Things</b><br><i>Adam Faroqi, Prakasa Tri Andhika, Muhammad Ali Ramdhani, and Innel Lindra</i>  | 76          |
| 13.30 - 13.45<br>Paper ID<br>050206                 | <b>Traffic Light System Based on FTP Server: Damage Detection and Duration Arranger</b><br><i>Griffani Megiyanto Rahmatullah, M. Reza Hidayat, Susanto Sambasri, Handoko Rusiana Iskandar and Yuda Bakti Zainal</i>           | 77          |
| 13.45 - 14.00<br>Paper ID<br>050207                 | <b>Softwater Tank Level Monitoring System Using Ultrasonic HC-SR04 Sensor Based On ATmega 328 Microcontroller</b><br><i>M. Reza Hidayat, Susanto Sambasri, Firman Fitriansyah, Atik Charisma and Handoko Rusiana Iskandar</i> | 78          |
| 14.00 - 14.15<br>Paper ID<br>050210                 | <b>Real-Time Monitoring System for Measurement Of Soil Fertility Parameters in Smart Farming Applications</b><br><i>Lia Kamelia, Susanto Nugraha, Mufid Ridlo Effendi, and Setia Gumilar</i>                                  | 79          |
| 14.15 - 14.30<br>Paper ID<br>050211                 | <b>Protecting and Monitoring System for Three Phase Induction Motor</b><br><i>Helpy Susilawati, Asep Wandu Priatna, Akhmad Fauzi Ikhsan, and Imam Nawawi</i>  | 80          |
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| 15.30 - 15.45<br>Paper ID<br>050209                    | <b>The Derivation of Matrix Transformation from Pixel Coordinates to Real-World Coordinates for Vehicle Trajectory Tracking</b><br><i>Rina Mardiati, Iyon Maryono, Edi Mulyana, and Koredianto Usman</i>                             | 90          |
| 15.45 - 16.00<br>Paper ID<br>050134                    | <b>Modify TOGAF ADM for Government Enterprise Architecture: Case Study in Ethiopia</b><br><i>Chernet Gebayew and Arry Akhmad Arman</i>   | 91          |
| 16.00 - 16.15<br>Paper ID<br>050037                    | <b>Academic Study of Feasibility Coexistence Between 5G Candidate Bands and Existing Service in Indonesia</b><br><i>Septi Andi Ekawibowo and Sigit Haryadi</i>   | 92          |
| 16.15 - 16.30<br>Paper ID<br>050240                    | <b>Design and Implementation of Model Autonomous Sentry Gun Using Image Processing and Motion Tracking</b><br><i>Eki Ahmad Zaki Hamidi, Mufid Ridlo Effendi and Firman Febrianto Asmoro</i>  | 93          |
| 16.30 - 16.45<br>Paper ID<br>050263                    | <b>Implementation of Digital Images Using the Chain Code Method to Calculate the Area and Surrounding of 2-Dimensional Objects</b><br><i>Ivan Septamihardja Prawira, Arief Fatchul Huda, Diena Rauda Ramdania, and Mohamad Irfan</i> | 94          |
| 16.45 - 17.00<br>Paper ID<br>050264                    | <b>Making a Batik Dataset for Text to Image Synthesis Using Generative Adversarial Networks</b><br><i>Aifa Nur Amalia, Arief Fatchul Huda, Diena Rauda Ramdania and Mohamad Irfan</i>  | 95          |
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| 15.30 - 15.45<br>Paper ID<br>050253                 | <b>Triple-Band Microstrip Patch Antenna Based on Artificial Magnetic Conductors</b><br><i>Siti Sarah Hardianti, Nanang Ismail, Eki Ahmad Zaki Hamidi and Achmad Munir</i>  | 61          |
| 15.45 - 16.00<br>Paper ID<br>050254                 | <b>Characterization of Artificial Dielectric Material on Microstrip Square Patch Antenna</b><br><i>Intan Novianti, Nanang Ismail, and Achmad Munir</i>   | 62          |
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| 16.15 - 16.30<br>Paper ID<br>050158                 | <b>Power Amplifier for RF Long Range Wide Area Monitoring and Control of Urban Farm</b><br><i>Mukhtar Amin and Basuki Rachmatul Alam</i>   | 64          |
| 16.30 - 16.45<br>Paper ID<br>050266                 | <b>Build a BTS VoIP Kit for Android-based Communication Needs (Handset)</b><br><i>Fadli Emsa Zamani, Khaerul Umam, Widodo Dwi Ismail Azis, Muhibudin Wijayalaksana, Wawan Setiawan Abdillah, Rina Mutirawati, Hamdan Sugilar and Ferli Septi Irwansyah</i> | 65          |
| 16.45 - 17.00<br>Paper ID<br>050072                 | <b>Design Truncated Corner Rectangular Patch Antenna with Multiple Slot Used in High Altitude Platform Station</b><br><i>Ryan Fikri and Iskandar Iskandar</i>  | 66          |
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| 15.45 - 16.00<br>Paper ID<br>050033                 | <b>Least Recently Frequently Used Replacement Policy in Named Data Network</b><br><i>Nana Rachmana Syambas, Hamonangan Situmorang, and Made Adi Paramartha Putra</i>  | 84          |
| 16.00 - 16.15<br>Paper ID<br>050036                 | <b>Forwarding Strategy Performance and Effect of Producer Placement on Palapa Ring Topology in NDN Networks</b><br><i>Fahrizal Djohar, Hadi Hasymi and Nana Rachmana Syambas</i>  | 85          |
| 16.15 - 16.30<br>Paper ID<br>050238                 | <b>e-Aquaponics: Aquaculture and Hydroponic Integration Using Electronical Control and Monitoring</b><br><i>Raden Wahyu Tri Hartono, Eka Pratiwi, Fajri Habibie Suwanda, Ginanjar Suwasono Adi, Sakinah Puspa Angraeni, Dandi Taufiqurrohman</i>                      | 86          |
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## **Keynote Speaker**

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## **Universal Service Obligation Agency Achievement and Priority Program**

**Anang Achmad Latif, S.T., M.Sc.**

***Biography***—Anang Achmad Latif, CEO of ICT- Universal Service Obligation Agency or known as BAKTI (formerly known as BP3TI). Prior before joining BAKTI, he served more than 20 years in Indonesian Ministry of Communication and Information Technology. His sensitivity and broad experiences on ICT and Digital Broadcasting Industry has made him a right person on his position now, as his aim is to make ICT obtainable to all Indonesian specifically 3T areas.

Anang Latif completed his Master's Degree at Coventry University – the United Kingdom, mastering Operational Communications. He also joins various courses and trainings, and internationally acclaimed as Indonesian Delegation on IPTV meeting at International Telecommunication Union (2009-2011), Chairman of special tasks force on Digital TV Implementation between Indonesia, Malaysia and Singapore (2009-2011), also a Member of ASEAN Digital Broadcasting (2009-present).

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## **Education**

## **Making Augmented Reality Learning Media In Conformation of Alkane and Cycloalkane Concepts**

Masmui, Ferli Septi Irwansyah, Neneng Windayani  
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***Abstract*** - The purpose of this study describes the results display of each stage of making augmented reality learning media on the conformation concepts of alkanes and cycloalkanes, analyze the results of the feasibility test of augmented reality learning media on the conformation concepts of alkanes and cycloalkanes. This research uses the Research and Development (R & D) method, which produces products in the form of AR learning media on the conformation concepts of alkanes and cycloalkanes. The results display of AR learning media is visual characteristic, that is a medium that visualizes the 3D form of each alkane and cycloalkane conformation by realizing a visual form into an original structure. The feasibility test phase and limited trial aim to get assessment, suggestions, and improvements to aspects of learning, material substance aspects, visual communication aspects, and software engineering aspects. The results of the overall feasibility test obtained showed high feasibility with a count of 0.73-0.87. While the results of the limited trials obtained showed a high possibility with a percentage of 75-87.5% feasibility, these results indicate that AR learning media on the alkane and cycloalkane conformation concepts are suitable for use as learning aids.

***Keyword:*** *conformation of alkanes and cycloalkanes, augmented reality, learning media*

## **The challenges and recommendations to interdisciplinary research and educational: A Joint Venture between Electrical Engineering and Biochemistry**

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***Abstract***—Real-life problems are tending to become more complex because of expanding population, high level of demand at all levels and the advancement of technology that became integrated into almost all aspects of life. Such complex problems can only be tackled by employing tools in multiple disciplines. The combination of disciplines in such research studies is dictated by the nature of the problem. Here we present our experience as a case study in which we conducted our research following an interdisciplinary research approach involving two disciplines of electrical engineering and biochemistry. We discuss the uniqueness of joint venture between the two disciplines, the obstacles faced and how they are tackled in addition to giving some recommendations that we believe can act as guidelines to scientists who are considering those two disciplines in their future research. Our observations and recommendations go in line with other's findings, but we additionally provide real cases and examples and more detailed advice, which can be more efficient and support previous finding in a practical way.

***Keywords***— *Interdisciplinary research, joint venture research, case study, multidisciplinary research, publications.*

Paper ID 050245

## **Literature Review on Gamification for Educational Content**

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**Abstract—** Education is one of many important things that we need as human being. The lessons given at class are repetitive and a bit boring, that is why we need something to be able to engage learners to learn more. To do that, educator can implement gamification for subject they teach, might be with a fun quiz, storytelling, or holding competition. Some other way to motivate learners to learn is by using digital game, an education game. Education game, if done correctly, will make learners even more motivated to learn.

**Keywords—***Gamification, education game, game, education, motivational design*

## **A Systematic Literature Review on Virtual Reality for Learning**

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***Abstract***—Learning can be performed in various ways and can utilize different technologies. This paper presents a review of current and previous research to understand the use of virtual reality technology for learning. This paper used a systematic literature review (SLR) as a method. Research question (RQ) was determined in the first step. The query to search the previous research on popular database journals was generated from previously created RQ. Popular journals included IEEE Xplore, ScienceDirect, SpringerLink, Scopus, and ACM Digital Library. Thirty-two related articles were produced from the search, then reviewed. The study concluded that there were four purposes of using virtual reality for learning, two types of devices used, and two types of user experiences.

***Keywords***—*virtual reality, learning, systematic literature review*

## **The Effectiveness of Using Edmodo as Online Media on Students' Outcome in Reading Course**

Hapid Ali <sup>1</sup>, Gojali <sup>2</sup>, Wahyudin Darmalaksana <sup>3</sup>, A.H. Fathonih <sup>2</sup>,  
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**Abstract - The aims of this research are: 1) to define in detail whether edmodo as the online media can enhance the students' outcome in reading course 2) to analyze what are the difficulties of implementing edmodo as the online media in teaching readings course. The classroom action research is as the method of this research design. In this research, It was conducted in two cycles used planning, implementing, observing, and reflecting as the procedures of the collecting data. This research was conducted at Pharmacy Department of the Mathematics and Natural Science Faculty of Garut University (UNIGA). The subject the research focused on the second semester at class B of Pharmacy Department which consisted of 47 students. The result of the research found that; 1) Edmodo as the online media in enhancing the students' reading outcome in identifying reading indicator regarding to the students' purpose in identifying the text b) the students' understanding in identifying the specific and detailed information in each paragraph. c) the student's finding of the content of the text d) the student's understanding in identifying of the main idea in each paragraph of the of the text e) the students' understanding in getting reference. The students' score in enhancing reading outcome improved from step to step. In this research result finding, the researchers found the students' improvement specifically, such as; the average of students' score in pretest session was 62.22, the first post-test session was 76.2, and the second post-test session was 84.20. Those results encouraged students to integrate the edmodo as the advanced technology in online media each learning, those created students to be active, creative in improving skill and knowledge; those involved students to be enjoyable activities in each learning including in teaching reading course.**

***Keywords: Reading, Edmodo as Online Media, Students' Outcome***

## **The Application of Assignment Problem Optimal Solution Using Ones Assignment Method in the Curriculum Developer Team**

Elis Ratna Wulan <sup>1</sup>, Dindin Jamaluddin <sup>2</sup>, A. Heris Hermawan <sup>3</sup> Teti Ratnasih <sup>4</sup>

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**Abstract**—This paper considers the issue of assignment to solve the problem of minimization using Ones Assignment Method. The objective is to perform the minimization problem using Ones Assignment Method. This method offers significant advantages over similar methods, in the process, first we define the assignment matrix, then by using determinant representation we obtain a reduced matrix which has at least one in each row and columns. Then by using the new method, we obtain an optimal solution for assignment problem by assigning ones to each row and each column. The new method is based on creating some ones in the assignment matrix and then try to find a complete assignment. The proposed method is a systematic procedure, easy to apply and can be utilized for all types of assignment problem with maximize or minimize objective functions. This method is applied to the research object of a consulting company developing mathematics curriculum with 5 experts and 5 stages of curriculum planning and development process. Obtained results in case Minimum minimization time of 24 days.

**Keywords**— *assignment problem; ones assignment method; linear integer programming; curriculum development*

## Quizizz Online Digital System Assessment Tools

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***Abstract***—The era of the industrial revolution encouraged activities to implement online-based technology as well as the implementation of assessments. Good and valid online tools are needed in this case quizizz. The purpose of this study is to determine the response of mathematics education students to the application of quizizz online exams, to analyze quizizz midterm scores. The method of research carried out includes the applied method, responding to quizizz in conducting learning assessments of multimedia learning. The research subjects were fourth semester students while the instruments used in the study consisted of quizizz tests and questionnaires. The results showed that students were very responsive to the application of quizizz during the midterm, although the average score was still low but students accepted the results and tried to improve them. Quizizz easily presents the problem by analyzing the results of detailed answers to help the teacher or lecturer in implementing the assessment.

***Keywords***— *assessment, digital, quizizz*



## **Software Engineering and Information System**

## Game Refinement Settings on Idle Games

Yoppy Sazaki <sup>1</sup>, Anggina Primanita <sup>1</sup>, Siti Zaiton Mohd Hashim <sup>2</sup>, Indri Dwi Ayu <sup>1</sup>

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***Abstract***— Idle game is a game that has minimal interaction with the player so it is considered unpleasant. To make the idle game more entertaining it can be done by applying a comfortable setting. The comfortable setting can be analyzed through measure excitement of game using game refinement. Game with game refinement value within zone value 0,07-0,08 is considered as an ideal and fun to played. Testing is done by determining the parameters first by analyzing idle RPG Infinity Heroes. After getting the parameters, testing is done by applying 4 different settings where every setting will be played 50 times. The result showed that game refinement value on the dynamic setting is within zone value 0,08 which indicates this setting is suitable to be applied on idle RPG game that has same environmen with Infinity Heroes.

***Keywords***— *idle game, RPG game, idle RPG game, game refinement, game setting*

## **Polling Stations Secure Scheme For e-Voting System**

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*Abstract*—The implementation of e-voting technology for elections has been many implemented in this world, there are 43 countries that have implemented, including those who are successful or unsuccessful, the average implementation of e-voting is based on inefficient, insecure and impractical in election conventionally, it seems that technology is the only way out to solve the problem, there has been a lot of research on e-voting and most assume that the implementation of e-voting is not just technology but there are some things that needed such as readiness of human resources, infrastructure, trust public, and others, apart from that, in this paper we propose in the technology section on the implementation of e-voting, namely the polling station scheme for implementing e-voting so that it can be more efficient, secure and practical, this study takes the case in Indonesian elections with the hope proposed scheme can be a reference for the Indonesia election commission or other countries if in the future will implement e-voting

*Keywords*—e-voting, polling station, ballot

## **Electronic Intelligence Construction Scheduling System Based on Physiological and Environment Conditions**

Soha Ahmed <sup>1</sup>, Razan Saif <sup>1</sup>, Hamad Al Jassmi <sup>2</sup>, and Mahmoud Al Ahmad <sup>1</sup>

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***Abstract***-This work proposed a novel technique for collaborative decision-making schemes to effectively improve the performance in construction site. This work investigates the relation between those factors and as a result develop an algorithm for a decision support system to aid construction sites projects manager. The system will employ a set of physiological and environmental sensors which will acquire workers vital sign data and the work environment conditions. Daily construction tasks extracted from the proposed project execution plan will be analyzed and their required productivity will be estimated based on current weather data and the work altitude using our predicted mean vote (PMV)- Tasks required productivity model. The worker physical health condition and emotional status will be extracted from the acquired worker's physiological signals. The workers' efficiency will be calculated using our worker estimated efficiency Indicator which takes into account individual characteristics of workers, their life styles, experience, stress level, mental status and their current health condition. The developed system will be able to efficiently allocate workers with the highest efficiency to tasks with the greatest required productivity and so forth to achieve the maximum possible productivity.

***Keywords***— *Automated data collection, scheduling, monitoring, resource planning, PMV, PPD, work ability index, performance measurement.*

## **A Novel Approach to Calculating Yaw Angles Using an Accelerometer Sensor**

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***Abstract*** — An *accelerometer* can be used to calculate pitch and roll orientation angles. However, the accelerometer sensor cannot calculate the yaw angle, so a novel approach is needed to calculate the yaw angle. This research focuses on designing a new algorithm for calculating yaw orientation angles using an accelerometer sensor. Tests are carried out using the Stewart Platform which is moved rotating on the yaw axis clockwise. The measurement results show that the calculation of the yaw orientation angle using the accelerometer sensor has an average percentage error of 6.42% with the largest error value at the parameter angle of 60 ° and the smallest value is at the 10 ° parameter angle. Based on the measurement of standard deviation, the most precise value is at an angle of 30° and the least precise value is at 50° parameter angle. The average standard deviation is 0.45°. The standard deviation value shows that this method has a fairly good precision level so that it is worthy of being used as an alternative measure of yaw angle.

***Keywords*** — *accelerometer; yaw angle; new algorithm, integral.*

## **e-Dokuw is A Smart Wallet Identifying Nominal Money Using Homography Estimation Methodes**

Raden Wahyu Tri Hartono, Dwi S. Wibowo, M. Yusuf Fadhlan, Fajri H. Suwanda, Ani W. Fauziah, Jericho P. Tarigan  
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***Abstract***—Many limitations of a conventional wallet, one of them is unable to detect the nominal value of the money inside it. e-Dokuw is a smart wallet perfecting from a conventional wallet. These improvements are in the form features, that based on the Internet of Things (IoT). e-Dokuw which has reliable features such as GPS, RFID Reader and equipped with Mini Camera, will be further enhanced with additional performance: "Reading Nominal Money", using homography estimation. Under homography, can be write the transformation of points in 3D from camera 1 to others camera. Using this estimation method in reading the money characteristics by processing the image the nominal value can be detected. With the successful implementation of this method, certainly helps the disabled people to detect the nominal amount of money to be used.

***Keywords***—*e-Dokuw, Homography, IoT, Smart Wallet*

## **Security Implementation of the Internet of Things Using the Advanced Encryption Standard (AES) Algorithm**

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**Abstract—** Technology is currently needed to facilitate human activities in order to improve efficiency, productivity, and human security itself. One of them is in technology to open and lock doors. In this study we will discuss the study of electronic key systems using codes or passwords as the key. The device used for this implementation is a microcontroller device that is installed on the door as the recipient of the control. Users communicate with microcontroller devices using cellular phones through Internet communication media. But communication over the Internet is not yet supported by strong security. Therefore in this study cryptography was made to the security aspects of electronic key codes by applying the Advanced Encryption Standard (AES) with a 256-bit key length. The results obtained from this study are that speed produces encryption and description of the description about 1.24 seconds and avoids sniffing and brute force.

***Keyword-Internet of Things, Key Electronic, Code or Password, Cryptography, Advanced Encryption Standard (AES)***

## **Improving Arabic Stemmer: ISRI Stemmer**

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***Abstract***—Stemmer is used in several types of applications such as Text Mining, Information Retrieval (IR), and Natural Language Processing (NLP). Stemmer is a step used to process text data. The main task in stemmer is to return the word formation to the basic word (root or stem). ISRI Stemmer is one of the Arabic stemmers contained in the NLTK package. This study improves the weakness of the ISRI stemmer in processing words consisting of two letters. From the results of the experiment, these improvements increased the stemmer yield by 7.3%.

***Keywords***—*Stemmer, Text Mining, Information Retrieval, Natural Language Processing, ISRI stemmer*



## **Analysis Distance Measure in Partition Clustering Algorithm on Alquran Verses Translation**

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***Abstract-*** Clustering text is an important application in data mining. This is related by grouping similar text documents together. In this study, several models are built to classify Qur'anic verses on Surah Al-Baqarah using three clustering technique: kmeans, bisecting k-means, and k-medoid. Every verse in Surah al-Baqarah represented as a document derived from the translation of the Qur'an in English. Three similarity measures are also used: cosine similarity, jaccard similarity, and correlation coefficient. Then, the cluster of each combination of clustering technique with similarity measure is evaluated using average within cluster distance and davies bouldin index. The result show that the best performance is achieved by using the hemodoidal combined with cosine similarity. Finally obtained the category verses in the Surah al-Baqarah that correlate with each other.

***Keywords—***Clustering; Partition Clustering; al-Quran Verses; Proximity; k-Means; Bisecting K-Means; K-Medoid.

## **Feature Selection using k-Medoid Algorithm for Categorization of Hadist Translation in English**

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***Abstract-*** The problem of document classification is the number of features that are very large. the number of features depends on the number of terms or vocabulary used. Obviously, for every document, it contains only a small number of words in a vocabulary. So that will cause the number of elements zero. Therefore, a method is proposed to select some features that can represent all features. the method used is to cluster the vocabulary. representatives of each cluster of clustered results are used as a feature for each document in the categorization process. the categorization process is done by the k-Nearest Neighbor (k-NN) and Nearest Centroid algorithms. The data used is the translation of English hadith. with this method, it is expected that computation time will be faster and categorization result will be better (accuracy more precise).

***Keywords—***Feature Selection; Classification; k-Nearest Neighbor; Clustering; k-Medoid; Nearest Neighbor.

Paper ID 050259

## **Analysis Clustering Using k-Means Algorithm with Hybrid Feature Extraction for Hadith Translation Data Text**

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***Abstract-*** Clustering results are strongly influenced by the selected technique and data dimensions. Large data dimensions become the main problem that must be considered. Therefore, a dimensional reduction is needed to select sub-feature that provides important information. One of the dimensions reduction methods is the hybrid method. The hybrid method combines the method of feature selection and feature extraction to select informative sub- feature. Furthermore, the simplest clustering technique is the k- means algorithm. The k-means algorithm divides n data into k cluster based on the centroid. This study carried out clustering analysis using the k-means algorithm after reducing dimensions on 892 English translation hadith documents. The clustering results are validated using the silhouette coefficient and Davies Bouldin index (DBI). Experimental results show that k-means algorithm can overcome data with congestion that has a significant difference, but cannot detect noise, and the results of dimensional reduction can improve the cluster quality.

***Keywords—Clustering; k-Means; Feature Selection; Feature Extraction; Principal Component Analysis (PCA).***

## Comparison of Analysis of K-Means Algorithms and Fuzzy C-Means for Grouping of Indonesian Language Hadiths

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**Abstract**—Hadith is the second source of Islamic religious law after the Al-Qur'an scriptures, in the hadith there are many chapters that discuss several cases. The number of chapters in the hadith will be an interesting thing to be combined with data mining techniques, especially text mining in order to group the hadith into several groups based on the contents of the hadith (matan) automatically. Clustering is a grouping technique, there are several methods that can be used for grouping including K-Means and Fuzzy C-Means. From previous research, research is rarely found on hadith clustering based on matan. This research will try to grouping Indonesian translation of Hadith texts and compare K-Means and Fuzzy C-Means algorithms with some parameters and experiments that are determined. This comparison is used to determine the most accurate method in the Hadith clustering. The results of this study indicate that some of the parameters used affect the results of cluster evaluation, especially in reducing data dimensions. In Silhouette Coefficient and F-Measure calculations, the Fuzzy C-Means method has an accuracy of 0.83079 and 0.97128 while the K-Means method has an accuracy of 0.67828 and 0.95078 with the results above show that the Fuzzy C-Means method is superior in grouping the Indonesian hadith text.

**Keywords**—*k-means, fuzzy c-means, compare, clustering, hadith, text, indonesian, python, pca*

Paper ID 050270

## **Designing a Data Logger Monitoring System Prototype on Automatic PlantSprinklers**

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**Abstract** One of plant treatment methods is water it regularly. There are lot of automatic watering device that sold. But sometimes, that device is not working at top performace caused by error and not monitored. For ease of monitoring to automatic watering system, a data logger built with four input sensors. Sensor that used are humidity sensor, soil moisture sensor, rain drop sensor, and voltage sensor. For ease of access to this data logger, it connected to internet. Source of data is come from environment and device performance data can be accessed via Ubidots Web as cloud. Monitoring system data logger device divide into two main components, which are data logger components and automatic watering plant components. Data logger component is used for collecting data automatically, and automatic watering plant component as monitoring object. Automatic watering plant device work at value of 850. This value is taken by average test of varity soil humidity level. After all device working completely then it combined into a system. Output of this system can be identified as 3 condition, which are normal ON, normal OFF, and normal OFF in rain condition. Any other condition will identified as a problem.

**Keywords:** *Sensor, Monitoring Data Logger, Cloud, Ubidots, Automatic Watering.*

## Digital Monitoring and Evaluation System Research Process

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**Abstract**—The proposal submission file is filtered based on the completeness of the requirements in submitting a proposal by an administrator or internal organizer. The recapitulation of the completeness of the requirements for submitting the proposal will be stored in the system and can be printed as a report and the basis for the failure of the research proposal. The system is also able to display statistical charts in the process of submitting research proposals. All requirements for the research proposal must be validated based on verification or verification tools. Specifically for proof of the previous year's research outcome bills, proposers must display progress, such as submitted, reviewed, revised, accepted, and published. The requirement file assessment session will determine the submission of research assistance whether it passes or fails. The software development methodology used in this study is RAD (Rapid Application Development). This system functions as an administrative evaluation desk selectively, objectively, effectively, quickly, and can be accounted for by digital application devices. This application product is designed to meet the needs of research proposals. Proposal Monitoring and Evaluation Information System This research helps businesses process the submission and assessment of research proposals.

**Keywords**— *desk evaluation, digital monitoring and evaluation, research proposal*

Paper ID 050074

## **Implementation of Service Level Measurement Based on System Uptime Sensor of Network Device in Internet Connection Service**

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**Abstract**—Uptime sensor in network device such as router or modem, indicate the current of total time since the system on. The sensor refer to the system uptime, so the calculation of total time start from when the system on. If the system start initially or restarted, the system uptime will reset. This typical sensor was already proposed as a based of service level measurement in internet connection service. The uptime data is usually stored in network monitoring system (NMS). In the NMS, uptime data used for monitoring only, so in order to measure the service level should be provided by other system. In addition to limitation of the NMS in measuring the service level, deployment the internet service for many locations also should be supported by the system which capable to collect and process a lot of data. Server based application is developed to result the service level measurement as output. The application develop in Linux based operating system, and all system requirement are already provided by Linux's utilities and packages. Peformance of the application with certain hardware specifications is able to calculate the service level measurement for about 1500 locations, it is still can be increased.

*Ke Keywords*—Internet, Uptime sensor, SNMP, NMS, SLA

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## **Hardware and RF Devices**

Paper ID 050213

## **The Design and Realization of the Yagi- Uda Antenna for Communication System between Ground Control Station (GCS) and Atmospheric Ballon**

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***Abstract***— A Yagi-Uda antenna is a directional antenna, which means the antenna only picks up or receives signals in one direction. The Yagi-Uda antennas usually have gain of around 3–20 dB. The purpose of the antennas is to ensure communication of telemetri system between the Ground Control Station (GCS) and the ballon of atmospheric ballon that is flown equipped with radiosonde. The Yagi-Uda antennas are selected because its advantages compared to other antennas, which are the narrow beamwidth that allow communication between the Ground Control Station (GCS) and a load of atmospheric ballons extend to considerable distance. In making this research, it will be designed a Yagi- Uda antenna designed with a frequency of 433 MHz. The design to use software Computer Simulation Technology (CST) and initiated to do measurements and testing. From the simulation, the Yagi-Uda antenna have a gain value of 11,09 dBi, VSWR is value of 1,46 and return loss is value of 14,442 dB. While the results of measurements Yagi-Uda frequency of 433 MHz are using Advantest R3770 Network Analyzer the gain value is 13,63 dBi, VSWR is 1,46 and return loss value is 14,471 dB.

***Keywords***— *Gain, radiosonde, Yagi-Uda, VSWR*

## **The Behavioral Study of an Optical Injection-Locked Semiconductor Laser under the Influence of Intensity and Phase Noise**

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***Abstract***—This work theoretically investigates the influence of intensity and frequency noise on the locking range of a semi-conductor laser. The analysis was conducted using the numerical simulations based on the developed locking range model including the noise sources. The effect of intensity noise resulted in a broadening of the locking range by shifting its lower boundary along the detuning frequency axis and the effect of frequency noise has shifted the locking range without changing the locking range width. When intensity and frequency noise are considered simultaneously, the locking range shows a superposition of the individual variation of each type of noise. The results obtained through this work is applicable only for the lower injection ratio applications such as optical sensors.

***Keywords***—*Locking Range; Optical Injection Locking; Semiconductor Laser; Frequency Noise; Phase Noise*

## **Improvement Performance of UWB Double Layer Antenna as Partial Discharge Detector**

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*Abstract*—Partial discharge (PD) is a phenomenon of local electric discharge that partially or partially connects isolation between conductors and inside a conductor (void). This phenomenon can be detected by the UHF method using an antenna sensor. Some antenna designs are capable of detecting the appearance of PD, but some antennas still have shortcomings in the frequency of waves obtained. Most antennas only have a narrow frequency range making it difficult to detect PD. One reference antenna design has frequency range of 0 - 2.35 GHz. At this range, the antenna is able to detect the presence of PD. The development of this reference antenna is made so that the detection of PD can be carried out on some insulation media, such as in solid, liquid and gas. This development also tests PD detection by measuring background noise, partial discharge inception voltage (PDIV) and Partial discharge waveform. The results obtained by sensor antennas carried out by development found a better results when compared to RC detector sensors as reference sensors.

*Keywords*—*Partial Discharge; Antenna;*

## **Rectangular Microstrip Yagi Array Antenna for Wifi Applications**

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***Abstract***—Wifi requires an additional external antenna with high gain so that its range increases. This paper discusses the design of a rectangular-microstrip Yagi array antenna for Wifi applications (2.4 GHz). The antenna consists of element driven and several parasitic elements, including reflector and director. The antenna is made in the form of an array consisting of 2 branches and each branch consists of 2 level directors. The antenna was realized using dielectric material with a relative permittivity of 4.3. Based on measurements, the value of S11 is -15.42 dB. The gain obtained is 9.08 dB with bidirectional radiation patterns. The array method is proven to increase gain compared to antennas which only have 1 branch and 2 director levels.

***Keywords***—*rectangular microstrip Yagi antenna; array; wifi; gain; return loss.*

## Microstrip Hairpin Bandpass Filter for S-Band Radar with Dumbbell-Defected Ground Structure (DGS)

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**Abstract**— One of the possible errors in radar communication is the presence of unwanted frequencies that are still passed by the radar system, causing performance to decrease. This paper proposes a bandpass filter (BPF) design for S-Band radars that work in the range of 3 GHz. A Bandpass filter is designed using the microstrip hairpin technique plus the dumbbell-Defected Ground Structure (DGS) method. This study aims to prove that the selection of DGS forms and effectiveness in optimization can provide better results. The band-pass filter is realized using the RO4350-B material with a relative dielectric constant of 3.48 and a thickness of 1.524 mm. The results obtained from the realization of band-pass filters show S11 of -31.822 dB, S21 of -0.829 dB and VSWR of 1.502. Filters work on ranges 2.760 – 3.053 GHz with a bandwidth of 293 MHz. From the parameters of the results obtained, the filter designed is in accordance with the specifications specified. Addition of dumbbell-DGS also gives better results than the form of a square groove-DGS.

**Keywords**—*Band-pass filter; dumbbell-DGS; S-parameter; bandwidth, S-Band radar*

## Low Complexity MIMO-SCMA Detector

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**Abstract**—The implementation of Multiple Input Multiple Output (MIMO) system on Sparse Code Multiple Access (SCMA) can enhance performance in 5G future communication. Most challenges on MIMO-SCMA system is designed low complexity detector to achieve near-optimum bit error rate (BER) performance. This paper will investigate the low complexity MIMOSCMA detector based on a joint factor graph and sphere decoding (SD) algorithm. A joint factor graph is combined n-th single factor graph to one virtual factor graph. The detection processing is done by a single operation. While the SD algorithm is used to reduce the complexity of conventional message passing algorithm (MPA) by calculating possible combination codeword within the search radius RSD. The simulation result shows that complexity and BER performance related to a selected radius of SD-MPA. In single SCMA system, RSD = 3 has optimum performance and lower processing time, while RSD = 4 is the optimum radius for 2x2 MIMO-SCMA system.

**Index Terms**—MIMO, SCMA, sphere decoding, MPA, joint factor graph

## **The Effect of Defected Ground Structure on The Characteristics of the Square-CSRR and Substrate Integrated Waveguide BPF**

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**Abstract--** This paper discusses the effect of the Defected Ground Structure (DGS) on the characteristics of the square Complimentary Split Ring Resonators (CSRRs) and the Substrate Integrated Waveguide Bandpass Filter (SIW-BPF). There are 2 pieces of DGS with a round and square pattern made on a groundplane. CSRR also has 2 pairs of grid patterns consisting of an inner ring and an outer ring. The proposed SIW

BPF was designed using a FR4 epoxy substrate with a size of 45x40mm. FR4 is very suitable for high frequency filters. BPF is designed to have a middle frequency of 6.75 GHz with a frequency band from 3 GHz to 15 GHz. The measured parameters are DGS size, CSRR size, distance between via and diameter via. The existence of DGS and CSRR can result in bandwidth and return loss and good insertion compared to filters without DGS. The best results from filter simulation with DGS box S11 reached -11.43 dB and S21 reached -4.09 dB at 9 GHz, the bandwidth produced was 4.2 GHz. As for the results of simulation filters with round S11 DGS reaching -11.76 and S21 reaching -3.98 at 9 GHz with a bandwidth of 4.25 GHz.

**Keywords:** BPF; CSRR; DGS; SIW; Wideband



## **Triple-Band Microstrip Patch Antenna Based on Artificial Magnetic Conductor**

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**Abstract—** This paper proposes a triple band antenna patch microstrip based on artificial magnetic conductor. The use of AMC is expected to generate other frequencies so as to get a triple band frequency. The AMC structure is made of a square ring with two gaps arranged 2x2 as an Artificial Magnetic Conductor. The total size 52mmx52mm. these antenna uses the FR4-Epoxy dielectric substrate with a relative permittivity value of 4.2 and the total thickness of the two antenna layers is 3.2mm. The results of the characterization show that AMC based antennas can produce triple band frequencies, that 1.625 GHz, 1.8GHz and 2.025GHz

**Keywords:** *Artificial Magnetic Conductor, Triple Band Frequency, Microstrip Patch Antenna.*

## **Characterization of Artificial Dielectric Material on Conventional Microstrip Square Patch Antenna**

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***Abstract*** - In this paper, artificial dielectric material was applied to conventional microstrip square patch antennas. The artificial dielectric material is designed with copper material as a cylindrical conductor. The cylinder conductor is then planted in such a way on the surface of the microstrip antenna. The microstrip antenna is designed with cork as a substrate and copper material as a patch. Characterization and planting of cylindrical conductors on the surface of the microstrip antenna, causing a decrease in the resonant frequency of 49.41%.

***Keywords***—artificial dielectric material, microstrip square patch antenna, resonant frequency

Paper ID 050255

## **Power Dividers in Arranged Antennas with Tiered Phases for X-Band Applications**

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***Abstract--*** This paper discusses the design of a power divider in a tiered phase antenna for X-Band applications that works at frequencies of 8 - 12GHz with a center frequency of 9GHz. The power divider is designed using the Epoxy FR4 dielectric substrate with a relative permittivity of 4.4 and 1.6 mm in thickness. The power divider has 5 ports with phases for each different port.

The size of the substrate and size on the ground plane is 47.5mm x 67mm. The parameters measured are the length of the patch on each port. The power divider is used on antennas with frequencies ranging from 8-12GHz and also for military radars.

***Keywords:*** Power Divider; Arranged Antennas; Tiered Phase; X-Band; 5 Port

## **Power Amplifier for RF Long Range Wide Area Monitoring and Control of Urban Farm**

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***Abstract***— AB class power amplifier (PA) is designed for long range wide area monitoring and control of urban farm. The PA is part of transceiver device which operates on 2.4 GHz frequency and 22 MHz bandwidth. The design is carried out by determining DC bias, completing the bias network with load pull analysis and impedance matching, and converting the resulting design to layout. The design process is done using Advanced Design System (ADS) software. QPSK modulated signal is used to simulate and compare signal spectrum before entering and after entering the power amplifier.

***Keywords***— RF, Long Range, Power Amplifier, AB Class, Load Pull Analysis, QPSK

## **Build a BTS VoIP Kit for Android-based Communication Needs (Handset)**

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***Abstract***— VoIP BTS is a device that functions as a telephone exchange for voice service services that can conduct long distance voice communication without depending on the provider. The purpose of this study is to make voice service services on the internet protocol using a network layer in Session initial protocol (SIP) signaling that is used as an Android smartphone as a client to register the service. The characteristics of this system are the type of contract, and audio codecs that are used are G.711 alaw / GSM codec, open source Asterisk software as a telephone exchange software, and Radio Wireless Local Area Network (WLAN) 802.11n which works at a frequency of 2.5GHz as topology network. The main focus of this research is that the IP telephone flow is not only for VoIP to VoIP services on VoIP BTS but is able to interconnect to GSM BTS for the recruitment of Indonesian GSM provider numbers. Quality of Service (QoS) produced on VoIP BTS is according to ITU-T G114 standard in service voice quality needs with Jitter VoIP to VoIP (5.70 ms) and VoIP to GSM (9.29 ms) values, delay VoIP to VoIP ( 32.4 ms) and SIP to GSM (39.28 ms), Troghput VoIP to VoIP (81.6 Kbps) and VoIP to GSM (86.4 Kbps), and packet loss VoIP to VoIP (0%) and VoIP to GSM (0%).

***Keywords***— VoIP, SIP, GSM, QoS, Topology Wifi 2.4 GHz network)

## **Design Truncated Corner Rectangular Patch Antenna with Multiple Slot Used in High Altitude Platform Station**

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**Abstract**— High Altitude Platform Station (HAPS) is one alternative in the limitations of BTS and satellite. HAPS technology has advantages that can cover the shortcomings of terrestrial and satellite technology. In this paper, a design of coax-fed rectangular microstrip patch antenna is proposed, in case determining antenna parameters based on WLAN application on communication platform for approach of using HAPS. A truncated corners rectangular microstrip antenna is designed at frequency of 2.4 GHz using multiple slot feeding by coax-fed feeder. The antenna uses an FR-4 epoxy material with a thickness of 1.6mm connected to a 50  $\Omega$  connector. The various parameters such as return loss, bandwidth, gain, radiation pattern and VSWR have been analyzed by software. This antenna has a total dimension 28,64 mm x 28,64 mm. The result shows that the proposed antenna is suitable for HAPS due to its small size and thickness.

**Keywords** – *High altitude platform station (HAPS), WLAN, Coax-fed.*

## **Wireless and Mobile Communication**

## **Indoor Signal Quality Improvement using Coverage Planning Method in Indoor Building Coverage Simulation**

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***Abstract*** – A building, especially apartments, not all of them have indoor network system installation. This condition causes the building doesn't have good network signal quality, especially in this study were observed LTE network. We can say that signal condition isn't good when we compare to the quality of indoor signal not as good as with outside the building. In addition to the construction and building materials also many other factors that cause signal attenuation. One solution that can be done to overcome the problems that occur is by planning the installation of Indoor Building Coverage (IBC) in the LTE network. In carrying out the design of LTE IBC is analyzed to perform the IBC planning to analyze in terms of capacity and coverage. Through the coverage and capacity planning calculations found the number of antennas required in the plan that is 172 antenna. Based on simulation results obtained an average RSRP range from -50 to -74 dBm and SINR with an average range of 14 to 67 dB. By comparing the simulation results with the standard values of parameters in one of the national provider operator (XL) found that the plan meets the standards that led to the building operator increased coverage.

***Keywords*** : *Indoor Building Coverage (IBC), LTE, Coverage Planning*



Paper ID 050018

## **Data Communication Design and Implementation for Marine Radio Using UHF Spectrum**

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***Abstract***— Affordable communication radios for fishermen do not usually have data communication feature which is able to send important informations in text format with the updated coordinate locations. The lack of standard radio for fishermen communication could cause a big risk for fishermen's safety. In this paper, data communication system using UHF spectrum for marine radio was designed and implemented. The system design was done by utilizing a micro controller with its supporting modules. The implemented data communication system could work on 300-400 MHz frequency with its bit rate 32,59 byte/s and 30 meters for communication range. The sent information in this data communication consisted of a message format with coordinate location and ship identity code inside of it.

***Keywords***—*data communication system, marine radio, UHF, design and implementation*

Paper ID 050023

## **Marine Radio for Voice Communication System on Very High Frequency (VHF) Spectrum**

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***Abstract***—Radio communication in Indonesia has developed quite well. However there are still many problems in the use of radio frequency channels although actually it has been regulated by the government. Radio channels for meritime and aviation for example, they both have their own dedicated frequencies so that they are not mixed in practice. But the problems that exist in Indonesia are that fishermen often communicate using flight frequency channels which belongs to aviation radio channels. Therefore, it is necessary to have a solution for all fishermen in the communication system in the form of a device that is comply with standards. In this research we design and implement the radio communication system in the form of communication devices for fishing vessels to communicate with other ships as well as “harbour” as recipients of distress signals (emergency), rapid reporting of certain events (such as piracy, arrests by foreign vessels, etc.). Maritime radio for fishermen is made by considering the standard needs of fishermen for the fishermen’s communication and information security system, this device is made aimed at making the price easily accessible to every fisherman, as well as easy to use. Finally maritime radio is built with the main control using Arduino Pro Mini 3.3 V / 8 MHz, DRA818V oscillator module on Very High Frequency (VHF) channels, and other supporting components. On the implementation of the radio, Arduino Pro Mini 3.3V / 8MHz will work to process input data from the user in the form of an integer value to be converted by DRA818V into a frequency channel. The predetermined frequency is the carrier frequency that is modulated and then becomes the communication path on the radio. This device has an output power of 1 watt and the results of the furthest communication test is 412 meters.

***Keywords:*** *Maritime Radio, Ship, Harbour, Fisherman, Channel, Modulation, Very High Frequency (VHF), Arduino Pro Mini 3.3V / 8Mhz, DRA818V, and Distress Signal*

## **Broadband Access Using Ethernet over PDH Based Microwave Radio Link for Rural Area**

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*Abstract*—There is still gap among people living in city and in rural area to get information access, especially who lived in the Eastern part of Indonesia. People living in such rural area usually are isolated from town by nature like rivers, valleys, hills and so on. Therefore, telecommunication infrastructure for rural area using cooper is not effective and efficient way to build. The issue is how information and communication technology could penetrate such areas. The target of this research is to propose technology that could be implemented to overcome the difficulties. Ethernet over Plesiochronous Digital Hierarchy (EoPDH) is one of many techniques that can provide Ethernet connectivity over non- Ethernet networks. EoPDH is a standardized methodology for transporting native Ethernet frames over the existing established PDH transport technology. To provide last mile for the local people, use of Mesh Wireless Local Area Network is made and connected to internet gateway via Ethernet over PDH based microwave radio link as an access backhaul. The test showed that The Ethernet frames are successfully transported to rural area with good quality of service such as throughput, response time, and transaction rate

*Keywords*—M WLAN; radio link; quality of service.

Paper ID 050046

## **Indoor Propagation Environmental Profile Analysis at 2300 MHz**

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**Abstrak – The aim of this research proposal is to find out the losses that occur in the profile of the indoor propagation environment, especially in the LTRGM ITB Building based on seat locations in the classroom. The method used is to calculate the attenuation that occurs at a frequency of 2300 MHz based on the profile of the indoor environment. The results of this study are estimating propagation attenuation based on seat location of LTE cellphone users and translated into graphical form based on calculations in Matlab.**

*Key Words – estimation, location, cellular, propagation, free space loss, indoor profile.*

Paper ID 050078

## **Design of Power Amplifier and Filter Circuits on Voice Radio Communication for Very High Frequency Spectrum**

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*Abstract*— One of the solutions in overcoming the use of communication frequency that is not suitable for radio communication, especially in maritime communication is to design communication devices that are in line with the spectrum regulated by the regulator, where one of the frequencies in regulations is in the VHF spectrum. To maximize the range of the radio communication device, a Power Amplifier system is designed that can maximize the transmit power of the radio from its basic 1-watt value. Power Amplifier system will be designed on a voice communication radio with the amount of output power reaching a value of 20 watts by utilizing the RD15HVF1 (MOSFET). The Power Amplifier system consists of 3 main circuits, namely the switching circuit, the power amplifier circuit along with impedance matching, and another one is the low pass filter circuit.

*Index Terms*— *Power Amplifier, Switching, Impedance Matching, Low Pass Filter*

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## **IoT and Emerging Technologies**

## **Design of Bag Monitoring Security System Base On Internet of Things**

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***Abstract***—Most common belongings that lost, stolen, drop, or not monitored because of our activity are wallet, suitcase, and bag. If those item stolen, most unlikely can retrieve back. Bag monitoring security system base on Internet of Things is a solution for acknowledge of bag condition. Is our bag open or close, whether it far or near us, or where is the exact position of our bag on the world. This system is using Arduino as microcontroller, bluetooth module as distance indicator, sim 800L module to send data to cloud server and make a call to give notification of opened bag, GPS module to acknowledge bag location, and Telegram app to display notification of every request to the system. Output of this research is a system that capable to display notification for user with 8 second delay notification

***Keywords***— *Bluetooth; GPS; Monitoring; IoT*



## **Traffic Light System Based on FTP Server: Damage Detection and Duration Arranger**

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**Abstract**—Traffic lights at intersection of highway have a very important role in regulating the flow of vehicles to avoid traffic jam. Therefore, it is necessary for setting the duration of lights and perform damage detection of traffic lights so it can be run in accordance with situational requirements of traffic at intersection. This final study's goal is to set the duration and perform detection of traffic light damage, so it can be repaired as soon as possible. The system consists id two main devices that are sending and receiving devices. Function of Raspberry PI and Arduino are to set duration based on data received by control center and perform detection of damage and also sending that data to the control center. Data processed in Raspberry PI device and uploaded to FTP Server. This system was tested by changing the duration and turn off one of the lights as simulated damage. From test results, data generated run in accordance with what is expected that data changes according to the conditions of traffic lights. That is, a system has been realized as well. This system consists of the Raspberry PI and Arduino UNO as the main processor, LDR sensor readings and voltage divider value as well as damage parameter and also Logitech C170 camera for taking pictures or video.

**Keywords**— *Traffic Light; Traffic Jam; Raspberry PI; Arduino; FTP Server*

Paper ID 050207

## **Softwater Tank Level Monitoring System Using Ultrasonic HC-SR04 Sensor Based On ATmega 328 Microcontroller**

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***Abstract***— In this paper, a configured monitoring system was discussed based on ATmega 328 microcontroller to replace previous sensor used in beverage industries nammely level stick sensor. Sensor HC-SR04 configured as a water level detector on the soft water tank and ATmega 328 microcontroller as controller that functions as a data processor, as well as displays and interfacing systems to display all measurement data of water level on soft water tanks. The soft water level monitoring system was used as a water controller using two valves with different funtion in soft water tanks level monitoring sytem. When the sensor reads the level in the range 0% - 15% the live alarm tells the operator that the tank is at a low level, then valve 1 opens pump1 on and valve 2 closes pump 2 off and the soft water tank is filled. When the sensor reads level higher than 70%, the valve 2 then opens pump on and soft water was transferred for production. If the sensor reads the level at position more than 95% then the alarm is active and valve 1 pump 1 off.

***Keywords***—ATmega328 microntrroller, Soft water tank, Sensor HC-SR04, Valve

## **Real-Time Monitoring System for Measurement Of Soil Fertility Parameters in Smart Farming Applications**

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*Abstract*— The real-time-based pH and soil moisture monitoring system is one of the solutions for monitoring soil fertility parameters for large areas. The research aims to monitor the pH and soil moisture values in a real-time website-based platform. The system used the Wemos d1 R2 microcontroller that has been planted with the esp8266 Wi-Fi module so that it will connect to the internet or access points wirelessly. The wireless connection method used to avoid cable installation and maintenance, which is complicated and expensive. Wemos d1 R2 also used as a web server using HTTP as a protocol. The sensor used in the system is the FC-28 sensor to measure soil moisture and ETP-110 to measure pH values. The results of pH and soil moisture measurements are displayed in the website. The results of the comparison of soil pH measurements with a soil analyzer as a control and pH sensor ETP-110 showed the average difference 1.58, while the comparison of FC-28 and Soil Analyzer measurements gave a difference of 0.6% for humidity value. This research successfully built a system that can display data in the website whose value is the same as the value in the database.

*Keywords*— ETP-110 ; FC-28 ; pH ; Sensor ; soil humidit.

## **Protecting and Monitoring System for Three Phase Induction Motor**

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***Abstract***—Three phase induction motor is alternating current motor that most used in industry. Three phase induction motor can be used to water pump. This research is to protecting and monitoring the water pump not ruin to over voltage, under voltage, missing phase, over current, and over temperature. Monitoring in this research is for monitoring the voltage, current, power factor, motor temperature, and water level in water pump. Measurement is use voltage sensor, current sensor, ultrasonic sensor, temperature sensor, Microcontroller, and ethernet shield. The sensor will result the data that will be process and analyze by Microcontroller. The data that was resulted will be sent to web server, so the user can monitoring the three phase induction motor condition from the distance. Monitoring and controlling the induction motor from the distance using IoT system and using website.. To connect Microcontroller to Web Server, we are use Ethernet Shield.

***Keywords***— *Sensor, IoT, Microcontroller, Website*

## **The IoT-Based Monitoring Systems for Humidity and Soil Acidity Using Wireless Communication**

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***Abstract***— On extensive agricultural land, a system for monitoring the quality of land that is spread over many points and uses data communication wirelessly needs to be made. This will facilitate the initial installation and maintenance of the system. This study aims to create a pH and humidity monitoring system for agriculture's soil with wireless sensor network technology based on internet of things (IoT). This system consists of two slave nodes and one master node. The master node and slave node use the RF433MHz radio module as a communication tool. Each slave node consists of a soil pH sensor and YL69 sensor to measure soil moisture. All data for each slave node is sent to the master node to be processed and then sent to the database using the Ethernet shield. Data contained in the database will be displayed on a web application that can be accessed anywhere. The maximum range of RF433MHz radio modules in open spaces is capable of receiving data from the transmitter at 50 meters. The monitoring system able to display pH and soil moisture values in real time with an average error value of the soil pH sensor which is equal to 1.66% and YL69 sensor error average is 1% compared to commercial soil analyzer.

***Keywords***—*monitoring; pH; radio wave; sensor; soil humidity; YL-69*

## **The Implementation of The Fuzzy Sugeno Algorithm On an IoT-Based Temperature and Humidity Monitoring System**

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***Abstract***—Internet of Things (IoT) is one of the new trends in the world of technology that connects electronic devices or sensors that can be accessed through the Internet continuously and can be controlled remotely through devices or gadgets. One example of using IoT in everyday life is a server that is always active and connected to the Internet. Continuous device activity causes the device to become high temperature and is likely to reduce the device's performance and age. The problem of this study is about how the system is able to monitor the temperature and humidity of the server device based on IoT in real-time through web-based monitoring using Sugeno Fuzzy Inference and how much accuracy the Sugeno Fuzzy Inference in determining the temperature and humidity of the server device. So, the purpose of this research is to design and build a monitoring system for server temperature and humidity based on IoT in real-time through web-based monitoring. The approach method used are the Sugeno Fuzzy for Inferencing and prototyping for Software Development method. The result shows that the web page is able to display the data captured from the hardware graphically and system able to response the condition when the temperature of the server reaches to the overheat condition.

***Keywords***—IoT, Temperature and humidity, Server, webbased, Sugeno Fuzzy.

Paper ID 050032

## **Priority Based Multilevel Cache LRU On Named Data Network**

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***Abstract***— NDN is a new paradigm in internet network architecture. Where the development of NDN is centered on content delivered to end users. One aspect that supports NDN is the caching system that is implemented. In this study, a caching system is used where there are two levels of cache that are performed as content storage. Using a multilevel cache system will increase the hit rate value and the average amount of content in the cache. The results obtained from the simulation show that using 2-level cache will be able to increase the hit ratio by 1.26 percent and lifetime content average by 5 percent.

***Keywords***—*Named Data Network, Multilevel, Cache, Replacement, LRU*

Paper ID 050033

## **Least Recently Frequently Used Replacement Policy in Named Data Network**

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*Abstract*—Internet users growth in last few years rapidly increased, which affected the number of content variation that requested by users. Network performance takes an important aspect to provided the best performance while sending the content requested by users. Named Data Network (NDN) is a new improvement in Information-Centric Network (ICN). NDN gives a new paradigm into networking by enabling cache system in NDN router and using the name as a network address, instead of using an IP address. Router caching effectively improved the network performance due to the user instantly request the content into the nearest router that connected in same NDN network, instead of request the content directly to the producer. Caching policy in NDN router controlled by a replacement policy. In this paper, we implement LRFU replacement policy in ndnSIM then compare with LRU and Priority-FIFO replacement policy based on content store size, interest rate, and the size of grid topology variation. From the simulation result, we found that the LRFU replacement policy achieved 3.36% higher hit rate than LRU and 5.78% compared with Priority-FIFO replacement policy.

*Keywords*—component; Named Data Network; LRFU; Content Store; Replacement Policy



## **Forwarding Strategy Performance and Effect of Producer Placement on Palapa Ring Topology in NDN Networks**

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*Abstract*—NDN is a network architecture that is seen to be implemented extensively in the future. With the concept of content-based network, NDN gets data packets not from a particular end point but can be obtained from node that are in the path of forwarded interest packets. To forward interest packets carried out by using the forwarding strategy function. Forwarding strategy works according to each algorithm. This study aims to compare the performance of forwarding strategy, especially best route and multicast in Palapa Ring topology, and the position of producers centralized or dispersed, using ndnSIM simulator.

*Keywords*—NDN, Forwarding Strategy, Palapa Ring, ndnSIM.

## **e-Aquaponics: Aquaculture and Hydroponic Integration Using Electronical Control and Monitoring**

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**ABSTRACT** We are living in a jungle of towering concretes as trees and blackened smoke of industries for breathing. The heartrending condition of agriculture and fisheries areas that getting narrow as the day goes is one of the problem that we have to face to keep on living. However, research and development with electronic monitoring and control are still very limited. e-Aquaponics is a leading innovation that optimize electronical monitoring and control for integration between Aquaculture and hydroponics in a single, complete system. e-Aquaponics bring the possibilities for us to grow agriculture and fisheries on any conditions. It can connect to cloud using Wifi to make monitoring and controlling easier and can be done even from far away. Moreover, the wireless sensor network that it have ensure the data and the steps taken are the best there is.

**Keywords:** *e-Aquaponics, Agriculture, Fisheries, electronically controlled, Wireless Sensor Network.*

## **Design and Implementation Supervisory Control and Data Acquisition (SCADA) of Flocculation Process of Water Treatment Plant (WTP) by Using Raspberry Pi 3 B**

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**Abstract**— Water is a very important factor for human survival, in order to get good quality water for daily activity, we need to do Water Treatment Plant (WTP). WTP can be treat the raw water from rivers, lakes, reservoirs or other underground sources to be drinkable or clean water that can be used by humans. Flocculation process is very important in WTP because water that processed was coming from the river and reservoir which has percentage of turbidity. SCADA system is used on flocculation process to ease the process of monitoring, so it can improve water quality produced. Raspberry Pi 3 B is used as an effective alternative to replace Programmable Logic Control (PLC) on flocculation process. Turbidity sensor as an indicator of turbidity that produced in flocculation process. Input the water before mixing on the system varied into 3 samples are 33 NTU, 21 NTU and 16 NTU. While output after mixing has average value 13,54 NTU, 10,17 NTU and 8,16 NTU. The output is still suitable with a parameter. All that SCADA system elements are well operated at flocculation process on Water Treatment Plant (WTP).

**Keywords**— *Flocculation Process, SCADA, Raspberry Pi 3 B.*

Paper ID 050269

## **Chatbot Application on Internet Of Things (IoT) to Support Smart Urban Agriculture**

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***Abstract*** - Information about the condition of the plant is certainly useful to do actions for plants to maintain the quality of these plants. The Internet of Things can help to inform the condition of the plant so that if there are circumstances that require further action such as watering can be informed immediately. In this study the tools used are wemos ESP8266 micro controller that can be connected to Wi-Fi connected to the internet so that the data state from the sensor can be sent immediately via the internet. Sensors that are attached to plants are temperature, soil moisture, air humidity and light, the data sent to the web application uses the REST API service. The Web application sends the data to the mobile application and Line Chatbot. Natural Language Processing method in chatbot applications as message processing to approach Indonesian language. The result is the user's response in asking about the condition of the plant can be answered and notification of the condition of the plant can be sent. Data delivery must be received as fast as possible for the user to test it for how many seconds the sensor data is sent to the user, from 40 data samples there are delay about 1-3 seconds to be accepted by the user. For further research, sensors are needed which are more varied with the number and type of different plants and testing with sensor data compression.

***Keyword*** : IoT, Smart Urban Agriculture, Line Chatbot, Natural Language Pro-cessing, REST API

## **Multimedia, Modeling, and IT Governance**

## The Derivation of Matrix Transformation from Pixel Coordinates to Real-World Coordinates for Vehicle Trajectory Tracking

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**Abstract**— Lately, the issue of coordinate transformation has gained interest from surveyors, GIS experts, remote-sensing practitioners and especially many researchers in transportation studies. In transportation studies, coordinate transformation is important for modelling vehicle trajectories. The trajectory of a vehicle can be obtained through traffic data. Traffic data are commonly collected from a video camera fixed at an elevated position to record traffic flow. In order to display the data coordinates as if they were taken from a top-view angle, coordinate transformation is needed. The most widely applied methods of coordinate transformation are generally being developed. Mostly, existing methods have complex computation and a large number of parameters. Naturally, complex transformations with a large number of parameters (sometimes with high-order terms that are not linear) are more accurate but introduce more distortions and deformations into the data. In this paper, a novel coordinate transformation for mapping the coordinates between video images and the real world based on a mathematical approach is proposed. The proposed coordinate transformation method was written using a matrix equation. This matrix transformation is a function of several parameters, i.e. the camera's pixels, the camera's height from the ground, and the actual width and length of the road recorded on camera. Experiments were designed to verify the proposed method, which was applied to vehicle movement tracking. The results showed that the proposed matrix transformation can correctly transform pixel coordinates to real-world coordinates with a simpler calculation and fewer parameters than existing methods.

**Keywords**— *matrix transformation; pixel coordinates; real-world coordinates; vehicle trajectory.*

## **Modify TOGAF ADM for Government Enterprise Architecture Case Study in Ethiopia**

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***Abstract***—Enterprise architecture is a conceptual blueprint that describes the structure and operation of the government and its elements. It provides a clear picture of the government where they are and where they want to be. In addition, it also addresses the issue of complexity and goes beyond IT in order to increase the simplicity of business processes across the country. The aim of this paper is to modify TOGAF ADM for the government enterprise architecture in order to improve the performance of the government enterprise. We have used eight steps to customize and modify TOGAF ADM for the government level. The modified TOGAF ADM comprises at the top Government Strategic Objective (i.e. it aims to align and formulate the overall strategic plan and policy across in both federal and regional government), Preliminary phase, Phase A—Phase H, and outside there is Security Architecture because it needs for all phases of the ADM.

The modified TOGAF ADM provides basic guidelines for the government in order to align strategic objectives with the opportunity for the transformation of the country. It accelerates the prioritization of government goals, commitment, and communication between government actors and the implementation of government interoperability. This modified TOGAF ADM can be applied to the government-wide enterprise across the country. Therefore, the modified TOGAF ADM can be used for designing enterprise architecture for government across the country.

***Keywords***—Enterprise Architecture, TOGAF, Government, modified TOGAF ADM, E-Government.

## **Academic Study of Feasibility Coexistence Between 5G Candidate Bands and Existing Service in Indonesia**

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***Abstract***—Indonesia aspires to become the world's top 10 economy by 2030 by carrying out the industrial revolution 4.0. Of the 3 layers identified by the Ministry of Industry can realize the Industrial Revolution 4.0 in Indonesia, 5G is a technology favored on connectivity layer and will become the foundation of many industries because of its highly qualified network characteristics, especially in terms of massive network rapid response and very high speed data transmission. Based on the timeline of the International Telecommunication Union (ITU), 5G technology will be officially held commercially in 2020. Several leading market countries have begun conducting trials and preparations to deploy their 5G networks in accordance with the timeline of ITU. Indonesia as a country with a large growth of internet and mobile phone users must begin to accelerate the steps to deploy 5G networks in Indonesia. One of the acceleration steps taken is to study the feasibility of 5G candidate bands in Indonesia and the possibility of sharing spectrum scenarios with existing services. From the results of the study it was found that the band is feasible for initial deployment of 5G technology in Indonesia for the low band is band 700 MHz which will be available after Analog Switch Off (ASO) and for the mid band is the band 3.5 GHz and for the high band is Band 26 GHz and Band 28 GHz.

***Keywords***—5G, Spectrum, Sharing, Coexistence



## **Design and Implementation of Model Autonomous Sentry Gun Using Image Processing and Motion Tracking**

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**Abstract—** Development of Auto Tracking Technology and Image Processing is very broad. One of them in the field that utilizes Autonomous Tracking technology is the military field. Autonomous Tracking technology is used by weaponry machines so that it becomes more accurate and efficient when compared to humans. Autonomous Sentry Gun is a tool that can shoot automatically by knowing the coordinates of the target. In the research entitled Design of Sentry Gun Model using Image Processing and Motion Tracking, tracking tests were carried out on the target given different colors and the target area varied by distance for each test. In the first test RGB color tracking was carried out with the target area varied and the result was the color that had the farthest distance was red with a distance of 223 cm with an area of 54 cm<sup>2</sup>. In the second test of RGB color tracking with the same area, the color results obtained with the farthest tracking distance is yellow with a distance of 430 cm with an area of 415 cm<sup>2</sup>. Meanwhile, the minimum tracking distance was found at purple which is 340 cm with an area of 415 cm<sup>2</sup>. The results of the experiments showed that Sentry Gun was working in accordance with the specified specifications which can distinguish the target color so that the tracking distance of each color was different.

**Keywords—** *Auto Tracking Technology, Image Processing, Autonomous Sentry Gun.*

## **Implementation of Digital Images Using the Chain Code Method to Calculate the Area and Surrounding of 2-Dimensional Objects**

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**Abstract—** Geometry is one of the oldest branches of science in mathematics that studies the shape of fields and spaces applied by architects and building technicians. Studying geometry provides many basic skills and helps to build thinking skills in analytical reasoning and problem-solving logic. Geometry is useful for understanding space in a real-life that helps in understanding better concepts. With the help of Smartphones as an information technology tool, today is able to simplify the calculation of a flat build. In this study will be presented the use of computer vision to calculate several types of flat shapes. The automatic calculation of the flat shape formula becomes a solution to calculate quickly to correct the answers to mathematical questions about regular or irregular flat shapes. The calculation process is done by detecting a flat shape that is taken using a Smartphone camera. Once detected, the image is converted into a binary image. Then the measurement of each pixel in the object image is measured, then the formula to be used and the calculation are processed by the application submitted. This study will utilize the Chain Code technique as a digital image processing which functions to generate codes in the form of a number of numbers based on the direction of the wind. This chain code is able to represent curves, lines, or contours of a field, determine circumference and area, and can determine the form factor of an object. From this method, it is used to detect objects and then scaling the size of objects so that the formula of the flat building that will be identified can be applied. The results showed that the detection of 2-dimensional objects was quite accurate with a percentage of 57.57% of 33 tests, and with 3 models of variation testing.

**Keywords—** Digital Image, 2D Object, Chain code, Android.

## **Making a Batik Dataset for Text to Image Synthesis Using Generative Adversarial Networks**

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*Abstract*— Batik is a cultural heritage as well as the identity of the Indonesian nation that needs to be preserved. The use of deep learning allows the process of making batik patterns done by computer through the mechanism of text-to-image synthesis without humans needing to make it directly. The main contribution of this research is to produce a synthetic batik pattern that is similar to the original without removing the characteristics possessed by each batik pattern. This process of text synthesis to images uses the Generative Adversarial Networks (GAN) by first creating a system that can learn from a set of datasets. A varied and structured dataset can make it easier for the system to learn faster. In this study, a batik dataset was created for the synthesis of text into images.

*Keywords:* Dataset Making, Text-to-Image Synthesis, Deep Learning, Generative Adversarial Networks

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## **Poster Session**

Paper ID 050350

## **Comparison of Time-domain Measurement Techniques for Interference Analysis in Power Line Communication**

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*Abstract*— This paper presents the comparisons between time-domain voltage and current measurement techniques for interference analysis in Power Line Communication (PLC) application. Voltage measurement is performed by directly sensing the mains voltage from a speed-controlled water pump using a 1:1000 voltage divider, whilst the current is measured using three types of sensors: current clamp, hall element, and differential probe over a shunt resistor. Voltage and current from these sensors are read with a digital oscilloscope. Impedance and power are calculated as well using post-processing software, in which the results can be analyzed in the frequency domain using a spectrogram to observe the possibility of performing communication. Voltage and current transducers should have transfer functions which are independent of frequency when performing time-domain measurements.

*Keywords*—time domain, measurement, power line communication, phase shift, load, impedance.

## **Development of GPS Transceiver for Quadcopter-based Emergency Locator Beacon**

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***Abstract***—Air transportation allows us to translocate the logistics and humans across islands, oceans, and even continents. In addition to these benefits, risk factors in the form of accidents are generally followed by disconnection of communication between aircraft and air traffic controllers. In that case, we could search an emergency locator transmitter to find the location where the accident occurred. However, such signal is vulnerable to fire and shock caused by an aircraft accident. This paper proposes a prototype of GPS transceiver for quadcopter based emergency locator beacon. A quadcopter equipped with a GPS transmitter, accelerometer sensor, and ATmega128 microcontroller could be put in a special place on the aircraft. The quadcopter will work or be activated if the accelerometer sensor detects an impact or sudden drop in height. While, a GPS receiver equipped with a Visual Basic 6 based desktop application was developed to detect the location of quadcopter. Experimental results show that the GPS receiver managed to detect the location of the quadcopter and convert GPS data into satellite images in real time through an application developed on the GPS receiver.

***Keywords***—aircraft; emergency locator beacon; GPS transceiver; quadcopter.

## **IoT System Implementation for ATmega328 Microcontroller Based Home Door Control**

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***Abstract***—The home gate control system uses a lot of infrared remote control, and it takes time to look for an infrared remote control if there is a loss of the remote. On the basis of this thought a design tool was made that was able to be used automatically. This house gate control system works automatically when the electricity supply from PLN provides voltage to the power supply to turn on the ATmega328 microcontroller, Wi-Fi NodeMCU ESP8266 module, LCD and L298 DFRobot shield motor driver. The Wi-Fi module will receive orders to open the house gate through a smartphone, and will provide notifications to LCD, LED and smartphone. This control system can accept orders to open and close the gate of the house which depends on the internet speed.

***Keywords***—ATmega328 Microcontroller; DC motor; ESP8266 NodeMCU; L298 shield motor driver; WiFi module.



## **Design of Linear Array Triangular Patch Antenna for Mobile Communication**

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**Abstract**—Mobile communication is growing rapidly, hence it requires devices including an antenna which is small, light, and compact. Researches on microstrip antennas which emphasize on its performance and miniaturization have been carried out extensively. The selection of dielectric material could sometimes achieve the desired antenna performance for some application. Therefore, the dielectric material usage is still one of important factors in the design and implementation of microstrip antennas. In this paper, a  $1 \times 2$  linear array triangular patch antenna is proposed for mobile communication application. The array antenna which is designed on FR4 epoxy dielectric substrate with the thickness of 1.6 mm and relative permittivity 4.3 is configured with several feeding systems. Some antenna parameters such as operating frequency, reflection coefficient, bandwidth, and gain are used to evaluate the performance of array antenna. From the characterization, the proposed array antenna has operating frequency of 2.364 GHz, reflection coefficient of -35.753 dB, working bandwidth of 83 MHz, and gain of 3.375 dB.

**Keywords**—*feeding system; linear array; mobile communication; triangular patch.*

Paper ID 050075

## **Design and Implementation of Web Application on Air Pollution Monitoring System Using Wireless Sensor Network Based on HAPS**

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***Abstract***— IoT can be applied in all aspects of human life, one of which is air pollution monitoring activities. In fact, many applications have created technology for air pollution monitoring, but unable to work in real time and complex. Therefore, a system is needed to develop this technology, namely air pollution monitoring system using Wireless Sensor Network (WSN) based on High Altitude Platform Station (HAPS). This system is designed on a website online in order to facilitate users to obtain data quickly. In addition, the data displayed on the air pollution monitoring system is graphs, tables and position node with Google Maps so that users can see the observed air quality in real time.

***Index Terms***—Haps, Website, Maps, Database

## **Antenna Design and Implementation of HAPS on Air Pollution Monitoring System**

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**Abstract**— Air pollution is an environmental issue that can not be ignored. The development of air pollution monitoring systems will be useful for controlling and measuring parameters associated with air pollution. Along with technological developments, the use of Wireless Sensor Network (WSN) is currently being considered for air pollution monitoring, as it can work automatically and has a much cheaper cost than conventional measuring stations. But WSN itself has several weakness that require supporting technology to cover the weakness of WSN. The solution is to integrate WSN with High Altitude Platform Station (HAPS).

In this final project will be discussed the implementation of HAPS on air pollution monitoring system based on WSN. In this study HAPS will serve as the center of aggregation and data processing from the head cluster. In order for HAPS to serve as the aggregation and data processing center of the head cluster, Raspberry Pi 3 is used as the HAPS control center. In addition HAPS will also serve as an access point for the sensor nodes to communicate wirelessly with each other. In the access point HAPS used microstrip patch antenna design results that have a working frequency of 2.4 GHz, return loss of 11.35 dB and VSWR of 1.743. The designed HAPS access point has the farthest reach of 255 meters.

**Index Terms**—HAPS, WSN, access point, microstrip patch antenna

## **Design and Implementation of Nodes on Air Pollution Monitoring System Using Wireless Sensor Network Based on HAPS**

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**Abstract**— The number of vehicles in Indonesia is increasing day by day. Each vehicle contributes to air pollution from exhaust fumes being released. Air pollution parameters based on ISPU are PM10, SO<sub>2</sub>, CO, Ozone (O<sub>3</sub>), NO<sub>2</sub>. Smoke from vehicle contributes pollutant gases, especially CO and PM10. Pollution monitoring is required to determine the air quality at the site. WSN is a wireless network consisting of devices that spatially spread using sensors to view physical or environmental conditions in various places. In the environmental field, WSN can be used for location recordings.

This final project discusses the design and implementation of nodes in air monitoring system with HAPS based on WSN. Nodes are parts of WSN that work by reading data similar to pollutants that are notified, ie CO and PM10. In addition, the node also provides location information of the node. After that, the data on the node is sent to the node that serves as the place of aggregation, named cluster node. The cluster node also has the same functionality as the node. After that, the cluster node will send data to the host on HAPS. In order for communication to be possible, the cluster nodes and nodes must be connected in the same network.

**Index Terms**— *Communication, Node, Sensor, Raspberry*

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Paper ID 050079

## **Analysis Operation NLSR With Ubuntu as NDN Router**

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***Abstract***—Named Data Networking (NDN) need routing to build NDN systems. Similar IP protocol, NDN has routing protocols intra-domain and inter-domain routing protocol. Named-data Link State Routing (NLSR) is one of the NDN intradomain routing protocols in NDN. Deployment NLSR on actual hardware and operating systems give more performance feedback which might not be obtained in a simulation. This paper explain how a NLSR work and performance use Ubuntu installed as NDN router.

***Keywords***—*ndn; nlsr; ndn routing*

Paper ID 050080

## **Experiment OLSR Routing In Named Data Network for MANET**

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***Abstract*** – Nowadays legacy IP network architecture has many limitations. And there are many researchers research for new future technology for network architecture called Named Data Network (NDN). Named Data Network (NDN) is a new design architecture for network that use directly name prefix of the content object instead of ip address, the most eneficial of using named based of content is can do multihop forwarding and greatly reduced of the congestion happened. In this paper, author tries to use Named Data Network (NDN) architecture to create MANET network topology using OLSR routing protocol, the reason using this topology is because MANET network is the most common.

***Keywords*** – *NDN, Cluster Based Routing*

Paper ID 050081

## **Open vSwitch Database Feature on SDN Architecture with OpenDaylight Controller**

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***Abstract***—Switch is an important factor on SDN architecture. Before the switch can be used a configuration is needed, this configuration usually is done on switch CLI directly. OVSDB management protocol supports this process being done on externally by manipulating OVSDB through REST API using OpenDaylight controller. Thus, the configuration can be done not from within, centrally, and more structured. This paper will be about accessing OVSDB data with REST API using Python. The application will be able to help OpenDaylight building connection to switch, adding and deleting bridge, attach and detach port from a bridge.

***Keywords***— *OVSDB, Configuration, Management*

Paper ID 050082

## **Reactive Flow using OpenDaylight Controller**

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***Abstract***—This paper will tell about reactive flow application. The application created using Python programming language and OpenDaylight controller. By utilizing REST API, the reactive flow application can be created easily. The reactive flow is used to connect layer 2 and layer 3 communication.

***Keywords***—*reactive flow, OpenDaylight, REST API, Python*



## **Hardware-Based Switch Mode Performance Comparison Using Open Daylight**

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*Abstract*— SDN (Software-Defined Networking) is a network architecture concept that equalized network configuration from various brands of devices. In SDN, there is a part named controller which communicates with devices through a standardized protocol called OpenFlow. However, not all of the devices produced by the vendor catch up these protocol developments. This documentation will reveal some examples of hardware-based OpenFlow switch characteristics. The switches used for testing are Pica8, Aruba, and MikroTik, which include performance testing, SDN features, and OpenFlow version. Performance testing depends on bandwidth results both in traditional mode or the OpenFlow protocol mode. Another aspect that affects the switch is the OpenFlow protocol version, checked using a program with Open Daylight controller and REST API. By knowing the specifications and performance of the OpenFlow switch, readers are expected to determine the appropriate OpenFlow switches easily.

*Keywords*— *Hardware switch, Network, Testing*

## **On the Design of System Integration and User Interface for Ambient Assisted Living Application**

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*Abstract*— Indonesia has a population of approximately 265 million, of which nearly 25 million are elderly, the number of elderly people is expected to continue to increase in the coming year. The main cause of death in the elderly is stroke followed by heart attack. Therefore, it is necessary to provide sophisticated and reliable health services to the elderly. This final project aims to create a monitoring system that can observe the health condition of the elderly in the form of heart rate, fall status and the location of the elderly using smartwatch sensors and cameras. The system can also provide a warning in the form of SMS notifications to be able to do first aid quickly to the elderly.

The first step is to design a data storage system for heart rate data, heart rate abnormalities, fall status and location of the elderly. The next stage is to design a system for sending data from sensors to the storage system, especially for smartwatch because it sends the data via the internet. The last stage is to design an interface for its Android-based application which consists of applications for the elderly and applications for elderly families.

The parameters tested in this study are the time needed to send data to the storage system and user interface features. The test results show that the transmission of heart rate data and the location of the elderly takes 1 to 2 seconds. In addition, for the interface there are features that has function: displaying the location of the elderly on the map, entering the emergency number data or deleting it and displaying the elderly heart rate, fall status and heart rate abnormalities data obtained from the smartwatch sensors and camera.

*Keywords*— AAL, system integration, user interface, elderly

## **On the Design of System Interface and Integrator (Syster) for Disaster Mitigation Kit (Dirga Kit)**

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**Abstract**— Natural disasters that happen in Indonesia contribute to the failure of telecommunication infrastructure in the affected area. As a result, the area is isolated from all forms of telecommunication. The act of Search and Rescue (SAR) done over the vicinity is often ineffective as there is lack of bird's eye view and visualization of the compound; coordination among SAR teams is done through devices that only support voice communication, which does not provide a detailed picture of the ongoing situation. An alternative to overcome this problem is Disaster Mitigation Kit (DIRGA KIT). DIRGA KIT is composed of two main devices: Portable Emergency Transceiver Station (PETS) and Rescuer Telecommunication Pack (RESPACK). However, a means to integrate both items and perform visualization of recorded data is needed to assist users, which is System Interface and Integrator (SYSTER). Research of SYSTER is done through literature study and laboratorial experiment. SYSTER consists of two components: integrator and graphical user interface (GUI). Integration is achieved with a mesh network utilizing B.A.T.M.A.N routing protocol and is supported with secure shell (SSH). The GUI is a web application built with Flask microframework and equipped with features to ease usage.

A form of database is also added: InfluxDB.

Parameters tested in this research are success of device connection and GUI functions. Result of this research has proven that devices are interconnected and are able to communicate. Moreover, the following features are added on GUI and functions fully: display PETS's and RESPACK's GPS footprint on a map, display potential areas with victims, download data from PETS and RESPACK, configure PETS, display and delete PETS's subscribers list, and display camera shots taken with RESPACK.

**Keywords**— *System Integration, GUI, PETS, RESPACK, DIRGA KIT*

## **Performance Evaluation of IEEE802.11p in Nakagami and the Two Ray Ground Propagation Model**

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***Abstract***— In this work, a performance evaluation of protocols defined in the IEEE 802.11p standard is conducted through the observation of data obtained from simulation using NS-2 software. IEEE 802.11p is a protocol standard used in VANETs as a proposed solution to ITS. The performance parameters observed in this work includes maximum range, throughput and latency for each of the datarate allowed in the standard for a given PER and packet size. Acquisition of required data is done via simulation on NS-2 software using modules available on the NS-2 distribution or any that can be obtained from previous research. The simulation scenario includes multi hop communications with varying number of hops and single hop communications. The wireless channel in this work uses the Nakagami model for urban environments and the Two Ray Ground propagation mode. Simulation results then processed using tools made to obtain the values of the performance parameters. Analysis and conclusions regarding maximum range, throughput and latency for IEEE 802.11p are given.

***Keywords***— *IEEE 802.11p, performance evaluation, throughput, latency, VANET*

Paper ID 050087

## **Performance Evaluation of Video Streaming over VANET using Veins Simulator Framework**

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*Abstract*— This paper discusses the design process and the simulation results on the Veins streaming video data applied to VANET. Methods used in this research are modify some of the modules in the Veins in order to support the simulation of video data with video trace method. Simulations carried out by modeling a Road side unit which transmits video data to numerous of vehicles crossing a street in the city of Bandung. Analysis was performed on data packet reception percentage, throughput, the car's distance from the transmitter and the quality of video received by each node or car.

The conclusion was drawn regarding the communication range and transmission range based on the simulation's scenario , the value of average packet throughput on the network and the quality of video received on each car

*Keywords*— VANET, Veins, video, streaming

## **Multiple Spanning Tree Protocol Inter-Operability in Multi-vendor Environment**

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***Abstract***— In a network topology which consists of many switch devices connected redundantly, Spanning Tree Protocol is very necessary to be implemented. This is intended to be able to overcome the problem of traffic looping, where frames sent from the source will only circulate between switch devices and will never reach its destination. Spanning Tree Protocol evolved, from the STP 802.1D standard until now there is a Multiple Spanning Tree Protocol (MSTP) that has a faster recovery time when loops are detected on the network and can reduce the CPU load on the switch in handling the Spanning Tree process. Along with the advancement of network technology, competition between vendors in producing network devices has also increased. At present there are a lot of switch devices where the operation is sometimes at the same time between the devices of a vendor and other vendor devices. Further testing is needed regarding the compatibility of the Multiple Spanning Tree process between multi-vendor devices.

***Keywords***— *Redundan, Spanning Tree Protocol, Traffic Looping, Multiple Spanning Tree Protocol, Multi-Vendor*

## **Data Streaming and Visualization Results of Object Detection Systems (Case Study of Human Object)**

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*Abstract*— Object detection system is one of the current needs. The increasing use of object detection systems in various fields has resulted in the fast development of object detection systems. The development carried out according to the needs or needs of each case example. Current conditions require the development of a reliable object detection system. One of the most reliable object detection systems is an object detection system that is independent of light intensity. Therefore, in this Final Project an object detection system is made using radar and cameras to be able to detect without the dependence of light intensity. Object detection systems are made to be able to detect human classes so that the output of this system is the number of humans detected. Object detection system using a camera used artificial intelligence to improve the performance using the YOLO model, while for the object detection system using radar, the AWR1642 was used. The detection results of this object detection system are finally displayed on the web interface.

*Keywords*— *YOLO, AWR1642, Artificial Intelligence*

Paper ID 050090

## **Design of Object Detection System Using Radar Device AWR1642 (Case Study of Human Object)**

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***Abstract***— Radar device is a technology that uses radio waves to detect an object or determine the range of detected object. But not only the range of the object, radar is also able to determine the angle and velocity of detected object. In this paper, I use AWR1642 to detect object and this object is human. AWR1642 is a radar device which has an advantage in terms of size and capability. AWR1642 is able to detect an object as other radar devices did. In this paper, I'll try to explain the object detection system using AWR1642

***Keywords***— Radar device, AWR1642, and detected object.



Paper ID 050091

## **Design and Implementation of AI Systems for Object Detection (Case Study of Human Object)**

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*Abstract*— Nowadays the development of AI is very rapid and covers various disciplines. One of the uses of an AI system is to detect object from given image. By that of course a reliable system in terms of accuracy and speed is needed. This paper aims to design and implement an AI system for detecting custom object (case studies person object) using YOLO v3 architecture and darknet framework.

*Keywords*— *AI, object detection, accuracy, speed*

## **Design and Simulation of C-Band Antenna for Portable Ground Surveillance Radar**

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***Abstract***— Portable Ground Surveillance Radar is a kind of radar system that intended to safeguard valuable assets or areas by detecting objects and their movements secretly. The system has to be undetectable to gain a tactical advantage in gathering information on opponents' positions. In that regard, this kind of system mostly using low power transmission, Frequency Modulated Continuous Wave (FMCW) radar. This paper describes the design and simulation of a C-Band microstrip array antennas for Portable Ground Surveillance Radar. The design parameters for the antenna: minimum gain 20 dBi, horizontal beamwidth 2.8 degrees, vertical beamwidth 7.5 degrees, horizontal polarization, and physical dimension less than 100cm x 42.9 cm x 18.2 cm. The simulation results showed that the required parameters had been achieved. The antenna's realized gain is 21.66 dBi with horizontal beamwidth 2.8 degrees, vertical beamwidth 7.5 degrees, and horizontal polarization with physical dimensions 38 cm x 16.2 cm.

***Keywords***— *microstrip antenna, antenna arrays, FMCW, radar*

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