

Program Book

TSSA 2021
15th International Conference on
Telecommunication Systems Service
and Applications
<https://tssa-conference.org/2021/>

November 18-19, 2021
The Trans Luxury Hotel
Bandung, Indonesia

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15th Telecommunication Systems Service and Application (TSSA) 2021

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Conference Record Number 52866

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Message from the General Chair

It gives me great pleasure to welcome you to the 15th International Telecommunication Systems Service and Application (TSSA) 2021. TSSA 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 15th TSSA 2021 is held in Bandung, Indonesia.

TSSA has been expected to become one of the important conferences in Indonesia in 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 2007, 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 60 submissions.

The 15th TSSA 2021 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 TSSA 2021. I would like to thank Sangga Buana University YPKP as our co-host, the steering committee; 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 on time. Special thanks also go to all authors since TSSA 2021 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.

Ir. Hendrawan, M.Sc., Ph. D.
General Chair

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Technical Program

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15th TSSA 2021 Conference Program – at a Glance

Thursday, 18 November 2021 (Day 1)	
09.00 - 09.30	REGISTRATION
09.30 - 09.55	OPENING CEREMONY Venue: Trans Luxury Hotel Ir. Hendrawan, M.Sc., Ph. D. General Chair 15 th TSSA 2021
	Opening Speech 1. Dr. Tutun Juhana, ST. MT Dean of School of Electrical Engineering and Informatics, Bandung Institute of Technology 2. Dr. H. Asep Effendy, SE. M.Si Rector of Sangga Buana University YPKP
09.55 - 10.00	Photo Session
10.00 - 12.00	Parallel Sessions 1 Online Room-1, Online Room-2
12.10 - 13.00	LUNCH BREAK
13.00 - 15.00	Parallel Sessions 2 Online Room-1, Online Room-2
15.00 - 15.40	COFFEE BREAK
15.40 – 17.40	Parallel Sessions 3 Online Room-1, Online Room-2
Friday, 19 November 2020 (Day 2)	
08.00 - 08.20	REGISTRATION
08.20 – 10.00	Parallel Sessions 4 Online Room-1, Online Room-2
10.00 – 13.20	LUNCH BREAK
13.20 – 15.20	Parallel Sessions 5 Online Room-1, Online Room2
15.40 - 18.00	Additional Parallel Sessions Online Room-1, Online Room-2
	TSSA Committee Meeting
END OF CONFERENCE	

Thursday, 18 November 2021 (Day 1)		
Parallel Sessions 1		
	Online Room-1	Online Room-2
	Track: Wireless Communication	Track: Information System and Application
10.00 – 10.20	Paper ID 150246	Paper ID 150110
10.20 – 10.40	Paper ID 150003	Paper ID 150162
10.40 – 11.00	Paper ID 150004	Paper ID 150269
11.00 – 11.20	Paper ID 150217	Paper ID 150238
11.20 – 11.40	Paper ID 150249	Paper ID 150242
11.40 – 12.00	Paper ID 150211	Paper ID 150147

Thursday, 18 November 2021 (Day 1)		
Parallel Sessions 2		
	Online Room-1	Online Room-2
	Track: Telematics Systems and Software	Track: Wireless Communication
13.00 – 13.20	Paper ID 150214	Paper ID 150036
13.20 – 13.40	Paper ID 150222	Paper ID 150224
13.40 – 14.00	Paper ID 150226	Paper ID 150223
14.00 – 14.20	Paper ID 150032	Paper ID 150037
14.20 – 14.40	Paper ID 150268	Paper ID 150039
14.40 – 15.00	Paper ID 150227	Paper ID 150225

Thursday, 18 November 2021 (Day 1)		
Parallel Sessions 3		
	Online Room-1	Online Room-2
	Track: Information and Network Security	Track: Artificial Intelligence and Machine Learning Application
15.40 – 16.00	Paper ID 150216	Paper ID 150218
16.00 – 16.20	Paper ID 150209	Paper ID 150135
16.20 – 16.40	Paper ID 150241	Paper ID 150243

16.40 – 17.00	Paper ID 150057	Paper ID 150151
17.00 – 17.20	Paper ID 150058	Paper ID 150240
17.20 – 17.40	Paper ID 150215	-
Friday, 19 November 2021 (Day 2)		
Parallel Sessions 4		
	Online Room-1	Online Room-2
	Track: Artificial Intelligence and Machine Learning Application	Track: Wireless Communication
08.20 - 08.40	Paper ID 150006	Paper ID 150055
08.40 – 09.00	Paper ID 150061	Paper ID 150212
09.00 – 09.20	Paper ID 150220	Paper ID 150056
09.20 – 09.40	Paper ID 150154	Paper ID 150059
09.40 – 10.00	-	Paper ID 150050

Friday, 19 November 2021 (Day 2)		
Parallel Sessions 5		
	Online Room-1	
	Track: Telematics Systems and Software	Track: Information System and Application
13.20 - 13.40	Paper ID 150060	Paper ID 150029
13.40 – 14.00	Paper ID 150033	Paper ID 150063
14.00 – 14.20	Paper ID 150134	Paper ID 150064
14.20 – 14.40	Paper ID 150044	Paper ID 150065
14.40 – 15.00	Paper ID 150052	Paper ID 150066
15.00 – 15.20	Paper ID 150053	-

PARALLEL SESSIONS 1 Thursday, 18 November 2021 Online Room 1 : 10.00 – 12.00	
Track : Wireless Communication	
Time	Title / Author
10.00 – 10.20 Paper ID 150246	Permittivity Estimation by FMCW Radar System as GPR Implementation Zainal Abidin ¹ , Andriyan B. Suksmono ² , Achim Mester ³
10.20 – 10.40 Paper ID 150003	Effect Of m-sequence Length to The Time Delay Detection Process in The Correlator Channel Sounder Varuliantor Dear ¹ , Adit Kurniawan ² , Iskandar ² , Prayitno Abadi ¹
10.40 – 11.00 Paper ID 150004	Study on Neural Network for Cellular Mobility Management: NS3 Simulation with Coverage Hole Case Baud Haryo Prananto, Iskandar, Adit Kurniawan
11.00 – 11.20 Paper ID 150217	Integrated Communications Required for Emergency Command System in Oil and Gas Application Winardi Sani ¹ , Ketut Abimanyu Munastha ² , Wisnu Wijaya ¹ , Dety Mulyanti ³
11.20 – 11.40 Paper ID 150249	Design and Simulation of Quadratic Curve Discone Antenna For Medical Interference Haryo Dwi Prananto ¹ , Dwi Mandaris ¹ , Achmad Munir ²
11.40 – 12.00 Paper ID 150211	Implementation of Fake News Detection Using Long Short Term Memory Method Base on Android Gunawansyah, Faris Ghilmany, Toni Arifin, Riffa Haviani Laluma, Bambang Sugiarto, Beki Subaeki

PARALLEL SESSIONS 1 Thursday, 18 November 2021 Online Room 2 : 10.00 – 12.00	
Track : Information System and Application	
Time	Title / Author
10.00 – 10.20 Paper ID 150110	FPGA Implementation of IoT-Based Health Monitoring System Shaker F. K. Abushukor, Infall Syafalni, Rahmat Mulyawan, Nana Sutisna, Nur Ahmadi, and Trio Adiono
10.20 – 10.40 Paper ID 150162	Electricity Smart Meter Payment System Through Payment Gateway and User Interface Design Trio Adiono and Alija Rasyidi Daud
10.40 – 11.00 Paper ID 150269	IoT Based Presence Screening Using RFID and Body Temperature Detection Rudy Gunawan, Raka Nugraha, Kusmadi, Sukadwilinda, Bambang Susanto, Rima Dwijayanty
11.00 – 11.20 Paper ID 150238	Design and Implementation of RTOS on Multivariable Control of Urban Farming Hydroponic Fertilizer based on Fuzzy Logic Dede Irawan Saputra Fajar Gumilang Irvan Budiawan
11.20 – 11.40 Paper ID 150242	Development of Android Application for Online Training using Blended Learning System (Case Study of LPIK ITB) Muhammad Fakhri Dwi, Ariza Husnul Qodim, Rina Mardiaty, Eki Ahmad Zaki Hamidi, Mufid Ridlo, Eueung Mulyana
11.40 – 12.00 Paper ID 150147	YOLOv3-Tiny's Weight Size Reduction using Pruning and Quantization Devi Noor Endrawati, Sayyid Irsyadul Ibad§, Infall Syafalni, Nana Sutisna, Rahmat Mulyawan, Trio Adiono

PARALLEL SESSIONS 2 Thursday, 18 November 2021 Online Room 1 : 13.00 – 15.00	
Track : Telematics Systems and Software	
Time	Title / Author
13.00 – 13.20 Paper ID 150214	Website Usability Evaluation using Human Centered Design (HCD) Approach Ade Geovania Azwar, Nurwathi, Andika Sirajuddin, Djoko Pitoyo, Ahmad Munandar, Novi Mardiana
13.20 – 13.40 Paper ID 150222	Reviewing The Competitiveness of Indonesian E-Commerce Through The Theoretical Framework of E-Business Competitiveness Peti Savitri, Ahmad Munandar, Fitri Sya'bandyah, Didin Saepudin, Nurwathi, Erna Garnia
13.40 – 14.00 Paper ID 150226	Simple Passing Room Model for Smart Campus Laboratory Through a Global Pandemic Andika Pratama, Ketut Abimanyu Munastha, Wisnu Wijaya, Ivany Sarief, Ricky Cardiansyah, Bakhtiar Abubakar
14.00 - 14.20 Paper ID 150032	Performance Comparison of Different Feature Sets for Network Traffic Classification using Recursive Feature Elimination and One-Vs-Rest Random Forest Algorithms Arba Robbani, Eueung Mulyana
14.20 - 14.40 Paper ID 150268	An Integrated Realtime Power Consumption Monitoring Device for Smart Home System Wisnu Wijaya, Rahadian Priambodho, Ketut Abimanyu Munastha, Cecep Deni Mulyadi, Hardy Purnama Nurba, Peti Savitri
14.40 - 15.00 Paper ID 150227	Digital Report Application Audit Using The COBIT 5 Framework Khaerul Manaf, Beki Subaeki, Hanhan Hanafiah, S.W. Pitara, Sopandi Hidayat, Riffa Haviani Laluma

PARALLEL SESSIONS 2 Thursday, 18 November 2021 Online Room 2 : 13.00 – 15.00	
Track : Wireless Communication	
Time	Title / Author
13.00 – 13.20 Paper ID 150036	Microstrip Array Antenna for Microwave Tomography using Proximity Coupled Technique Fauzia Anis Sekar Ningrum, Achmad Munir
13.20 – 13.40 Paper ID 150224	Implementation of Radio Over Internet Protocol Gateway for Police Station in Mountainous and Uncovered Areas Ivany Sarief, Denny Irawan, Nina Lestari, Kusmadi, Hartuti Mistialustina, Rudy Gunawan
13.40 – 14.00 Paper ID 150223	Vehicle Coordinate Monitoring System Based on GSM Communication and GPS Satellite Kusmadi ¹ , Agung Kritiyanto ¹ , Slamet Risnanto ² , Rudy Gunawan ¹ , Nina Lestari ¹ , Nenny Handajany ³
14.00 - 14.20 Paper ID 150037	Design And Implemetation of Microstrip Array Antenna For Microwave Tomography Application Proximity Coupled S-Band Sri Mulyani, Achmad Munir
14.20 - 14.40 Paper ID 150039	Implementation of Non-Uniform Slot for Radiation Characteristics Improvement of Slot Substrate Integrated Waveguide Antenna Fadjrianah, Achmad Munir
14.40 - 15.00 Paper ID 150225	Simulation Design of Six Stage Schottky Diode Rectifier for Radio Frequency Energy Harvesting Kusmadi, Ahmad Suwandi, Hendra Garnida, Nina Lestari, Adi Permana Sidik, Asep Effendi

PARALLEL SESSIONS 3 Thursday, 18 November 2021 Online Room 1 : 15.40 – 17.40	
Track : Information and Network Security	
Time	Title / Author
15.40 – 16.00 Paper ID 150216	e-Voting Protocol Modelling To Improve Verifiability Requirements Teguh Nurhadi Suharsono, Gunawan, Riffa Haviani Laluma
16.00 – 16.20 Paper ID 150209	E-Voting: Security, Threats and Prevention Slamet Risnanto ¹ , Yahaya Abd Rahim ² , Othman Mohd ² , Kusmadi ³
16.20 – 16.40 Paper ID 150241	The Implementation of Motorcycle Security System Using Voice Commands and Fingerprint Sensors Edi Jajuli, Mufid Ridlo Effendi, Lia Kamelia, Rina Mardiati, Deni
16.40 - 17.00 Paper ID 150057	Brute Force Modification Algorithm for Ring Topology Network Optimization Muhammad Ali Fahroni, Dwi Pratiwi, Ali Ramadhoni, Nana Rachmana Syambas
17.00 - 17.20 Paper ID 150058	The Shortest Path in the Ring Topology Using Genetic Algorithm Sussi ^{1,2} , Panji Krisna Dwi Cahya ¹ , Nana Rachmana Syambas ¹
17.20 - 17.40 Paper ID 070215	End-to-End Verifiability Degree Metric in e-Voting System Teguh Nurhadi Suharsono, Riffa Haviani Laluma, Gunawan

PARALLEL SESSIONS 3 Thursday, 18 November 2021 Online Room 2 : 15.40 – 17.40	
Track : Artificial Intelligence and Machine Learning Application	
Time	Time
15.40 – 16.00 Paper ID 150218	Dissociative Identity Disorder by Using Dissociative Experiences Scale Method Based on Android Riffa Haviani Laluma ¹ , Prabowo Satria Wicaksono ¹ , Gunawansyah ¹ , Bambang Sugiarto ¹³ , Beki Subaeki ² , Rini Nuraini Sukmana ¹ ,
16.00 – 16.20 Paper ID 150135	Vehicle Traffic Volume Counting in CCTV Video with YOLO Algorithm and Road HSV Color Modelbased Segmentation System Developm Abel Stanley, Rinaldi Munir
16.20 – 16.40 Paper ID 150243	Design a Landmark Facial-Based Drowsiness Detection Using Dlib And Opencv For FourWheeled Vehicle Drivers Muhammad Alvin Noor Reza, Eki Ahmad Zaki Hamidi, Nanang Ismail, Mufid Ridlo Effendi, Eueung Mulyana, Wervyan Shalannanda
16.40 - 17.00 Paper ID 150151	Path Planning Algorthm Combining Rapidly Exploring Random Trees (RRT) with Dynamic Window Approach (DWA) in ROS for an Autonomous Froklift Annisa Izaty, Pranoto Hidayata Rusmin
17.00 - 17.20 Paper ID 070240	License Plate Detection Using OCR Method with Raspberry Pi Annisa Firasanti, Tiara Eka Ramadhani, Muhammad Amin Bakri, Eki Ahmad Zaki Hamidi

PARALLEL SESSIONS 4 Friday, 19 November 2021 Online Room 1 : 08.20 – 10.00	
Track : Artificial Intelligence and Machine Learning Application	
Time	Time
08.20 – 08.40 Paper ID 150006	Classification of Malware Using Machine Learning Based on Image Processing Radifa Akbar Abhesa, Hendrawan, Setia Juli Irzal Ismail
08.40 – 09.00 Paper ID 150061	The Impact of the Content Store Scaling toward the LRU and FIFO Cache Replacements on the Named Data Networking using Mini-NDN Mochamad Soebagja Budiana, Muhammad Miqdad Nadra, Transmissia Ratu Hapsari, Ratna Mayasari, Nana Rachmana Syambas
09.00 – 09.20 Paper ID 150220	Ground Surface Contour Data Imaging for Cut and Fill Analysis Using Drones Muhammad Ryanto, Andri Perdana, Chandra Afriade Siregar, Ketut Abimanyu Munastha, R. Didin Kusdian, Muhammad Syukri
09.20 - 09.40 Paper ID 150154	Hardware Resource Reduction Using Winograd Approach on YOLOv3-Tiny Denny H. T. Nugroho, Trio Adiono, Infall Syafalni, Nana Sutisna, Rahmat Mulyawan, Nur Ahmadi

PARALLEL SESSIONS 4 Friday, 19 November 2021 Online Room 2 : 08.20 – 10.00	
Track : Wireless Communication	
Time	Time
08.20 – 08.40 Paper ID 150055	Development of Equipment for Data Collection on Microwave Tomography Measurement System Miftakhudin ¹ , Zenal Aripin ² , Fauzia Anis Sekar Ningrum ² , Achmad Munir ²
08.40 – 09.00 Paper ID 150212	The Implementation of Fuzzy Logic for Fire Extinguishing Robot Based on Arduino Uno Bambang Sugiarto, Slamet Riyadi, Riffa Haviani Laluma, Gunawansyah, Gunawan, Rini Nuraini Sukmana
09.00 – 09.20 Paper ID 150056	Implementation of ATmega328 Microcontroller for Measurement System of Microwave Tomographic Image Reconstruction Zenal Aripin ² , Miftakhudin ¹ , Sri Mulyani ² , Achmad Munir ²
09.20 - 09.40 Paper ID 150059	Smart Governance Using System Dynamics Modeling for 5G Frequency Allocation in Indonesia Muhammad Shalahuddin, Mohammad Ridwan Effendi, Wikan Danar Sunindyo, Kridanto Surendro
09.40 - 10.00 Paper ID 150050	NMS Performance Analysis and Optimization on the Microwave Radio Network Ali Farhani Sani, Ian Joseph Matheus Edward, M

PARALLEL SESSIONS 5 Friday, 19 November 2021 Online Room 1 : 13.20 – 15.20	
Track : Telematics Systems and Software	
Time	Time
13.20 – 13.40 Paper ID 150060	Prevention Methods of Recognition of Virtual Machine Environment By Malware With Modification of Filesystems, Processes, and Windows Management Instrumentation (WMI) Annisa Rifky Zulmeika, Marcellinus David Arel B, Hendrawan
13.40 – 14.00 Paper ID 150033	A Low Cost, Compact, and Easy to Set Up 4G Telemetry Module for UAV Application Fajri Anugerah Pramadhana Kornel, Farhan Ardiya Fernanda, Rama Rahardi, William Damario Lukito, Pramadithya Herdian, Rhenetou Virginio, Eueung Mulyana
14.00 – 14.20 Paper ID 150134	CLAHE Performance on Histogram-Based Features for Lymphoma Classification using KNN Algorithm Antonius Eko Nugroho, William Damario Lukito, Isa Anshori, Widyawardana Adiprawita, Hermin Aminah Usman, Okky Husain
14.20 - 14.40 Paper ID 150044	Adaptive Clustering for Efficient Urban Area HAP Covered Veronica Windha Mahyastuty, Hendrawan, Iskandar, Mohammad Sigit Arifianto
14.40 - 15.00 Paper ID 150052	Chaotic Map-based Image Encryption for Vehicle Registration Certificate Application: A Backend Subsystem Design Hafizh Mulya Harjono, M. Athallah Rizki Putra, Rifqy Hakimi, Wervyan Shalannanda
15.00 - 15.20 Paper ID 150053	Frontend Subsystem Design for Vehicle Registration Certificate Application with Image Encryption Muhammad Athallah Rizki Putra, Hafizh Mulya Harjono, Rifqy Hakimi, Wervyan Shalannanda

PARALLEL SESSIONS 5 Friday, 19 November 2021 Online Room 1 : 13.20 – 15.40	
Track : Information System and Application	
Time	Time
13.20 – 13.40 Paper ID 150029	IoT-based of Seaweed Cultivation Employing a Lowcost Autonomous Experimental Buoy Iskandar† , C.I. Samuel, D. Favitri, Padlan, Azizi
13.40 – 14.00 P Paper ID 150063	Forwarding Strategies Effect on Named Data Network Traffic Load. Case Study : Simulation with Mini NDN Anggietha Santoso Putri, Mitra Sofiyati, A.A. Bagus Yoga Deva Mahesa, Galih Nugraha Nurkahfi, Nana Rachmana Syambas
14.00 – 14.20 Paper ID 150064	Comparison of Caching Replacement Policies in Changing the Number of Interest Packets on Named Data Networks Using Mininet-NDN Faishal Zharfan, Larastya Devindira Hasnaa, Nana Rachmana Syambas, Ridha Muldina Negara
14.20 - 14.40 Paper ID 150065	Adaptive Forwarding Strategy in Named Data Networking : A Survey Syaiful Ahdan, Ade Nurhayati, Galih Nugraha Nurkahfi, Nana Rachmana Syambas
14.40 - 15.00 Paper ID 150066	Design and Implementation of Low-Cost and Highly Customable Named Data Networking(NDN) Testbed Galih Nugraha Nurkahfi, Tody Ariefianto Wibowo, Syaiful Ahdan, Arumjeni Mitayani, Mochamad Mardi Marta Dinata, Vita Awalia Mardiana, Nana Rachmana Syambas, Ade Nurhayati, Hafizh Mulya Harjono

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Wireless Communications

Paper ID 150246

**Permittivity Estimation by FMCW Radar System as
GPR Implementation**

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Abstract—Using our FMCW system as GPR, we can distinguish the permittivity of three different mediums, which are air, sand, and water. In addition, we carried out time-variant measurements for subsurface infiltration in laboratory scale that indicate a possible application as a leakage detector by mapping the subsurface permittivity.

Keywords— *frequency modulated continuous wave (FMCW); ground penetrating radar (GPR); leakage detection; permittivity estimation.*

Paper ID 150003

**Effect Of m-sequence Length to The Time Delay Detection Process
in The Correlator Channel Sounder**

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Abstract—For observing the impulse response of a channel, correlator channel sounder is one of the methods that popular to be used. Using the m-sequence bit as the baseband signal, the characteristic of a channel could be analyzed on the receiver side using the autocorrelation function. To optimize the design of the correlator channel sounder, the length of the m-sequence should be taken carefully with consideration to the specification that will be achieved or targeted. There is no rule-of-thumb that the longest bit sequence will optimize the design. However, the length of the m-sequence will imply the Signal to Noise Ratio (SNR) value. Therefore, the detection capability of time delay in the correlator channel sounder will also increase. In this paper, we show the effect of m-sequence lengths to the capability of detecting the time delay using a simulation process. Simulation results show if the length of the m-sequence is doubly increased, the minimum of SNR value for the detection process in the correlator channel sounder will also increase in the logarithmic shape.

Keywords—*m-sequence length, correlator channel sounder, time delay detection*

Paper ID 150004

**Study on Neural Network for Cellular Mobility Management: NS3
Simulation with Coverage Hole Case**

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Abstract— With the emergence of 5G cellular technology, that uses higher frequency spectrum and thus smaller cells, a more robust mobility management mechanism is required especially for high-mobility users. In a connected user, the mobility management is done by performing handover and a successful handover is crucial to the performance of data transmission. Machine learning is a promising technology to assist the cellular network to improve the mobility management performance. This research simulates the usage of artificial neural network, as a type of machine learning algorithm, in helping the cellular network to decide the correct target cell during handover mechanism. It is concluded that neural network can decide the target cell better than traditional measurement-based handover algorithm, especially in the presence of coverage hole. We also studied the impact of some neural network parameters to the performance of the decisions. An improved design of the neural network also proposed in this research.

Keywords—cellular, handover, 5G, LTE, machine learning

Paper ID 150217

Integrated Communications Required for Emergency Command System in Oil and Gas Application

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Abstract— In chaotic situations and competing objectives on the scene during the emergency responses, good, and effective communications between incident management teams are highly required. Integrated communications provide and maintain contact among incident responders, enable connectivity between various levels of the organization, achieve situational awareness, and facilitate information sharing and informed decision-making. This paper will elaborate on the major incident command system (ICS) components as a practical tool in managing the emergencies applicable in the oil and gas industries. The emphasis of the analysis is on what are the minimum requirements to be met in the planning of integrated communications used within the Emergency Command Center (ECC). A software application developed through XVR Technology has been utilized to demonstrate how these requirements are implemented and used to simulate an established incident response plan, especially in issues of suitable communication media as vital resources for potential incident commanders. Having communication management integrated at all levels of incident response team members enables making informative decisions on time.

Keywords— *Communication, Incident, ICS, ECC*

Paper ID 150249

Design and Simulation of Quadratic Curve Discone Antenna For Medical Interference

Haryo Dwi Prananto¹, Dwi Mandaris¹, Achmad Munir²

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National Research and Innovation, Agency Republic of Indonesia
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Abstract—The large number of uses of IoT equipment causes the potential for electromagnetic interference to interfere with the performance of medical devices. Discone antenna is an antenna that is suitable for measuring electromagnetic interference that occurs. In this study, the development of a discone antenna was carried out by modifying the shape of the cone surface. This aims to improve the characteristics of the S11. The modification made is to use a curved shape on the cone of the discone antenna using the quadratic curve. The quadratic curve form is modified by the degree of curvature. The simulation results show that the greater the degree of curvature, the lower the S11 and the higher the cut off frequency. The characteristics of S11, radiation pattern, and gain are shown in this study.

Keywords—*discone antenna, quadratic curve, electromagnetic interference, medical device*

Paper ID 150211

Implementation of Fake News Detection Using Long Short Term Memory Method Base on Android

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Abstract— Technology is a part of industrial revolution that can make human easier to receipt informations and news. In 2019, 63,3% Indonesian people already have personal smartphone and owning a smartphone can indicate an accelerator to getting news. But it is an opportunity for irresponsible people to share fake news. Therefore it is necessary to make a system to help people in detecting fake news, include in smartphone application. In this research, a machine learning model was made using the LSTM (Long Short Term Memory) method to detect fake news. LSTM is a classification method that improves the weakness of the previous method, namely RNN (Recurrent Neural Network). An android application was built in this study to make it easier to detect fake news. An application programming interface was also built to bridge the detection process on the backend to the Android application. The results of this study indicate that the LSTM method is able to detect fake news with an accuracy value of 0.983. The evaluation results of the model training, the model does not show the occurrence of underfitting or overfitting.

Keywords: *Classification, Long Short Term Memory, Android, fake news*

Paper ID 150055

Development of Equipment for Data Collection on Microwave Tomography Measurement System

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Abstract—In this paper, the development of equipment for collecting data on microwave tomography measurement system is proposed. The equipment is to facilitate the retrieval of measured data with higher accuracy and precision of the reconstructed object. During the measurement process, the object is positioned at an azimuth angle in the distance between the object and the antennas. The measurement system is developed based on a microcontroller with a mechanical part implemented by a stepper motor and a rotary table for object loads. The rotation of the reconstructed object is optimized by changing the azimuth angle by 5o and 10o in one full rotation. The characterization result shows that the developed microwave tomography measurement system can precisely measure the object and accurately collect its measured data with the heaviest object as the load measured at 15kg.

Keywords—*Equipment; microcontroller; measurement system; microwave tomography; reconstructed object.*

Paper ID 150224

Implementation of Radio Over Internet Protocol Gateway for Police Station in Mountainous and Uncovered Areas

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Abstract— Police stations are one of the main assets that need to communicate with one another. The problem that occurs is the location of the police station that separate by mountains/hills areas or uncovered areas. This paper will discuss radio over internet protocol (ROIP) media for police station communication between describing areas before. ROIP functions as an interface between conventional radios and servers supported by the internet network so that old radios can reach a network. This radio gateway itself consists of some components such as a raspberry pi3 microprocessor, soundcards, and simple switching as components that forward voice data and an ISP to communicate via the internet. The test occurs by using different cellular operators in a programmed smartphone with an interface application, especially for ROIP communication.

Keywords—radio, RoIP, communication, gateway

Paper ID 150223

**Vehicle Coordinate Monitoring System Based on GSM
Communication and GPS Satellite**

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Abstract— This document proposed the Drive by Touch method integrated with GPS and SMS Gateway. The Neo6M V2 GPS module connected to the satellite acted as the determinant of the object's position coordinates. Communication between the system and the vehicle takes place using the SMS Gateway when the movement occurs, and the coordinates are obtained via GPS. The GSM communication network is used because the network has more coverage and is widely used. This system is used as anti-theft protection. When the vehicle coordinates are detected that are different from the coordinates known to the user, the vehicle can be disabled via SMS. The results of the performed evaluation of the system indicate a success rate of vehicle communication with the system of 83.3%.

Keywords—*Drive by Touch, coordinate tracker, SMS gateway*

Paper ID 150056

Implementation of ATmega328 Microcontroller for Measurement System of Microwave Tomographic Image Reconstruction

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Abstract—This paper deals with the implementation of Atmega328 microcontroller for measurement system of microwave tomographic image reconstruction. An ATmega328 microcontroller-based Arduino as a main part of master controller unit (MCU) is used to control the measurement system for obtaining accurate measured data applied for reconstructing the image of object. Two potentiometers directly connected to the MCU module are used as sensor for the measurement system. Some modes of measurement can be selected for gaining different types of measured data in which the data can be monitored through the liquid crystal display (LCD). A motor stepper as the controlled part is connected to the MCU and can operate automatically or manually depends on the mode of measurement. From the result of testing, it shows that the realized hardware is effectively to control the measurement system with the average error of measurement less than 2%.

Keywords—Atmega328 microcontroller; measurement system; microwave tomography; motor stepper; potentiometer.

Paper ID 150039

**Implementation of Non-Uniform Slot for Radiation Characteristics
Improvement of Slot Substrate Integrated Waveguide Antenna**

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Abstract— In wireless communication, the development of Wireless Local Area Network (WLAN) allows mobility and flexibility to existing infrastructure, especially with high user density. An antenna is presented with a compact size, lightweight, low cost, and easy to integrate with other electronic devices to ensure communication can run flawlessly. In this study, a microstrip antenna was integrated with Substrate Integrated Waveguide (SIW). The integration of the SIW structure is intended to obtain a waveguide-based array slot antenna for WLAN applications. The design of the SIW slot antenna operates at a frequency of 2,4 GHz. The SIW slot antenna has a total thickness of 1,6 mm with dimensions of 376 mm x 40 mm. The proposed SIW slot antenna uses an FR4 epoxy dielectric substrate by using a microstrip line feeding through the SMA connector. The SIW slot antenna has 8 longitudinal slots with non-uniform slot lengths to improve radiation characteristics. The measurement results of the SIW-based slot array show the bandwidth achieved 92 MHz with a frequency range of 2,323 GHz to 2,415 GHz with dimensions of 378 mm x 38 mm. Meanwhile, the gain resulted from the non-uniform slot length is 4,07 dBi

Keywords— *Substrate Integrated Waveguide (SIW), slot antenna, wireless local area network (WLAN), radiation characteristics.*

Paper ID 150225

Simulation Design of Six Stage Schottky Diode Rectifier for Radio Frequency Energy Harvesting

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Abstract— Energy harvesting is a process of extracting energy from the surrounding environment which can be used as a resource to operate low power devices. The energy in question is in the form of electromagnetic waves which are wasted from several BTS sources. Electromagnetic waves are captured through the antenna and then converted into electrical energy by a series of wave rectifiers so that they can be reused as a new energy source. In this study, a design for a wave rectifier circuit was carried out using the 2009 Advanced Design System (ADS) simulation program. After conducting a comparative study of some data and references, a Dickson-type wave rectifier circuit arranged in 6 levels was selected with the main component in the form of a Schottky HSMS-2852 diode and a 22-pF capacitor. The simulation results at a frequency of 900 MHz, this 6-stage wave rectifier circuit produces a voltage output of 1.444 V DC at -14 dBm and 5.984 V DC at 0 dBm.

Keywords— *Six stage wave rectifier circuit, Schottky diode, energy harvesting.*

Paper ID 150036

Microstrip Array Antenna for Microwave Tomography using Proximity Coupled Technique

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Abstract — This paper will present the design of a microstrip antenna array for microwave tomography applications using the proximity coupled technique. Tomography is the process of reconstructing an image, in which the object will use waves to pass through scattered or reflected objects. In order for microwave tomography to produce tomograms, the antenna must operate at frequencies above 3 GHz. The design of the microstrip array antenna in this paper will work at the Ku-Band frequency, which is around 14GHz. The microstrip array antenna will use proximity coupled, where the transmission line is located between two dielectric substrates. The material used in the antenna fabrication is Duroid 5880 with a thickness of 1.575 mm for each substrate. The total dimensions are 45.5 mm x 45.5 mm, with a 2x2 array configuration, resulting in four patch antennas. The antenna will be simulated using ANSYS HFSS software. To find out the optimal results on the simulation of the required parameter testing. The parameter used for testing the antenna results is the Scattering Parameter, which in this paper will only be tested for the S11 parameter. Apart from scattering parameters, radiation pattern, polarization, bandwidth and gain will be the testing parameters of this paper. From the simulation results using HFSS, it is found that the best value of Parameter S11 is -12.5 dB at a frequency of 14 GHz, which means that the antenna has met the requirements for the S11 parameter test. Then the resulting bandwidth on the tested antenna is 0.19 GHz, which is about 0.14%.

Keywords— *Microstripe Array Antenna; Microwave Tomography; Proximity Coupled; Ku-Band; Testing Parameters*

Paper ID 150212

**The Implementation of Fuzzy Logic for Fire Extinguishing Robot
Based on Arduino Uno**

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Abstract—Currently, robots are widely used to help human life. One of the functions of robots is to help humans do risky work. One of them is a fire extinguishing robot. This robot is a form of autonomously moving robot designed to assist in handling disasters or find hot spots in a fire disaster. This research aims to implement fuzzy logic on fire extinguishing robots so that they can extinguish fires according to the fire conditions. In this research, two sensors were used to generate input data in the fuzzification process, namely the flame and smoke sensors. Both sensors were integrated with a microcontroller on the Arduino Uno board to produce the voltage output to regulate the speed of the DC fan. The evaluation result showed that fuzzy logic can work on the robot according to the design through the stages of fuzzification, inference, and defuzzification. The result showed that the DC fan rotational speed level can be adjusted based on the condition detected by the sensor to extinguish the fire.

Keywords—*fuzzy logic, Arduino Uno, fire extinguishing robot, microcontroller, flame sensor, smoke sensor.*

Paper ID 150037

**Design And Implemetation of Microstrip Array Antenna For
Microwave Tomography Application Proximity Coupled S-Band**

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Abstract- Proximity coupling is a method of supplying the transmission line that is not directly connected to the patch but by a coupling mechanism. This paper represents the design of an SBand microstrip array antenna with a proximity coupled feeding technique. A proximity coupled fed antenna was choosen because it has a larger bandwidth and is easier to achieve match impedance. The resonant frequency of antennais designed at the frequency of 3 GHz for microwave tomography application. The proposed antenna array consists of and 1×2 and 2x2 element square patches with dimension 21mm x 21mm. . The antenna which has the total thickness of 3.2 mm is fed by proximity coupling feed line through a 50Ω SMA connector. The patches are deployed on the top side of two layers FR4 epoxy which the thickness and dielectric constant are 1.6 and 4.3. The characterization result of return loss, working bandwith, VSWR (Voltage Standing Wave Ratio), and gain are presented.

Keywords—*microwave tomography, compressive sensing*

Paper ID 150059

**Smart Governance Using System Dynamics Modeling for 5G
Frequency Allocation in Indonesia**

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Abstract— Smart governance by using system dynamics modeling can be used to assist decision-making in determining the allocation of 5G frequencies in Indonesia. 5G is a new technology that uses a frequency spectrum, while currently the frequency spectrum has been used for other purposes. Therefore, regulators must make the right decisions regarding the allocation of frequency spectrum for 5G and other uses to provide optimal benefits. System dynamics modeling used in smart governance can help identify causal relationships of elements that affect 5G frequency allocation and see short-term and long-term impacts. Regulators must be able to make decisions regarding frequency allocation by considering shortterm and long-term impacts so that smart governance by utilizing system dynamics modeling is expected to assist regulators in making decisions.

Keywords—*smart governance, system dynamics, causal effect, 5G, spectrum frequency, Indonesia*

Paper ID 150050

**NMS Performance Analysis and Optimization on the Microwave
Radio Network**

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Abstract-- Network Management System (NMS), a system that acts as an early warning system must have maintained performance so that the condition of the monitored equipment can be monitored according the actual conditions in field. Recently, NMS had been implemented in almost every devices(SNMP or nonSNMP based) in order to supervise the condition of the system and it devices. SNMP (Simple Network Management Protocol) as a protocol with the ability to manage network from long distance, else known as remote system, had adequately developed. In the implementation, this protocol can work paralell with other protocols such as TCP/IP Protocol. The combination of the protocols mentioned above had been successfully obtained and application that is able to monitor microwave radio devices and also run a management process on it. This management process gives a lot of advantages because can be done remotely hence it does not need the manager to be available at the location of the device. This monitoring and management system can be done by connecting microwave radio device into LAN, WANor even the internet so that the management process can be run from everywhere as long as we have the device connected to the internet system. The decrease in NMS performance result in a decrease in devices surveillance. NMS optimization needs to be done so that all Network Elements (NE) of the Microwave Radio network are monitored in real time.

Keywords: *Network Management System, Network Element, Microwave Radio Network*

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Information and Network Security

Paper ID 150216

e-Voting Protocol Modelling To Improve Verifiability Requirements

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Abstract— The level of trust in collection is very dependent on the ability of the system to protect voters' votes until the end of the process. The parameters in e-voting consist of accuracy, invulnerability, privacy, and verifiability. The verifiability aspect is one of the parameters in e-voting that can increase confidence in voting technology, where some parties can ensure that there is no change in votes from voters. To get to the concept of the proposed e-voting system, an analysis of the needs of evoting has been carried out and the stage of the protocol model design analysis for verifiability needs. Some parties involved in meeting the needs of verifiability are Voters, Officers, Witnesses or KPU (General Election Commission), where some parties can verify the votes of voters before the election, during the election, after the election and after the vote count. In fulfilling the verifiability needs of this e-voting system, traditional simulation modeling and voting testing have been carried out as a comparison with modeling simulations and testing of e-voting protocols. Before modeling simulation and protocol testing, formal notation writing was carried out in the form of Communicating Sequential Processes (CSP) notation. Protocol testing will be carried out with formal verification, which proves that protocol specifications are in accordance with the integrity properties that have been defined previously. This verification can be achieved by using a verification tool based on reference modeling, namely SPIN (Simple Promela Interpreter) which can analyze the logical consistency of specifications, and reports about verified properties. The verified system is modeled with PROMELA language (MEta LANGUAGE process) which is translated from CSP formal notation.

Keywords— *e-voting; e-voting protocol; verifiability; formal notation; formal method.*

Paper ID 150209

E-Voting: Security, Threats and Prevention

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Abstract—None in this world, neither software nor hardware that is safe against the threat of attacks and security disturbances, including e-voting technology. There is no chance of tolerance for the slightest security flaws in e-voting technology because it involves public trust, cost and the sustainability of the implementation of e-voting. Several countries such as United States, Netherlands, Germany, United Kingdom and Norway canceled the implementation of general elections using e voting and even did not continue the project due to security factors that degrade public trust. In this paper, E-voting: Security, Threats and Prevention, we propose the results of the mapping of the security aspects needed, and the potential for attacks in each phase of e-voting in general continued with an analysis of their prevention. Hopefully, this paper will contribute to the development of e-voting technology especially in the security factor, and in general, provides an overview of the security needs of e-voting technology

Keywords—: e-voting, security, threat, prevention

Paper ID 150241

The Implementation of Motorcycle Security System Using Voice Commands and Fingerprint Sensors

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Abstract—Motorcycle theft cases often occur in Indonesian every year and will continue to exist as long as motorbike users are not vigilant. Public attention to the safety and security of motorbikes is less aware of the public and weak security system in parking lots are some of the things that become obstacles in preventive efforts. This motorcycle security system using voice commands and an IoT-based fingerprint sensor is a solution for taking preventive actions and building awareness to secure the user's motorbike. This motorcycle security system uses a smartphone for monitoring and control, voice commands via a smartphone application and fingerprints as input so as to prevent motorcycle theft cases optimally. In this motorcycle security system, the Blynk platform is used as an Internet of Things (IoT) device that allows users to monitor and control remotely. The control system used is a closed loop control system using Arduino Mega 2560 as a microcontroller, HC-05 as a Bluetooth module for voice input and AS608 as a fingerprint sensor. The output of this security system is remote monitoring and control of the motorcycle and the motorbike cannot be turned on if the voice and fingerprint inputs are not initialized.

Keywords—voice command, fingerprint, blink, Arduino mega 2560

Paper ID 150057

Brute Force Modification Algorithm for Ring Topology Network Optimization

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Abstract— In this era, technology is now growing so fast. Especially in the optical network site. In this paper, the authors focus about problem solving in Travelling Salesman Problem (TSP) using bruteforce algorithm that has been modified. This Proposed Algorithm trying to get a better result from the original bruteforce its self using pyton. With bruteforce as a basic, this Proposed Algorithm can get more than 15 nodes, in other hand, bruteforce only be able to touch 15 nodes only. And this Proposed Algorithm can beat the original bruteforce in time almost 200 times better than original.

Keywords—*Bruteforce, Pyton, Antcolony, TSP*

Paper ID 150058

The Shortest Path in the Ring Topology Using Genetic Algorithm

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Abstract— The shortest path in the ring topology is discussed in this paper using a genetic algorithm. The measurement parameters in the study are the shortest path and the computational time on the varying number of nodes. The measurement results of the genetic algorithm were compared with the results of the brute force and ant colony algorithms. The measurement of the shortest path using the genetic algorithm has an average difference of 23 when compared to the ant colony, while the brute force algorithm has the same value. The computational time of the genetic algorithm requires an additional time of about 1000-9000 milliseconds for each additional node which is better than the computational time when using the brute force algorithm but not as good as the computational time using the ant colony algorithm.

Keywords—*Genetic Algorithm, Ring Topology, The Shortest Path*

Paper ID 150215

End-to-End Verifiability Degree Metric in e-Voting System

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Abstract— In e-voting, the verifiability parameter gives confidence and confidence to the voters that the voting system used will provide protection, both for the votes cast and for the voters themselves. The notion of verifiability includes Individual Verifiability, Universal Verifiability and End-to-End Verifiability. End-to-End Verifiability (EV) is a type that allows voters to be able to verify after the voting process, even though the voting process has not yet been closed. Some research on End-to-End Verifiability is more for the selectors only and does not see for some e-voting phases and has not proposed any metrics. In this research, it has been proposed an End-to-End Verifiability Metric to measure the degree of End-to-End verifiability consisting of End-to-End Verifiability Metrics Before Election, End-to-End Verifiability Metrics When Election, End-to-End Verifiability Metrics After Election, Endto-End Verifiability Metrics After Vote Counting and to determine the position of degree of verifiability, followed by the degree range of verifiability.

Keywords—: *e-voting system, end-to-end verifiability, End-toEnd Verifiability Degree Metric.*

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Artificial Intelligence and Machine Learning Application

Paper ID 150218

Dissociative Identity Disorder by Using Dissociative Experiences Scale Method Based on Android

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***Abstrak---* Any individual can have an event that triggers trauma. If the individual is unable to deal with the trauma it can cause some mental disorder problems. One of them is Dissociative Identity Disorder (DID), this disorder is one type of dissociative that results in identity chaos, compound personality, even uncontrollable behavior. One way to identify DID is by testing the traumatic experience. The traumatic experience testing technique used in this study was Dissociative Experiences Scale-I (DES-I). DES is a collection of questions centered on did symptoms. DES-I presents a concise method of generating a score that can identify a person who has DID, if the person has a high score then the person has a DID disorder. Although it gives a high score, DES-I can be used as a means of suggestion leading to the process of rehabilitation or mental treatment. The purpose of this research is to create a DID detection system using an expert system. Monitoring can be done through questionnaire filling using des-I method as measurement. The results of filling out the questionnaire are then processed and entered into the database. The test result that shows did symptomatic based on the score if the score shows a result of ≥ 30 then the result is positive to have DID otherwise if < 30 then it is declared negative to have DID.**

***Keywords----* expert, dissociative, DID, disorder**

Paper ID 150220

**Ground Surface Contour Data Imaging for Cut and Fill Analysis
Using Drones**

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Abstract— In planning the geometric design of highways in the Subang Regency project at West Java Province - Indonesia, field data is needed as the basis for calculating the volume of excavated soil and embankments of a land. This calculation is necessary to minimize the difference/comparison between the volume of excavated and embankment soil obtained when planning the geometric design of the highway to determine the need for how much soil volume require for embankment or disposal of land waste from the excavation results. The analysis uses two comparison methods, the data from the processing of aerial photos using a fixed-wing drone and field measurements (RTK). The results showed a difference in the volume accuracy from excavation and soil fill between the data processing based on Drones and RTK in sequence follow for excavation of 17.9% and embankment of 20.6%.

Keywords—drone, RTK, excavation

Paper ID 150135

Vehicle Traffic Volume Counting in CCTV Video with YOLO Algorithm and Road HSV Color Modelbased Segmentation System Development

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Abstract—Traffic congestion is a significant problem in developing countries. One viable solution is a Smart Traffic Light System which utilizes artificial intelligence to adapt light configuration to actual traffic condition in real time. To adapt properly, the system would need traffic density information. We propose a vehicle counting system with neural networks to calculate vehicle volume in traffic roads. In the proposed system, a vehicle is detected with YOLO (You Only Look Once), the state-of-the-art of neural network-based object detection algorithm. The model's performance can be improved with the extraction of RoI (Region of Interest), which is traffic roads. RoI extraction is implemented with HSV color model-based segmentation. Vehicle detection is followed by vehicle tracking and counting. Three tracking algorithms are experimented with the system: KCF (Kernelized Correlation Filter), CSRT (Channel and Spatial Reliability Tracking), and MOSSE (Minimum Output Sum of Squared Error). Vehicle counting is implemented in two methods: incremental or actual. A graphical user interface is developed to provide easy access to system configurations. The result reveals that the best system configuration in terms of accuracy while capable of running in real-time for CCTV recordings is YOLOv4 (608x608) with KCF tracker and RoI Extraction.

Keywords—*artificial intelligence, HSV color model-based segmentation, region of interest extraction, vehicle counting, YOLO*

Paper ID 150243

**Design a Landmark Facial-Based Drowsiness Detection Using Dlib
And Opencv For Four-Wheeled Vehicle Drivers**

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Abstract—Traffic congestion is a significant problem in developing countries. One viable solution is a Smart Traffic Light System which utilizes artificial intelligence to adapt light configuration to actual traffic condition in real time. To adapt properly, the system would need traffic density information. We propose a vehicle counting system with neural networks to calculate vehicle volume in traffic roads. In the proposed system, a vehicle is detected with YOLO (You Only Look Once), the state-of-the-art of neural network-based object detection algorithm. The model's performance can be improved with the extraction of RoI (Region of Interest), which is traffic roads. RoI extraction is implemented with HSV color model-based segmentation. Vehicle detection is followed by vehicle tracking and counting. Three tracking algorithms are experimented with the system: KCF (Kernelized Correlation Filter), CSRT (Channel and Spatial Reliability Tracking), and MOSSE (Minimum Output Sum of Squared Error). Vehicle counting is implemented in two methods: incremental or actual. A graphical user interface is developed to provide easy access to system configurations. The result reveals that the best system configuration in terms of accuracy while capable of running in real-time for CCTV recordings is YOLOv4 (608x608) with KCF tracker and RoI Extraction.

Keywords—artificial intelligence, HSV color model-based segmentation, region of interest extraction, vehicle counting, YOLO

Paper ID 150151

Path Planning Algoritih Combining RapidlyExploring Random Trees (RRT) with Dynamic Window Approach (DWA) in ROS for an Autonomous Froklift

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Abstract— Forklift is a transportation tool of materials or logistics contained in the warehouse. Forklift is categorized as autonomous if they have navigation capabilities. The navigation system consists of path planning and obstacle avoidance. Sampling-based methods of path planning have been extended from basic robotic planning to more difficult and diverse applications for efficient solutions. A common problem occurs where solutions are offered only for path but not for velocity commands and environmental changes around the forklift. This paper presents a new integrated algorithm for creating paths for navigation in dynamic environment. The proposed algorithm is Rapidly-Exploring Random Trees (RRT) for global path planning that takes a random sample of configuration space to generate collision-free paths. As for local path planning, the Dynamic Window Approach (DWA) algorithm is used to take samples of the forklift speed space by calculating the translational and rotational speeds of the forklift. The performance of this algorithm will be tested and validated using Robot Operating System (ROS). Simulation show that the algorithm can achieve efficient paths for forklift in a dynamic environment.

Keywords—*autonomous forklift, navigation, Path Planning, Obstacle Avoidance, Rapidly Random Trees (RRT), Dynamic Window Approach (DWA), Robot Operating System (ROS).*

Paper ID 150240

License Plate Detection Using OCR Method with Raspberry Pi

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Abstract— The application of The Automatic License Plate Recognition (ALPR) to overcome the weakness of reading vehicle license numbers manually is largely determined by the choice of segmentation techniques in processing the detected object image. This study shows a comparison of the performance of two segmentation methods in detecting license plate edges, namely Canny Edge and Otsu Thresholding. The license plate image data is processed through several stages before the license plate text is detected by the OCR and Teserract Library methods. Data processing is done using Raspberry Pi. The performance test of the two methods compared was carried out on 30 samples of vehicles in three time segments, namely morning, afternoon, and evening. From the results of the experiments carried out, Canny Edge shows better performance because it can detect 100% of edges compared to Otsu Thresholding which is only able to detect 70% of edges of the entire data. In general, the system built successfully detects number plates with an average accuracy of 72%.

Keywords— *Canny Edge, Otsu Thresholding, Vehicular License Plate, Optical Character Recognition*

Paper ID 150006

**Classification of Malware Using Machine Learning Based on
Image Processing**

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Abstract--This paper aims to explain the process of classifying malware using machine learning methods based on image processing. The steps taken are to convert the software program suspected of being malware into binary bits, then convert them into strings, 8-bit vectors, and then into grayscale images. Convolutional Neural Network (CNN) is used to process malware visualization datasets so that similarities can be found. The final model is expected to identify malware into one of the categories/families of an operating system. Parameter testing will be carried out in the form of measurement of accuracy, error, precision, and sensitivity of the model using a confusion matrix.

Keywords: *Malicious Software, CNN, Image Processing, Machine Learning*

Paper ID 150061

The Impact of the Content Store Scaling toward the LRU and FIFO Cache Replacements on the Named Data Networking using Mini-NDN

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Abstract—The requisite access speed on a network is the main thing in the switchover of information. The IP-based network uses a client-server approach that provides a sufficient high delay because of the requested information placed on the server, which is considered less effective. One of the solutions to overcome this issue is to use the NDN architecture. The NDN architecture can responses the client request through the closest node without requesting the information from the server because the NDN nodes can save the data in the Content Store (CS). Another factor that can affect the service quality of the NDN network is the cache replacement strategy. Some of the common strategies used are Last Recently Used (LRU) and First In First Out (FIFO). We conduct a study on the effect of changing the CS size toward the LRU and FIFO cache replacements on the NDN network by using a Mini-NDN. This study will evaluate the impact of changing the CS sizes toward the cache replacements used. In this work, each customer periodically sends the interest packets to the producer with the same amount using a traffic generator. The results of the data processing obtained are increasing the CS size, the average roundtrip time will decrease. And also, the lower the CS size, LRU is more effective than FIFO.

Keywords—Named Data Networking, Cache Replacement, Content store, Last Recently Used, First In First Out

Paper ID

Ground Surface Contour Data Imaging for Cut and Fill Analysis Using Drones

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Abstract— In planning the geometric design of highways in the Subang Regency project at West Java Province - Indonesia, field data is needed as the basis for calculating the volume of excavated soil and embankments of a land. This calculation is necessary to minimize the difference/comparison between the volume of excavated and embankment soil obtained when planning the geometric design of the highway to determine the need for how much soil volume require for embankment or disposal of land waste from the excavation results. The analysis uses two comparison methods, the data from the processing of aerial photos using a fixed-wing drone and field measurements (RTK). The results showed a difference in the volume accuracy from excavation and soil fill between the data processing based on Drones and RTK in sequence follow for excavation of 17.9% and embankment of 20.6%.

Keywords—*drone, RTK, excavation*

Paper ID 150154

Hardware Resource Reduction Using Winograd Approach on YOLOv3-Tiny

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Abstract—Convolutional neural network (CNN) is a very effective method in object detection. YOLOv3-Tiny, which uses a CNN base, has excellent performance for object detection. The Winograd algorithm can reduce the use of large multiplication operations on the convolution layer. In this paper, we explore the reduction of hardware resources in the convolution layer of the YOLOv3-Tiny model using the Winograd algorithm of various sizes. The results of the calculation of this algorithm can reduce the use of multiplication operations 49.76% - 74.09%, which on the other hand, increases the number of addition operations.

Keywords—CNN, YOLOv3-Tiny, Winograd

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Telematics Systems and Software

Paper ID 150214

**Website Usability Evaluation using Human Centered Design
(HCD) Approach**

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Abstract— As a result of the COVID-19 pandemic that is endemic throughout the world including Indonesia, which forces all activities to be done at home, including teaching and learning activities. This study aims to see the level of usability on an online college website and provide input based on human-centered design. The method used is the Usability testing criteria by Nielsen and the task to respond to the HCD approach, and consider the Quality Requirement tree for the academic websites. The results of the evaluation in this study indicate that the value of usability acceptance by users on the online college website is at 3.52, meaning that the online college website is quite user-friendly. The average value for usability testing, they are 3.4 for learnability, 3.4 for efficiency, and 3.52 for satisfaction, while memorability and error rate both get a value of 3.5.

Keywords— *Usability Testing, Human Centered Design, Universitas Sangga Buana*

Paper ID 150222

**Reviewing The Competitiveness of Indonesian E-Commerce
Through The Theoretical Framework of E-Business
Competitiveness**

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Abstract— This research is motivated by the phenomenon of e-commerce which has a very large influence on the economic growth of a country in the current digital era. This study utilizes an e-commerce competitiveness framework recommended by Ramune Ciarnienė and Giedre Stankevičiūtė to describe the map of Indonesia's e-commerce strength through Strengths Opportunities Aspirations and Result (SOAR) analysis. The description of Indonesia's e-commerce competitiveness generated in this study can be used as a basis for determining strategies to increase Indonesia's economic growth and face competition with other countries.

Keywords— *e-commerce, framework, competitiveness, SOAR analysis, economic growth*

Paper ID 150226

**Simple Passing Room Model for Smart Campus Laboratory
Through a Global Pandemic**

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Abstract— This research is focused on modelling a simple passing room for a "smart campus laboratory" design. The initial work of the passing room is using an air shower to clean off contamination from a person before entering the laboratory. The difference between the medical air shower and the passing room model is the maximum blower capacity to clean the contamination on a person and the generated pressure. The implementation result was a 1:4 room model implemented with a door interlock system, automatic blower response, and controlled oxygen purging by a pressure sensor.

Keywords—*passing room, door, sensor*

Paper ID 150032

Performance Comparison of Different Feature Sets for Network Traffic Classification using Recursive Feature Elimination and One-Vs-Rest Random Forest Algorithms

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Abstract— Network traffic classification is an identification process of network applications like Yahoo, YouTube, Facebook, and Skype. Network traffic classification is required by network management to manage resources and to know different applications that can help network operators provide good Quality of Service, secure network, and monitor network. In this paper, we focused on the 7th layer of OSI model and using only TCP data. In recent years, there is much machine learning research to solve this problem either using supervised, unsupervised, or deep learning. Different feature sets are used to find the best performance for network traffic classification using Recursive Feature Elimination feature selections and One-Vs-Rest Random Forest classifiers. Six sets are compared: flow-based, session-based, time-based, packet-based, flow+ session-based, and packet+time-based. Furthermore, we have class imbalance problems in multiclass that make this difficult due to imbalance distribution, presence of outliers, and irrelevant features. Using this method, we can solve these problems. From the experiment, we get flow-based as the best feature set for network traffic classification with f1-score 0.81, GM 0.85, and model build time is 2634.987 s. Actually, we also can use packet-based, flow+session-based, and packet+timebased with a good classifier but need more time to model build.

Keywords—*feature sets, one-vs-rest, random forest, multiclass, imbalance data, network traffic, classification, flow-based, session-based, time-based, packet-based*

Paper ID 150268

**An Integrated Realtime Power Consumption Monitoring Device
for Smart Home System**

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Abstract— A Smart Home is a well-designed structure with adequate access to communication, control, data and information technology to improve the quality of life for its residents through convenience, reduced costs and increased connectivity. A Smart Home has several benefits, including providing better comfort, saving on electricity usage. The issue of energy, especially electrical energy, has become a hot topic discussed by many people because electrical energy is mainly obtained from non-renewable fuels, such as coal. In connection with the increasing development of technology and the internet, the researchers made a real-time monitoring tool for monitoring the consumption of electrical energy on a Smart Home via a smartphone, which later can find out the consumption of electrical energy used without having to look at the kWh meter. In this final project, the researchers made a one-phase kWh meter prototype with the help of the PZEM-004T sensor, which functions as a sensor to measure electrical energy consumption.

Keywords—*Electrical Energy, Prototype, kWh, PZEM-004T*

Paper ID 150227

Digital Report Application Audit Using The COBIT 5 Framework

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Abstract- MTs is one of the schools that realizes the importance of the role of IT in education, they have used one of the ARD applications in processing its values. Judging from this, it is very necessary to have an audit on the application, especially in terms of users because it is to provide maximum service for these users. In this study, the framework used is the COBIT 5 framework, especially the DSS (Deliver Support Service) domain, the domain used is the DSS01 (manage operations) domain, DSS02 (manage service requests and incidents), DSS03 (manage problems), DSS04 (manage continuity). , and DSS05 (manage security service) obtained from problem mapping. In the DSS01 domain it reaches 3.7625 or with a percentage of 75%, in the DSS02 domain it reaches 3.5875 or with a percentage of 72%, in the domain DSS03it reaches 4.0875 or with a percentage of 82%, in the DSS04 domain it reaches 3.975 or with percentage 80%, in the DSS05 domain it reaches 4.15 or 83%. Based on the results of the assessment, the Digital Report Application at MTs is running well enough which must be improved to achieve maximum results in order to increase user satisfaction of the application.

Keywords— Information Systems Audit, COBIT 5, DSS

Paper ID 150060

Prevention Methods of Recognition of Virtual Machine Environment By Malware With Modification of Filesystems, Processes, and Windows Management Instrumentation (WMI)

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Abstract— Anti-virtual machine (anti-VM), a virtual environment detection technique used by malware, is one of the many challenges for malware researchers to overcome. With this technique, the malware can decide to change its behavior to good or dormant so that researchers cannot perform either static or dynamic analysis. To overcome this, the effective approach taken is to identify the anti-VM technique first and then build VM protection to avoid malware manipulation. Through this approach, the result is the fact that the malware tries to hide its presence by first checking the parameters that indicate the existence of the VM as a detection process. Among these parameters are filesystem, process, and WMI. In other words, the malware will operate properly if it can't find these parameters when executed. There are different types of parameters detected by malware on different platforms. In this thesis, the author proposes the easiest approach to build a Windows VM introduction prevention system that operates in VirtualBox from a special anti-VM on the filesystem, process, and WMI section. The tool is designed and implemented using Powershell scripts and made into an executable (.exe) file. Tool testing is carried out using the anti-VM tool so that it can determine the effectiveness of the tool being made. The results suggest that the tool is able to mask some artifact parameters in the VM. However, to apply this tool, you need to pay attention to several conditions so that the tool and the entire system in the guest OS can run properly.

Keywords—malware, anti-VM, Powershell script

Paper ID 150033

**A Low Cost, Compact, and Easy to Set Up 4G Telemetry Module
for UAV Application**

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Abstract—Unmanned Aerial Vehicle (UAV) application is growing rapidly as it becomes more accessible and advanced. In many UAV applications, a telemetry system plays a significant role e.g. to stream real time data from/captured by the vehicle. Currently, the most common UAV telemetry connectivity is radio pairing system, which is limited by the actual distance of the paired devices. In order to deal with such a limitation, UAVs might utilize existing connectivity alternatives such as mobile infrastructure. In this work we propose a low cost, compact, and easy to set up 4G telemetry module for UAV application. The proposed module has a dimension of 75 mm x 68 mm x 32 mm, consists of common, easy-to-find components with a total cost of \$57.2. It is also equipped with an automation script for an easier setup process. This paper highlights some design considerations of the module and presents results related to the connectivity aspects.

Keywords—UAV, Telemetry, 4G

Paper ID 150134

**CLAHE Performance on Histogram-Based Features for
Lymphoma Classification using KNN Algorithm Antonius**

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Abstract—Immunohistochemistry or IHC is a method for gaining better diagnosis on lymphoma patients. Early diagnosis is needed to enhance their survival rate by giving the right treatment before the cancer spreads to other system organs. However, this method is not affordable in some developing countries, including Indonesia, since it requires advanced tools that are only available at certain high-class hospitals and top public hospitals. Therefore, a machine learning model using H&E (hematoxylin and eosin) stained tissue image was developed to reduce the needs of using IHC. Therefore, only samples classified as lymphoma will undergo the IHC analysis for validation. In this study, a weighted KNN (k-nearest neighbour) model was chosen since it has the performance in classifying datasets to three classes: BL (benign lesion), CA (carcinoma), and LY (lymphoma). Carcinoma was put into consideration because lymphoma can be in the organ as the carcinoma, especially for Non-Hodgkins Lymphoma (NHL). The developed model was analyzing the features on image's histogram in every RGB layer. Image preprocessing using CLAHE (contrast limited adaptive histogram equalization) was studied and succeeded to enhance the model performance with an average accuracy at 85.5% and specificity of LY at 90.3%.

Index Terms—*lymphoma, tissue image, KNN model, histogram, CLAHE*

Paper ID 150044

Adaptive Clustering for Efficient Urban Area HAP Covered

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Abstract— Wireless Sensor Network (WSN) is one application from massive Machine Type Communication (mMTC). The WSN consists of sensor nodes that have the ability to collect data and route data to Base Station (BS). In this paper, High Altitude Platform (HAP) is used to replace the BS as a sink node in the WSN. HAP is designed with a coverage area of 63 km and height of 20 km from the ground level. The main constraint from WSN is the limited power at each sensor node. One of the ways to solve the constraint is by using clustering method. So, in this paper, adaptive clustering for WSN based HAP is proposed which is able to support large number of sensor node and can anticipate movement of HAP. In this paper, 250,000 sensor nodes are distributed in the sensor area and clustered using the proposed clustering algorithm. Simulations were carried out to tie the mechanism of the proposed clustering algorithm to the HAP movement.

Keywords—WSN, HAP, Adaptive, Clustering

Paper ID 150052

Chaotic Map-based Image Encryption for Vehicle Registration Certificate Application: A Backend Subsystem Design

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Abstract—This paper proposed a backend API subsystem for image encryption to provide chaos maps and storage services to securely upload and store documents for the Vehicle Registration Certificate extension by using a mobile app. The proposed system helped to make the Vehicle Registration Certificate extension more effectively done because it enabled vehicle owners to do it from their homes. This paper tried to approach the problem by using Henon’s map and Arnold’s cat map algorithm to encrypt image documents and using a database service to store the documents. The result showed that for image size between 50 pixels × 50 pixels to 1000 pixels × 10000 pixels, Arnold’s cat map algorithm’s API response time grew exponentially to image size, while the Henon’s map’s response time grew significantly slower with a coefficient factor of 0.368 (weak correlation). Arnold’s cat map’s response time also grew proportionally to the number of iterations that were used as the secret key, so there was a trade-off between security and response time. This paper concluded that Henon’s map algorithm could be used to encrypt image-based documents and also served as proof of concept, while Arnold’s cat map algorithm, which had a slow response time, was not feasible to be implemented in a mobile app environment.

Keywords—REST API, image encryption, Henon’s map, Arnold’s cat map

Paper ID 150053

**Frontend Subsystem Design for Vehicle Registration Certificate
Application with Image Encryption**

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Abstract— Every citizen who owns a motorized vehicle is required to have a Vehicle Registration Certificate. Vehicle Registration Certificate must be extended every certain period and done at the Samsat office. However, the Vehicle Registration Certificate extension process often takes a very long time due to the large number of documents that must be processed and the long queues. Therefore, we need a solution so that the process of renewing the vehicle registration becomes easier and faster, one of which is by providing services on the mobile application. The purpose of this final project is to create an Android application for the extension of the Vehicle Registration Certificate. This application also includes an encryption method to secure various documents uploaded by users during the renewal process. Image encryption is implemented using the Henon and Arnold Map algorithms and document transmission is carried out through a secure communication channel to prevent data theft. Android application and decryption encryption algorithm are created using Visual Studio Code and Android Studio. This application has a main menu, namely “Pengisian Form” which functions to extend the Vehicle Registration Certificate. The user must fill in a bio and upload an image for successful registration. The code for image encryption is created using the Python programming language, but for application implementation the Dart programming language is used because the two programming languages interpret images in different ways. Henon's algorithm has better parameters than Arnold's, so that Henon provides a better security aspect.

Keywords— *Android, encryption, decryption. Henon Map, Arnold Map, Front-end, Vehicle Registration Certificate*

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Information System and Application

Paper ID 150110

FPGA Implementation of IoT-Based Health Monitoring System

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Abstract—The electrocardiogram (ECG) is a very important biomedical signal that evaluates the electrical activity of the heart. To diagnose heart disorders, different features should be extracted from the ECG signals. In this context, a fully FPGA-based system for ECG signal monitoring is proposed. The proposed QRS detection method is inspired by the Pan and Tompkins algorithm. This paper shows a prototype for IoT-based health monitoring system design using FPGA. The system uses a System-on-Chip FPGA with an embedded ARM processor and the WiFi 802.11b/g/n operated at 2.4 GHz channel. The heart rate is monitored using an ECG sensor module. And, the body temperature is monitored using an NTC thermistor sensor with a steel head. The ARM processor runs a RTOS to support real time monitoring. Moreover, the QRS module reads out the heart rate. The proposed design is implemented on the FPGA. The system extracts vital signals then sends the values to a smart device. The experimental results show that our system can detect the heart rate. Moreover, the data is received successfully to the web interface.

Keywords—FPGA Zynq, IoT, QRS detection, electrocardiogram (ECG), Pan and Tompkins algorithm

Paper ID 150162

Electricity Smart Meter Payment System Through Payment Gateway and User Interface Design

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Abstract— The electricity smart meter is an Internet-of-Things (IoT) based intelligent electricity metering device. This device has a two-way data communication system connected to the internet using LoRA® technology so that electrical data can be accessed digitally. One of the main features of a digital electricity meter is the addition of electricity credits and payment through a payment gateway, so that users can top-up through payments at supermarkets, internet banking, or digital wallets. In addition, data on electricity meter usage can be accessed through an interface system by both operators and customers. In this system, a data communication system architecture on a digital electricity meter is made, which includes a database, protocol, server, so that it allows customers to access payments through payment gateways. Customers can also access electricity meter data, electricity meter control, notifications, through the provided interface. The results of the implementation of the payment gateway feature and data access through the interface went well as expected.

Keywords— *electricity smart meter; payment gateway; protocol, user interface.*

Paper ID 150269

IoT Based Presence Screening Using RFID and Body Temperature Detection

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Abstract—Corona virus is a pandemic that has hit globally (COVID-19) and has affected every country. All countries in the world are taking precautionary measures to suppress the spread of this case. Each work unit or business in each country must comply with the policies of the respective state authorities. For this reason, each business unit must implement a fairly strict health protocol for both employees and customers who will enter the office or business area. This is to ensure health protocols by screening employees or customers who will enter the business area. The indicator of measuring the health condition of employees is by knowing whether the employee's body temperature is in accordance with the permitted threshold. Every employee who will enter will be selected with this tool, and if the body temperature exceeds the threshold, then they are not allowed to enter the business area. An internet of things based electronic equipment is designed to help business units implement health protocols. Using ESP32 as a microcontroller and infrared temperature measurement as a marker to be able to decide whether someone is sick or not.

Keywords—RFID, Covid 19, Internet of Things (IoT)

Paper ID 150238

Design and Implementation of RTOS on Multivariable Control of Urban Farming Hydroponic Fertilizer based on Fuzzy Logic

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Abstract— In reducing the reduction of land for farming caused by the urbanization process, an alternative to farming using an indoor hydroponic system is chosen. The features of this system are multitasking with the use of the RTOS scheduler and task management by implementing RTOS, a complex system will be divided into modules. Tasks that can be carried out by hydroponic systems with implementation of RTOS are modular and have high performance. This methodology of the research was carried out using the VDI 2206 approach to develop a nutrient control system in hydroponics with an RTOS system based on fuzzy logic. The freeRTOS system was chosen as an algorithm to perform multitasking such as reading sensor values and a decision-making system to control the working duration which is calculated using artificial intelligence fuzzy logic. From the test results of the sensors reading task, the percentage error for the TDS sensor is 0.11% and 0.02% for the pH sensor, besides that, it is also found that the program execution speed on RTOS is relatively faster than without RTOS.

Keywords— *Fuzzy Logic, Multitasking, Multivariable Nutrients Control, RTOS*

Paper ID 150242

Development of Android Application for Online Training using Blended Learning System (Case Study of LPIK ITB)

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Abstract— Blended learning is a learning system that combines offline learning with e-learning, in order to maintain two-way communications between the teacher and their students resulting in a more maximum outcome. LPIK ITB is an institution which focuses on innovation and entrepreneurship development in purpose of building a development culture for the country. One of LPIK ITB program is an incubation program which is an accompaniment program for start-up to develop further. The online training application is used to help said accompaniment program to become more maximized using blended-learning system which supported by direct messaging features that makes two-way communications during learning session possible. The application was examined using the black box testing with a value of 100 which means the application can function properly according to the scenario and testing with the mean opinion score (MOS) method with a test result of 3.87 which means it is included in the Enough group.

Keywords— *blended learning, lpik itb, retrofit, firebase, android*

Paper ID 150147

YOLOv3-Tiny's Weight Size Reduction using Pruning and Quantization

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Abstract—CNN has been widely applied to various technology fields, like real-time edge devices. One of the architecture detection objects based on CNN is YOLO, a real-time detection object with a high level of accuracy. Detection objects on the edge device itself are expected to have speed, accuracy, and less memory needed to carry out the detection process. In this paper, YOLOv3-Tiny will be pruned and quantized to reduce the size of the data from the weight without significant reduction of accuracy. Experimental results show that YOLOv3-Tiny weight data decreased up to 85.7% compared to the weight data before the pruning process, while in the quantization mode. Moreover, the iterative pruning method can reduce the weight up to 43%.

Keywords—YOLOv3-Tiny, Pruning, Quantization

Paper ID 150029

**IoT-based of Seaweed Cultivation Employing a Low-cost
Autonomous Experimental Buoy**

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Abstract—This paper aims at evaluating an environment monitoring system to increase productivity of seaweed cultivation. There are several main problems related to seaweed cultivation, namely the implementation of understanding cultivation that has not been measured, the addition of selling value is still small (still in the form of dry raw materials), expensive logistics or transportation, and low selling prices (there is no certainty of the market). In this study, we developed an IoTbased monitoring system using a buoy to measure environmental parameters using sensors in a seaweed farm. The output of this research is the real time parameter values that are displayed continuously on the dashboard that can be accessed via a web browser. Then another important result is an analysis of these parameters and recommendations for seaweed farmers.

Keywords: Buoy, IoT, Seaweed, Cultivation, Sensors.

Paper ID 150063

Forwarding Strategies Effect on Named Data Network Traffic Load. Case Study : Simulation with Mini NDN

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Abstract—NDN is a new network architecture where packets no longer carry information in the form of source and destination addresses but carry the name of data. FIB (Forwarding Information Base) is one of the structures in the NDN routers used for packet forwarding in the network. The FIB contains the information needed for decision-making on where the packet of interest will be forwarded. NDN forwarding process has many strategies such as best route, multicast, access, broadcast, etc. This study discusses the comparison between best-route and multicast forwarding strategies and their effect on traffic load. The simulation is performed on Mini-NDN using a topology consisting of five fully-mesh nodes and two nodes connected to the mesh via a single link. Two single-link nodes are used as producer and consumer. The traffic load parameters used to compare the performance of the best-route and multicast forwarding strategies are average delay of the packet, throughput in the consumer node, and average packets drop. In addition, the simulation is carried out by varying the frequency of interest from the consumer then observing its effect on delay of packet and packet drop.

Keywords— *NDN, forwarding strategy, best-route, multicast, traffic load*

Paper ID 150064

Comparison of Caching Replacement Policies in Changing the Number of Interest Packets on Named Data Networks Using Mininet-NDN

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Abstract— Named Data Networking (NDN) is a new concept of network architecture. Unlike TCP/IP which is based on IP address and each IP layer packet needs to travel end-to-end from source to destination address in order to get the requested content, NDN enables the content requesting process to become a shorter journey because of a component called caching. With caching, Content Store (CS) in the NDN router will be filled with content that was requested by consumers. This content storing mechanism is managed using caching policy, which is divided into two types, cache placement policy, and cache replacement policy. In this research, the performance of cache replacement policy, in this case, FIFO and LRU are tested toward a certain amount of interest packet and the result will be concluded based on parameters such as delay, packet loss, and throughput. This research uses nodes from GEANT pan-European network topology in Mini-NDN, a Mininet-based network emulator for NDN. As it is an emulator, the concluded result from this research is expected to be applicable in real-world situations. Based on the experiment, LRU is said to be better than FIFO in its average delay for cases of using a higher amount of interest packet. If the amount of interest packet belongs to a lower one, then FIFO is better than LRU in terms of average delay, throughput and packetloss.

Keywords—NDN, Cache Replacement Policy, FIFO, LRU, Mini-NDN

Paper ID 150065

**Adaptive Forwarding Strategy in Named Data Networking : A
Surve**

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Abstract - Named Data Networking (NDN) is a new network Architecture, the design principle of NDN comes from the success of today's internet, NDN changes the current network paradigm, sending a packet to be sent to the destination address based on the name, Forwarding strategy is a decision making for the purpose of forwarding, when and where the interest will be forwarded, The purpose of this paper is to provide information about the performance of the forwarding strategy that has been proposed by NDN researchers in accordance with the results that have been achieved. Each application will require different forwarding behavior, to know the characteristics of each proposed forwarding, this paper will present information about the measurement metrics and information about the topological model used in each implementation of the proposed forwarding strategy. The measurement metrics section also presents a summary in a comparison chart, and a classification of the proposed forwarding strategy. 50% on testing the forwarding strategy using interest metrics, 32% Delay, 29% Data, 21% Hop count and Delivery, and 57% Other Metrics.

Keywords: *Named Data Neworking, Adaptive Strategi Forwarding, Forwarding Plane.*

Paper ID 150066

**Design and Implementation of Low-Cost and Highly Customable
Named Data Networking(NDN) Testbed**

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Abstract—Nowadays, named data networking information centric networking (ICN) architecture has attracted many researchers to study it as one of future internet architecture candidates. One of the facilities to study new networking technology is a testbed. It functions as a platform to run various component functionalities, topologies, and communication schema in a labscale environment designed as close to the actual operational environment. However, there are just a few research topics about NDN testbed that have been published. Also, there was no experiment-related testbed resource utilization and more extensive topology used in the research conducted. On the other hand, there is no development already taken for easy testbed management based on GUI. This paper proposed a low-cost and highly customizable NDN testbed based on Linux VM. The experiments conducted in the research were testbed functionality, testbed resource utilization measurement, and topology customization through the GUI. Based on the implementation and test shown, all functionalities needed for running NDN testbed were already fulfilled. The testbed that was highly customizable, low-cost, easy-to-use has succeeded to build and has better functionality than the previously created testbed.

Index Terms—NDN, ICN, testbed, Eve-NG, computing resource measurement