

Program Book

TSSA 2022
16th International Conference on
Telecommunication Systems Service
and Applications
<https://tssa-conference.org/2022/>

October 13-14, 2022
Bintang Bali Resort
Bali, Indonesia

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16th Telecommunication Systems Service and Application (TSSA) 2022

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Message from the General Chair

It gives me great pleasure to welcome you to the 16th International Telecommunication Systems Service and Application (TSSA) 2022. 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 16th TSSA 2022 is held in Bali, 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 16th TSSA 2022 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 2022. 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 2022 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.

Prof. Dr. Ir. Nana Rachmana Syambas, M. Eng
General Chair

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School of Electrical Engineering
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Technical Program

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16th TSSA 2022
Conference Program – at a Glance

Thursday, 13 October 2022 (Day 1)	
08.00 - 08.30	REGISTRATION
08.30 - 09.00	OPENING CEREMONY Venue: Bintang Bali Resort Prof. Dr. Ir. Nana Rachmana Syambas, M. Eng General Chair 16 th TSSA 2022
	Welcome Remarks 1. Dr. Tutun Juhana, ST. MT Dean of School of Electrical Engineering and Informatics, Bandung Institute of Technology 2. Dr. Didin Saepudin, S.E., M. Si. Rector of Sangga Buana University YPKP
09.00 - 10.20	Keynote Speakers 1. Prof. Noriaki Kamiyama, Ph..D. Professor, Ritsumeikan University, Japan 2. Prof. Alyani Ismail, Ph.D. Professor, Universiti Putra Malaysia, Malaysia
10.20 - 10.25	Photo Session
10.25 - 10.40	COFFEE BREAK
10.40 - 12.00	Parallel Sessions 1 Offline Room-1, Offline Room-2, Online Room-1, Online Room-2, Online Room-3
12.00 - 13.00	LUNCH BREAK
13.00 – 15.00	Parallel Sessions 2 Offline Room-1, Offline Room-2, Online Room-1, Online Room-2, Online Room-3
15.00 – 15.20	COFFEE BREAK
15.20 – 18.20	Parallel Sessions 3 Online Room-1, Online Room-2
Friday, 14 October 2022 (Day 2)	

08.40 - 09.00	REGISTRATION
09.00 – 11.00	Parallel Sessions 4 Online Room-1, Online Room-2
11.00 – 13.20	LUNCH BREAK
13.20 – 15.40	TSSA Committee Meeting
END OF CONFERENCE	

Parallel Sessions Schedule
Timezone: GMT+8

Offline Room-1

Offline Room-1				
Thursday, 13 October 2022				
Time (GMT+8)	Paper #	Authors	Title	Notes
10.40 - 12.00	3885	Wisnu Wijaya, Asep Apriyani and Dian Rosdiana	Utilization of PLC control on pneumatic powered tofu press machine	Track: Signal Processing, Control Systems, and System Modeling Chair: Wisnu Wijaya
	4274	Nurwathi Nurwathi, Rudy Gunawan, Nasa Naqqasy Noor, Ade Geovania Azwar, Muhammad Fauzan and Ahmad Munandar	Digitization Design Of Vacuum Sealer Machine For Polypropylene (PP) Plastic Packaging	

Offline Room-1				
Thursday, 13 October 2022				
Time (GMT+8)	Paper #	Authors	Title	Notes
	7732	Hendra Noor Aditya, Rina Mardiaty and Lia Kamelia	Two-Axis Balancing System for Ship-Table Based on The Proportional Integral Derivative Controller (PID) Methods	
	9243	Cecep Deni Mulyadi, Ali Waliyullah Muwaffaq, Ivani Syarief, Dody Kusmana, Wisnu Wijaya and Hanhan Hanafiah Solihin	ANALYSIS AND DESIGN OF AUTOMATION ON PLC-BASED FLOWMETER CALIBRATION MEDIA	
12.00 - 13.00	LUNCH BREAK			
13.00 - 15.00	2234	Gunawan Gunawan, Muhammad Fikri Fadillah, Esa Prakasa, Bambang Sugiarto, Teguh Nurhadi	Road Segmentation with U-Net Architecture Using Jetson AGX Xavier For Autonomous Vehicle	Tracks: Wireless Communications and Communication

Offline Room-1				
Thursday, 13 October 2022				
Time (GMT+8)	Paper #	Authors	Title	Notes
		Suharsono and Rini Nuraini Sukmana		Electronics Systems; AI and Machine Learning Application
	2815	Hendrawan Hendrawan and Iskandar Iskandar	Medium Access Control Protocol and Clustering Algorithm for HAPS Based WSN Utilizing Simulated Annealing	Chair: Ivany Sarief
	5321	Hendrawan Hendrawan	Design And Implementation Of Agriculture Environment Monitoring System Based On Wireless Sensor Network (WSN) And Cloud Services	

Offline Room-1				
Thursday, 13 October 2022				
Time (GMT+8)	Paper #	Authors	Title	Notes
	6012	Nina Lestari, Daffa Akbar Badri, Ahmad Khadafi, Ketut Abimanyu Munastha, Ivany Sarief and Wisnu Wijaya	An Automatic Sorting Machine Using Weight Sensor and Moisture Content Measurement for Sweet Potatoes	
	6124	Hendrawan Hendrawan	Implementation of Deep Learning Method for Malware Detection using CNN Architecture with Hyperparameter Tuning	
	8817	Dwi Pratiwi and Ian Joseph Matheus Edward	Analysis Efficiency Network Performance of 4G LTE in Video Conference Applications	
15.00-15.20	COFFEE BREAK			

Offline Room-2

Offline Room-2				
Thursday, 13 October 2022				
Time (GMT+8)	Paper #	Authors	Title	Notes
10.40 - 12.00	1031	Aji Nurcahya, Nina Lestari, Kusmadi Kusmadi, Ketut Abimanyu Munastha, Ivany Sarief and Hardy Purnama Nurba	Internet of Things Based Remote Automation on Seedbeds Environmental Control System	Track: Telematics, Networked Systems and Applications Chair: Kusmadi
	4942	Agil Fuad Gumelar, Nadifa Rose Rachmawati, Nathan Tenka, Vieri Fajar Firdaus, Mochammad Faiq Al-Harits, Nana Rachmana Syambas and Sulthon Furqandhani Araska	Design and Implementation of UAV Remote Control and Monitoring in Cloud Infrastructure for IoT Services	

Offline Room-2				
Thursday, 13 October 2022				
Time (GMT+8)	Paper #	Authors	Title	Notes
	8366	Iskandar Iskandar and Adam Baihaqi	IOT PROTOTYPE AIR QUALITY MONITORING USING LORA COMMUNICATION SYSTEM ON FREQUENCY 433 MHZ	
	9172	Iskandar Iskandar and Via Nabila Hidayati	Web Dashboard Development for Cloud Server-Based Air Quality Monitoring System	
12.00 - 13.00	LUNCH BREAK			
13.00 - 15.00	2029	Khaerul Manaf, Aedah Binti Abd Rahman, Faiz M Kaffah, Beki Subaeki, Djoko Pitoyo and Endah Permatasari	Decision Support System for Children's Food Menu Selection Using the Simple Additive Weighting (SAW) Method	Track: Information System and Software Development

Offline Room-2				
Thursday, 13 October 2022				
Time (GMT+8)	Paper #	Authors	Title	Notes
	3350	Aryanti Ratnawati, Endah Kartikasari, Bambang Susanto, Bambang Rustandi, Audita Setiawan and Ketut Abimanyu Munastha	A Web-Based Accounting Information System Application using CodeIgniter Framework: (A Case Study Approach)	Chair: Rini Nuraini Sukmana
	3649	Rangga Satria Perdana, Asep Effendy, Hendra Garnida, Abdul Fidayan, Femmy Nazar and Ketut Abimanyu Munastha	Risk Management of Academic Information System By Using NIST 80-300 Framework (Case Study : Universitas Sangga Buana YPKP)	
	4339	Rini Nuraini Sukmana, Andessya Julian Pradinda, Teguh Nurhadi Suharsono, Gunawan Gunawan and Riffa Haviani Laluma	Gamification Implementation in The Learning Media for Waste Separation	

Offline Room-2				
Thursday, 13 October 2022				
Time (GMT+8)	Paper #	Authors	Title	Notes
	4521	Hanhan Hanafiah Solihin, Lilis Puspitawati, Rangga Satria Perdana, Khaerul Manaf, Beki Subaeki and Suharjanta Wisnu Pitara	Enterprise Resource Planning: Analysis and Utilization of Open Source Applications with the EAP Method	
	5845	Slamet Risnanto, Reza Saeful Rachman, Abdurrohman Abdurrohman, A. Andini Radisyia Pratiwi, Kusmadi Kusmadi and Ahmad Munandar	ID-Vote : Indonesian e-Voting machine Optimization using Voter Verifiable Paper Audit Trail (VVPAT)	
15.00-15.20	COFFEE BREAK			

Online Room-1

Online Room-1				
Time (GMT+8)	Paper #	Authors	Title	Notes
Thursday, 13 October 2022				
10.40 - 12.20	1402	Jupriyadi Jupriyadi, Syaiful Ahdan, Adi Sucipto, Eki Ahmad Zaki H., Hasan Nur Arifin and Nana Rachmana Syambas	Interest Flooding Attack in Named Data Network: Case Study on Palapa Ring Topology	Track: Information Centric and Named Data Network
	1995	Adi Sucipto, Jupriyadi Jupriyadi, Syaiful Ahdan, Eki Az Hamidi, Hasan Nur Arifin and Nana Rachmana Syambas	Pending Interest Table (PIT) Performance Analysis in Named Data Networking on Palapa Ring Topology	Chair: Ratna Mayasari
	3772	Ratna Mayasari, Nana Rachmana Syambas and Eueung Mulyana	Classification of interfaces on Named Data Networking Using machine learning	

Online Room-1				
Time (GMT+8)	Paper #	Authors	Title	Notes
	5680	Hasan Nur Arifin, Nana Rachmana Syambas, Jupriyadi Jupriyadi, Eki Ahmad Zaki Hamidi and Adi Sucipto	Comparative Analysis of Network Congestion on IP and Named Data Network	
	5763	Eki Ahmad Zaki Hamidi, Syaiful Ahdan, Jupriyadi Jupriyadi, Adi Sucipto, Hasan Nur Arifin and Nana Rachmana Syambas	Load Balancing on Named Data Networking, Case Study: UIN Topology in Indonesia	
	3358	Ayu Rosyida Zain, Maria Agustin, Prihatin Oktivasari, Nur Fauzi Soelaiman, Muhammad Fatih Fahroji	Design of Monitoring System for Water Levels and Turbidity Water Canals Based on Nodemcu	
12.20 - 13.00	LUNCH BREAK			

Online Room-1				
Time (GMT+8)	Paper #	Authors	Title	Notes
13.00 - 15.00	231	Aan Eko Setiawan, Angga Rusdinar, Syamsul Rizal, Rina Mardiyati, Abdul Wasik and Eki Ahmad Zaki Hamidi	Fuzzy Logic Control for Modeling Multi Robot AGV Maneuver Based on Inverted Camera	Track: Signal Processing, Control Systems, and System Modeling
	346	Rifal Faturrohman, Nanang Ismail and Mufid Ridlo Effendi	Speed Control System of BLDC Motor Based on DSP TMS320F28027F	
	1175	Muhammad Haniff, Hendri Maja Saputra, Catur Hilman A.H.B. Baskoro, Saip Ardo Pratama and Eki Ahmad Zaki Hamidi	Design and Control of Swerve Drive Mechanism for Autonomous Mobile Robot	
	1210	Putra Wisnu Agung Sucipto, Khusnul Yaqin, Muhammad Amin Bakri, Setyo Supratno, Annisa Firasanti and Eki Ahmad Zaki Hamidi	Statistical and Spectral Feature Extraction of Oryzias Celebensis Heart Rate	

Online Room-1				
Time (GMT+8)	Paper #	Authors	Title	Notes
	3399	Susmini Indriani Lestaringati, Andriyan Bayu Suksmono, Koredianto Usman, Ian Joseph Matheus Edward and Dewi Iswaratika	Comparison of Reconstruction Algorithm on Sparse Representation based Classification (SRC) for Face Recognition	
	3713	Ruli Jauhar, Nanang Ismail and Nike Sartika	Design of Torque Controller Based on Field Oriented Control (FOC) Method on BLDC Motor	
15.00-15.20	COFFEE BREAK			
15.20 - 18.20	4065	Rina Ristiana and Rina Mardiati	Controller Design of an Electric Power Steering System for Energy Optimization	Track: Signal Processing, Control Systems, and System

Online Room-1				
Time (GMT+8)	Paper #	Authors	Title	Notes
	5193	Dede Irawan Saputra, Aditiya Eko Pambudi, Asep Najmurrokhman, Zul Fakhri, Nenny Hendajany and Didin Saepudin	Cascade PID Control Loop Implementation For Liquid Tank Level in LabVIEW PC-Based Control Using Arduino Mega as Data Acquisition	Modeling Chair: Hartuti Mistialustina
	5239	Rofid Komarul Ikbar, Edi Mulyana, Rina Mardiyati and Rin Rin Nurmalasari	Fire Fighting Robot Using Flame Detector and Ultrasonic Based on Fuzzy Logic Control	
	5805	Agung Tri Wahyudi, Taufik Ramadhan, Fadli Afdhalash Adam, Nanang Ismail, Feri Rivaldi and Mufid Ridlo Effendi	On The Design of Object Stamping System Using Electro-Pneumatic Based on PLC OMRON CP1E	

Online Room-1				
Time (GMT+8)	Paper #	Authors	Title	Notes
	5937	Aditya Kurniawan, Kholilatul Wardani and Eki Ahmad Zaki Hamidi	Implementation of 80MHz NodeMCU Lolin for Realtime Precision Maintenance Scheduler CPS Calculation on a Volvo In-Line D16C610 Engine	
	6970	Vincent Vincent and Efrina Yanti Hamid	Joint Synchronization and Channel Equalization of Preamble-based GFDM	
	7081	Hardy Purnama Nurba, Deden Hadian, Nina Lestari, Ketut Abimanyu Munastha, Hartuti Mistialustina and Eva Rachmawati	Performance Evaluation of 3 DOF Arm Robot With Forward Kinematics Denavit-Hartenberg Method For Coffee Maker Machine	
	7244	Aan Eko Setiawan, Angga Rusdinar, Syamsul Rizal, Rina Mardiaty and Eki Ahmad Zaki Hamidi	Design of Multi Robot AGV Prototype Manuever Control Based on Inverted Camera	

Online Room-1				
Time (GMT+8)	Paper #	Authors	Title	Notes
Friday, 14 October 2022				
09.00 - 11.00	2721	Sumiati Sumiati, Eugenia Audrey, Lia Kamelia and Agung Triayudi	Application of Certainty Factor Method to Diagnose Venereal Diseases Using Confusion Matrix For Multi-Class Classification	Track: 6. Information System and Software Development
	3364	Farida Yuliaty, Yudhan Triana, Fitri Sya'Bandyah and Chevie Wirawan	TELEMEDICINE APPLICATION AS A DECISION FACTOR OF PATIENT IN CHOOSING CONSULTATION MEDIA DURING AND POST COVID PANDEMIC ERA	
	3666	Teguh Nurhadi Suharsono, H.R. Ricky Agusiady, Rini Nuraini Sukmana, Gunawan Gunawan, Wahyudi Wahyudi and R. Rita Avianty	Individual And Eligibility Verifiability Method For Verification Mechanism of Voter On E-Voting System	

Online Room-1				
Time (GMT+8)	Paper #	Authors	Title	Notes
	4976	Asep Muhammad Indra Purnama, Adi Santoso, Yanyan Gunawan and Sw Pitara	Design and Prototype Data Warehouse Modeling : New Student Admission	
	5493	Lilis Puspitawati, Hanhan Hanafiah Solihin, Sukadwilinda Sukadwilinda, Ivany Syarief, Dody Kusmana and Cecep Deni Mulyadi	Factors That Affect The Effectiveness of Management Accounting Software	
	5787	Sw Pitara, Khaerul Manaf, Tevi Leviany and Hetti Herawati	Cover Letter from the Residents of The Neighborhood to The Village Office Based on Smartphones	
	7877	Beki Subaeki, Riffa Haviani, Khaerul Manaf, Sw Pitara, Siti Solihat and Hanhan Hanafiah Solihin	Decision Support System: Selection of the Best Coffee Using Simple Additive Weighting	

Online Room-1				
Time (GMT+8)	Paper #	Authors	Title	Notes
	8248	Yanyan Gunawan, Asep Muhammad Indra Purnama and Sw Pitara	SERVICE-ORIENTED ARCHITECTURE DESIGN FOR APPLICATIONS E-PROCUREMENT WITH SOMA METHOD	

Online Room-2

Online Room-2				
Time (GMT+8)	Paper #	Authors	Title	Notes
Thursday, 13 October 2022				
10.40 - 12.00	651	Nadya Glaudira and Joko Suryana	Design of 3D Printed Slotted Waveguide Antenna Array by Using Composite Material for Frequency S-Band	Track: Wireless Communications and Communication Electronics Systems
	1097	Iskandar Iskandar and Rustanto Rustanto	Simulation and Analysis Optimization Ku-Band Satellite Transponder	
	1124	Taopik Romdoni, Nanang Ismail and Levy Olivia Nur	On the Design of Dual-Band Microstrip Antenna with U-Slot for 5G Applications	

Online Room-2				
Time (GMT+8)	Paper #	Authors	Title	Notes
	2891	Dinda Prameswari, Azwar Mudzakkir Ridwan, Eki Ahmad Zaki Hamidi, Nurul Fahmi Arief Hakim, Arip Budiman and Ahmad Fairuzi	Performance Enhancement of 13.56 MHz Crystal Oscillator with Component Optimization for Wireless Power Charging	
12.00 - 13.00	LUNCH BREAK			
13.00 - 15.00	1820	Nurul Fahmi Arief Hakim, Azwar Mudzakkir Ridwan and Tommi Hariyadi	Modification of Monopole Flower-Shaped Patch Ultra-Wideband Antenna for Communication Systems	Track: Wireless Communications and Communication Electronics Systems Chair: Ade Geovania Azwar
	2482	Ghaith Mansour, Faisal Tubbal, Ekasit Nugoolcharoenlap, Mana Abu Dirbalah, Raad Raad and Wajid Ali Khan	Selective Six-Pole Microstrip Bandpass Filters for 4G Applications	

Online Room-2				
Time (GMT+8)	Paper #	Authors	Title	Notes
	7414	Haifa Nabila, Aisyah Novfitri and Raisah Nur Afifah	Time Sorting Method for TOA-Based 3D Hyperbolic Positioning System	
	7522	Rudy Gunawan, Parama Dicki Chandra, Kusmadi Kusmadi, Ade Geovania Azwar, Nurwathi Nurwathi and Slamet Risnanto	Autonomous Vehicle Guided with RFID Position Detection for Warehouse Management System	
	8641	Wajid Ali Khan, Raad Raad, Faisal Tubbal and Ghaith Mansour	Design of a compact antenna and rectifier for a dual band rectenna operating at 2.4 GHz and 5.8 GHz	
	9613	Farrel Raditya Eduardi, Hepi Ludyati and Hanny Madiawati	Double Slot Antipodal Vivaldi Structure for Ultrawideband Applications	

Online Room-2				
Time (GMT+8)	Paper #	Authors	Title	Notes
15.00-15.20	COFFEE BREAK			
15.20 - 18.20	2924	Sri Marini, Abdul Hafid Paronda, Andi Hasad, Sukwati Dewi Asrika, Muhammad Ilyas Sikki, Muhammad Fikri Bivani Al Qohar, Muhammad Viki Nisfani Al Azis and Eki Ahmad Zaki Hamidi	Design Microstrip Patch Ground Mirror Rectangular Slit Horizontal Antenna As DTV Antenna Receiver	Track: Wireless Communications and Communication Electronics Systems Chair: Adhitya Naufal Firdaus
	3112	Vina Fitrianingrum and Joko Suryana	Antenna Design for V2X Application in 5G Network	
	3128	Dwi Harinitha, Irma Zakia, Iskandar and Adit Kurniawan	Effect of Different Locations of Millimeter Wave HAPS on the Downlink Sum Rate	

Online Room-2				
Time (GMT+8)	Paper #	Authors	Title	Notes
	4809	Muhammad Rizqi, Nuh Theofilus Dwi Putra Hardjowono, Joko Suryana and Ahmad Izzuddin	Wideband Quadrature Coupler Implementation for a Balanced S Band Amplifier	
	5316	Muhammad Rizqi, Nuh Theofilus Dwi Putra Hardjowono, Joko Suryana and Ahmad Izzuddin	Design of Bias Tee for an S Band Power Amplifier	
	5742	Adhitya Naufal Firdaus, Kusmadi Kusmadi, Nina Lestari, Bambang Susanto, Slamet Risnanto and Erna Garnia	Wireless Interface Communication System On Water Level Monitoring Device Using NRF24L01+ PA LNA Transceiver Module	

Online Room-2				
Time (GMT+8)	Paper #	Authors	Title	Notes
	7881	Dede Sudirman, Teguh Nurhadi Suharsono and Rina Mardiaty	Security Implementation of Wifi Password Asset Sharing With One Way Hash Cryptography Method Sha256 And QR Code	
	8359	Nurul Fahmi Arief Hakim, Nike Sartika, Mariya Al Qibtiya, Silmi Ath Thahirah Al Azhima, Tommi Hariyadi and Iwan Kustiawan	Analysis of UWB Wilkinson Power Divider Design Using 4-Stepped Patch and Ring Structure	
Friday, 14 October 2022				
09.00 - 11.00	7319	Agus Susanto and Iskandar Iskandar	Interference Analysis between LEO and GSO Satellites at Ku Band Frequency: Case Study on Starlink and Telkom-3S	Tracks: Wireless Communications and Communication Electronics

Online Room-2				
Time (GMT+8)	Paper #	Authors	Title	Notes
	8399	Muhamad Iqbal Nurmanditya and Slamet Risnanto	Application design for Human Resources Department using gamification method	Systems; Information System and Software Development
	8447	Nurhaeni Sikki and Muhammad Iqbal Nurmanditya	IMPROVING THE E-LEARNING SYSTEM COMPETENCE OF EDUCATORS AT EDUCATION CENTER WOMAN ARMY CORPS	
	9547	Hendra Saepudin, Teguh Nurhadi Suharsono and Abdul Chalid	Implementation of Geographic Information System for Road Maintenance Management Application in Bandung Regency	

Online Room-2				
Time (GMT+8)	Paper #	Authors	Title	Notes
	9617	Teguh Nurhadi Suharsono, H.R. Ricky Agusiady, Rini Nuraini Sukmana, Gunawan Gunawan, Wahyudi Wahyudi and R. Rita Avianty	Mobile Voting Persistent Method For Voter Authentication In Mobile Voting	
	9752	Khaerul Manaf, Aedah Binti Abd Rahman, Bismar Bismar, Faiz M Kaffah, Cecep Nurul Alam and Hadi Ahmad Sukardi	Front-End Builder Design With Laravel Framework For Campus Service Development	
	9924	Amran Paso Salmeno and Iskandar	Performance of Some Frequency Reuse Schemes on LTE 900 MHz for Cell-Edge Users in Multi-Layer LTE	

Online Room-3

Online Room-3				
Time (GMT+8)	Paper #	Authors	Title	Notes
Thursday, 13 October 2022				
10.40 - 12.00	870	Khalfan Nadhief Prayoga Wicaksono and Catur Apriono	Practical Comparison of Plant Pest and Disease Control Technologies: A Systematic Review	Track: AI and Machine Learning Application
	1801	Izuardo Zulkarnain, Rin Rin Nurmalasari and Fazat Nur Azizah	Table Information Extraction Using Data Augmentation On Deep Learning And Image Processing	
	3910	Abba Suganda Girsang	News Classification Based On News Headline Using SVC Classifier	
	6143	M. Hanif Naufal Eka Wiratama, Irma Zakia and Wervyan Shalannanda	Development of User Throughput-Downlink Prediction System in 4G LTE	

Online Room-3				
Time (GMT+8)	Paper #	Authors	Title	Notes
			Network using Machine Learning Method	
	9980	A. Andini Radisya Pratiwi, Slamet Risnanto, Abdul Chalid, Kusmadi Kusmadi, Doni Romdhoni Witarasa and Ketut Abimanyu Munastha	The Use of Artificial Intelligence for Urban Green Space Development	
12.00 - 13.00	LUNCH BREAK			
13.00 - 15.00	3423	Nivika Tiffany Somantri, Mughofa Zani, Azwar Mudzakkir Ridwan, Naftalin Winanti and Dede Furqon Nurjaman	Prototype Sorting Items for Disinfection Sterilization Using Smart Relay	Track: Telematics, Networked Systems and Applications

Online Room-3				
Time (GMT+8)	Paper #	Authors	Title	Notes
	3479	Muhammad Alvito Aditya, Nur Rokhman, Mufid Ridlo Eff, Sugih Gumilar, Padlan Alqinsi and Nanang Ismail	Smart Greenhouse System for Cultivation of Chili (<i>Capsicum Annum L.</i>) with Raspberry Pi 3B Based on MQTT Protocol	
	3482	Heriansyah Heriansyah	Trajectory Prediction on Vehicular Network Using SINDy	
	8619	Doni Pradana Wira Ambara Arifin, Rina Mardiaty, Mufid Ridlo Effendi and Nike Sartika	Boarding House Water Usage Monitoring System Using Internet of Things-Based Application	
	8696	Khaerul Manaf, Yadi Setiawan, Faiz M Kaffah, Suharjanta Wisnu Pitara, Aedah Binti Abd Rahman and Cecep Nurul Alam	Design Smart Garden Based Flutter And Internet Of Things (IoT)	

Online Room-3				
Time (GMT+8)	Paper #	Authors	Title	Notes
15.00-15.20		COFFEE BREAK		

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Signal Processing, Control Systems, and System Modeling

Paper ID 231

**Fuzzy Logic Control for Modeling Multi Robot AGV Maneuver
Based on Inverted Camera**

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Abstract—In a case where the robot used only has a vision sensor located on the robot with a navigational landmark system that is in the sky so that when a multi-robot system is made there will be several obstacles, including the relatively expensive financing side because the entire process is made in one robot so that when more than one robot is made, the processing components increase, prone to collisions because they are directed at the same landmark. Landmarks on the robot and the target, also moving the camera to the ceiling (inverted camera) with the aim of the camera workspace in detecting the movement of the robot is proposed in this study. A fuzzy logic control algorithm is used to determine the right motor speed (V_r) and left motor speed (V_L) in PWM. The input used is the magnitude of the deviation angle of the robot direction with the target and distance. The distance here is taken from the length of the vector. Vector is obtained from the coordinates of the robot's point, direction, and target. In one case the robot is at coordinates A (41, 164), coordinates B (60, 164), and coordinates C (245, 73). From these coordinate points, the angle is 155.960 and the vector length from the robot to the target is 223.37. Got VR 117 and VL 30 PWM. In the calculation, the results obtained are VR 116.4 PWM with an error rate of 0.0051.

Keywords— Robot AGV, Computer Vision, Optical Flow, Fuzzy Logic.

Paper ID 346

**Speed Control System of BLDC Motor Based on DSP
TMS320F28027F**

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Abstract—Brushless Direct Current (BLDC) motor is a development of DC motor which uses a three-phase voltage source. BLDC motor has the advantages of high efficiency, good speed and torque characteristics, low operating noise, and long operating life. BLDC motor requires a control system which can improve a stable and responsive speed response to maximize these advantages. This research discusses controlling BLDC motor speed with Proportional Integral (PI) control and Field Oriented Control (FOC) methods based on Digital Signal Processor (DSP). The initial stage of the research is to simulate the PI control to see the results of control before it is implemented on the BLDC motors. The simulation results show that the value of K_p is 0.01165 and K_i is 0.10699. This research also applies the FOC method using the Texas Instruments Insta SPIN-FOC library and the implementation uses the DSP TMS320F28027F. The results obtained indicate that the response is good with a small overshoot value and steady state error so that it produces an output with low ripple and fast response. The designed control system is capable of tracking speed at 500 rpm, 700 rpm and 900 rpm setpoints. The BLDC motor speed test for each setpoint results a settling time value of 0.30 s, 0.18 s and 0.14 s, an overshoot value of 0.2%, 1.14% and 0.22% and a steady state error value by 1%, 0% and 0.22%.

Keywords — *Speed control system, BLDC Motor, PI, DSP.*

Paper ID 1175

Design and Control of Swerve Drive Mechanism for Autonomous Mobile Robot

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Abstract— Mobile robots are robots with mobility capabilities, the ability of mobile robots is generally used for logistics purposes such as transporting goods. Steering mechanism is one of popular research subject from the development of mobile robot. Mobile robot steering mechanisms have been widely developed such as mecanum and omni-wheel steering which have a high maneuverability rate, but have a low traction value. Swerve steering is a steering mechanism that has advantages in terms of high maneuverability with traction values on a good track. This study discusses the design of a swerve steering module for mobile robot steering system. Swerve steering has the characteristic to perform translational movements and rotational movements at one point. Fuzzy logic control is designed for rotational movements performed with angle inputs, with a test of setpoint values from 5°-90° with an interval of every 5°, based on tests found the difference angle between actual and setpoint angle varies at value 0°-0.06°, with a first angular rise time of 1537 ms and an interval of rise time increase against an angle increase of 200 ms – 500 ms. Fuzzy logic control also designed for translational movement, carried out by input the distance to travel, based on tests with distance setpoints of 100 cm, 200 cm, 300 cm, 400 cm, and 500 cm, found the accuracy values of the distance traveled are 99.3%, 99.72%, 99.86%, 99.93%, 99.972%.

Keywords— *swerve steering, translational movement, rotational movement, fuzzy logic, mobile robot.*

Paper ID 1210

**Statistical and Spectral Feature Extraction of *Oryzias Celebensis*
Heart Rate**

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Abstract—Due to its unique characteristics, the heart rate of *Oryzias Celebensis* can play an important role in the observation of the health of the aquatic environment. Unfortunately, due to its tiny size, the process of scanning the heart rate of these fish fry requires sophisticated device engineering. The purpose of this study is to extract cardiac signal characteristics of *Oryzias Celebensis* seeds based on statistical and spectral aspects. We performed the extraction of statistical and spectral characteristics of heart rate using five statistical formulas namely mean, variance, standard deviation, skewness and kurtosis. As for spectral characteristic, we analyze the magnitude value of the discrete Fourier transformation from the color intensity that appear in the video view. The results of this study showed that statistical characteristic has much better result with 50% accuracy of pulse calculations while spectral characteristic that use fourier transformation only shows 0.2% accuracy.

Keywords: *Oryzias Celebensis, Heart rate, Video Processing, Feature Extraction*

Paper ID 3399

Comparison of Reconstruction Algorithm on Sparse Representation based Classification (SRC) for Face Recognition

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Abstract—Sparse representation based Classification (SRC) has gained the attention of pattern recognition and computer vision researchers, especially researchers working on face recognition. On SRC's algorithm, it is necessary to find a solution to an optimization problem to recover x from the equation $y = Ax$. Only a few studies reported the reconstruction of the signals on SRC's algorithm. Therefore, this paper studies the comparison of OMP, LASSO, and CVX to help the readers understand the reconstruction algorithm's effect on SRC. The simulation result is that LASSO and CVX algorithms have the same recognition rate, but LASSO can compute twice faster as CVX. On the other hand, the OMP algorithm can give the highest recognition rate on a specific dimension of the image with a faster computation time than LASSO.

Index Terms—SRC, Sparse Representation, Reconstruction

Paper ID 3713

Design of Torque Controller Based on Field Oriented Control (FOC) Method on BLDC Motor

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Abstract—Brushless Direct Current (BLDC) motors have the characteristics of better speed and torque control, high efficiency, and affordable maintenance costs compared to other types of electric motors. BLDC motors require a control system that can produce stable and responsive torque to maximize these advantages. This study discusses torque control with Proportional Integral (PI) control and Field Oriented Control (FOC) method using DSP LaunchPad XL TMS320F28069M. This research simulates the PI control to see the results of the control before it is implemented on the BLDC motor. The simulation results obtained a K_p value of 0.80541 and a K_i of 0.42578. The final result of this study shows a good response with a small overshoot value and steady state error, resulting an output with low ripple, a stable system, and a fast response. The designed control system is capable of tracking torque at I_q 0.3A, 0.6A, and 0.9A setpoints. Sequentially, the settling time values were 0.02ms, 0.06ms, and 0.16ms; the overshoot values were 0.042%, 0.02%, and 0.01%; and the steady state error values for each setpoint were 0.06%, 0.03%, and 0,03%.

Keywords—BLDC Motor, Torque, FOC, PI, DSP.

Paper ID 3885

Utilization of PLC control on pneumatic powered tofu press machine

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Abstract— Making tofu and the level of production speed in the food industry cannot be separated from fully automatic machines. The press machine knows the pneumatic system with PLC control affects production productivity. Conventional tofu press machines are said not to meet the needs of today's industry because they still use human power, the weight of stones or jerry cans filled with water. The compressive force required when pressing tofu is 15 kg. PLC is an electronic computer that is easy to use (user friendly) and has control functions for various types and various levels of difficulty. At the testing and measurement stage, a power supply with a capacity of 24Volt Dc is used because each sensor requires a voltage of 24Volt Dc. The output of the measurement results on the sensor has different voltage values; from that value, it does not interfere with the sensor's work because the voltage is still following the sensor datasheet. From the results of design testing with a pneumatic trainer where the pneumatic cylinder cycle follows what is expected (A+A-B+C+C-B-). And from the calculation results of the Tofu Press Machine Frame using theSolidworks application is declared safe.

Keywords—*PLC (Programmable Logic Controller), Pneumatic, Compressor*

Paper ID 4065

Controller Design of an Electric Power Steering System for Energy Optimization

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Abstract—This paper presents an energy optimization strategy by designing an electric power steering (EPS) controller using an optimal control method approach. The control design is built in two cases, namely case-1, discrete linear quadratic regulator (DLQR), and case-2, predictive control model (MPC) application. To see the efficient energy potential, all controller design cases are applied to the EPS model and then compared to the control performance in order to obtain a timely response that is considered the same by providing the same input (such as road reaction torque, electric motor speed, and variation voltage), and the energy consumption is calculated based on the electric energy formula. This results in a controller design that eliminates unwanted vibrations and ensures system stability, and efficient energy.

Keywords— *Electric Power Steering, Optimal Control, Discrete Linear Quadratic Regulator, Model Predictive Control.*

Paper ID 4274

Design Of Automatic Vacuum Sealer Machine for Polypropylene (PP) Plastic Packaging

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Abstract— The development of food products over time will always develop, and with these developments, the competition for the quality of food products is getting higher. One way to maintain the quality of food products is to use good packaging. The vacuum sealer is a type of press machine that is used to remove or vacuum the air inside the plastic. The air that is removed or vacuumed is intended to create an oxidation process, where oxygen in its development will be suppressed in such a way that the bacteria that will breed in the plastic takes a long time compared to the natural oxidation process, vacuum sealer products on the market today for packaging must use special plastic to be able to glue (seal successfully), where this plastic is still rarely found in the market. While the type of plastic packaging that is easiest to find on the market is the type of Polypropylene (PP) plastic. Especially in the areas of micro, small and medium enterprises (MSMEs) located in areas far from urban areas where many MSMEs still use ordinary packaging for their products which in terms of durability are not too long so that the quality of product durability is not optimal. Thus, in this study, a vacuum sealer was designed which can pack polypropylene plastic which is widely marketed. In the final design, we get a vacuum sealer product that can pack polypropylene (PP) plastic.

Keywords— *Product design, vacuum sealer, packaging*

Paper ID 5193

Cascade PID Control Loop Implementation For Liquid Tank Level in LabVIEW PC-Based Control Using Arduino Mega as Data Acquisition

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Abstract—The performance of a single PID system can be increased by using a cascade control loop approach. In the tank system, level control is located in the primary loop, and the flow setpoint, which is located in the secondary loop, is the PID output value. Computers can be used in process control, such as using LabVIEW, which was created to handle several types of data processing tasks and is easily integrated with other pieces of hardware, such as Arduino Mega as a data acquisition (DAQ) device that is integrated utilizing the serial connection. Types of sensors and actuators, which use the HC-SR04 as a liquid level sensor in the tank, flow sensors, which use the YF-S201 as a flow sensor that both enters and exits the tank, servo motors connected to valves to function as control valves, and the pump motor used to supply liquid into the tank are the sensors used in the tank system. With a setpoint of 8 cm, the test results showed a rising time of 167.5 seconds, a settling time of 202.5 seconds, a maximum overshoot of 0.0625%, and a delay time of 119 seconds even though the setpoint was reached. In comparison to random input the PID constant without employing tuning, this control is advantageous since it takes a long time but does not result in overshoot and oscillations. The controller continues to work well, as shown by the fact that it restarts to reach the setpoint value after disturbance testing on the tank

Keywords—*Cascade PID Control Loop, Liquid Tank Level, DAQ, Arduino Mega, LabVIEW*

Paper ID 5239

Fire Fighting Robot Using Flame Detector and Ultrasonic Based on Fuzzy Logic Control

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Abstract—The development of a fire fighting robot requires a fire detector with high accuracy, which is influenced by the input signal received from the sensor. It was embedded in the robot. The fire fighting robot requires a control method used by the robot in the fire detection process. In this study, the flame detector KY-026 ultrasonic was installed on the front of the robot and used Arduino MEGA 2560 as the microcontroller. In order to make the robot movement more stable when detecting fire, a Fuzzy Logic controls the fan and DC motor PWM. Testing Fuzzy Logic on the robot is carried out with the condition that the robot detects fire on a candle with a distance of 20 cm for the ultrasonic sensor and the ADC value of 300 for the flame detector. It compared the output of the fire fighting robot based on Fuzzy Logic with the output from manual calculations, simulation calculations, and robot system calculations. It is obtained that Fuzzy Logic has been successfully implemented on firefighting robots with a success value of 99.978% on the fan and 99.941% on the DC motor.

Keywords— *fire fighting robot, fuzzy Logic, flame detector sensor, ultrasonic sensor*

Paper ID 5805

On The Design of Object Stamping System Using Electro-Pneumatic Based on PLC OMRON CP1E

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Abstract— Automation and efficiency in the industrial sector are increasingly needed. One of the machines that is often used in industry is the Stamping Machine. Stamping Machine is a machine that can stamp goods automatically. One of the main components of this machine is the Programmable Logic Controller (PLC) as a working controller of the system. The type of PLC used in this system is PLC Omron CP1E - E20 which consists of 20 I/O, completed with Reed Switch (RS) sensor as input and solenoids valve 5/2 integrated with Single Acting Cylinder as the output used to carry out the stamping process. The system works by utilizing the air pressure from the compressor and the PLC program according to the engine performance algorithm. The operation of the system requires a wind pressure of 4 bar and a power supply voltage of 24V. This system is programmed using a CX-Programmer with a stamping duration of 3 seconds and a standby time between stamping processes of 2 seconds. The stamping time measurement is conducted in real time and revealed the average time of 5.044 seconds.

Keywords— *Stamping Machine, PLC, Reed Switch, Solenoid Valve (SV), real-time*

Paper ID 5937

Implementation of 80MHz NodeMCU Lolin for Realtime Precision Maintenance Scheduler CPS Calculation on a Volvo In-Line D16C610 Engine

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Abstract—The intensive usage of the Volvo engine for mechanical hauling requires a real time and intelligent approach on how or when to perform a periodic maintenance. Volvo in-line D16C610 engine is specifically installed on a FH16 prime mover truck head dragging a single or double trailer (vessel) weigh about 136.4 – 140 metric ton for each vessel. Unfortunately, the parameter used for the maintenance schedule is depend only on hour-meter (HM) which shows running hours of the engine regardless the speed, load, or temperature of oil. This faulty parameter therefore made the maintenance schedule inefficient and faulty. A NodeMCU Module is installed on an ECU to include crankshaft rotation to Hour Meter parameter which used to decide when to carried out the periodic maintenance. The wear components inside the engine that is in contact with rotating or moving parts such as crankshaft, camshaft, piston cylinders specifically the rings, cylinder liner, and connecting rod are all depend on the number of crankshaft rotation. The scheduler used is an excel based program that used data specifically Crankshaft Position Sensor (CPS) to properly adjust the Hour Meter value to ensure the periodic maintenance activities that are carried out in pace with wear components condition. By including the crankshaft RPM when the engine is operating, using *HMconv*, The most frequent maintenance service (PS250) is carried out approximately every 11 days (previously every 15 days). By making PS250 more frequent which means replacement of engine oil, engine oil filter, and secondary fuel filter (racor filter) will be done more frequently. The result and effect of the maintenance is therefore in accordance with metal wear pace inside the engine. Therefore, by modifying the HM parameter the more frequent maintenance service is expected to make make better MTBF and MTTR thus resulting in longer engine lifetime.

Keywords—*Volvo D16C610 engine, NodeMCU, Modified Hour Meter*

Paper ID 6970

Joint Synchronization and Channel Equalization of Preamble-based GFDM

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Abstract—Generalized frequency division multiplexing (GFDM), which not only meets the needs of the 5G network but also has high compatibility with OFDM, is one strong waveform candidate. However, it is essential to have a good performance of low complexity synchronization and channel equalization (CE) of it to fully reap the advantageous features. A simple method to solve CE is the least square (LS), but it requires pilot symbols, thus degrading the frame efficiency. Commonly, the CE techniques assume perfect synchronization, which is not practical. A method utilizing the adaptive filter is able to jointly solve the synchronization and channel issue, but at a cost of high complexity. To address the issue, a technique that maximizes the utilization of preamble is proposed. A preamble constructed by deterministic sequence is treated as pilots, and can be used for joint synchronization and CE. Here, no pilot should be inserted among the payload. The performance is observed similar to conventional LS technique, but at frame efficiency of 3.76% higher.

Keywords—Channel Impulse Response, GFDM, Preamble, Synchronization, Zadoff Chu Sequence

Paper ID 7081

Performance Evaluation of 3 DOF Arm Robot With Forward Kinematics Denavit-Hartenberg Method For Coffee Maker Machine

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Abstract— This paper presents the implementation of the forward kinematics Denavit-Hartenberg method on a 3 DOF arm robot which is implemented on a coffee maker. This system imitates human movement which works as a regulator of the movement direction of the robotic arm joints. Degree of Freedom (DOF) is set to support the movement method of the manipulator robot. In the process of making coffee, a robotic arm requires a minimum of 3 to 4 joints (3 to 4-DOF) to do the job of imitating a human arm. The forward kinematics method uses kinematic equations to determine the joints of the robot so that the final coordinates of its movement can be determined. The Denavit-Hartenberg method is implemented on 4 variables that become parameters for analyzing the forward kinematics robot movement. These four parameters are used in matrix transformation to determine the relationship between matrices which represents the position and orientation of one body to another. Overall, the results of repeatability testing in moving coffee cups with a deviation standard value for the xcoordinate is 0.060, for the y-coordinate is 0.020 and for the zcoordinate is 0.000. In accordance with the deviation standard theory that smaller deviation standard value, better the repeatability.

Keywords—3 DOF arm robot, Forward Kinematics method, Denavit-Hartenberg method.

Paper ID 7244

Design of Multi Robot AGV Prototype Manuever Control Based on Inverted Camera

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Abstract— In this research, a prototype navigation system for the AGV robot has been created. The sensor used is the Pixy2 CamCMU5 vision sensor. The cameraman is kept upside down on the ceiling. The height between the camera and the target is 1 meter. The vision sensor is used to detect the position of the robot and the target. Robots and targets will be given a color as a marker of position and direction. The approach used is to calculate the size of the angle and the length of the vector. From this value will then be sent to the microcontroller for processing. The microcontroller used is Arduino Mega. After that the data will be sent to the NRF and then sent to the robot in the form of the left motor speed (V_l) and the right motor (V_r). Based on target detection trials, the best lighting is obtained at values of 82 – 121. In its implementation, the pixy camera is not recommended because of the low detection distance and easily disturbed by changes in light.

Keywords—*Robot, AGV, Pixy2Cam, Sensor Vision.*

Paper ID 7732

Two-Axis Balancing System for Ship-Table Based on The Proportional Integral Derivative Controller (PID) Methods

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Abstract— In shipping, the damage is often caused by not maintaining balance when facing big waves or bad weather. It is necessary to apply a control system to certain objects. This study uses the PID control method to implement a control system on the ship's table. This method is expected to stabilize the table position with a setpoint angle of 0o on the x (roll) and y (pitch) axes. This balancing system uses the MPU-6050 sensor, Arduino UNO as a microcontroller, and two servo motors as actuators on each axis that maintain the table position at the setpoint. Mechanical design is needed to support the optimization of the system's performance. The implementation of the control parameter values from the manual tuning carried out obtained values on the x (roll) axis, namely $K_p = 10$, $T_i = 0.192$, and $T_d = 0.0487$. The control parameter values on the yaxis (pitch) are $K_p = 6$, $T_i = 0.392$, and $T_d = 0.092$. The test results showed the system could work stably, and the response on both axes was as desired. The response values obtained by the x and y axes are the overshoot percentages of 20.05% and 3.85%, the steady-state error is both 0%, the rise time is 0.55 and 0.35 seconds, and the settling time is 1, 06, and 0.74 seconds.

Keywords— *Balancing, PID, MPU-6050, Servo Motor.*

Paper ID 9243

**A PLC-BASED FLOWMETER CALIBRATION USING PID
METODE**

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Abstract—Many calibration companies still use the gravimetric method in the totalizer and flowrate calibration processes for flowmeters, so the results obtained cannot be maximized considering that there are many factors that become limitations when using the gravimetric method, one of which is the height of the tank which has a significant effect on water velocity, requiring space. Wide area, the installation path used is not flexible, the flow rate for flowrate calibration is limited, and it also requires a large number of flow media, oil, water, diesel, and others. This paper discusses the design of a fluid flow regulation machine that functions for flowmeter calibration media that focuses on flowrate or flow velocity using PLC (Programmable Logic Controller) based automation. The calibration method used is a comparison method between a standard flowmeter and a UUT (unit under test) flowmeter. The flow rate that can be produced by this system is 150 liters per minute, but to prevent overload on the standard flowmeter, a threshold of 10% is made below the system capacity of 135 liters per minute. This PLC (Programmable Logic Controller) based discharge control machine has a stability value of 0.236 liters/minute.

Keywords: Fluid, Flow meter, PLC

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Telematics, Networked Systems and Applications

Paper ID 592

Power Monitoring System of Home-scale Internet of Things (IoT)

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Abstract—During the Covid-19 pandemic, there was an increase in the use of electrical energy on a household scale. This study developed a home-scale power monitoring system to monitor electrical power at a household scale. This research was conducted to facilitate access to home power monitoring via Android based on the Internet of Things using the Thinger.IO web browser and Bot feature on Telegram Messenger. This power monitoring system develops using the ACS712 sensor as a current reader and the ZMPT101B as a voltage reader, using an ESP32 microcontroller with a WiFi module that can be connected online. The results of this study are that the accuracy of the ZMPT101B voltage sensor is relatively high, with an accuracy value of 99.845%. The ACS712 current sensor has the highest difference value with a reference of 0.32 A and 0.04 A for the lowest difference value. The data logger system on Thinger.IO works well in recording data. The Bot Feature on the Telegram application can work well even though it has an average delay of up to 4.2 seconds, depending on the speed of the internet network.

Keywords—*Current sensor, Voltage sensor, ESP32, Thinger.IO, Telegram, Internet of Things.*

Paper ID 1031

**Internet of Things Based Remote Automation on Seedbeds
Environmental Control System**

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Abstract—This research proposed an environmental growth control system to manage light intensity, temperature, and soil moisture. A DHT11 sensor is used to measure humidity and room temperature, a TEMT 600 sensor to measure light intensity, and Arduino Uno as the overall system controller. There is an additional real-time clock (RTC) to determine the timing of watering cabbage seedlings, and some actuators as controllers and maintain stability in the greenhouse are blowers (fans), heaters (lights), and water pumps. Using an automatic watering system for seeding cabbage seedlings and adding a light-intensity control system can be a solution for cabbage farmers to produce excellent and perfect seeds. The result shows that this research's quality of cabbage seeds is better than without a growth environmental control system.

Keywords—remote automation, IoT, environment control system , DHT11, TEMT 600

Paper ID 3423

Prototype Sorting Items for Disinfection Sterilization Using Smart Relay

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Abstract—Humans have various kinds of needs, namely primary, secondary and tertiary needs. One of the activities to fulfill those needs is to carry out sales and purchase transaction. The development of knowledge and technology makes the process of sales and purchase transaction become easier. Currently, sales and purchase transaction can be carried out online. However, there are many concerns that occur in online transaction, especially during the current pandemic, in which virus can be carried on the purchased items. One of the efforts to reduce the spread of the virus is to carry out disinfection sterilization. Prototype sorting items for disinfection sterilization is one of ways to carry out automatic sterilization. This system uses a smart relay as its main component, and uses ladder diagram programming as instruction. The smart relay used is zelio with 10 I/O. It has an input in the form of a photoelectric sensor that will be directly if there is object in front of it. And also, the addition of a water level sensor is to measure whether the disinfection liquid is ready to use. The output of the smart relay is in the form of a sprayer to spray disinfection liquid, and a dc motor to move object automatically. The dc motor and sprayer become the important points in the disinfection sterilization process. The speed of the dc motor used is 114 RPM with a voltage of 4.4VDC, so that with this speed, the object can reach the sprayer point within 3.5s for high object and 8s for short object. The use of a splitter is to direct short type object using a timer as a determinant of the degree of rotation. The degree of rotation produced must be 45o forward and backward rotation, and the timer used to obtain those degrees is 0.05s for the forward splitter servo motor and 0.1s for the opposite direction until it returns to its initial place.

Keywords—*Sorting, Sterilization, Disinfection, Smart Relay*

Paper ID 3479

Smart Greenhouse System for Cultivation of Chili (*Capsicum Annum L.*) with Raspberry Pi 3B Based on MQTT Protocol

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Abstract—Indonesia is the largest agrarian country in the world with abundant natural resources, especially in the plantation sector. The greenhouse concept can be developed by adding a smart greenhouse system with Internet of Things (IoT) technology which can accelerate an accurate and expected plant cultivation system. This study introduces a smart greenhouse system for chili cultivation based on the IoT using website technology of NodeJS as an application interface and MongoDB as a database. The system that has been developed consists of several sensors designed to collect information related to the environmental conditions of the greenhouse. These sensors are Total Dissolved Solid/TDS (water turbidity) sensor, Dissolved Oxygen Sensor (Oxygen content), DHT11 (air temperature and humidity), pH sensor (soil pH), soil moisture sensor (soil moisture), and ultrasonic sensor (to measure the distance from the water surface). The system is developed using the Message Queuing Telemetry Transport (MQTT) protocol. Data from the sensor is delivered to the Raspberry Pi 3B and the server passes through the internet network to be stored in the database. Testing of the DHT11 sensor produces an average air temperature of 26°C and air humidity of 62% which affects the growth of chili plants while the results of testing the water pH data are 6.36 mg/l. The value of the oxygen content (Dissolved Oxygen (DO)) is 0 – 2.141 ppm while the value of the Water Level data in the reservoir is 14.7 – 19.2 cm. Testing of water turbidity uses TDS (Total Dissolved Solids) sensor. This test is performed to ensure good water quality for chili plants which is in the range of 3 – 3.5 ppm. Messages sent by MQTT have 100% delivery success rate, smaller payload size compared to HTTP, and lower device power consumption.

Keywords—*Internet of Things, Greenhouse, NodeJS, MongoDB, MQTT, Raspberry Pi 3B*

Paper ID 3482

Trajectory Prediction on Vehicular Network Using SINDy

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Abstract—The high mobility of the vehicle network leads to a number of challenges, including rapid topology changes, unstable wireless connectivity, short link durations, and many other issues. Information regarding the trajectory of a vehicle is crucial to solve this issue. Furthermore, complete information about the future trajectory can be used to improve the capabilities of several applications in the vehicle network, such as road safety, traffic management, routing, clustering, handover, etc. In this research, Sparse Identification of Nonlinear Dynamics (SINDy) is proposed to discover the governing equation of the vehicle's movement based on trip history. The limitations of historical data on vehicle movements can reduce prediction accuracy, particularly for machine learning-based techniques. The main objective of the proposed technique is to derive movement patterns from limited historical data and utilize those patterns to predict the future trajectory of the vehicle. SINDy can identify sparse systems of ordinary differential equations and generate equations that describe the movement of the vehicles. In addition, this equation is utilized to predict the future trajectory of the vehicle. To the best of our knowledge, this is the first time of applying SINDy technique to predict trajectory on vehicular network. Based on the simulation results, this technique is able to produce accurate predictions even with insufficient historical data.

Keywords— *vehicle, trajectory, SINDy, prediction*

Paper ID 4942

Design and Implementation of UAV Remote Control and Monitoring in Cloud Infrastructure for IoT Services

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Abstract—News gives new insight and information from all over the world. News has many categories, such as politic, economy, science, and other common news categories. Every news will have their own category based on its content. The classification of news is usually done manually by inputting the category during the news posting. Some of the categories may be inputted incorrectly. The news classifier can be the solution for problem, but the news classifications out there are usually based on the news content. The classifier will receive the word vector inputs that are taken from the news content and try to classify it into one of certain categories. Unfortunately, news contents can be longer and harder to be processed rather than processing the news headline. The news headline is shorter and packs a decent information for the classifier to find out what category it is. Besides the news headline usage, the classifier also needs to be chosen correctly. In this paper, the SVC model will be tested using the news headline data to classify the news and compare with several other models, such as Linear Regression, Multinomial Naïve Bayes, Decision Tree, and Random Forest. The common variables to be compared are the accuracy, recall, and precision to evaluate the SVC model.

Keywords—News Classification, News Category, Text Classification, TF-IDF, SVC

Paper ID 8366

IOT PROTOTYPE AIR QUALITY MONITORING USING LORA COMMUNICATION SYSTEM ON FREQUENCY 433 MHZ

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Abstract—Internet of Things (IoT) is one of the technologies in the telecommunications sector that is currently developing. One of the IoT applications that can be used is daily air quality monitoring. Indonesia is a vast country with diverse ecosystems, according to WHO, Indonesia has moved from the cleanest air quality country to one of the twenty most polluted countries in the last two decades. For now, information regarding exposure to air pollution in Indonesia is still limited. The implementation of this project aims to provide a solution by designing a device that can monitor air conditions in real-time. This device will be equipped with several sensors relevant to air quality, namely PMS5003 to detect concentrations of PM 2.5 and PM 10 in the air, MICS-6814 to detect levels of carbon monoxide (CO) and nitrogen dioxide (NO₂) gases, MQ-131 to detect levels of carbon monoxide (CO) and nitrogen dioxide (NO₂). ozone gas (O₃). The device will upload it to a web dashboard that can be accessed by the public, on the web it will display the Air Pollutant Standard Index (ISPU), which is a standard for measuring air quality that has been made by the Ministry of Environment and Forestry (KLHK). This final project will also explain the performance of LoRa communication on the prototype against distance and line of sight.

Keywords— *Internet of Things, LoRa, air quality**This page is intentionally left blank*

Paper ID 8619

Boarding House Water Usage Monitoring System Using Internet of Things-Based Application

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Abstract— The need for water is increasing daily along with the increasing population in an area. One of the reasons for increasing water demand is boarding houses. The water consumption limit for luxury boarding houses is 123.45 liters/person/day; for medium boarding houses, it is 120.52 liters/person/day, and for simple boarding houses, 115.86 liters/person/day. In this study, a water usage monitoring system was designed using an Internet of Things-based application to monitor water discharge and volume via a smartphone. This system uses a water flow sensor, solenoid valve, and Arduino Uno ATmega microcontroller, which is communicated serially with the ESP8266, a two-channel relay, and a water pump so that water can flow quite fast. The monitoring system designed can calculate the water discharge and the volume of water usage for boarding house residents per day with a water usage limit of 123 liters/person/day. If the boarding house occupants use water exceeding the predetermined limit, the excess water usage fee will be charged to the house occupant. This monitoring system is implemented in 2 rooms in a boarding house. Based on the tests that have been carried out, the average water consumption in Room 1 is 123.72 liters, with an average water flow of 22.41 liters/min. In comparison, the average water consumption in Room 2 is 116.54 liters, with an average water discharge of 21.48 liters/min. Then the accuracy value of the water discharge is 99.88%, the water volume is 98.88% in Room 1, the accuracy value of the water discharge is 99.85%, and the water volume is 95.19% in Room 2. This shows that the monitoring system can work according to the design, where the monitoring system can display the daily water usage of boarding house residents through the Blynk application. Then the monitoring result data is sent to the user via email that the occupant has registered on the Blynk application.

Keywords—*monitoring system, water discharge, water volume, internet of things.*

Paper ID 8696

Design Smart Garden Based Flutter And Internet Of Things (IoT)

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Abstract—Plants in schools are often watered repeatedly or watered regardless of the water content in the soil so that the plants will wither or get sick and eventually die. So the purpose of this research is to design a smart garden based on flutter and the internet of things which will be used to water plants automatically according to the water content in the soil. The object of this research is loose soil. Loose soil conditions are classified based on lab tests at High School with the classification of 0.3V-1.27V water, 1.28V-1.79V wet soil, 1.80V-2.60V dry soil, and 2.61V-2.90V. This research applies the internet of things concept to an android application to water plants automatically when the soil is dry.

Keywords: *industry 4.0, plant, flutter, internet of things, smart garden.*

Paper ID 9172

Web Dashboard Development for Cloud ServerBased Air Quality Monitoring System

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Abstract— Air is an element that is inextricably linked to human life. Air pollution is not a new issue in Indonesia. In 2016, 80 percent of Indonesia's 256 million people lived in locations with annual average levels of particle pollution above WHO recommendations [1]. According to WHO, 90 percent of the world's population has inhaled polluted air, which kills seven million people each year [2]. With this knowledge, it is clear that air pollution is a problem with serious consequences for human health. Technological advancements can help decrease the risk of this issue. One of them is by developing a tool that can monitor air quality using the LoRa IoT communication protocol. This tool will utilize several air sensors, including the PMS5003 and MQ-131, which can detect the concentration of dangerous gases and particulates. In addition, the DHT-22 and KY-021 sensors can read temperature, humidity, and detect fire. The data of this reading will be saved in a database on the cloud server. This data will then be analyzed using ISPU standardization to provide an air quality index value, or AQI, which will be displayed on a web dashboard. The public can use this dashboard to learn about the surrounding air and what health recommendations can be done.

Keywords—air pollution, IoT, cloud server, web dashboard, AQI

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Wireless Communications and Communication Electronics Systems

Paper ID 651

Design of 3D Printed Slotted Waveguide Antenna Array by Using Composite Material for Frequency S-Band

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Abstract—This paper design (SWAA) slotted waveguide antenna array at s-band frequency for Radar (Radio detection and ranging) surveillance applications when scanning targets. The slotted waveguide technique in this design is realized using 3d printed composites made of copper coated which can be obtained by electroplating, imitation chrome, conductive paint and other coating techniques. Determine waveguide slots in designing array a very important part so that it can accommodate the needs of radar applications, namely having a gain the big one, bandwidth and power handling tall one. Metals such as copper and aluminum are widely used. Their high metallic conductivity values provide high shielding effectiveness and low antenna loss. However, the disadvantages of metals are their high weight, production costs and poor corrosion resistance. Therefore, an alternative emerged to overcome these weaknesses by using material copper coating on Abs composite. Due to its light weight, ease of fabrication, low cost, high rigidity, high thermal and electrical conductivity. The simulated CST result of a SWAA with a length 1.5 meters with Abs composite material with a thickness of 2 mm and copper layer thickness of 0.035 show that the proposed antenna operates at frequency of 2.9 GHz to 3.1 GHz, the gain of antenna is 17.54 dBi, with s11 -17.6 dBi and SLL -11.5 dB.

Keywords— *Slotted Waveguide, antenna composite, RADAR, array antenna*

Paper ID 1097

**Simulation and Analysis Optimization Ku-Band Satellite
Transponder**

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Abstract—In this paper the use of a 36Mbps Satellite Ku-Band transponder that will be used for internet services for VSAT terminals. The capacity of the Ku-Band transponder serves several VSATs that will be connected to broadband internet through the Hub station. Transponder Satellite is a resource that is limited in bandwidth and limited in power, of course, planning is needed in its application. Planning for the optimal use of satellite transponders is carried out using Network Simulator NS-2. The satellite transponder used for internet services provides bandwidth for both of Hub stations and VSAT terminals. This satellite internet service uses the TCP/IP communication protocol which will access services from the VSAT terminal to the hub station. Planning the use of transponders with NS-2 will obtain QoS parameters including throughput, packet loss, end to end delay. This can be obtained from QoS information from VSAT that uses Ku-Band transponders for internet services.

Keywords—*Transponder Satellite, QoS, NS-2, TCP/IP, VSAT.*

Paper ID 1124

On the Design of Dual-Band Microstrip Antenna with U-Slot for 5G Applications

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Abstract—This paper discusses the design of a dual-band microstrip antenna for 5G applications with a slot loading technique in the form of a U-Slot. This antenna is designed to work on the 5G service frequency in Indonesia at a frequency of 1.848 GHz (1.8375 – 1.8575 GHz) and a frequency of 2.315 GHz (2.300 – 2.330 GHz). The feeding technique used is a feedline feeding technique, while the substrate material used is FR-4 Epoxy with a purity of 4.3 and a thickness of 1.6 mm. In this paper, two antenna designs are compared, namely the conventional antenna design and the antenna design with a USlot operating at the same frequency. Parameters compared are antenna dimensions, return loss, VSWR, gain and bandwidth. The addition of a U-Slot on a dual-band microstrip antenna managed to reduce the antenna dimensions by 32.3% and still be able to work on 5G frequencies in Indonesia with performance that is on target.

Keywords—U-Slot, 5G, Microstrip Antenna, Dual Band

Paper ID 1820

Modification of Monopole Flower-Shaped Patch Ultra-Wideband Antenna for Communication Systems

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Abstract—Ultra-wideband (UWB) technology has the advantages of high data rates and low costs. One of the developments of microwave devices is the UWB antenna. In this study, a monopole flower-shaped patch antenna was designed with the addition of resistive loads and DGS. The proposed UWB antenna configuration uses RO 3450 dielectric substrate with a thickness of 1.524 mm with a relative permittivity of 3.6. The results obtained show that the antenna with resistive load and DGS is capable of having a UWB frequency. The reflection coefficient obtained is following the FCC minimum standards from 3.1 GHz - 10.6 GHz. The radiation pattern obtained when the antenna is added with resistive load and slot at the ground plane is relatively similar. However, the gain of the antenna with resistive load and slot at the ground plane is better than the antenna that only uses resistive load. The highest gain of the antenna can reach 7 dB when using a resistive load of 50 Ω . The radiation efficiency of the antenna is more stable when resistive loads and DGS are added.

Index Terms—antenna, DGS, resistive load, ultra-wideband.

Paper ID 2482

Selective Six-Pole Microstrip Bandpass Filters for 4G Applications

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Abstract— Six-pole microstrip bandpass filters composed of square C-shaped resonators are designed for 4G applications at 2.6 GHz. To improve the filters selectivity around the passband, two pairs of transmission zeros are introduced by coupling of multiple resonators. The filters, which have different topologies, contain two cross couplings of opposite types in order to obtain a very sharp skirt. The simulation and measurement results show very good reflection and transmission characteristics. The proposed filters are synthesized using AWR® and simulated using CST® simulation tools. The simulated reflection coefficients are better than -13dB whereas the simulated transmission coefficients are better than -1 dB. In order to validate the simulations, one filter has been manufactured and measured. The simulated and measured results are in good agreement. The measured reflection and transmission coefficients are better than -12 dB and -4 dB respectively. The simulated and measured 3dB bandwidths are 80MHz and 60MHz respectively. A small shift in the centre frequency is obtained which is attributed to mechanical tolerances and tolerances of the thickness and dielectric constant of the substrate used.

Keywords— *microstrip bandpass filters, selective filters, quadruplet bandpass filters*

Paper ID 2815

**Medium Access Control Protocol and Clustering Algorithm for
HAPS Based WSN Utilizing Simulated Annealing**

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Abstract— In WSN (Wireless Sensor Network), the only source of energy from each node is the battery. Communication activities between nodes consume a lot of energy because there is a processing and sending of data to the sink node or base station. Battery replacement is costly and time-consuming so it is avoided in many WSNs. Therefore, the communication process in WSN requires an efficient communication protocol and can minimize energy use. This thesis examines the Medium Access Control (MAC) protocol for clustered wireless sensor networks with High Altitude Platforms (HAPS) as the base station. To complement the proposed MAC protocol, this thesis also examines a clustering algorithm that uses three clustering weighting factors, namely, and each of which plays a role in weighting parameters in terms of remaining energy, distance, and cluster capacity, respectively. The annealing simulation optimization method is used to find the value of the weighting factor, and which is optimal in providing lifetime until all nodes die. The proposed MAC protocol uses the concept of scheduling for intra-cluster communication. Scheduling is done based on the ratio between the distance and the remaining energy at the sensor node. In addition, the proposed MAC protocol uses four states, namely sleep, contention, back-off, and active Tx/Rx. This helps to avoid the sensor node from idle listening so that it can save energy used. Performance of the proposed MAC Protocol Through several simulations based on life and energy consumption. In addition, simulations are carried out to test how far the HAPS can shift and still keep all sensor nodes connected to the network. The simulation results show that the HAPS displacement of the proposed MAC protocol is better than the recommendations given by ITU-R F.1891

Paper ID 2891

Performance Enhancement of 13.56 MHz Crystal Oscillator with Component Optimization for Wireless Power Charging

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Abstract— Nowadays, mobile device technology has driven the need for more flexible charging using wireless technology. This technology is called wireless charging, a wireless technology used to transfer power to mobile devices. A wireless power transfer system consists of three parts: oscillator, power amplifier, and radiator. The oscillator is designed using a 74HC04 CMOS IC as the main part of the oscillator and a 13.56MHz crystal and is equipped with a common-collector amplifier using a Bipolar Junction Transistor (BJT) type BC547. This study discussed the optimization of the oscillator with the tuning method on the values of capacitors C1, C2, C3, and C4 and resistors R2, R3, and R4 to increase the signal output level. This research produces an output signal on the oscillator of -0.246dBm and a peak amplitude of 5.1V at a frequency of 13.573MHz. Compared to the previous study, the signal output has increased by 4.544 dBm, where the previous study produced a signal output of -4.79dBm with a peak amplitude of 0.95V at a frequency of 13.56MHz.

Keywords— *oscillator, common-collector amplifier, optimization, wireless charging*

Paper ID 2924

**Design Microstrip Patch Ground Mirror Rectangular Slit
Horizontal Antenna As DTV Antenna Receiver**

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Abstract— Digital technology for TV broadcasting provides a great opportunity for the availability of space for the implementation of broadcasting, both the development of the existing and the demand for the implementation of new broadcasting that can not be accommodated in the analog broadcasting masterplan. In addition to the increase in the number of broadcast programs that can be transmitted in one frequency channel, digital broadcasting technology also offers another reliability, namely reception quality that is much better than analog broadcasting. Broadcast programs that can be channeled more varied types. In addition, digital broadcasting technology allows the use of shared transmitter towers to channel all broadcast programs in a service area so that an excellent infrastructure efficiency will be achieved. Reception of broadcasts that arrive in the community will be evenly distributed. Digital TVs generally use Yagi and Kubikal type antennas that are large and use cables so they are not flexible and practical to use indoors. In this study, designing and implementing microstrip antenna made from epoxy FR4 as a digital TV receiver with bluetooth technology and using a frequency channel 478 MHz - 723.92 MHz. the advantages of antenna design using antenna patch or microstrip antenna because the antenna dimensions are smaller and bandwidth is greater so that it is suitable for use indoors, users can easily and practically use the antenna on television devices owned. The purpose of the research is to design a horizontal Center Microstrip antenna based on android with Bluetooth technology for digital TV broadcast reception. Optimal simulation results, antenna fabricated and tested parameters, and applied to digital TV. From the results obtained actual dimensions 18 cm x 18 cm. The antenna has characteristics with a return loss value of - 28.31 dB, VSWR 1.0799, gain 4.1 dBm and bandwidth of 236.97 MHz. With these characteristics, the antenna can work well on digital TV channels at frequencies 478 MHz-723.92 MHz.

Keywords— *Digital TV, Microstrip antenna, Rectangular Slit Mirror ground Patch, Bluetooth technology.*

Paper ID 3112

Antenna Design for V2X Application in 5G Network

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Abstract—5G communication have a lot of advantages in our daily activity. The development of 5G, allows some mobility communication, like a car that especially needs some communication for the user and supporting V2X (Vehicle to Everything) application. Wider bandwidth is the one that to be required. ETSI and 5GCar said that for supporting 5G communication, many countries using bandwidth antenna more than 500 MHz. An antenna with compact size can be easy to integrate with any surface mounting, make sure the communication seamlessly with what the user need. In this study, the antenna design process begins by determining the antenna parameters. Next, design a conventional single microstrip antenna and then added more resonances with the process of enhance the bandwidth using the parasitic patch technique. The parasitic patch is electrically not connected from the central patch, but patch using edge coupled utilization. This present design of the parasitic antenna use frequency of 3.5 GHz with width of antenna 68.71 and length 48.58 mm. Substrate antenna using an FR4 and use 50 Ω coaxial probe for fed technique. The proposed design antenna has 5 patch parasitic with gap coupling for staggering resonance and yet wider bandwidth. The results of the proposed antenna can achieved bandwidth untill 658.1 MHz, with range of frequency from 3,3158 GHz to 4.0066 GHz with antenna dimension 68.71 x 48.58 mm. Meanwhile, the gain resulted is 4.89 dBi. Index

Terms—*bandwidth enhancement, parasitic patch, vehicle to everything, 5G*

Paper ID 3128

Effect of Different Locations of Millimeter Wave HAPS on the Downlink Sum Rate

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Abstract—Telecommunication services globally use two communication systems: terrestrial and satellite, but they still have weaknesses that must be addressed immediately. An alternative is High Altitude Platform Station (HAPS), which was studied extensively in the 1990s and 2000s, and is now returning to public attention. In this study, we firstly determine the optimal HAPS position assuming equal power allocation to each User Equipment (UE) in order to maximize the downlink sum rate given a backhaul link constraint and minimum data rate of each UE. HAPS operates at the 28 GHz millimeter-wave band with an altitude of 20 km. The antenna configuration is Uniform Planar Array (UPA) with varying number of elements. The number of UE is fixed but randomly distributed in an area of 100x100 km². The area is divided into 100 equal-sized grids, from which the HAPS location will be varied for optimization purpose. The simulation results indicate that the optimal location is grid number 29 when the antenna element is 16x16. Increasing the antenna element to 128x128 results in higher data rate for each UE. After determining the optimal HAPS location, power allocation for each UE is carried out to fulfill the backhaul link constraint. From several power combinations for each UE, the combination that has the minimum total power is taken. Thus, as the array elements increase, the total minimum power will decrease.

Keywords—HAPS position, data rate, millimeter-wave

Paper ID 4809

Wideband Quadrature Coupler Implementation for a Balanced S Band Amplifier

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Abstract—An implementation of a wideband quadrature coupler for a balanced S band amplifier is proposed in this paper. By adopting a previously proposed design, a wideband branchline coupler is implemented on a 3.66 relative permittivity and 0.762 mm thick substrate to operate from 2.9 GHz up to 3.5 GHz. A meandering approach is taken to minimize the branchline coupler's relatively large structure, achieving roughly 75% area reduction in the process. The final design layout is then implemented on an amplifier-MMIC based S band balanced amplifier to characterize its performance in regards to the amplifier's return loss and gain. Measurement results show excellent return loss of the quadrature coupler despite open-circuit terminations of under -13 dB, although a 2 dB gain loss is observed when comparing the balanced amplifier's gain to the used amplifier MMIC's original gain.

Index Terms—*quadrature coupler, branchline coupler, balanced amplifier, S band*

Paper ID 5316

Design of Bias Tee for an S Band Power Amplifier

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Abstract—A detailed design procedure for an S band bias tee used in a high power application is provided in this paper. A substrate with 3.66 relative permittivity and 0.762 mm in thickness is used. The proposed bias tee design utilizes an RF short-circuit in the form of a radial stub and a $\lambda/4$ transformer to implement the RF choke. A capacitor with appropriate specifications are used as the bias tee's DC block to complete the bias tee. To optimize the bias tee's form factor, a meandering approach with mitered lines are used. The resulting bias tee achieved RF-DC isolation, insertion loss, and return loss of better than -20 dB, -0.1 dB, and -24 dB respectively from 2.9 GHz to 3.5 GHz. Evidence of the realized bias tee's functionality is also provided in its utilization on an balanced S band power amplifier.

Index Terms—*bias tee design, RF choke, DC block, power amplifier, S band.*

Paper ID 5321

Design And Implementation Of Agriculture Environment Monitoring System Based On Wireless Sensor Network (WSN) And Cloud Services

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Abstract— At least 70 percent of the 8 million hectares of agriculture fields in Indonesia contain low organic matter. One of the reasons for this condition is land utilization that is not in accordance with the potential and capabilities of the land. This degraded land condition can lead to declining in land productivity which results in reduced quality and quantity of crop yields to the occurrence of natural disasters. To avoid this, precision farming methods can be applied that utilize data taken from sensors through IoT devices such as the Wireless Sensor Network. Though However, WSN itself has a problem where the energy usage is very large while the available energy resources are small. In this project, an agricultural environmental monitoring system is developed using WSN and cloud services that are more energy efficient. This system can retrieve relevant agricultural environmental information including air temperature, soil moisture data and pH index. Data from a number of scattered sensors installed on Arduino UNO in an area will then be sent through radio communication of Xbee SC2 to the ESP32 base station which will perform data transmission to a server. Dashboard deployed on Google Cloud can display visualization of sensor values in the form of historical data graphs, actual values in real-time, also maximum, minimum, and average values.

Index Terms—*wsn, dashboard, cloud service, agriculture*

Paper ID 5742

Wireless Interface Communication System On Water Level Monitoring Device Using NRF24L01+ PA LNA Transceiver Module

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Abstract— Well Measurement of water level is very important for Geothermal Well operations. Manual measurement is very ineffective and inefficient because the water level cannot be monitored in real time. So, a wireless interface communication system was designed to monitor water level using ultrasonic sensor and the NRF24L01+ PA LNA transceiver communication module. The NRF24L01+ PA LNA is a long-distance wireless communication module that utilizes a 2.4-2.5 GHz radio wave frequency equipped with a Low Noise Amplifier and Power Amplifier. The distance data from the sensor transmitted by the NRF24L01+ PA LNA communication module will be displayed on the LCD and the thingspeak website platform. By using this method, the water level can be monitored quickly in real time and efficiently. The test results of communication modules show that the capability of the NRF24L01+ PA LNA module is quite good and effective in transmitting data at a maximum distance of 200 meters.

Keywords—*wireless interface communication, ultrasonic sensor, NRF24L01+ PA LNA, thingspeak, IOT*

Paper ID 7319

**Interference Analysis between LEO and GSO Satellites at Ku Band
Frequency: Case Study on Starlink and Telkom-3S**

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Abstract—We investigate the aggregate interference caused by large scale NGSO constellations to GSO systems. We propose starlink and Telkom-3S satellite as a case study. We utilize the TLE, a (near-) real-time orbital elements, and simulate the downlink interference scenario. Based on the simulation results, we found that in the range of latitude 0 to 40°N, the higher the latitude of the GSO receiver, the less the number of interference events. We also observe that the EPFD will exceed the interference limit recommended by ITU-R article 22.

Keywords—*interference analysis, co-frequency, equivalent power flux density, separation angle, non-geostationary orbit constellations.*

Paper ID 7414

Time Sorting Method for TOA-Based 3D Hyperbolic Positioning System

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Abstract— Positioning technology is now very important and has many advantages. One way to determine the position is to use a hyperbolic algorithm. The algorithm can use the time-ofarrival (TOA) parameter of the target signal to determine the position of the target in three dimensions. In this paper, we examine target positioning using existing hyperbolic positioning systems. In some cases, an error was detected when the x-, y-, and z-coordinates were imaginary. A time sorting method was added to solve this problem. Performance improvements were then made using this method. This method improves target positioning accuracy and avoids errors.

Keywords—*Hyperbola, TOA, Time Sorting*

Paper ID 7522

Autonomous Vehicle Guided with RFID Position Detection for Warehouse Management System

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Abstract— Finding the location of goods stored in the warehouse is part of the quality of the management warehousing system. Location goods usually always change or reposition to rearrange space in warehouses. Changes in the goods placement system have resulted in the location of goods being stored in the database. Retrieval of goods from the location requires an AGV (Automatic Guided Vehicle) which can work automatically based on data on the position of goods in the database. AGVs in warehouses use a lot of lanes on the warehouse floor as road guides. A search robot in the form of a car is developed by using data on the position of goods in the database as the direction of the robot's destination. The robot has Wi-Fi communication and uses RFID as a guide for the robot's path. RFID can be placed at certain points where the AGV needs direction assistance so that the robot does not rely on black lines. The movement of the robot is calculated through the actual position data from the RFID tag which is read when the robot passes the RFID and the position data of the item that has been given. The use of robots with the ability to detect their actual position is in accordance with the principles of a warehouse management system that requires automation and real-time data. So with this robot, automatic search media can be obtained, and improve management and storage in warehouses.

Keywords— Robot, ESP32, RFID, Autonomos

Paper ID 7881

Security Implementation of Wifi Password Asset Sharing With One Way Hash Cryptography Method Sha256 And QR Code

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Abstract— The study was conducted to model Wi-Fi password resource assets in a platform that can be shared and collaborated publicly securely and support dynamic data changes with online repository shortcuts documented in access support via dedicated search engines and QR CODE. This study uses 3 methods, namely the one-way SHA-256 HASH function which was formulated with the addition of sowing techniques and reversing techniques so as to produce a long String named Keycode, the second method uses modern cryptographic techniques, namely Digital Signature, which collects keycodes in Path the identity of the resource asset, and the last one is a QR CODE used as an access shortcut that collects digital signature access data. This study used testing data from comparator application contributors, namely wifimap.io randomly, the results of which the formulation results were then disassembled using the brute force technique using hashcat. The results of the research of password data from resources were successfully formulated into a combination of Strings with high confidentiality that cannot be disassembled to the original data but are still accessible to the owner and holder of the keycode that is balanced with the limitations of access control.

Keywords— *Cryptography, SHA-256, Digital Signature, QR CODE*

Paper ID 8359

Analysis of UWB Wilkinson Power Divider Design Using 4-Stepped Patch and Ring Structure

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Abstract—A Wilkinson ultra-wideband (UWB) power splitter is proposed and analyzed in this paper. The power divider line is added with a resistive load to keep the two output ports matched. The power divider is designed with a 4-stepped patch and ring capable of producing UWB frequencies. The proposed power divider design approach is derived from the analysis of even/odd mode circuits and stripline transmission lines. The power splitter design process was optimized and simulated using CST Studio Suite with a 1.524 mm thickness RO4350B substrate and a dielectric constant of 3.66. The overall dimensions of the proposed power divider are $85 \times 37 \text{ mm}^2$. The proposed wilkinson power divider has an operating frequency of 3-13 GHz. The insertion loss obtained has the lowest value of about -9 dB, and the isolation value is below -10 dB in the operating frequency range.

Index Terms—*power divider, stepped-patch, ultra-wideband, wilkinson.*

Paper ID 8641

**Design of a compact antenna and rectifier for a dual band
rectenna operating at 2.4 GHz and 5.8 GHz.**

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Abstract—In this article, a multiband compact patch antenna and a multiband rectifier circuit is proposed for a rectenna operating at 2.4 GHz and 5.8 GHz for RF energy harvesting and wireless power transmission. A modified inverted F shape antenna is used as the main receiving component of the rectenna. The antenna has a compact size of 35x40 mm². The proposed antenna has good impedance bandwidth (for $S_{11} < -10$ dB) values of 230 MHz and 620 MHz at the resonant frequencies 2.4 GHz and 5.8 GHz respectively. The gain values are 3.6 dB and 3.3 dB at 2.4 GHz and 5.8 GHz respectively. Furthermore, an efficient dual band rectifier circuit is presented. The rectifier circuit is a single branch and consists of a matching network, voltage doubler circuit and a load. The proposed rectifier circuit is designed on RT-Duroid 5880 substrate and the HSMS2850 diode is used for rectification. The rectifier achieves very good efficiency at both frequencies i.e., 71% and 51.9 % at 2.4 GHz and 5.8 GHz respectively.

Keywords— *Microwave power transmission, Wireless power transfer, Energy harvesting, Rectenna, Multiband rectenna, dualband antenna, Rectifier*

Paper ID 8817

Analysis Efficiency Network Performance of 4G LTE in Video Conference Applications

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Abstract— video conferencing is one of the multimedia services that can be performed in real time and allows voice, image and data communication to occur at the same time. This video conference service requires a large bandwidth capacity and can be applied to networks that have high data transfer speeds. With video conferencing, users who have certain needs but are in different locations can still see and hear each other and communicate interactively and can save time and costs. Therefore, it takes a fast internet network access such as an LTE network so that the communication process when conducting video conferences can run smoothly. Therefore, to see how well the quality of LTE network services can be used, the Mean Opinion Score is used to measure the level of user satisfaction with the services used. The highest throughput value for Telkomsel's performance is 989 Kbit/s, at Telkomsel provider the throughput value is never < 338 Kbit/s. Measurement of packet loss values using wireshark obtained packet loss values that vary but are still in the range of 0% - 3% based on the TIPHON standard, the value is still in the "good" category. maximum delay on provider 3 and Indosat.

Keywords— *Video Conference, LTE, Throughput, Jitter, Delay, Packet loss, ITU-T, Tiphon*

Paper ID 9613

Double Slot Antipodal Vivaldi Structure for Ultrawideband Applications

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Abstract— This study discusses the development of a Conventional Antipodal Vivaldi Antenna (CAVA), which is intended for use in ultra-wideband applications. The development is carried out by adding a Double Slot Structure (DSAVA) with Corrugated Edges (CE) and a Trapezium Dielectric Director (TD). The antenna is targeted to work in the 3.5 GHz – 10.5 GHz frequency range. Based on the test results, it is found that there is an increase in performance in the operating frequency range with gain variations between 10- 14 dBi. The method can also improve the characteristics of the antenna radiation pattern at high frequencies in the E-Field field.

Keywords—Vivaldi Antenna, Antipodal, Double Slot Structure, Corrugated Edges, Trapezium Dielectric Director, Gain

Paper ID 9924

**Performance of Some Frequency Reuse Schemes on LTE 900 MHz
for Cell-Edge Users in Multi-Layer LTE**

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Abstract— In multi-layer LTE configuration, LTE 900 MHz band placed as the outer layer due to its large coverage and small bandwidth available. This layering configuration makes the LTE 900 MHz coverage only focused for the cell-edge users (CEU) while the cell-center users (CCU) are served by other inner layer bands. Consequently, the LTE 900 MHz users suffer from inter-cell interferences (ICI) more than user in other bands. This paper presents a performance comparison of three different frequency reuse schemes for mitigating ICI, namely Strict Fractional Frequency Reuse (strict FFR), Soft Fractional Frequency Reuse (soft FFR), and Hard Frequency Reuse with reuse factor of 3. The performances evaluated using average user throughput and average Signal to Interference and Noise Ratio (SINR) for users in the cell edge. The simulation results show that the Hard Frequency Reuse Scheme provides the highest performance, particularly for outer layer in multi-layer LTE configuration.

Keywords—*inter-cell interference (ICI), LTE 900 MHz, Fractional Frequency reuse (FFR), multi-layer LTE*

AI and Machine Learning Application

Paper ID 870

Practical Comparison of Plant Pest and Disease Control Technologies Based on Neural Networks, IoT, and AI: A Systematic Review

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Abstract— Nowadays, coffee lovers are growing extensively. It can be seen from the coffee popularity, which is the second largest commodity in the world. Producing the best quality coffee beans is not an easy thing. Diseases and pests can attack a plant randomly. For example, coffee leaf rust disease causes a decrease in coffee production by up to 35%. Rust fungus on coffee plants can spread through the distribution of fungal spores by natural forces. Therefore, to increase the production of quality coffee beans, it is necessary to have the technological support to help detect pests or diseases in coffee plants. Technologies that can be used include neural networks, the internet of things, and artificial intelligence in collaboration with deep learning. This article compares the three technologies that have been experimented on by researchers. The AI-DL technology experiment conducted by Livio et al. produces an accuracy of 95%. Meanwhile, the experiments with IoT technology and neural networks conducted by Escola et al., Divyashri et al., and De Vita et al. resulted in an accuracy of 100%, 88.35%, and 96%, respectively. These results show that different modelling techniques can make a difference in accuracy in detecting disease from a plant.

Keywords— *Technology, Mitigation, Pests, Diseases, Coffee.*

Paper ID 1801

Table Information Extraction Using Data Augmentation on Deep Learning and Image Processing

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Abstract— Generally, the extraction of information in the table is done quickly if the table is within a document with a tabular structure. However, in the case of tables presented in the image document, steps are needed first to detect the table. Seeing a table in image documents becomes more complicated if the table to be seen does not have clear boundaries. This research focuses on extracting information from borderless tables in image documents. The study applies the Mask RCNNFPN deep learning model to detect borderless tables using augmentation data. The use of data augmentation is expected to increase the accuracy of deep learning models even though there is only a small amount of training data available. The data augmentation technique proposed in this study is a fine-tuning method with CutMask augmentation data. For model formation and testing, this study uses the UNLV data set. This data set consists of scanned images of documents from various sources, including financial reports, journals, and different tabular research papers. The total amount of data used is 427 samples. After data augmentation, the amount of data used is 854 samples. The table detection model is based on the Mask RCNN created using Python programming language. The testing parameters used for table detection quality are precise detection, partial detection, false detection, Precision, Recall, and F-Measure. The table's structure recognition rate is measured from the detection intersection value, rows, columns, and cells compared to ground truth. The test results show that using data augmentation with the CutMask technique can improve the performance of deep learning models to detect borderless tables. The use of image processing is shown to enhance table segmentation. However, the table structure recognition result does not offer a good result compared to the effects of other research.

Keywords— *table information extraction, table detection, data augmentation, deep learning, mask RCNN-FPN, image processing, computer vision.*

Paper ID 2234

Road Segmentation with U-Net Architecture Using Jetson AGX Xavier For Autonomous Vehicle

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Abstract— Autonomous Vehicle is a technology that has been often discussed in the last few years in the category of research and industry. This technology is able to sense the surrounding environment and control the vehicle autonomously without any human intervention. In its implementation, this technology requires a lot of information, especially the road track that will be passed. Because of that, the thing that must be considered is to segment the road first. The aim of this research is to develop a method that can segment the roads to produce a model that can recognize the road track as well. This research uses Convolutional Neural Network (CNN) with U-Net architecture. The datasets have a form of car trips video recordings from the dashboard camera, which are then extracted into a frame. After this process, it is annotated or manual segmentation using Supervisely to be used as a reference for training and testing. From the results of the calculation process with the confusion matrix, the accuracy of the U-net architecture gets a value of 95%, precision value is 81%, recall value is 92%, F1-Score value is 86% IOU value is 76%. Followed by testing the model in realtime using Jetson AGX Xavier, this tool is specially designed to develop artificial intelligence with high specifications. The test is carried out with two types of testing. The first test with an RGB background produces an FPS of 0.17, and the second test without an RGB background gets an FPS in the range of 0.55– 0.67.

Keywords—Autonomous Vehicle, road segmentation, Convolutional Neural Network (CNN), U-Net, Supervisely, Jetson AGX Xavier

Paper ID 3910

News Classification Based On News Headline Using SVC Classifier

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Abstract—News gives new insight and information from all over the world. News has many categories, such as politic, economy, science, and other common news categories. Every news will have their own category based on its content. The classification of news is usually done manually by inputting the category during the news posting. Some of the categories may be inputted incorrectly. The news classifier can be the solution for problem, but the news classifications out there are usually based on the news content. The classifier will receive the word vector inputs that are taken from the news content and try to classify it into one of certain categories. Unfortunately, news contents can be longer and harder to be processed rather than processing the news headline. The news headline is shorter and packs a decent information for the classifier to find out what category it is. Besides the news headline usage, the classifier also needs to be chosen correctly. In this paper, the SVC model will be tested using the news headline data to classify the news and compare with several other models, such as Linear Regression, Multinomial Naïve Bayes, Decision Tree, and Random Forest. The common variables to be compared are the accuracy, recall, and precision to evaluate the SVC model.

Keywords—*News Classification, News Category, Text Classification, TF-IDF, SVC*

Paper ID 6012

An Automatic Sorting Machine Using Weight Sensor and Moisture Content Measurement for Sweet Potatoes

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Abstract—This study proposes a method for sorting potatoes as post-harvest processing. Sorting is currently the most essential part of the production stage, namely at the time of sorting at harvest time. The parameters used in the sorting setting are sweet potatoes color, shape, size, mass, and water content. This automatic sorting machine assesses the quality of sweet potatoes based on the water content and weight. It doesn't require a lot of sensors, but it does show the required output. The weight sensor uses HX711 and measures the water content using a parallel plate; sensor data is used to determine the decision to sort sweet potato quality values. This system can be an alternative solution for farmers to sort their crops. The results of the prototype test show that this research can sort sweet potatoes based on the quality that the Indonesian National Standard has determined.

Keywords—automatic sorting machine, HX711, parallel plate, NodeMCU

Paper ID 6124

**Implementation of Deep Learning Method for Malware Detection
using CNN Architecture with Hyperparameter Tuning**

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Abstract— Malware is software that can contaminate and harm the operating system. Malware attacks frequently cause damage to a variety of parties. Machine learning is now the most advanced malware detection technique. It is asserted that this strategy outperforms more established signature-based detection methods. Hyperparameter tuning is one of the methods that can be used to enhance model performance in real-world applications. A comparison of the assessment results of the effects of the selection of image types, image resizing parameters, and the number of epochs was conducted in this research. Based on the test results, selecting the RGB image and then applying the preprocessing parameter resizing the image to 128×128 pixels, where the number of epochs is 50, can provide the outcomes of the evaluation of the best model with an accuracy metric of 90%. The deployment of the best-performing model is done after it has been stored. In terms of each component's appearance and functionality, the deployment outcomes are quite acceptable.

Keywords—*Malware, CNN, machine learning, deep learning, hyperparameter tuning, RGB, resize image, epoch, accuracy.*

Paper ID 6143

**Development of User Throughput-Downlink Prediction System in
4G LTE Network using Machine Learning Method**

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Abstract— With the huge load demands on the cellular network due to skyrocket increase in high-speed mobile data networks such as 4G LTE and increasing number of users, users often experience unexpected variations in connection quality. To deal with such variations and maintain consistent connections, we need to predict these variations before they occur. According to previous research, accurate user throughput can significantly improve bandwidth utilization. Therefore, it is important to predict network throughput based on other network parameters. In this final project, we study two techniques for throughput prediction: predictive modeling with regression and time series forecasting. Then the author has analyzed the effect of different data preparation techniques such as PCA and Feature Selection on the accuracy and duration of modeling on the data using the Random Forest algorithm. Data preparation techniques can reduce modeling time with a duration of three times faster than without processing. In addition, to make it easier for users to take advantage of the developed model, the author creates a web-based dashboard application with streamlit library that can be accessed from anywhere on the internet.

Keywords—*Cellular Network, 4G LTE, Throughput Prediction, Machine Learning, Time Series Forecasting*

Paper ID 9980

The Use of Artificial Intelligence for Urban Green Space Development

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Abstract—Urban green space (UGS) plays a vital role in achieving a better quality of life in urban areas. UGS offers multiple benefits, including physical, psychological, environmental and health benefits. Meanwhile, artificial intelligence (AI) provides powerful methods for examining urban infrastructure, including UGS, through diverse perspectives. AI has abilities to identify problems and come up with prospective solutions. This paper reviews the use of AI in UGS development. There are three case studies in have been explored.

Keywords— AI, UGS, urban services, urban development

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Information Centric and Named Data Network

Paper ID 1402

Interest Flooding Attack in Named Data Network: Case Study on Palapa Ring Topology

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Abstract—This research focuses on the interest flooding attack model and its impact on the consumer in the Named Data Networking (NDN) architecture. NDN is a future internet network architecture has advantages compared to the current internet architecture. The NDN communication model changes the communication paradigm from a packet delivery model based on IP addresses to names. Data content needed is not directly taken from the provider but stored in a distributed manner on the router. Other consumer request data can served by nearest router. It will increase the speed of data access and reduce delay. The changes communication model also have an impact on the existing security system. One attack that may occur is the threat of a denial of service (DoS) known as an interest flooding attack. This attack makes the network services are being unavailable. This paper discussed examining the interest flooding attack model that occurred and its impact on the performance of NDN. The result shows that interest flooding attacks can decrease consumer satisfied interest.

Keywords—NDN, interest flooding attack, Denial of Service, Named Data Networking, IFA

Paper ID 1995

Pending Interest Table (PIT) Performance Analysis in Named Data Networking on Palapa Ring Topology

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Abstract—The concept of the internet in the future will prioritize content, by reducing delays in data transmission. Named Data Networking (NDN) is a content-based future internet concept that changes the paradigm of using IP. Inside the NDN router, there are three data structures, namely Content Store (CS), Pending Interest Table (PIT), and Forwarding Information Base (FIB). Pending Interest Table (PIT) contains a list of unfulfilled interests. This condition occurs when the node has not received a response after the interest forwarding process. Measurable and fast PIT performance is a challenge in Named Data Networks. In this study, we will try to do a simulation to measure and analyze the performance of PIT in NDN in the Palapa Ring topology. The research was conducted using the NDNsim simulator, to see the performance in the PIT. The simulation and analysis of the results show that the granularity of a prefix has an effect on In Satisfied Interest in an NDN network. At the number of interests of 100, the result obtained from the simulation is that there is a decrease in the percentage of interest data served, amounting to more than 20%. At the amount of interest in 1000 about more than 30%. The length of the prefix and the number of interest sent by the consumer affect the performance of the PIT, seen from the number of In Satisfied Interests.

Keywords— *Pending Interest Table, Named Data Networking, Palapa Ring, Prefix, NDNsim.*

Paper ID 3772

Classification of interfaces on Named Data Networking Using machine learning

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Abstract— NDN (Named Data Network) network is the future network that transforms network communication from sending packets to the destination address to retrieving data (content) identified by name. A forwarding strategy is needed to select the next hop efficiently when forwarding interest. NDN, a data-centric network that can reduce network load (especially on the server side), has been widely developed using Machine Learning (ML) recently. The main factor in using ML is to examine very large data, for example, data in the Forwarding Information Base (FIB) table. The purpose of this study is to classify faces for interests that come to the NDN network and find out that the interests will be forwarded to closer nodes (producers). This research classifies several faces of FIB Classification techniques in Machine Learning are needed to classify the faces based on several interrelated features (variables). The results of the classification that has been carried out, show that the Random Forest classification model has the highest level of accuracy, which is 85,77%.

Keywords—NDN, FIB, Face, Machine Learning

Paper ID 5680

Comparative Analysis of Network Congestion on IP and Named Data Network

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Abstract—Today's data communication needs have shifted from client-server data communication to peer-to-peer. The user's focus is currently on the immediately requested data or the so-called Named Data Network (NDN). Changes to the nature of the app, user needs, and usage patterns have changed significantly, and apps on networks like YouTube, Facebook, and other social networks have revolutionized the idea of usergenerated content. One of the problems in the network is network congestion or network failure. Network congestion occurs due to the need for network resources exceeding the capacity of network resources. When network congestion occurs, the NDN forwarding mechanism facilitated by FIB on the IP router cannot detect the congestion condition and will still use the same path. At the same time, the NDN router can detect congestion conditions and react by using alternative paths. The simulation results show that on the NDN router, the forwarding mechanism can maximize the use of link bandwidth faster than the forwarding mechanism on the router-based IP network. In the topology designed, NDN can achieve maximum bandwidth in the 3rd second compared to IP in the 5th second.

Keywords-NDN, FIB, IP, network congestion

Paper ID 5763

**Load Balancing on Named Data Networking, Case Study: UIN
Topology in Indonesia**

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Abstract— Named Data Networking (NDN) is a network with a future internet architecture that changes the point of view in networking from host-centric to data-centric. Named data networking provides a network system where the routing system is no longer dependent on traditional IP. Network packets are routed through nodes by name. When many manufacturers produce packages with different names for several consumers, routing with load balancing is necessary. The case study carried out is to conduct a simulation by connecting all UIN campuses into a topology with the name UIN Topology in Indonesia, using several scenarios to describe the effectiveness of the load balancer on the UIN topology in Indonesia. This study focuses on load balancer applications to reduce delays in Named Data Networking (NDN), the topology of UIN in Indonesia.

Keywords—load balancing, UIN topology in Indonesia, named data networking

Paper ID 3358

Design of Monitoring System for Water Levels and Turbidity Water Canals Based on Nodemcu

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Abstract—Indonesia has two seasons, namely the dry season and the rainy season. Floods occupy the first position in the sequence of natural disasters with a total of 1,067 floods in Indonesia. The flood caused a lot of losses for the community, this is because the garbage that has accumulated in the waterways makes it difficult for the water to flow and when it rains enough it can cause the canal to be unable to accommodate a lot of water so it overflows onto the road and causes floods to occur. From this condition, a system is needed that aims to monitor the height and turbidity of the water. This research will be designed using NodeMCU as a microcontroller and communication with android applications via the internet. The method used is a literature study by collecting data related to the problem, analyzing needs for research, designing tools, testing, analyzing systems and documentation, and compiling research reports. The results of this study are a prototype tool that is used as a monitoring system for water level and turbidity using an android application as an early flood warning.

Keywords— *Water Channel, NodeMCU, Android, Turbidity*

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Information System and Software Development

Paper ID 2029

Pending Interest Table (PIT) Performance Analysis in Named Data Networking on Palapa Ring Topology

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Abstract—The selection of healthy food menus for children is one of the factors that must be considered to maximize baby growth and development. Because the food menu that children need must contain balanced nutrients such as carbohydrates, protein, fiber, and water, for this reason, a decision support system is required in determining the ranking of healthy and nutritious food menus using the Simple Additive Weighting (SAW) method. The basic concept of the Simple Additive Weighting (SAW) method is to find the weighted sum of the performance ratings for each alternative on all attributes. This method is used based on predetermined weights and criteria. The results of this study indicate that to get the decision value, you must go through the process of calculating the value and weight for each measure. The value and weight are calculated based on the level of importance of the criteria that have been determined. The results of the analysis are the results of ranking the most significant value in the decision-making process.

Keywords— *Decision Support System, Simple Additive Weighting, Children Food Menu Selection, Analysis.*

Paper ID 2721

Application of Certainty Factor Method to Diagnose Venereal Diseases Using Confusion Matrix For Multi-Class Classification

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Abstract—Public awareness about health is still deficient due to limited public knowledge in the health sector. Another problem is the limited availability of experts, especially in sexual health. Currently, health clinics that provide consultation for patients with venereal disease are still very limited. Awareness of venereal disease in Indonesia is still lacking, and there is still a reluctance to seek treatment or consult with venereal disease. Sexually transmitted diseases can be transmitted through sexual and non-sexual intercourse. Based on these problems, this study aims to build an expert system for diagnosing venereal diseases using the Certainty Factor method with Confusion Matrix for Multi-Class - Classification. The results of the study based on the accuracy test with the Confusion Matrix for Multi-Class Classification approach of 95% with an RMSE level of 0.091897.

Keywords— *certainty factor, classification, confusion matrix, expert systems, venereal disease.*

Paper ID 3350

Analysis And Design Down Payment on Retain Financial Accounting Information System

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Abstract—The design of the Financial Accounting Information System at the Operational and Financial Unit aims to analyze the system and procedures for filing, recording and accountability of ongoing downpayment, designing a system that can make submissions, recording and accountability of downtime computerized web-based, as well as evaluating application system submission, recording and down payment accountability that is built as well as compiling an internal control system of the proposed system. Data collection was done by interviews and direct observation of ongoing business processes which then described qualitatively in flowchart and narrative. Based on analysis of the current system, shows that the systems and procedures for filing and accountability ongoing imprest has not been effective and still has several problems. System analysis model is described using an object-oriented approach with UML diagrams are represented by use case diagram while the phases of system development using the waterfall model in the SDLC. Information system designed web-based and developed using framework CodeIgniter v3 with the PHP programming language and MySQL database that can generate a report containing the amount of the down-payment that must be accounted for, the amount of the down payment that has been accounted for and the amount of the down payment that has not been accounted for in certain periods.

Keywords: Analysis, Design, web-based Financial AIS, CodeIgniter, MySQL

Paper ID 3364

Telemedicine Application as a Decision Factor of Patient in Choosing Consultation Media During and Post Covid Pandemic Era

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Abstract—Indonesia has two seasons, namely the dry season and the rainy. The purpose of this research is to analyze factors that influence the decision making factor of patients in order to use telemedicine application. With using survey method, the amount of patients population / users of telemedicine application determined as 100 person(s). The analysis that used in this research are qualitative and quantitative, descriptive and verificative. After examining and analyzing and processing data showed that: Whole variables that contained products, price, performance, reliability, features, promotion and location partially and simultaneously affected decision making of patients in consulting via telemedicine services during and post COVID-19 pandemics era. Thus can be seen from F-count (25,340) larger than F-table for d(f) for n that 100 (2,311). Reliability variable of telemedicine service contributed 21,69% costumers to hold a consultation via telemedicine, followed by respondents location 19,97%, then features from the application 9,86%, promotion that held by the services 7,59%, the influence of prices 4,38% and performance 4,39% and last, the lowest influence from products from the telemedicine services 0,02%. Therefore telemedicine are suggested to adapt the product and prices with market demands, synergizing information and patients to maintain the quality.

Keywords—Telemedicine Application, Decision Factor, During and Post Covid Pandemic Era

Paper ID 3649

Risk Management of Academic Information System By Using NIST 80-300 Framework (Case Study: Universitas Sangga Buana YPKP)

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Abstract—This Paper will mainly discuss about Implementation of NIST 80-300 Framework as Risk Management Step into Academic Information System at Universitas Sangga Buana YPKP, Bandung.

Keywords—Risk Management, NIST, Academic Information System

Paper ID 3666

Individual And Eligibility Verifiability Method For Verification Mechanism of Voter On E-Voting System

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Abstract— Elections conducted with the system are the most effective and efficient steps compared to conventional voting. However, in this case, the low level of trust between voters and candidates in the E-Voting system, such as voters being unable to verify their choices to ensure the choices have been recorded and counted correctly and the low level of confidence of candidates in the validity of voters involved in the voting process so that they prefer conventional selection. The verifiability factor is one aspect that affects the confidence level of voters and candidates in the results and processes of the electronic voting system. Individual and eligibility verifiability for voters for the verification mechanism in the E-Voting system is an E-Voting system created to be able to verify voter choices. and verification of voters to increase confidence from both the voter's and candidate's point of view of the E-Voting system.

Keywords— *e-voting, individual verifiability, eligibility verifiability*

Paper ID 4339

Gamification Implementation in The Learning Media for Waste Separation

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Abstract—Students generally do not like to do daily work for a long time, but are willing to spend a lot of time playing games. They grew up with digital technology. Teachers must solve important problems related to adapting the learning process to students who have different learning styles and new requirements for teaching and learning. Based on this, how to combine learning and games so that they can motivate students to do the learning. Wrapping learning in a game. Gamification is one of the educational approaches and techniques that increase the motivation and involvement of students. Gamification is also focused on digital literacy. Gamification uses elements in games or video games to motivate students in the learning process and maximize feelings of enjoyment and engagement with the learning process, besides that this media can be used to capture things that interest students and inspire them to continue doing the learning. Education about waste is the first step in shaping the character of environmental care, discipline, and children's responsibility towards waste and how to handle it. The Educational Game application sorting waste is a game that has an educational element of learning in recognizing the types of waste. With this game, it is hoped that children can recognize and understand the types of organic and inorganic waste in a fun way and style.

Keywords— *Educational game, gamification, sorting trash, digital technology*

Paper ID 4521

**Enterprise Resource Planning: Analysis and Utilization of
Open Source Applications with the EAP Method**

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Abstract— System automation is currently very much needed for the small and medium business industry to large-scale companies. The computerized systems concept is increasingly in demand due to the shift in the industrial era 4.0. Enterprise Resource Planning (ERP) is a multi-module application that puts forward the concept of an integrated computerized system that stores all company data in one easily accessed database. This study discusses open source ERP applications for Micro, Small, and Medium Enterprises by looking at the running business processes that will then adjust to the ERP application module facilitated by the developer. The Enterprise Architecture Planning method acts as an analysis stage and a tool used in business process analysis using the Unified Modeling Language to identify all actors involved and a matrix of relationships between data entities, business processes, and applications. This research provides recommendations modules that can use in open source ERP applications appropriate for the company.

Keywords— *Enterprise Resource Planning, Enterprise Architecture Planning, Open Source*

Paper ID 4976

Design and Prototype Data Warehouse Modeling : New Student Admission

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Abstract—Universitas Sangga Buana YPKP Bandung is an educational institution that annually carries out new student admissions activities. Due to the need for statistical information on the number of prospective students who apply, the Faculties and Departments that are most in demand, as long as the prospective new students are, for the Rectorate of the University it is necessary to have a data warehouse that provides this information. From this research resulted in a design and prototype data warehouse modeling for New Student Admission at Universitas Sangga Buana YPKP Bandung

Keywords— *Data Warehouse Modeling, Design, Prototype, New Student Admission*

Paper ID 5493

Factors That Affect the Effectiveness of Management Accounting Software

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Abstract—5G technology in Indonesia operates at 3 frequency layers, namely the lower band, middle band and upper band. This technology can be applied to the planning for the development of the New Capital of Indonesia or known as IKN which is located in the Kalimantan region. The Capital of Indonesia covers a land area of approximately 256,142 ha and territorial waters the sea area of approximately 68,189 ha. The 26000 MHz Frequency band has a great opportunity for capacity planning and coverage in the region. This study aims to analyze the capacity of the allocated bandwidth, provide RF channels in each cell, determine the location of cells in each area and their coverage. Coverage area design and planning using calculation, whereas propagation models using the ETSI TR 138 900 V15.0.0 (2018-07) standard.

Keywords— *Accounting Software, Business Strategy, Organizational Structure, User Competence and Management Accounting Software*

Paper ID 5787

Cover Letter from the Residents of The Neighborhood to The Village Office Based on Smartphones

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Abstract— In recent years, various electronic-based government service systems have been successfully developed and implemented in Indonesia. These systems cover the scope of ministries, institutions, and local governments. The services that are felt by the community, especially those that are directly related to the needs of the community, such as identity cards, development information, government administration, and so on.

However, at the village or sub-district office level, these systems have not yet been widely covered. Even at the level of community units or neighborhood units that are directly related to every citizen, there is not yet an adequate system in place.

For this reason, this research will develop a service system for letters of introduction for residents of neighborhood associations to village or sub-district offices based on smartphones. With this system, it is hoped that residents will be able to quickly and easily get a letter of introduction from the head of the neighborhood unit or community unit. On the other hand, the village or village office can quickly provide services and obtain more accurate data.

The principle of this cover letter is the trust between the village or sub-district office and the heads of the community and neighborhood units. A letter will be generated and sent electronically to the related parties.

Keywords— *village office cover letter, neighborhood community, smartphone cover letter, smartphone-based cover letter*

Paper ID 5845

ID-Vote : Indonesian e-Voting machine Optimization using Voter Verifiable Paper Audit Trail (VVPAT)

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Abstract—The general elections in Indonesia are usually held every 5 years. With approximately 200 million people participating in 2014, it will be more costly if the government organizes the elections conventionally. One way to minimize the budget and solve problems related to that is utilizing e-voting technology. Indonesia digital vote is designed for general elections Indonesia uses e-voting technology by adopting the current conventional method. As the security aspect increases with the help of technology, it is expected that its implementation will obtain public trust and there is no significant controversy.

Keywords— *e-Voting, General election, VVPAT*

Paper ID 7877

Decision Support System: Selection of the Best Coffee Using Simple Additive Weighting

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Abstract— Today science and technology are developing rapidly and producing innovations for humans in various aspects of the industry, animal husbandry, agriculture, health, etc., as an effort to adapt to technological developments ranging from plant engineering to determining an option using technology assistance using various existing methods. Especially in the coffee industry, technology plays an important role, from planting to selecting coffee to be produced or consumed, all of which cannot be separated from technology to make it easier to sort and have good products. One of the coffee-producing products is Gununghalu. Gununghalu is one of the best coffee-producing areas in Indonesia, which consists of small gardens owned by farmers. The resulting coffee beans have a characteristic more pungent taste when compared to coffee beans from other regions. So far, people who want to buy coffee for consumption or resale have difficulty determining a good coffee bean product due to the many coffee products in circulation. All these coffee beans depend on the processing techniques carried out by the coffee farmers who grow crops. To deal with this problem, Gununghalu Coffee Products need a system that can simplify and assist in selecting a good coffee bean product with predetermined criteria and assessment weights, namely a decision support system with the method used in this study Simple Additive Weighting (SAW). From the results of the research conducted, it found that to produce the best coffee, there are four criteria, namely price, aroma, taste, and packaging.

Keywords: *Simple Additive Weighting, Expert System Decision, Best Coffee, Gununghalu*

Paper ID 8248

SERVICE-ORIENTED ARCHITECTURE DESIGN FOR APPLICATIONS E-PROCUREMENT WITH SOMA METHOD

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Abstract— Service-Oriented Architecture (SOA) is a Web service service that can manage resources from various information contained in the business processes of many companies or related relationships effectively and efficiently. E-Procurement is the use of information technology for business-to-business use (B2B) transactions for purchases of goods and services. The stages of SOA design for the E-Procurement Application begin a good study of studio studies, observations or face-to-face interviews through interviews, SOA design is conducted using the SOMA method.

Keywords– *Service Oriented Architecture, E-procurement, SOMA*

Paper ID 8399

Application design for Human Resources Department using gamification method

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Abstract—Today's rapidly growing business growth requires companies to excel and compete consistently. In order for companies to be able to become prominent and competitive companies, companies need various ways that are structured programs to improve employee performance. Marketing to make it much more attractive to users. Gamification will inspire users to participate because sustainable behavior that uses the human psychological tendency to play games and requires entertainment gamification produces a motivational impact and fun in its use. This makes the foundation that implementation in the company can help deal with these things and positively impact employees. It is hoped that this Gamification method can provide rewards for employees as an increase in employee motivation and satisfaction. Because this gamification method relies on company activities such as playing games and using a very fun reward system

Keywords—*Design System, reward system, gamification, increase motivation, employee management*

Paper ID 8447

**IMPROVING THE E-LEARNING SYSTEM COMPETENCE OF
EDUCATORS AT EDUCATION CENTER WOMAN ARMY
CORPS**

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Abstract—In the era of globalization marked by the increasingly rapid development of science, technology, information, and communication, it has become a demand and necessity for every individual to follow these developments. In relation to research on the competence of e-learning educators at Education Center Woman Army Corps, the author analyzes natural objects with data collection techniques using triangulation techniques as Sugiyono's opinion above. In the form of data collection with different techniques against the same data source so that credible data are found. The ability of Gadik in Education Center Woman Army Corps is mostly good enough according to the existing level of education, but there is still a need for a refresher for Gadik, faced with the current situation so that the expected student outcomes can be achieved. Explaining that the abilities of the girls are sufficient in the cognitive (knowledge) domain, they only need improvement in the procedure for improving learning. This is based on the development of an increasingly advanced situation, especially regarding e-learning competencies in teaching and learning activities. Thus, the role of E-Learning does Education Center Woman Army Corps has helped in the implementation of learning activities. Meanwhile, Gadik's competence in the psychomotor domain has been increasing, marked by an increase in work skills based on the selection and use of equipment and work techniques, especially in the IT field.

Keywords—*E-Learning, Education, Technology in Education*

Paper ID 9547

Implementation of Geographic Information System for Road Maintenance Management Application in Bandung District

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Abstract— Transportation is an important facility and infrastructure that connects activity and service centers, so that they are connected to each other. Good transportation can trigger economic, social, political development and the mobility of a region that grows together in various fields and sectors. The handling of road network maintenance is prioritized on the realization of good road performance and quality conditions to improve services, both services and distribution in advancing strategic sectors in Bandung Regency. So far, the Department of Public Works and Public Works of Bandung Regency for Road Sector is to determine and carry out road maintenance, at each UPT conducting surveys and screening issues/complaints on the road network, which are then used as the basis for budgeting maintenance. From this description, it is necessary to conduct research on the management of road network maintenance based on Geographic Information Systems (GIS) in Bandung Regency. The method used is a Geographic Information System which is a spatially based system that can prepare a management system for the maintenance and improvement of the road network in Bandung Regency efficiently and effectively which is expected to facilitate evaluation and can be updated regularly and continuously.

Keywords— *transportation; road maintenance; Geographic Information System*

Paper ID 9617

**Mobile Voting Persistent Method For Voter Authentication In
Mobile Voting**

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Abstract— The general election system in Indonesia requires voters to come directly to the polling station / TPS to vote. The traditional election has various weaknesses, such as relatively high costs, various frauds that occur at polling stations, lack of enthusiasm from voters and so on. Electronic voting / electronic voting can be a solution to overcome existing weaknesses, however problems in the electronic voting system can still occur, for example system security. Persistent mobile voting is a method of general election development of an electronic voting system into the android platform so that it can facilitate the general election process, because voters can cast their votes anywhere without having to go to the election site. In persistent mobile voting, voters validate as valid vote owners by checking No. His KK and KTP are in the system, if they are declared valid, then proceed to the registration stage to get a username and password. In addition to using usernames and passwords, this application also implements a fingerprint system and security algorithms to hide voter identity.

Keywords— *General election, mobile voting, mobile voting persistent*

Paper ID 9752

Front-End Builder Design With Laravel Framework For Campus Service Development

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Abstract— They are designing a Front-end Builder with the Laravel Framework with a personalization system on a website interface by drag-and-drop and recommending templates for use in making a website. The development method used in this research is a prototype. This method facilitates building web-based applications, and developers and customers can interact with each other during the system creation process. The model process in developing the prototype model system consists of communication, an immediate plan, a short modeling design, prototype construction, deployment delivery & feedback. Web applications are applications that Users can rely on to perform many valuable activities. Apart from the awareness of web application developers about creating a powerful front-end, currently, there are still many front-end displays on web applications that only display information but ignore the appearance of the website. An attractive appearance in the application must be applied to all pages on the web application. This research must be continued in further research to implement the front-end builder that has been produced so that the overall goal of this research can be achieved, namely Creating a front-end builder system that effectively makes an appearance on a website

Keywords—*Front-end, Builder, drag-and-drop, web application*