IES 2022

INTERNATIONAL ELECTRONICS SYMPOSIUM

Energy Development for Climate Change Solution and Clean Energy Transition

AUGUST 9-11 2022
at Politeknik Elektronika Negeri Surabaya

PROGRAM BOOK

2022 International Electronics Symposium

August 9-11th 2022
Surabaya, Indonesia

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Program Book
2022 International Electronics Symposium (IES)

Politeknik Elektronika Negeri Surabaya - PENS
Surabaya, Indonesia, August 9-11th, 2022

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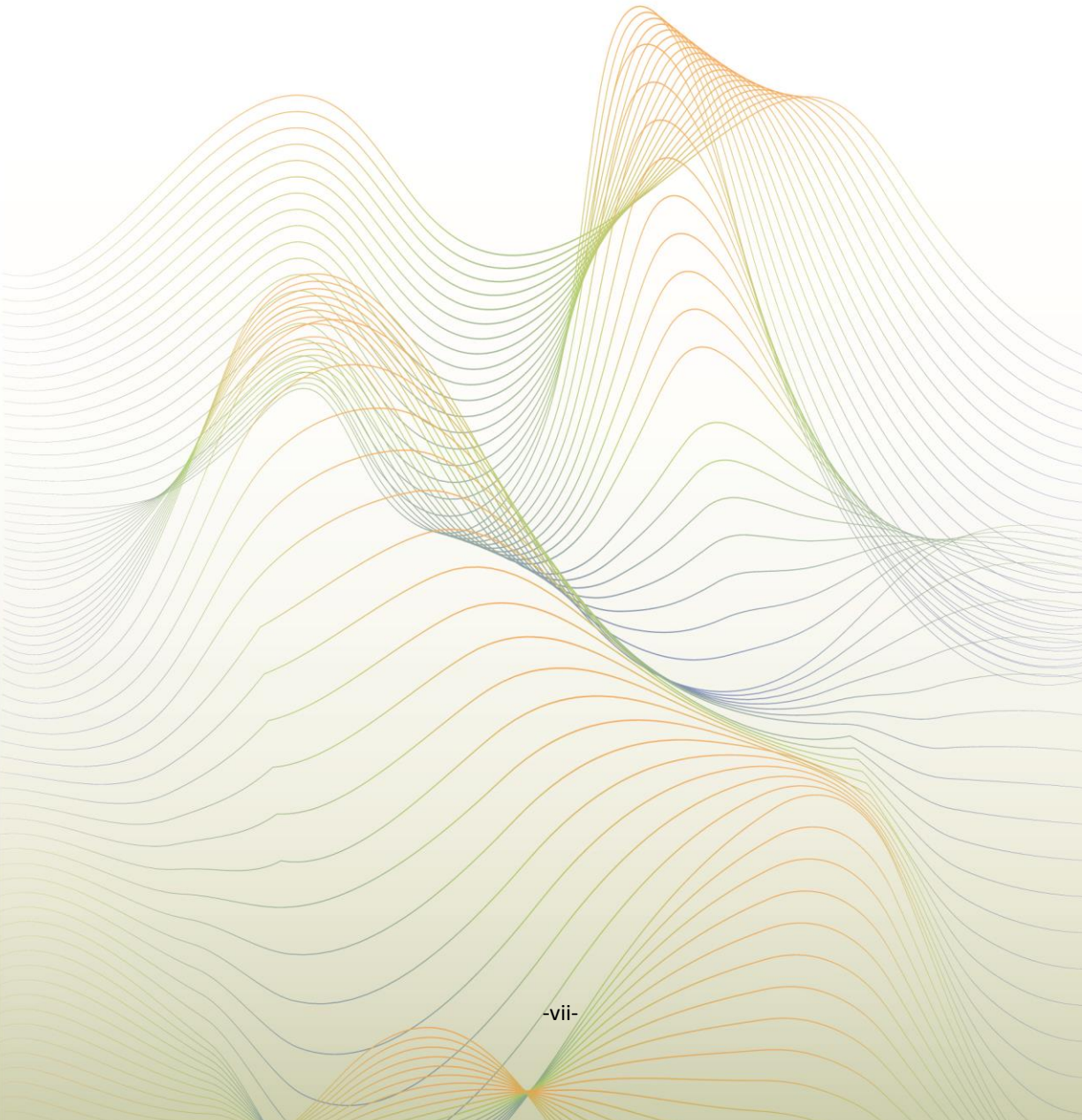
Foreword ————————————————————

Assalamualaikum Warahmatullahi Wabarakatuh

It is my great pleasure and honor as Director of Politeknik Elektronika Negeri Surabaya (PENS) to welcome all of you to the International Electronics Symposium (IES) 2022, which is held in Surabaya, Indonesia on August 9-11, 2022. I would like also to welcome all the keynote speakers and discussion panelists. I am sure you will find this conference an excellent forum for innovative and technical discussion.

Since the first IES in 1998, this is the 24th IES conference organized by PENS. IES 2022 is the ninth conference which is collaborated with IEEE Indonesia section. IES 2022 contains two tracks: International Electronics Symposium on Engineering Technology and Applications (IES-ETA) and International Electronics Symposium on Knowledge Creation and Intelligent Computing (IES-KCIC). During the conference, all participants will also have opportunities to join 2 workshops and one day summer school. The workshops are (1) Hands-on Workshop on Computational Fluid Dynamics and Open Foam and (2) Panel Discussion on Artificial Intelligence and 5D Systems.

This symposium would be impossible without the contributions and hard work of the keynote and invited speaker, all authors and reviewers, the advisory committee as well as chair persons, technical committee and organizing committee. Allow me to take this opportunity to express my sincere appreciation to all of you. The symposium may become the "Bridge to the Future" for the participants for stepping forward in science and technology aiming at providing original concepts and powerful methodologies for solving a variety of social and industrial problems such as environment, energy, medical, security, etc. "Bridge to the Future" as stated in our institution's slogan also means that we are the way for the people who are headed to the future of advanced technologies.

I do expect this symposium will give prolific contributions to the development of research, academics, and industries nationally and globally. I hope that all participants have fruitful technical discussions and enjoy the symposium.

Wassalamualaikum Warahmatullahi Wabarakatuh

Surabaya, August 9-11, 2022
Aliridho Barakbah, S.Kom., Ph.D.
Director of Politeknik Elektronika Negeri Surabaya (PENS)

Welcome Message from General Chair of IES 2022

Assalamualaikum Wr. Wb.

Welcome to the 24th International Electronics Symposium (IES) 2022.

IES 2022 aims to provide a good platform for researchers, scientists, and the entire engineering community to meet one another and exchange ideas on engineering applications to stimulate research and to advance region-wide cooperation in the engineering disciplines. The IES 2022 conference also offers some supporting events such as free summer school, workshops, and panel discussions. This year, IES takes the topic of Energy Development for Climate Change Solution and Clean Energy Transition. It is all our responsibility to support solutions to the global environmental crisis and to improve society for a good and healthy community.

This year, we have prepared a comprehensive program consisting of several keynote speeches which are delivered by Dr. Ir. Hendra Iswahyudi, M.Si (Ministry of Energy and Mineral Resources, Indonesia), Professor Stephen R Turnock MA, SM, Ph.D., CEng, FIMechE, FRINA, FHEA (University of Southampton, United Kingdom), Professor Naoki Ishibashi (Musashino University, Japan), and Professor Novie Ayub Windarko Ph.D. (Politeknik Elektronika Negeri Surabaya, Indonesia). The conference has received 253 registered papers from researchers and academics all over the world including Indonesia, Malaysia, Japan, Philippines, India, Bangladesh, Australia, United Kingdom, Algeria and many more. Best papers are awarded in the conference to appreciate the hard and effortless work spent in the area of engineering and technology.

As the general chair, I would like to thank all participants who have contributed to IES 2022. I would also like to share my gratitudes to IEEE Indonesia section, honourable keynote speakers, and reviewers for their great assistance and support so that this event can be successful. I hope you can take advantage of the conference and enjoy your visit in Surabaya.

Wassalamualaikum Wr. Wb.

Dr. Nu Rhahida Arini, S.T., M.T.
General Chair of IES 2022.

1. **Official Language**
   The official language of IES 2022 is English. All presentations including Q&A will be delivered in English.

2. **Guideline for Participants**
   - Conference Venue
     IES 2022 will be held on hybrid conference, that is on-site conference (physical presence) in PENS Surabaya and an online option (virtual participation) by using Zoom.
   - On-site Conference Venue
     On-site conference will be held in Politeknik Elektronika Negeri Surabaya Campus, Keputih, Sukolilo, Surabaya City, Jawa Timur, Indonesia, 60111.
   - Online Conference Venue
     Online conference will be held by using Zoom.
     ZOOM Event will be opened 30 minutes before the event (08.00 Western Indonesia Time, Jakarta Time). Link to join will be sent through email.
   - Registration
     Time of Registration: 08.00 – 08.30 (Local Time Jakarta, GMT + 7), Tuesday, August 9th, 2022

3. **Guideline for Presenters and Session Chair/Moderator**
   - International Electronics Symposium (IES) 2022 will be held on hybrid conference, that is on-site conference (physical presence) in Politeknik Elektronika Negeri Surabaya and an online option (virtual participation) by using Zoom.
   - Regarding this situation, the guidelines about how to do physical presentation and virtual presentation can be accessed in this link: https://ies.pens.ac.id/2022/guidelines-for-presenter/.
   - Author needs to attend both dry run and parallel session. Dry run and parallel session in virtual conference will be held using Zoom. Both dry run and Parallel Session, the IES Committee are using English Language and recoding during session progress.
   - During parallel session, the presenters and session chairs are asked to keep to the paper sequence as shown in the Final Program. By following the predefined schedule, participants can switch between sessions without missing the particular papers of interest.
   - The presentation time for each presenter is 15 minutes including Q&A. The session chairs should allow the presenter for a 10 minutes presentation and leave 5 minutes for discussions. All presenters are requested to report their attendance to the session chair 10 minutes before the session begins.

Conference Room IES 2022 ───────────────

A. Opening Ceremony and Keynote Speech

Zoom Virtual Conference for Online Participants
Auditorium Pascasarjana PENS. 6th Floor for Offline Participants

B. Seminar Room

Zoom Virtual Conference for Online Participants
Classroom Pascasarjana Building, PENS for Offline Participants:

Room I (IES ETA 1)   **:** PS.0317, 3rd Floor
Room II (IES ETA 2)   **:** PS.0315, 3rd Floor
Room III (IES ETA 3)   **:** PS.0313, 3rd Floor
Room IV (IES KCIC 1) **:** PS.0311, 3rd Floor
Room V (IES KCIC 2)   **:** PS.0419, 4th Floor
Room VI (IES KCIC 3) **:** PS.0408, 4th Floor

C. Lunch Room

Cafetaria Pascasarjana 5th Floor, PENS

D. Registration and Information
Zoom Virtual Conference for Online Participants
Auditorium Pascasarjana PENS. 6th Floor for Offline Participants

Technical Program

Rundown of International Electronics Symposium 2022
Date: August 9-11th, 2022
Time Zone: Local Time Jakarta (GMT + 7)
Venue: PENS, Surabaya
Energy Development for Climate Change Solution and Clean Energy Transition

Time	Tuesday, August 9th 2022		
07.30 - 08.30	Registration		
08.30 - 09.15	**Opening Ceremony :** IES General Chair: Dr. Nu Rhahida Arini, S.T., M.T PENS Director: Aliridho Barakbah, S.Kom., Ph.D. IEEE Indonesia Section: Dr.-Ing. Wahyudi Hasbi, S.Si, M.Kom.		
09.15 - 10.15	**Keynote Speech I :** Ministry of Energy and Mineral Resources (Dr. Ir. Hendra Iswahyudi, M.Si,) **Moderator:** Amang Sudarsono, ST, Ph.D		
10.15 - 10.30	Coffee Break		
10.30 – 12.10	**Parallel Session I**		
	Room I: IES-ETA 1 (5 papers)	**Room II:** IES-ETA 2 (5 papers)	**Room III:** IES-ETA 3 (5 papers)
	Room IV: IES-KCIC 1 (5 papers)	**Room V:** IES-KCIC 2 (5 papers)	**Room VI:** IES-KCIC 3 (5 papers)
12.10 - 13.00	Break and Lunch		
13.00 - 14.00	**Keynote Speech II :** Prof. Stephen R Turnock MA, SM, PhD, CEng, FIMechE, FRINA, FHEA (University of Southampton, UK) **Moderator:** Dr.-Ing. Hestiasari Rante, S.T., M.Sc.		
14.00 - 15.20	**Parallel Session II**		
	Room I: IES-ETA 1 (4 papers)	**Room II:** IES-ETA 2 (4 papers)	**Room III:** IES-ETA 3 (4 papers)
	Room IV: IES-KCIC 1 (4 papers)	**Room V:** IES-KCIC 2 (4 papers)	**Room VI:** IES-KCIC 3 (4 papers)
15.20 - 15.50	Coffee Break		
15.50 - 16.50	**Parallel Session III**		
	Room I: IES-ETA 1 (3 papers)	**Room II:** IES-ETA 2 (3 papers)	**Room III:** IES-ETA 3 (3 papers)
	Room IV: IES-KCIC 1 (3 papers)	**Room V:** IES-KCIC 2 (3 papers)	**Room VI:** IES-KCIC 3 (3 papers)

Time	Wednesday, August 10th 2022		
07.30 - 08.30	Registration		
08.00 – 09.00	**Keynote Speech III :** Prof. Naoki Ishibashi (Musashino University, Japan) **Moderator**: Dr. Eng. Bambang Sumantri, S.T., M.Sc.		
10.00 - 10.15	Coffee Break		
09.00 – 12.00	**Workshop AI and 5D** Location: Mini Teather PS 6th Floor	**Workshop CFD and OpenFOAM** Location: Meeting Room PS 3rd Floor	
12.00 - 13.00	Break and Lunch		
13.00 - 14.00	**Keynote Speech IV :** Prof. Novie Ayub Windarko Ph.D. PENS, Indonesia **Moderator:** Rahardhita Widyatra Sudibyo, S.ST., MT., Ph.D.		
14.00 - 15.30	**Parallel Session IV**		
	Room I: IES-ETA 1 (4 papers)	**Room II:** IES-ETA 2 (4 papers)	**Room III:** IES-ETA 3 (4 papers)
	Room IV: IES-KCIC 1 (4 papers)	**Room V:** IES-KCIC 2 (4 papers)	**Room VI:** IES-KCIC 3 (4 papers)
15.30 - 15.45	Coffee Break		
15.45 - 16.45	**Parallel Session V**		
	Room I: IES-ETA 1 (3 papers)	**Room II:** IES-ETA 2 (3 papers)	**Room III:** IES-ETA 3 (3 papers)
	Room IV: IES-KCIC 1 (4 papers)	**Room V:** IES-KCIC 2 (3 papers)	**Room VI:** IES-KCIC 3 (3 papers)
16.45 – 17.15	**Closing Ceremony :** Souvenir Handing & Best Paper Award: by General Chair (Dr. Nu Rhahida Arini, ST, MT.) Closing Remarks: by Head of P3M PENS (Dr. Mike Yuliana)		

Time	Thursday, August 11th 2022
08.00 - 09.30	Departing from PENS
09.30 – 18.00	Trowulan Musem Tour Bajang Ratu Tample Tour Tikus Temple Tour Brahu Temple Tour Vihara Budha Tidur Tour

No	Time	Paper ID	Paper Title	Authors
1	10.30 - 10.50	1570824284	Study of a hybrid system with various types of energy storage in Wetar Island	Ruly Sitanggang (PLN Research Institute, Indonesia)
2	10.50 - 11.10	1570817344	Optimization and Management of Residential Energy Load Using PSO and WOA	Abir Hasnaoui, Abdelhafid Omari and Zin-eddine Azzouz (USTO-MB, Algeria); Mohammed Bilal Danoune (Université Kasdi Merbah, Algeria); Nu Arini (Politeknik Elektronika Negeri Surabaya, Indonesia)
3	11.10 - 11.30	1570817828	Multiple Degree of Freedom Vibrations User Interface Development	Mochammad Faqih (Universiti Teknologi PETRONAS, Malaysia); Nu Arini (Politeknik Elektronika Negeri Surabaya, Indonesia); Temitope Ibrahim Amosa and Abdulrahman Abdullah Omar Bahashwan (Universiti Teknologi Petronas, Malaysia)
4	11.30 - 11.50	1570818265	Experimental and Numerical Study of Plainand Perforated Twisted Tape Effect on the Double Pipe Heat Exchanger Performance	Arrad Ghani Safitra, Susi Puspitasari and Ririn Kusnul Khotimah (Politeknik Elektronika Negeri Surabaya, Indonesia); Setyo Nugroho (University of Adelaide, Australia)
5	11.50 - 12.10	1570818314	Constant Current Constant Voltage for Precise Lithium Ion Battery Charging	Feby Chandra Arsandi (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia); Moh. Zaenal Efendi (Politeknik Elektronika Negeri Surabaya, Indonesia); Farid Dwi Murdianto (Electronics Engineering Polytechnic Institute of Surabaya, Indonesia)

Session : Parallel Session 01
Location : Room II
Moderator : Hendy Briantoro, SST., M.T., PhD
Date : Tuesday, August 9th 2022
Track : Power Engineering and Energy Technology
Telecommunication Engineering Technology
Topic : IES-ETA 2

No	Time	Paper ID	Paper Title	Authors
1	10.30 - 10.50	1570812313	Fiber to the Home Design and Analysis for Urban Housing of Cluster Garuda	Adli A. Fattah, Muhammad Hafizh, Jonathan Christopher, Ida Diwy, Nicholas Chandra, Rachmah Attalia and Catur Apriono (Universitas Indonesia, Indonesia)
2	10.50 - 11.10	1570825488	Performance Study of Organic Rankine Cycle (ORC) Using Low-Temperature Waste Heat With Zeotropic Refrigerants	Habibatu Nihayah and Fara Nabilah Sakina (Politeknik Elektronika Negeri Surabaya, Indonesia); Teguh Hady Ariwibowo (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia); Arrad Ghani Safitra (Politeknik Elektronika Negeri Surabaya, Indonesia)
3	11.10 - 11.30	1570818029	Performance of MIMO-OFDM System Based on Single RF using Linear Detection	I Gede Puja Astawa (Politeknik Elektronika Negeri Surabaya, Indonesia)
4	11.30 - 11.50	1570818531	High Speed Wireless Transmission System at 190-320 GHz Band	Muhammad Agus Zainuddin and Sritrusta Sukaridhoto (Politeknik Elektronika Negeri Surabaya, Indonesia)
5	11.50 - 12.10	1570822241	Energy Efficiency in D2D Cooperative Communication System UAV-Assisted for Energy Harvesting Process at Source and Relay	Annysa Aprilya, Meyra Chusna Mayarakaca, Hendy Briantoro and Yoedy Moegiharto (Politeknik Elektronika Negeri Surabaya, Indonesia); Arifin Arifin (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia)

Session	:	Parallel Session 01		
Location	:	Room III		
Moderator	:	Dr.-Ing. Hestiasari Rante, S.T., M.Sc.		
Date	:	Tuesday, August 9th 2022		
Track	:	Telecommunication Engineering Technology		
		Electronics Systems and Electrics Technology		
Topic	:	IES-ETA 3		

No	Time	Paper ID	Paper Title	Authors
1	10.30 - 10.50	1570801349	Real Time Monitoring System of Drinking Water Quality using Internet of Things	Zainul Abidin (Universitas Brawijaya, Indonesia); Eka Maulana (Brawijaya University, Indonesia); Muhammad Yogi Nurrohman, Fitri Wardana and Warsito Warsito (Universitas Brawijaya, Indonesia)
2	10.50 - 11.10	1570826678	Information Loss of Secret Key from Improper Quantization Decision in Wireless Physical-Layer Security with False Channel Statistics Knowledge	Apirath Limmanee (King Mongkut's Institute of Technology Ladkrabang, Thailand)
3	11.10 - 11.30	1570826687	Implementation of Air Quality Monitoring for Traffic Routing	Rahajeng Rahmadhani, Mike Yuliana and Rahardhita Sudibyo (Politeknik Elektronika Negeri Surabaya, Indonesia)
4	11.30 - 11.50	1570826713	RAMI: Security System of Information Exchange Based on Shared Key Generation in Vehicle-to-Vehicle Communication	Muhamad Ramdhan Syaadillah (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia); Amang Sudarsono (Politeknik Elektronika Negeri Surabaya (PENS), Indonesia); Mike Yuliana (Politeknik Elektronika Negeri Surabaya, Indonesia)
5	11.50 - 12.10	1570826673	Improvement of PSNR by Using Shannon-Fano Compression Technique in AES-LSB StegoCrypto	Wildan D Walidaniy (Bangkalan & PENS, Indonesia); Mike Yuliana and Hendy Briantoro (Politeknik Elektronika Negeri Surabaya, Indonesia)

Session : Parallel Session 01
Location : Room IV
Moderator : Iwan Syarif, S.Kom., M.Kom., M.Sc., Ph.D.
Date : Tuesday, August 9th 2022
Track : Robotics Technology and Control Systems
Topic : IES-KCIC 1

No	Time	Paper ID	Paper Title	Authors
1	10.30 - 10.50	1570823722	UV-C Disinfection Robotic	Mohamed zied Chaari (Qatar University & Qatar, Qatar)
2	10.50 - 11.10	1570824212	Mechanical Design and Forward Kinematics Analysis of T-FLoW 3.0 Prosthetic Robot Hand: Lever-based Finger Movement Mechanism	Kevin Ilham Apriandy (Electronic Engineering Polytechnic Institute of Surabaya (EEPIS) & EEPIS Robotics Research Centre (ER2C), Indonesia); Bima Sena Bayu Dewantara (Politeknik Elektronika Negeri Surabaya, Indonesia); Raden Sanggar Dewanto (Electronic Engineering Polytechnic Institute of Surabaya (EEPIS), Indonesia); Dadet Pramadihanto (PENS, Indonesia)
3	11.10 - 11.30	1570824305	Automated Library System Mobile Robot using A-Star Algorithms	Heri Nur Alim and Niam Tamami (Politeknik Elektronika Negeri Surabaya, Indonesia); Ali Husein Alasiry (Politeknik Elektronika Negeri Surabaya & Electronics Engineering Polytechnic Institute of Surabaya, Indonesia)
4	11.30 - 11.50	1570824490	The Comparison of Image Enhancement Methods for A Realtime Under Water Vision System of The Break Water Implementation	Bayu Sandi Marta and Muhammad Amin Abdullah (Politeknik Elektronika Negeri Surabaya, Indonesia); Dewi Mutiara Sari (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia); Haryo Dwito Armono (Institut Teknologi Sepuluh Nopember, Indonesia)
5	11.50 - 12.10	1570826437	Implementation of Deep Learning on Obstacle Avoidance System PENSHIP Ship Robot	Hendika Putra Madani, Iwan Kurnianto Wibowo and Mochamad Mobed Bachtiar (Politeknik Elektronika Negeri Surabaya, Indonesia)

Session	:	Parallel Session 01
Location	:	Room V
Moderator	:	Dr. Idris Winarno, S.ST, M.Kom
Date	:	Tuesday, August 9th 2022
Track	:	Computational Intelligence
Topic	:	IES-KCIC 2

	Time	Paper ID	Paper Title	Authors
1	10.30 - 10.50	1570818374	Path Planning Based on Deep Reinforcement Learning Towards Human-Robot Collaboration	Rokhmat Febrianto, M Muhtadin and I Ketut Pumama (Institut Teknologi Sepuluh Nopember, Indonesia); Mauridhi Hery Purnomo (Institut of Technology Sepuluh Nopember, Indonesia)
2	10.50 - 11.10	1570815271	Improving Power Transformer Lifetime Prediction using Hyperparameter Optimization	Andro Aprila Adiputra (Electronic Engineering Polytechnics Institute of Surabaya, Indonesia); Tita Karlita (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia); Entin Martiana Kusumaningtyas (Politeknik Elektronika Negeri Surabaya(PENS)-Indonesia, Indonesia)
3	11.10 - 11.30	1570818178	SDGs India Index Analysis using SHAP	Entin Martiana Kusumaningtyas (Politeknik Elektronika Negeri Surabaya(PENS)-Indonesia, Indonesia); Alfian Haidar Setyawan (Electronic Engineering Polytechnics Institute of Surabaya, Indonesia); Ali Ridho Barakbah (Politeknik Elektronika Negeri Surabaya, Indonesia)
4	11.30 - 11.50	1570818566	Human Pose Estimation for Fitness Exercise Movement Correction	Atharian Rahmadani (Politeknik Elektronika Negeri Surabaya); Bima Sena Bayu Dewantara (Politeknik Elektronika Negeri Surabaya, Indonesia); Dewi Mutiara Sari (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia)

	Time	Paper ID	Paper Title	Authors
5	11.50 - 12.10	1570818646	Topological based Environmental Reconstruction for Efficient Multi-Level Control of Robot Locomotion	Azhar Aulia Saputra and Wei Hong Chin (Tokyo Metropolitan University, Japan); Mohamad Yani (Universiti Teknologi Malaysia, Malaysia); Fernando Ardilla (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia); Adnan Besari (Tokyo Metropolitan University, Japan); Yuichiro Toda (Okayama University, Japan); Naoyuki Kubota (Tokyo Metropolitan University, Japan)

Session : Parallel Session 01
Location : Room VI
Moderator : Sritrusta Sukaridhoto ST, Ph.D.
Date : Tuesday, August 9th 2022
Track : Applied-Computing Sciences
Intelligent Multimedia Systems
Topic : IES-KCIC 3

	Time	Paper ID	Paper Title	Authors
1	10.30 - 10.50	1570811562	Factors Influencing the Adaption of Online Pharmacy in Oman: Pilot Study	Abir AlSideiri (AlBuraimi College, Oman)
2	10.50 - 11.10	1570818279	Heatmap Visualization and Badminton Player Detection using Convolutional Neural Network	Muhammad Abdul Haq (Tokyo Metropolitan University, Japan); Shuhei Tarashima (NTT Communications Corporation, Japan); Norio Tagawa (Tokyo Metropolitan University, Japan)
3	11.10 - 11.30	1570821128	A Multilayered Analytical Visualization Method for assessing Forest-Urban-Disaster Resilience	Amane Hamano (University of Musashino, Japan); Shiori Sasaki (Musashino University, Japan)
4	11.30 - 11.50	1570824522	Personal Community-member Information Management System with Individual Face Recognition Function	Shiori Sasaki and Li Xing (Musashino University, Japan)
5	11.50 - 12.10	1570818583	Cross-cultural analysis of the American, German, and Japanese newspaper coverage on COVID-19	Yukiko Sato (Sophia University, Japan)

Session : Parallel Session 02
Location : Room I
Moderator : Dr. Eng. Teguh Hady Ariwibowo, S.T., M.T.
Date : Tuesday, August 9th 2022
Track : Power Engineering and Energy Technology
Topic : IES-ETA 1

No	Time	Paper ID	Paper Title	Authors
1	14.00 - 14.20	1570821148	Analysis Comparison Of Linear Interpolation And Quadric Interpolation Methods For Forecasting A Growth Total Of Electricity Customers In Kotawaringin West Regency At 2022-2025 Years	Sujito Sujito (State University of Malang, Indonesia); Langlang Gumilar, Ridho Riski Hadi and Mohamad Rodhi Faiz (Universitas Negeri Malang, Indonesia); Syafriyudin Syafriyudin (IST AKPRIND, Indonesia); Zory Satrio Nugroho (Universitas Negeri Malang, Indonesia)
2	14.20 - 14.40	1570822139	A Novel Power Switching Control Method of the Wind Power MPPT System Based on the Switching System Theory	Xin Guo, Weipeng Li, Yuan Pan and Jun Liu (Xi'an University of Technology, China)
3	14.40 - 15.00	1570818288	Design Hotwell Condenser Level Control System Using Feedback-Feedforward Control Strategy With Tunning Direct Synthesis	Mohammad Hasan Fadlullah Fadlullah, Erik Tridianto and Joke Pratilastiarso (Politeknik Elektronika Negeri Surabaya, Indonesia)
4	15.00 - 15.20	1570818356	Numerical Analysis On The Effect of Jet Impingement Ratio in Double Trapezoidal Absorber Plate Solar Air Heater	Faris Hanuntiarso, Lohdy Diana, Radina Anggun Nurisma and Arrad Ghani Safitra (Politeknik Elektronika Negeri Surabaya, Indonesia)

Session : Parallel Session 02
Location : Room II
Moderator : Rahardhita Widyatra Sudibyo, S.ST., MT., Ph.D.
Date : Tuesday, August 9th 2022
Track : Telecommunication Engineering Technology
Topic : IES-ETA 2

No	Time	Paper ID	Paper Title	Authors
1	14.00 - 14.20	1570822546	Pseudonymous Identities Generated from RSS-Based Secret Key Generation in A Join Protocol Process	Amang Sudarsono (Politeknik Elektronika Negeri Surabaya (PENS), Indonesia); Mike Yuliana (Politeknik Elektronika Negeri Surabaya, Indonesia)
2	14.20 - 14.40	1570822621	The implementation of Optimal K-Means Clustering for Indoor Moving Object Localization	Syafira Salsabila (Politeknik Elektronika Negeri Surabaya, Indonesia); Prima Kristalina (Politeknik Elektronika Negeri Surabaya (PENS), Indonesia); Tri Budi Santoso (Electronic Engineering Polytechnic of Surabaya (EEPIS), Indonesia)
3	14.40 - 15.00	1570823284	Energy Efficiency of The Cooperative Communication Systems With Energy Harvested at Source and Relay Using Battery Power at Relay	Ines Sastre Umayya, Annysa Aprilya, Meyra Chusna Mayarakaca, Muhamad Milchan, Yoedy Moegiharto and Hendy Briantoro (Politeknik Elektronika Negeri Surabaya, Indonesia)
4	15.00 - 15.20	1570823409	Realtime Weather Prediction System Using GRU with Daily Surface Observation Data from IoT Sensors	Hendri Darmawan (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia); Mike Yuliana and Mochammad Zen Samsono Hadi (Politeknik Elektronika Negeri Surabaya, Indonesia)

Session : Parallel Session 02
Location : Room III
Moderator : Dr. Agus Indra, S.T., M.Sc.
Date : Tuesday, August 9th 2022
Track : Electronics Systems and Electrics Technology
Topic : IES-ETA 3

No	Time	Paper ID	Paper Title	Authors
1	14.00 - 14.20	1570805052	Air Purification System for Air Quality Monitoring In-Vehicle	John Patric A Sasis, Kyle Vonmar Agullo and Julius Sese (Mapua University, Philippines)
2	14.20 - 14.40	1570822924	Congestion Monitoring System Using Infrared Sensor	Taiki Kimura and Thatsanee Charoenporn (Musashino University, Japan); Virach Sornlertlamvanich (Musashino University, Japan & Thammasat University, Thailand)
3	14.40 - 15.00	1570822666	Numerical simulation of thermal performance of porous metal heatsink for cooling the CPU	Upasana Panigrahi (Bhubaneswar Engineering College, India); Subhasini Muduli (Bhubaneswar Engineering College, Australia)
4	15.00 - 15.20	1570818156	Controlling 3D Model of Human Hand Exploiting Synergistic Activation of The Upper Limb Muscles	Firman Isma Serdana (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia)

Session   :   Parallel Session 02
Location :   Room IV
Moderator :   Dr. Eng. Indra Adji Sulistijono, S.T., M.Eng
Date   :   Tuesday, August 9th 2022
Track   :   Robotics Technology and Control Systems
              Knowledge Base and Engineering
Topic   :   IES-KCIC 1

No	Time	Paper ID	Paper Title	Authors
1	14.00 - 14.20	1570826731	Estimation of Ball Position Using Depth Camera for Middle Size Goalkeeper Robot	Dekasari Putri Suwandi, Iwan Kurnianto Wibowo and Mochamad Mobed Bachtiar (Politeknik Elektronika Negeri Surabaya, Indonesia)
2	14.20 - 14.40	1570810997	Movies Analysis on DBpedia and Wikidata Using Community Detection and Centrality Algorithms	Tri Puspa Rinjeni, Sri Suci Indasari and Ade Indriawan (Institut Teknologi Sepuluh Nopember, Indonesia); Nur Aini Rakhmawati (Institut Teknologi Sepuluh Nopember Surabaya, Indonesia)
3	14.40 - 15.00	1570814775	Semantic Software Traceability Using Property Listing Task: Pilot Study	Adhatus Solichah Ahmadiyah and Siti Rochimah (Institut Teknologi Sepuluh Nopember, Indonesia); Daniel Siahaan (Institut teknologi Sepuluh Nopember, Indonesia)
4	15.00 - 15.20	1570815357	RIP and OSPF Routing Protocol Analysis on Defined Network Software	Arief Agus Sukmandhani (Binus Online Learning, Bina Nusantara University, Indonesia); Muhammad Aulia (Binus Online Learning, Bina Nusantara University, Jakarta, Indonesia); Jenny Ohliati (Binus Online Learning, Bina Nusantara University, Indonesia)

Session : Parallel Session 02
Location : Room V
Moderator : Dr. Tita Karlita, S.Kom., M.Kom., M.Sc., Ph.D.
Date : Tuesday, August 9th 2022
Track : Computational Intelligence
Topic : IES-KCIC 2

No	Time	Paper ID	Paper Title	Authors
1	14.00 - 14.20	1570824649	Hand Gesture Recognition Based on Keypoint Vector	Heru Arwoko (Universitas Surabaya, Indonesia)
2	14.20 - 14.40	1570823089	Implementation of Face Recognition Using Discrete Cosine Transform on Convolutional Neural Networks	Ari Setiawan, Riyanto Sigit and Rika Rokhana (Politeknik Elektronika Negeri Surabaya, Indonesia)
3	14.40 - 15.00	1570824507	Audio Based Action Recognition for Monitoring Elderly Dementia Patients	Dwi Kurnia Basuki (Tokyo Metropolitan University, Indonesia & Politeknik Elektronika Negeri Surabaya, Indonesia); Rizky Zull Fhamy, Mahaputra Ilham Awal, Luqmanul Hakim Iksan and Sritrusta Sukaridhoto (Politeknik Elektronika Negeri Surabaya, Indonesia); Kazuyoshi Wada (Tokyo Metropolitan University, Japan)
4	15.00 - 15.20	1570822394	Voice Recognition System for Home Security Keys with Mel-Frequency Cepstral Coefficient Method and Backpropagation Artificial Neural Network	Ziyadatus Shofiyah and Haniah Mahmudah (Politeknik Elektronika Negeri Surabaya, Indonesia); Tri Budi Santoso (Electronic Engineering Polytechnic of Surabaya (EEPIS), Indonesia); Okkie Puspitorini and Ari Wijayanti (Politeknik Elektronika Negeri Surabaya, Indonesia); Nur Siswandari (EEPIS, Indonesia)

Session   :   Parallel Session 02
Location   :   Room VI
Moderator :   Dr. Muhammad Agus Zainuddin, S.T., M.T.
Date   :   Tuesday, August 9th 2022
Track   :   Applied-Computing Sciences
Topic   :   IES-KCIC 3

No	Time	Paper ID	Paper Title	Authors
1	14.00 - 14.20	1570811627	Decision Tree and Fuzzy Logic in The Audit of Information System for Tax Letter Issuance	Ratih Nur Esti Anggraini (Intelligent Systems Lab, University of Bristol, United Kingdom (Great Britain) & Institut Teknologi Sepuluh Nopember, Indonesia); Riyanarto Sarno (Institut Teknologi Sepuluh Nopember, Indonesia); Irfanur Febriansyah (Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia)
2	14.20 - 14.40	1570824722	Flood Vulnerability Mapping in Lamongan District, Indonesia, using Fuzzy Analytical Hierarchy Process - Natural Breaks	Arna Fariza, Firyal Zahwa Salsabila and Arif Basofi (Politeknik Elektronika Negeri Surabaya, Indonesia)
3	14.40 - 15.00	1570826722	Design of Corrugated Road Detection System using LoRa Communication	Muhammad Dicky Athalla and Mochammad Zen Samsono Hadi (Politeknik Elektronika Negeri Surabaya, Indonesia); Aries Pratiarso (Politeknik Elektronika Negeri Surabaya (PENS), Indonesia); Izzuddin Ahmad Afif (Politeknik Elektronika Negeri Surabaya, Indonesia)
4	15.00 - 15.20	1570825254	Hydrometeorological Disaster Vulnerability Mapping in East Java Using Hierarchical Clustering	Belinda Anindya Kusuma Wardhani, Arna Fariza and Ira Prasetyaningrum (Politeknik Elektronika Negeri Surabaya, Indonesia)

Session : Parallel Session 03
Location : Room I
Moderator : Dr. Sony Junianto, ST.
Date : Tuesday, August 9th 2022
Track : Power Engineering and Energy Technology
Topic : IES-ETA 1

No	Time	Paper ID	Paper Title	Authors
1	15.50 - 16.10	1570818428	The Effect Of Nano Refrigerant R22-CuO Using On Water Chiller: An Experimental Study	Julfan Hafiz Farezza and Arrad Ghani Safitra (Politeknik Elektronika Negeri Surabaya, Indonesia); Teguh Hady Ariwibowo (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia)
2	16.10 - 16.30	1570818475	Numerical Study of the Effect of Rib Width Angle on Elbow Erosion	Muhammad Hanif Mufadhol, Lohdy Diana and Rif'ah Amalia (Politeknik Elektronika Negeri Surabaya, Indonesia)
3	16.30 - 16.50	1570811354	Hybrid Energy System Using ANFIS For CC-CV Battery Charging	M. Taufik Imam Hidayat (Politeknik Elektronika Negeri Surabaya, Indonesia); Farid Dwi Murdianto (Electronics Engineering Polytechnic Institute of Surabaya, Indonesia); Moh. Zaenal Efendi (Politeknik Elektronika Negeri Surabaya, Indonesia)

Session : Parallel Session 03
Location : Room II
Moderator : Dr. I Gede Puja Astawa, S.T.,MT.
Date : Tuesday, August 9th 2022
Track : Telecommunication Engineering Technology
Topic : IES-ETA 2

No	Time	Paper ID	Paper Title	Authors
1	15.50 - 16.10	1570823479	Analysis of Lightweight Boat Communication Equipment Performance for Data Transmission onVHF Long Range (LoRa) Onshore Network System	Okkie Puspitorini and Ari Wijayanti (Politeknik Elektronika Negeri Surabaya, Indonesia)
2	16.10 - 16.30	1570824227	IDEA Encryption System for Data Acquisition on Autonomous Underwater Vehicle	Nanang Syahroni, Hari Wahjuningrat Suparno and Djoko Santoso (Politeknik Elektronika Negeri Surabaya, Indonesia)
3	16.30 - 16.50	1570824244	Towards Shortest Path Finding System Using Fuzzy-Dijkstra Method for Emergency Routing Problem	Gholyf Al Mustafid (Politeknik Elektronika Negeri Surabaya, Indonesia); Prima Kristalina (Politeknik Elektronika Negeri Surabaya (PENS), Indonesia); I Gede Puja Astawa (Politeknik Elektronika Negeri Surabaya, Indonesia)

Session   :   Parallel Session 03
Location   :   Room III
Moderator   :   Dr. Mike Yuliana, ST. MT.
Date   :   Tuesday, August 9th 2022
Track   :   Electronics Systems and Electrics Technology
Topic   :   IES-ETA 3

No	Time	Paper ID	Paper Title	Authors
1	15.50 - 16.10	1570822919	Smart DC Home for Energy Saving with Android-Based Real-Time Energy Monitoring	Falia Innocentia Ananda Sunarko, Epyk Sunarno, Diah Yanaratri and Eny Kusumawati (Politeknik Elektronika Negeri Surabaya, Indonesia)
2	16.10 - 16.30	1570825705	Implementation of Fall Detection for The Elderly Home Support using 24-GHz Radar Sensor	Amran Amran (Politeknik Elektronika Negeri Surabaya, Indonesia); Elly Purwantini (Lecturer, Indonesia); Ardik Wijayanto (Electronic Engineering Polytechnic Institute of Surabaya (EEPIS), Indonesia); Rusminto Widodo, Budi Nur Iman and Edi Satriyanto (Politeknik Elektronika Negeri Surabaya, Indonesia); Eru Puspita (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia); Hary Oktavianto (Politeknik Elektronika Negeri Surabaya, Indonesia)
3	16.30 - 16.50	1570826530	Internet of Things and Data Encryption in the Agricultural Sector Using the AES Cryptosystem	Ryan Rama Maulana (Electronic Engineering Polytechnic Institute of Surabaya (EEPIS), Indonesia); Mochammad Zen Samsono Hadi (Politeknik Elektronika Negeri Surabaya, Indonesia); Amang Sudarsono (Politeknik Elektronika Negeri Surabaya (PENS), Indonesia)

Session : Parallel Session 03
Location : Room IV
Moderator : Dr. Setiawardhana, ST., MT.
Date : Tuesday, August 9th 2022
Track : Knowledge Base and Engineering
Topic : IES-KCIC 1

No	Time	Paper ID	Paper Title	Authors
1	15.50 - 16.10	1570818567	Improving Maintainability in GraphQL Authorization using Dynamic Authorization	Muhammad Riza Nafis and Umi Saadah (Politeknik Elektronika Negeri Surabaya, Indonesia); Ahmad Syauqi Ahsan (Politeknik Elektronika Negeri Surabaya & PENS, Indonesia); Willy Fauzi (PT. Sinergi Dimensi Informatika, Indonesia)
2	16.10 - 16.30	1570818539	Effective Building Data Warehouse Infrastructure by Code in Cloud Platform	Andi Abdul Salam Sabil, Hero Martono and Desy Intan Permatasari (Politeknik Elektronika Negeri Surabaya, Indonesia)
3	16.30 - 16.50	1570818483	Characteristics of Accuracy Function on Multiclass Classification Based on Best, Average, and Worst (BAW) Subset of Random Forest Model	Ronny Susetyoko and Wiratmoko Yuwono (Politeknik Elektronika Negeri Surabaya, Indonesia); Elly Purwantini (Politeknik Elektronika Negeri Surabaya); Budi Nur Iman (Politeknik Elektronika Negeri Surabaya, Indonesia)

Session : Parallel Session 03
Location : Room V
Moderator : M. Udin Harun Al Rasyid, S.Kom, Ph.D
Date : Tuesday, August 9th 2022
Track : Computational Intelligence
Topic : IES-KCIC 2

No	Time	Paper ID	Paper Title	Authors
1	15.50 - 16.10	1570823521	Smart Victims Detection in Natural Disaster using Deep Learning	Muhammad Adamu Islam (Jl. Raya ITS - Kampus PENS Sukolilo Surabaya 60111, INDONESIA & Politeknik Elektronika Negeri Surabaya, Indonesia); Mochammad Zen Samsono Hadi and Rahardhita Sudibyo (Politeknik Elektronika Negeri Surabaya, Indonesia); Prima Kristalina and Aries Pratiarso (Politeknik Elektronika Negeri Surabaya (PENS), Indonesia)
2	16.10 - 16.30	1570823319	Road Damage Detection and Alert Application Using Smartphone's Built-In Sensors	Dicha Nada Puspita (Politeknik Elektronika Negeri Surabaya, Indonesia); Dwi Kurnia Basuki (Tokyo Metropolitan University, Indonesia & Politeknik Elektronika Negeri Surabaya, Indonesia); Bima Sena Bayu Dewantara (Politeknik Elektronika Negeri Surabaya, Indonesia)
3	16.30 - 16.50	1570823518	Emotion Recognition Based on Facial Expression by Exploring Batch Normalization Convolutional Neural Network	Rochimatus Sadiyah and Arna Fariza (Politeknik Elektronika Negeri Surabaya, Indonesia); Entin Martiana Kusumaningtyas (Politeknik Elektronika Negeri Surabaya(PENS)-Indonesia, Indonesia)

Session : Parallel Session 03
Location : Room VI
Moderator : Dr. Ir Rika Rokhana, M.T.
Date : Tuesday, August 9th 2022
Track : Intelligent Multimedia Systems
Topic : IES-KCIC 3

No	Time	Paper ID	Paper Title	Authors
1	15.50 - 16.10	1570824703	Developing Microframework based on Singleton and Abstract Factory Design Pattern	Jauari Akhmad Hasim, Umi Saadah and Desy Intan Permatasari (Politeknik Elektronika Negeri Surabaya, Indonesia); Fardani Annisa Damastuti (Politeknik Elektronika Negeri Surabaya & MMB PSDKU Lamongan, Indonesia)
2	16.10 - 16.30	1570822703	Implementation of Speech Commands on Construct 3 In Developing A Renewable Energy Gamification	Rifa atul Mahmudah Burhan, Hestiasari Rante and Nu Arini (Politeknik Elektronika Negeri Surabaya, Indonesia)
3	16.30 - 16.50	1570818343	Design and Implementation of WebXR Health Learning Module Application	Kirana Hanifati and Sritrusta Sukaridhoto (Politeknik Elektronika Negeri Surabaya, Indonesia); Dwi Kurnia Basuki (Tokyo Metropolitan University, Indonesia & Politeknik Elektronika Negeri Surabaya, Indonesia); Rizqi Putri Nourma Budiarti (Universitas Nahdlatul Ulama Surabaya, Indonesia); Evianita Dewi Fajrianti and Ilham Achmad Al Hafidz (Politeknik Elektronika Negeri Surabaya, Indonesia)

Session : Parallel Session 04
Location : Room I
Moderator : Dr. Eny Kusumawati, S.Pd., M.Pd.
Date : Wednesday, August 10th 2022
Track : Power Engineering and Energy Technology
Topic : IES-ETA 1

No	Time	Paper ID	Paper Title	Authors
1	14.10 - 14.30	1570822578	Maximum Power Point Tracking with Constant Power Generation of Photovoltaic Systems Based on Artificial Neural Network Under Partial Shading Condition	Brenda Nathania Passandaran, Eka Prasetyono and Dimas Okky Anggriawan (Politeknik Elektronika Negeri Surabaya, Indonesia)
2	14.30 - 14.50	1570818151	Identification of Series DC Arc Fault Location in MPPT Photovoltaic System Based on Fast Fourier Transform and Artificial Neural Network	Dhigmayoga Raseto Akbar (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia); Eka Prasetyono and Dimas Okky Anggriawan (Politeknik Elektronika Negeri Surabaya, Indonesia)
3	14.50 - 15.10	1570822784	Design Analysis Of Fullbridge Converter On Proton Exchange Membrane Fuelcell	Fifi Hesty, Himami Firdausia and Joke Pratilastiarso (Politeknik Elektronika Negeri Surabaya, Indonesia)
4	15.10 - 15.30	1570823155	State of the Art in Floating Tidal Current Power Plant Using Multi-Vertical-Axis-Turbines	Sony Junianto, Wahyu Fadilah and Ahmad Firyal Adila (Politeknik Elektronika Negeri Surabaya, Indonesia); Tuswan Tuswan (Universitas Diponegoro, Indonesia); Dendy Satrio (Institut Teknologi Sepuluh Nopember, Indonesia); Siti Musabikha (National Research and Innovation Agency (BRIN), Indonesia)

Session : Parallel Session 04
Location : Room II
Moderator : Dr. Hary Oktavianto, ST., M.Sc.
Date : Wednesday, August 10th 2022
Track : Telecommunication Engineering Technology
Topic : IES-ETA 2

No	Time	Paper ID	Paper Title	Authors
1	14.10 - 14.30	1570824500	Analysis Performance of QoS and QoE Digital Television in Urban Area	Yorda Safiro Doveriandi, Ari Wijayanti, Martianda Anggraeni and Ida Anisah (Politeknik Elektronika Negeri Surabaya, Indonesia)
2	14.30 - 14.50	1570825091	Symmetric Key Generation Use Received Signal Strength for V2V Communication	Izza Saputra (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia); Amang Sudarsono (Politeknik Elektronika Negeri Surabaya (PENS), Indonesia); Mike Yuliana (Politeknik Elektronika Negeri Surabaya, Indonesia)
3	14.50 - 15.10	1570826263	IoT Based Climate Prediction System Using Long Short-Term Memory (LSTM) Algorithm as Part of Smart Farming 4.0	Devina Shafa Anindya, Mike Yuliana and Mochammad Zen Samsono Hadi (Politeknik Elektronika Negeri Surabaya, Indonesia)
4	15.10 - 15.30	1570826538	3-Dimensional Static Environment Multihop Communication System for SAR Team	Amalia Rizki Fadhila (Politeknik Elektronika Negeri Surabaya & Surabaya City Sar Team, Indonesia); Mochammad Zen Samsono Hadi (Politeknik Elektronika Negeri Surabaya, Indonesia); Prima Kristalina (Politeknik Elektronika Negeri Surabaya (PENS), Indonesia)

Session : Parallel Session 04
Location : Room III
Moderator : Reesa Akbar, ST. MT., Ph.D.
Date : Wednesday, August 10th 2022
Track : Electronics Systems and Electrics Technology
Robotics Technology and Control Systems
Topic : IES-ETA 3

No	Time	Paper ID	Paper Title	Authors
1	14.10 - 14.30	1570826091	Electrode Engineering in Memristors Development for Non-/Erasable Storage, Random Number Generator, and Synaptic Applications	Firman Simanjuntak (University of Southampton, United Kingdom (Great Britain)); Fayzah Talbi, Adam Kerrigan and Vlado Lazarov (University of York, United Kingdom (Great Britain)); Themistoklis Prodromakis (University of Edinburgh, United Kingdom (Great Britain))
2	14.30 - 14.50	1570823002	Deep Q-Network for Biped Robot Walking Optimization	Hasan Imaduddin and Azhar Saputra (Tokyo Metropolitan University, Japan); Indra Adji Sulistijono (Politeknik Elektronika Negeri Surabaya (PENS), Indonesia); Naoyuki Kubota (Tokyo Metropolitan University, Japan)
3	14.50 - 15.10	1570818496	Development and Control of an Unmanned Ground Vehicle (UGV) Robotic Arm for Volcanic Material Sampling Based on Kinematics Modelling	Mohamad Nasyir Tamara (Politeknik Elektronika Negeri Surabaya & EEPIS, Indonesia); Riyanto Sigit, Setiawardhana Setiawardhana and Bima Sena Bayu Dewantara (Politeknik Elektronika Negeri Surabaya, Indonesia)
4	15.10 - 15.30	1570818617	Design And Realization Of UGV Robot With Combined Of Geared Wheel And Walked Mechanism for Uncertain Terrain in Volcanic Observation	Mohamad Nasyir Tamara (Politeknik Elektronika Negeri Surabaya & EEPIS, Indonesia); Riyanto Sigit, Bima Sena Bayu Dewantara and Setiawardhana Setiawardhana (Politeknik Elektronika Negeri Surabaya, Indonesia)

Session : Parallel Session 04
Location : Room IV
Moderator : Ir. Wahjoe Tjatur Sesulihatien, MT., Ph.D.
Date : Wednesday, August 10th 2022
Track : Knowledge Base and Engineering
Topic : IES-KCIC 1

No	Time	Paper ID	Paper Title	Authors
1	14.10 - 14.30	1570818091	Sense-IT: An Aquaculture-Specific Autonomous Data Acquisition and Monitoring System	Monirul Islam Pavel (Universiti Kebangsaan Malaysia, Malaysia); Syed Mohammad Kamruzzaman (Musa Technologies Limited, Bangladesh)
2	14.30 - 14.50	1570817992	IoT Framework Development for Health Conditions Monitoring	M. Udin Harun Al Rasyid (Politeknik Elektronika Negeri Surabaya (PENS), Indonesia); Budi Utomo (Universitas Airlangga, Indonesia); Huai-Kuei Wu (Asia Eastern University of Science and Technology, Taiwan); Isbat Uzzin Nadhori (Politeknik Elektronika Negeri Surabaya - Indonesia, Indonesia); Ardian Pratama (Politeknik Elektronika Negeri Surabaya, Indonesia)
3	14.50 - 15.10	1570824063	Adaptive Beamforming Based on Linear Array Antenna for 2.3 GHz 5G Communication using LMS Algorithm	Budi Aswoyo and Muhamad Milchan (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia); Anang Budikarso (Politeknik Elektronika Negeri Surabaya, Indonesia)
4	15.10 - 15.30	1570824024	Human Joint Skeleton Tracking Using Multiple Kinect Azure	Azhar Aulia Saputra, Adnan Rachmat Anom Besari and Naoyuki Kubota (Tokyo Metropolitan University, Japan)

Session : Parallel Session 04
Location : Room V
Moderator : Dr. Arna Fariza, S.Kom, M.Kom
Date : Wednesday, August 10th 2022
Track : Computational Intelligence
Topic : IES-KCIC 2

No	Time	Paper ID	Paper Title	Authors
1	14.10 - 14.30	1570824663	Javanese Script Text Image Recognition Using Convolutional Neural Networks	Goldy Najma Adli Kesaulya (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia); Arna Fariza (Politeknik Elektronika Negeri Surabaya, Indonesia); Tita Karlita (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia)
2	14.30 - 14.50	1570824698	Support Vector Machine: Melanoma Skin Cancer Diagnosis based on Dermoscopy Image	Tirta Farisaldi Ibrahim (Politeknik Elektronika Negeri Surabaya, Indonesia)
3	14.50 - 15.10	1570824731	Crowd Counting in Public Places Using MultiScale Convolutional Neural Network	Muhammad Mujir and Tita Karlita (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia); Nana Ramadijanti (Politeknik Elektronika Negeri Surabaya, Indonesia)
4	15.10 - 15.30	1570825855	Analysis of Steel Bridge Trunk Conditions Based on Loads and Corrosion Levels Based on Fuzzy Sugeno	Berlian Al Kindhi (Institut Teknologi Sepuluh Nopember, Indonesia)

Session : Parallel Session 04
Location : Room VI
Moderator : Riyanto Sigit, ST., M.Kom., Ph.D.
Date : Wednesday, August 10th 2022
Track : Intelligent Multimedia Systems
Applied-Computing Sciences
Topic : IES-KCIC 3

No	Time	Paper ID	Paper Title	Authors
1	14.10 - 14.30	1570822893	Virtual Reality Application for Co-Bot Training	Amma Liesvarastranta Haz, M Muhtadin and I Ketut Pumama (Institut Teknologi Sepuluh Nopember, Indonesia); Mauridhi Hery Purnomo (Institut of Technology Sepuluh Nopember, Indonesia); Sritrusta Sukaridhoto (Politeknik Elektronika Negeri Surabaya, Indonesia)
2	14.30 - 14.50	1570823924	Implementation of Immersive Technology on Medical Education	Muhammad Ivan Muntahir and Sritrusta Sukaridhoto (Politeknik Elektronika Negeri Surabaya, Indonesia); Dwi Kurnia Basuki (Tokyo Metropolitan University, Indonesia & Politeknik Elektronika Negeri Surabaya, Indonesia); Rizqi Putri Nourma Budiarti (Universitas Nahdlatul Ulama Surabaya, Indonesia); Ilham Achmad Al Hafidz, Evianita Dewi Fajrianti, Kirana Hanifati and Naufal Adi Satrio (Politeknik Elektronika Negeri Surabaya, Indonesia)
3	14.50 - 15.10	1570824112	Integrated Ticketing Website for Cultural Events in Covid-19 Endemic Transition Era Using Heuristic Evaluation Method	Shinta Amalia Hapsari (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia); Aries Pratiarso (Politeknik Elektronika Negeri Surabaya (PENS), Indonesia); Haniah Mahmudah, Okkie Puspitorini and Ari Wijayanti (Politeknik Elektronika Negeri Surabaya, Indonesia); Nur Siswandari (EEPIS, Indonesia)
4	15.10 - 15.30	1570811376	Concentration Patterns Estimation Method in Deskwork by Using Time-series k-means	Tyler Inari (University of Musashino, Japan); Takafumi Nakanishi (Musashino University, Japan)

Session : Parallel Session 05
Location : Room I
Moderator : Raden Sanggar Dewanto, S.T., M.T., Ph.D.
Date : Wednesday, August 10th 2022
Track : Power Engineering and Energy Technology
Topic : IES-ETA 1

No	Time	Paper ID	Paper Title	Authors
1	15.45 - 16.05	1570811330	Charging of PV Battery at Constant Voltage Mode by Using Fuzzy Logic Control for Automation Feeding System	Dinda Putri Nagari (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia); Syechu Nugraha and Suhariningsih Suhariningsih (Politeknik Elektronika Negeri Surabaya, Indonesia)
2	16.05 - 16.25	1570824319	2D Modelling The Effect of Tilting Burner Boiler to Characteristic Emission NO With CFD	Muchamad Ilham Aditiyansyah and Rif'ah Amalia (Politeknik Elektronika Negeri Surabaya, Indonesia); Teguh Hady Ariwibowo (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia)
3	16.25 - 16.45	1570824498	Parametric study of a vertical axis tidal turbine blade using the CFD method to achieve high turbine performance	Nu Arini (Politeknik Elektronika Negeri Surabaya, Indonesia)

Session : Parallel Session 05
Location : Room II
Moderator : Mochammad Zen Samsono Hadi, S.T., M.Sc., Ph.D.
Date : Wednesday, August 10th 2022
Track : Telecommunication Engineering Technology
Topic : IES-ETA 2

No	Time	Paper ID	Paper Title	Authors
1	15.45 - 16.05	1570826549	Environmental Condition Monitoring and Decision Making System Using Fuzzy Logic Method	Hasan Hasan (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia); Haryadi Amran Darwito (Politeknik Elektronika Negeri Surabaya, Indonesia); Amang Sudarsono (Politeknik Elektronika Negeri Surabaya (PENS), Indonesia)
2	16.05 - 16.25	1570826576	Multihop Communication System in 2D and 3D Environments on WSN for Disaster Applications using NS-3	Hestina Novi Dianti and Mochammad Zen Samsono Hadi (Politeknik Elektronika Negeri Surabaya, Indonesia); Aries Pratiarso and Prima Kristalina (Politeknik Elektronika Negeri Surabaya (PENS), Indonesia)
3	16.25 - 16.45	1570826654	Hardware Design of Air Quality Monitoring and Classification using Artificial Neural Network with Hyperparameters Optimization	Andika Kusmahendra, Haniah Mahmudah and Rahardhita Sudibyo (Politeknik Elektronika Negeri Surabaya, Indonesia)

Session : Parallel Session 05
Location : Room III
Moderator : Dr. Alrijadjis, Dipl. Eng., M.T.
Date : Wednesday, August 10th 2022
Track : Robotics Technology and Control Systems
Topic : IES-ETA 3

No	Time	Paper ID	Paper Title	Authors
1	15.45 - 16.05	1570818444	ERSOW Robot's Orientation Data Estimation Based on Landmark L-shape Recognition	Erna Alfi Nurrohmah, Iwan Kurnianto Wibowo and Mochamad Mobed Bachtiar (Politeknik Elektronika Negeri Surabaya, Indonesia)
2	16.05 - 16.25	1570823204	Optimization of Chasing and Catching Skills on Robot Soccer ERSOW	Fadl Lul Hakim Ihsan (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia); Bima Sena Bayu Dewantara and Iwan Kurnianto Wibowo (Politeknik Elektronika Negeri Surabaya, Indonesia)
3	16.25 - 16.45	1570824301	Human Target Distance Estimation System Using Mono-camera On Human-Following Mobile Robot	Yohanes Dimas Tirta Tri Wicaksana, Akhmad Hendriawan and Niam Tamami (Politeknik Elektronika Negeri Surabaya, Indonesia)

Session : Parallel Session 05
Location : Room IV
Moderator : Dr. Eng. Bima Sena Bayu Dewantara, S.ST., MT.
Date : Wednesday, August 10th 2022
Track : Knowledge Base and Engineering
Computational Intelligence
Topic : IES-KCIC 1

No	Time	Paper ID	Paper Title	Authors
1	15.45 - 16.05	1570824428	Spatial-Temporal Visualization of Tuberculosis Vulnerability in East Java, Indonesia, Using the K-medoids Clustering Algorithm	Sarah Ummul Afifah, Arna Fariza and Arif Basofi (Politeknik Elektronika Negeri Surabaya, Indonesia)
2	16.05 - 16.25	1570824623	Rollator with Random Forest Implementation for Footstep Prediction using IMU Sensor	Rizky Benniah Arvind Gunawan and Reesa Akbar (Politeknik Elektronika Negeri Surabaya, Indonesia); Ardik Wijayanto (Electronic Engineering Polytechnic Institute of Surabaya (EEPIS), Indonesia)
3	16.25 - 16.45	1570818505	Identification of the effect of different feature samples on Handwritten Japanese Character Recognition using YOLOv4	Andro Aprila Adiputra (Electronic Engineering Polytechnics Institute of Surabaya, Indonesia); Tita Karlita (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia); Entin Martiana Kusumaningtyas (Politeknik Elektronika Negeri Surabaya(PENS)-Indonesia, Indonesia)
4	16.45 - 17.05	1570818557	Mobile Application for Cholesterol Detection Using Iridology with Image Processing and Support Vector Machine	Entin Martiana Kusumaningtyas (Politeknik Elektronika Negeri Surabaya(PENS)-Indonesia, Indonesia); Alfian Haidar Setyawan (Electronic Engineering Polytechnics Institute of Surabaya, Indonesia); Ali Ridho Barakbah (Politeknik Elektronika Negeri Surabaya, Indonesia)

Session : Parallel Session 05
Location : Room V
Moderator : Tessy Badriyah, S.Kom., M.Kom., Ph.D.
Date : Wednesday, August 10th 2022
Track : Computational Intelligence
Topic : IES-KCIC 2

No	Time	Paper ID	Paper Title	Authors
1	15.45 - 16.05	1570825231	Design and Implementation of Real-time Object Detection for Blind using Convolutional Neural Network	Kartika Merdekawati Mulyono (Politeknik Elektronika Negeri Surabaya, Indonesia); Tri Budi Santoso (Electronic Engineering Polytechnic of Surabaya (EEPIS), Indonesia); Rahardhita Sudibyo (Politeknik Elektronika Negeri Surabaya, Indonesia)
2	16.05 - 16.25	1570825931	Implementation Augmented Intelligence on Drug Inventory Management Forecasting	Naufal Adi Satrio and Sritrusta Sukaridhoto (Politeknik Elektronika Negeri Surabaya, Indonesia); M. Udin Harun Al Rasyid (Politeknik Elektronika Negeri Surabaya (PENS), Indonesia); Evianita Dewi Fajrianti and Ilham Achmad Al Hafidz (Politeknik Elektronika Negeri Surabaya, Indonesia); Rizqi Putri Nourma Budiarti (Universitas Nahdlatul Ulama Surabaya, Indonesia); Amma Liesvarastranta Haz (Institut Teknologi Sepuluh Nopember, Indonesia)
3	16.25 - 16.45	1570826656	Classification of Ocular Diseases on Fundus Images Using Weighted MobileNetV2	Rika Rokhana (Politeknik Elektronika Negeri Surabaya, Indonesia); Wiwiet Herulambang (Universitas Bhayangkara Surabaya, Indonesia); Rarasmaya Indraswari (Institut Teknologi Sepuluh Nopember, Indonesia)

No	Time	Paper ID	Paper Title	Authors
1	15.45 - 16.05	1570818220	Android and Desktop Based Ground Control Station (GCS) Interface Design for Unmanned Aerial Vehicle (UAV) Communication and Monitoring	Hafizh Irfansyah Putra, Mochamad Mobed Bachtiar and Maretha Ruswiansari (Politeknik Elektronika Negeri Surabaya, Indonesia)
2	16.05 - 16.25	1570824169	Background Blurring and Removal for 3D Modelling of Cultural Heritage Objects	Nurul Istiqomah Budianti (Engineering Polytechnic Institute of Surabaya, Indonesia); Muhammad Gibran (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia); Anhar Risnumawan, Martianda Anggraeni and Aestatica Ratri (Politeknik Elektronika Negeri Surabaya, Indonesia)
3	16.25 - 16.45	1570826414	Implementation of Augmented Reality in Medical Education	Alfis Syahry (Politeknik Elektronika Negeri Surabaya, Indonesia); Dwi Kurnia Basuki (Tokyo Metropolitan University, Indonesia & Politeknik Elektronika Negeri Surabaya, Indonesia); Sritrusta Sukaridhoto (Politeknik Elektronika Negeri Surabaya, Indonesia); Rizqi Putri Nourma Budiarti (Universitas Nahdlatul Ulama Surabaya, Indonesia); Evianita Dewi Fajrianti, Muhammad Ivan Muntahir and Kirana Hanifati (Politeknik Elektronika Negeri Surabaya, Indonesia)

Poster Exhibition Session IES 2022
Location: Hall Pascasarjana 6th Floor, Politeknik Elektronika Negeri Surabaya

No	Title	Authors
1	Motor Driver Design for ERSOW Robot	Iwan Kurnianto Wibowo, Didi Alfandi, Moch. Mobed Bachtiar
2	Classification of Single Tuition Fees for New Students Using a Hybrid Ensemble (Logistics Regression and Random Forest)	Ronny Susetyoko, Wiratmoko Yuwono, Elly Purwantini
3	Automatic Vehicle Classification and Counting System Using Inception Model	Hani'ah Mahmudah, Moch. Imam Rifai, Arasy Dafa Sulistya Kurniawan, Rahardhita Widyatra Sudibyo, Moch. Zen Samsono Hadi, and Nihayatus Sa'adah
4	TYRE PRESSURE AND TEMPERATURE MONITORING SYSTEM BASED ON INTERNET OF THINGS	Anang Budikarso, Arifin, Yoedy Moegiharto, Hendy Briantoro, Melki Mario Gulo, Naufal Ammar Priambodo
5	Study the Effectiveness of Omnidirectional Motion Balance Control on Humanoid Soccer Robot EROS	Puguh Budi Wasono, Muhammad Mukhtarul Lathief, Anhar Risnumawan
6	IDEA Encryption System for Data Acquisition on Autonomous Underwater Vehicle	Nanang Syahroni, Hari Wahjuningrat S, Djoko Santoso, Widya Andi P, dan Risky A. K.
7	Flight Controller for EFRISA Quadcopter	Mochamad Mobed Bachtiar, Iwan Kurnianto Wibowo, Nur Cahyo Ihsan P.
8	AUTOMATIC IRRIGATION SYSTEM FOR SHRIMP POND USING FLOAT LEVEL SENSORS AND MQTT	Mohammad Robihul Mufid, Mochammad Jauhar Ulul Albab
9	Evaluation of MIMO OFDM System with Predistortion Technique Using USRP	Yoedy Moegiharto, Hendy Briantoro, Arifin, I Gede Puja Astawa, Melki Mario Gulo, M Wisnu Gunawa
10	Electric Battleship Prototype PENShip Soero Segoro with Remote Control System	Lucky Pradigta Setiya Raharja, Adytia Darmawan, Iwan K. Wibowo, M. Mobed Bachtiar, Pradono K. Putro, Athallah N. Pratama, Ricky W.B. Pratama, Muhammad Fauzi, Nizhar A.H. Bernardt, Pangestu Nugroho
11	AN ACCURATE POWER CHARGE WITH ADAPTIVE CONTROL STRATEGY	Indhana Sudiharto, Farid Dwi Murdianto, Lavia Isnani
12	Chatbot Student Services in PENS Using Named Entity Recognition	Entin Martiana

No	Title	Authors
13	An Effective Approach of Speed Estimation Using Position Detector on Six Step Inverter for Trapezoidal PMSM Drive	Gigih Prabowo, Indra Ferdiansyah, M. Ali Maskur, M. Budiono
14	The Making of Visual Effect for Content Podcast Videos	Novita Astin, Citra Devi Murdaningtyas, M. Julias Fachri
15	PQRST heart signals detection with biopotential chip and cell phone in health care kiosk	Moch. Rochmad, Riyanto Sigit, Kemalasari
	Building Infrastructure of High Availability Database and Data Warehouse as Code	Hero Yudo Martono

Keynote Speaker 1 ——————————————

Dr. Ir. Hendra Iswahyudi, M.Si

Director of Infrastructure Planning and Development, Directorate General of Renewable Energy and Energy Conservation (EBTKE), Ministry of Energy and Mineral Resources.

Profile:

Dr. Ir. Hendra Iswahyudi, M.Si is the Director of Electricity Business Development at the Ministry of Energy and Mineral Resources, Hendra Iswahyudi. Iswahyudi has been in office since July 2016. Previously he served as Head of Planning and Reporting of the Director General of New Renewable Energy and Energy Conservation (EBTKE).

Dr. Ir. Hendra Iswahyudi, M.Si was born in Banyuwangi on November 30, 1968. Dr. Hendra received his bachelor degree in physics engineering from Institut Teknologi Sepuluh Nopember, master degree in planning and public policy and doctoral degree in economics. Currently, he is appointed as Director of EBTKE Infrastructure Planning and Development at the Directorate General of New Renewable Energy and Energy Conservation (EBTKE), Ministry of Energy and Mineral Resource.

Keynote Speaker 2 ────────────────

Professor Stephen R Turnock MA, SM, PhD, CEng, FIMechE, FRINA, FHEA

Professor of Maritime Fluid Dynamics
Head of the Department of Civil, Maritime and Environmental Engineering
University of Southampton
United Kingdom

Profile:

Professor Stephen R Turnock is Head of Civil, Maritime and Environmental Engineering, a 50 strong academic department, a previous head of the Maritime Engineering Group, set up the Performance Sports Engineering Laboratory (awarded Queen's Anniversary prize for higher and further education, 2012) and founded the Maritime Robotics Laboratory in 2008.

He has strong interests in decarbonisation of shipping, maritime robotics and ship autonomous systems, performance sport and sailing, maritime energy including tidal and floating wind as well as his long-standing expertise in hydrodynamics including hull-propeller-rudder interaction, manoeuvring in waves, propeller noise and energy harvesting. At present he is leading the fit-out on behalf of the Faculty for the £25M Fluids Research Complex including a 138 x 6 x 3.5 m tow/wave tank with a maximum carriage speed of 12m/s. He teaches Masters modules in Zero Carbon Ship Powering and Renewable Energy from the environment. He is co-author of two books: Marine Rudders and Control Surfaces, Butterworth- Heinemann (2nd Ed 2021) and Ship Resistance and Propulsion, CUP (2nd Ed 2017). His fluid dynamics expertise lies in the synthesis of analytical, experimental, and computational methods for a diverse range of applications. Examples of such work are in the development of an integrated tidal energy generator (winner of The Engineers' Energy Sector Innovation award 2008), supervision of the students who designed Amy Williams' Gold medal winning bob skeleton sled (winner of The Engineer's Sport Technology Innovation award in 2010) and with continued support for Gold medal success in 2014 and 2018.

Keynote Speaker 3 ————————————————

Professor Naoki Ishibashi

Musashino University, Japan

Profile:

Professor Naoki Ishibashi received Master of Media and Governance at Graduate School of Media and Governance in 1998, and completed Ph.D in Media and Governance in 2004 at Keio University.

In 2005, he started Governance Design Laboratory, Inc, where he has launched and managed projects to promote renewable energy in Japan such as CO2free.jp Project or mamenergy project. In 2006, he became a lecturer at Faculty of Global Media Studies, Komazawa University, and taught entrepreneurship in the global digital network.

In 2010, he became a director of Ishibashi Foundation, which operates current Artizon Museum. Since then, he has planned the information technology strategy for the museum of art, and designed its core system. In 2020, he became a professor at Faculty of Data Science, Musashino University. He is also a member of IEEE, ACM, Information Processing Society of Japan, and Database Society of Japan.

Professor Novie Ayub Windarko Ph.D.

Professor of Photovoltaic Power Generation Technology
Department of Electrical Engineering
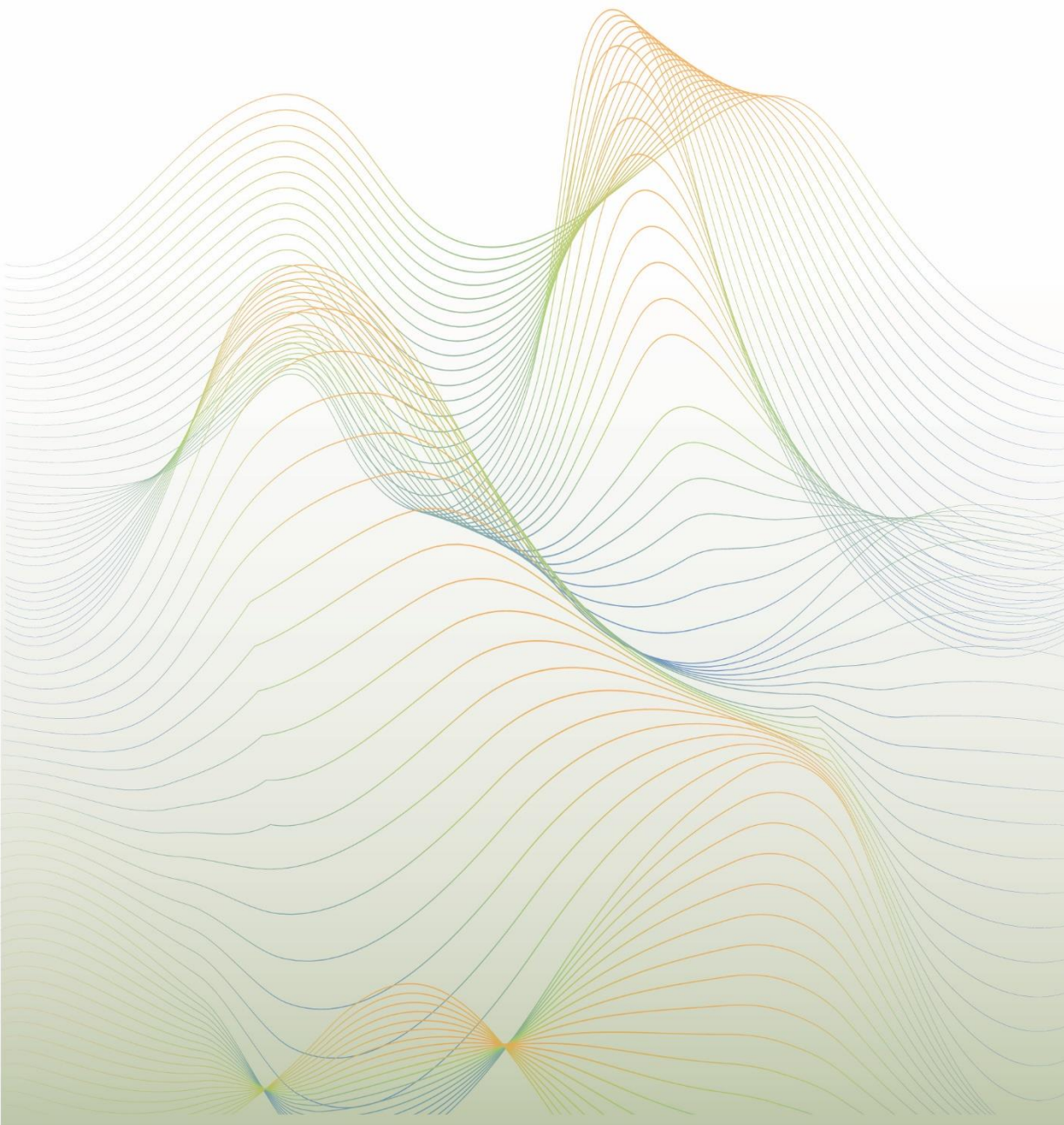Politeknik Elektronika Negeri Surabaya
Indonesia

Profile:

Prof. Novie Ayub Windarko, Ph.D finished his Bachelor and master degree from Department of Electrical Engineering, Institut Teknologi Sepuluh Nopember Surabaya, Indonesia. He received his Ph.D from School of Electrical Engineering, Chungbuk National University, South Korea. He was a JICA junior visiting researcher in Hirofumi Akagi Lab., Tokyo Institute of Technology in 2002. He has been joining to PENS since 2000. He was the head of Renewable Energy Research Centre of PENS. He received the best paper and the best poster award at IEEE IES 2015. He has served as reviewers for IEEE Trans. on Transportation Electrification, IEEE Trans. on Power Electronics, Journal of Batteries, Journal of Energies and EMITTER International Journal of Engineering Technology. His research interests include power electronics converter, PV power generation and optimization for renewable energy.

He has various experiences to serve industrial and community projects. He worked to assisst the development of 1MWp Solar PV Farm in 2014 and developed two units of 5kWp Solar PV Tracker system in 2017 for PT. PJB Cirata Hydropower. He designed PV rooftop for Surabaya mayor's office in 2017, PV Power Generation at remote island of Gili Genting in 2018, and automatic deep well pump for drought area at Ponorogo in 2019. He assessed the reliability of Hybrid PV-Diesel Power Generation at Waingapu, NTT for PT.PLN in 2020. He investigated the large storage tank explosion by indirect lightning struck at PT. Pertamina RU-IV in 2021. In 2022, He worked for the research and development of smart grid system in Semau Island for PT.PLN.

01. [IES-ETA]
Power Engineering and Energy Technology

Charging of PV Battery at Constant Voltage Mode by Using Fuzzy Logic Control for Automation Feeding System

Dinda Putri Nagari, Syechu Dwitya Nugraha, Suhariningsih
Department of Electrical Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
dindaputri.nagari15@gmail.com, syechu@pens.ac.id, nuning@pens.ac.id

Abstract –Currently, rabbit animal feed is still done manually so its consistency is less guaranteed. Therefore, a tool is designed to feed livestock automatically by using Real-Time Clock as a comparison of time to set the feeding schedule. At each hour of feeding, the servo motor will open the feed container valve. Next, the feed will come down from the shelter and fill the container below it which is equipped with a load cell. When the feed weight has been measured at 100 grams, the servo motor will close the valve again. The system uses solar panels as a power plant equipped with a charge controller and a 6V/12Ah battery which then the battery is used as a supply for a load of a 15W/6V servo motor and a 5W/6V LED lamp as lighting at night to reduce interference from night animals that usually eat rabbit chicks or even eat rabbit pellets as well. However, because the output of solar panels is unstable, buck-boost converters are sought to help the stability of charging the battery at a voltage of 7.2V by using fuzzy controls. From the results of simulation tests using Matlab for charging control with fuzzy methods obtained the result that the output voltage of the converter has reached the setpoint and after being given some interference, the system can maintain the voltage of the output at a value of 7.2V.

Keywords: Battery Charging, Buck-Boost Converter, Fuzzy Logic, Rabbit Feeding System.

Hybrid Energy System Using ANFIS For CC-CV Battery Charging

M.Taufik Imam Hidayat, Moh. Zaenal Efendi, Farid Dwi Murdianto*
Department of Electrical Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
mtaufikih@gmail.com, zen@pens.ac.id, nuning@pens.ac.id, farid@pens.ac.id,
fariddm@ieee.org

Abstract – A hybrid system is a combination of two or more energy sources. The most used energy sources are solar panels and batteries. Solar panel energy sources have variable currents and voltages that depends on irradiation and temperature. Besides, when both energy sources produce a voltage that exceeds the maximum battery limitation, it can cause an overcharge that can reduce the battery life. To overcome the voltage and current from solar panels that fluctuate, a DC-DC Converter is needed. Meanwhile it is necessary to choose an appropriate control system and charging method to prevent overcharging battery. In this research, a hybrid system with a multi-input buck converter proposed with ANFIS control for battery charging using the CC-CV method. From simulation results through the reliability test, control ANFIS can maintain the current and voltage according to the setpoint of 3A and 14.4V with less than 5% error value. ANFIS control can change conditions from CC to CV where CC-CV displacement occurs when the SOC of the battery is 99.76%.

Keywords: Space Vector PWM, Simplified C-Block, PSIM, Digital Implementation.

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Energy Development for Climate Change Solution
and Clean Energy Transition

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INDONESIA SECTION

Optimization and Management of Residential Energy Load Using PSO and WOA

Abir Hasnaoui[1], Abdelhafid Omari[2], Zin-eddine Azzouz[3], Mohammed Bilal Danoune[4], Nu Rhahida Arini[5]

[1,2]AVCIS Laboratory, University of Sciences and Technology of Oran Mohamed-Boudiaf, Oran, Algeria

[3]LDEE Laboratory, University of Sciences and Technology of Oran Mohamed-Boudiaf, Oran, Algeria

[4]LAGE Laboratory, University Kasdi Merbah Ouargla, Ouargla, Algeria

[5]Mechanical Engineering and Energy Department, Electronic Engineering Polythecnic Institute of Surabaya, Surabaya, Indonesia

[1]abir.hasnaoui@univ-usto.dz, [2]o_abdelhafid@hotmail.com, [3]zinazzouz@yahoo.fr, [4]danoune.mohammed.bilal@gmail.com, [5]arini@pens.ac.id

Abstract – Lately significant investment is being conducted in the smart grids area in order to address the reliability, flexibility, accessibility and economic aspects. Therefore, a proper management system is essential to reduce the cost of both production and consumption of energy. In this paper, the objective of our optimization problem is to minimize the total electricity cost of a residential system based on renewable energy sources which are solar panel and wind turbine, and a battery storage system, connected to the main grid through a bidirectional inverter. Two meta-heuristic optimization methods were used to achieve the objective, the first one is particle swarm optimization (PSO) and the second one is the whale optimization algorithm (WOA). The results obtained showed that the best reduction in total electricity cost was made by using the WOA method.

Keywords: smart grid, renewable energy sources, particle swarm optimization, whale optimization algorithm.

Multiple Degree of Freedom Vibrations User Interface Development

[1]Mochammad Faqih, [2]Nu Arini, [3]Temitope Ibrahim Amosa, [4]Abdulrahman Abdullah Omar Bahashwan

[1,3,4]Universiti Teknologi PETRONAS, Malaysia

[2]Politeknik Elektronika Negeri Surabaya, Indonesia

mochammad_22000035@utp.edu.my, arini@pens.ac.id, temitope_21002075@utp.edu.my, abdulrahman_18001631@utp.edu.my

Abstract – Multiple Degree of Freedom (MDOF) vibrations is found in many cases of vibration phenomenon. The evaluation of the vibration is important for structural stability and fatigue investigation. However, the evaluation often requires a complicated calculation step due to the complex system that makes the process is not straightforward and time-consuming. This paper aims to provide a Graphical User Interface (GUI) that can be used to analyze the vibration of the MDOF system with two, three, and four degrees of freedom. The system is simplified by mass-spring-damper elements to model the interaction of components in the industry. The algorithm is developed using an open-source computational programming language named GNU Octave. The GUI is used to ease the user to simulate the vibration response based on given initial parameters. The GUI also provides features to calculate the natural frequencies and mode shapes of the system and present them on the spectrum. The algorithm is verified in the previous study to establish the simulation result. Based on the result, the amplitude of the time-domain displacement reaches a precise value as the reference. It is proven by the displacement amplitude of the first and second mass of the 2 DOF system are 0.05 m and 0.06 m. The calculation of the natural frequency also proved by the value of the first, second, and third natural frequency of the 3 DOF system which are 64.89 rad/s, 108.13 rad/s, and 281.06 rad/s respectively. Moreover, the mode shape shows a proportional value compared to the related study. It can be inferred that the proposed GUI is verified and ready to use to evaluate the vibration of the MDOF system.

Keywords: MDOF vibration, natural frequency, GNU Octave.

Identification of Series DC Arc Fault Location in MPPT Photovoltaic System Based on Fast Fourier Transform and Artificial Neural Network

Dhigmayoga Raseto Akbar, Eka Prasetyono, Dimas Okky Anggriawan
Electrical Engineering Department
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
dhigmaakbar@gmail.com, eka@pens.ac.id, dimas@pens.ac.id

Abstract – The growth of Solar Energy is being increased and developed. One of them, the Maximum Power Point Tracking (MPPT) is mainly used to get a maximum output power in unstable weather conditions. However, a series of DC arc fault causes damaged insulation and fire. This paper will discuss the identification of series DC arc fault location in conventional MPPT photovoltaic array based on PSIM and MATLAB simulation. Series DC arc fault will be analyzed using a current signal parallel capacitor on a photovoltaic array. Furthermore, those signals will be processed with the Fast Fourier Transform and Artificial Neural Network to know where the series DC arc fault occurs. The proposed location identification method gives a 98.2% accuracy rate when implemented in a conventional MPPT photovoltaic system. The average sum of frequency DC-link capacitor current ratio between series DC arc fault occurs for all proposed locations against normal's condition is 1.39807:1. 18 different characteristic testing data validated the simulation result, and it shows the proposed method is more accurate from a comparison between possible neural network training methods.

Keywords: Fast Fourier Transform, Artificial Neural Network, series DC arc fault, location identification.

Experimental and Numerical Study of Plain and Perforated Twisted Tape Effect on the Double Pipe Heat Exchanger Performance

[1]Arrad Ghani Safitra, [2]Susi Puspitasari, [3]Ririn Kusnul Khotimah, [4]Setyo Nugroho
[1,2,3]Power Plant Engineering, Mechanical and Energy Engineering Department,
Politeknik Elektronika Negeri Surabaya, Surabaya, Indonesia
[4]School of Mechanical Engineering, Science Engineering and Technology
Department, University of Adelaide, Adelaide, Australia
[1]arradgs@pens.ac.id, [2]susipuspitasari01@gmail.com,
[3]ririnkhusnulkhotimah9@gmail.com, [4]setyo.nugroho@adelaide.edu.au

Abstract – The double pipe heat exchanger is one of heat exchanger type which has one pipe placed concentrically inside the pipe which has a larger diameter. There are two fluids flow through double pipe heat exchanger. One fluid flow in the inner pipe, and the other fluid flow in annulus with different temperature. The performance of a double pipe heat exchanger is based on heat transfer coefficient, pressure drop, and effectiveness. Heat transfer coefficient and pressure drop are characterized by Nusselt number and friction factor. A way to increase the performance of double pipe heat exchanger is by a passive method with adding twisted tape in the inner pipe. This research has been done by experimental and numerical study with additional perforated twisted tape which has a 3.77% porosity ratio. The testing was done with a range of Reynold number in an inner pipe is 1000-5000 and with an inlet temperature of the water is 50ºC. In addition, Reynold number in the annulus is 20000 with an inlet temperature of the water is 20ºC. The results show that using of perforated twisted tape with porosity ratio 3.77% is showing better performance than plain twisted tape. Porosity ratio of 3.77% could be increase the Nusselt number with average value on a plain tube by 0.31% and increase the average friction factor on a plain-tube by 366.34%. Furthermore, double pipe heat exchanger rise the average of NTU on a plain tube by 78.42% and also increasing the average value of ε on a plain tube by 45.86%.

Keywords: Coefficient of heat transfer, pressure drop, porosity ratio of perforated twisted tape, double pipe heat exchanger.

Design Hotwell Condensor Level Control System Using Feedback-Feedforward Control Strategy with Tunning Direct Synthesis

M. Hasan Fadlullah, Erik Tridianto, Joke Pratilastiarso
Department of Mechanical and Energy
Power Plant Engineering
Surabaya, Indonesia
hasanfadlullah90@gmail.com, erik@pens.ac.id, joke@pens.ac.id

Abstract – The use of condensers as heat exchangers has an important role in PLTU. The condition of the condenser hotwell level must be maintained so that the boiler components that use feed water experience overheating in the boiler tube. In this study, the condenser hotwell level will be controlled using the feedforward feedback loop control method. Control performance is obtained by testing the setpoint changes and disturbances. Good performance results are indicated by the low value of settling time, maximum overshoot, and IAE. and the results of the simulation carried out are the maximum overshoot value obtained from the set point test and disturbance testing +5% and +5%, namel 0.7516% and 0.36%; The IAE values obtained were 0.0122% and 0.005516477% with ts of each it is 180 and 130s.

Keywords: hotwell, condenser, level, feedback feedforward.

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Energy Development for Climate Change Solution
and Clean Energy Transition

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INDONESIA SECTION

Constant Current Constant Voltage for Precise Lithium Ion Battery Charging

Feby Chandra Arsandi, Moh. Zaenal Efendi, Farid Dwi Murdianto,
Department of Electrical Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
febychandraarsandy@gmail.com, zen@pens.ac.id, farid@pens.ac.id

Abstract – Currently, electric vehicles have begun to be used in various countries. In some countries, their combined with renewable energy. Renewable energy that is often used in the battery charging process is solar panel. Even so, the solar panel have fluctuating current and voltage because the weather influences them. The process of charging electric vehicle batteries must be done in a short time. High current and voltage can shorten the charging duration. However, high current and voltage charging can cause the battery to be damaged. The fluctuating current and voltage of the solar panels require a DC-DC Converter to match the battery requirements. To prevent damage to the battery, it is necessary to select an appropriate charging method to regulate the charging power flow. Thus, in this study, a lithiumion battery fast charging system was simulated using a solar panel source connected to the SEPIC Converter and using the Constant Current Constant Voltage (CCCV) method. Based on the results obtained through simulation testing of the Fast Charging Lithium-Ion battery system, it is proven that the Fuzzy method can adjust the lithium battery charging system according to the setting point with a voltage error of 0.28% and a current error of 4%.

Keywords: CCCV, Fast Charging, Fuzzy Logic Controller Lithium-Ion, SEPIC Converter.

Numerical Analysis On The Effect of Jet Impingement Ratio in Double Trapezoidal Absorber Plate Solar Air Heater

Faris Hanuntiarso, Lohdy Diana, Radina Anggun Nurisma, Arrad Ghani Safitra
Department of Mechanical and Energy Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
farishanuntiarso1999@pg.student.pens.ac.id, lohdydiana@pens.ac.id,
radinaanggun@gmail.com, arradgs@pens.ac.id

Abstract – The drying method using Solar Air Heater (SAH) is an efficient method compared to conventional drying. SAH utilizes heat from the intensity of radiation absorbed by absorber plate in the heating channel. One way to increase the heat transfer rate in SAH is to expand the heat absorption area with changing the type, shape, and size of the absorber plate. The use of a corrugated absorber plate with a trapezoidal shape has been proven to increase the rate of heat transfer as well as its efficiency and thermal performance. Changing the airflow method on the SAH is also able to increase the performance of the SAH, one of which is the addition of jet impingement on the SAH. This study discusses the analysis of the effect of the distance between the jet impingement on the Double Trapezoidal Absorber Plate Solar Air Heater or DTAPSAH which was carried out numerically using Computational Fluid Dynamics (CFD). The ratio between the jet impingement that were varied was 0,25 (7 holes); 0,375 (5 holes); and 0,5 (3 holes). The jet ratio 0.5 has highest outlet temperature value compared to other jet ratio variations with a temperature of 362 °K.

Keywords: solar air heater, simulation, jet impingement.

The Effect Of Nano Refrigerant R22-CuO Using On Water Chiller: An Experimental Study

Julfan Hafiz Farezza, Arrad Ghani Safitra, Teguh Hady Ariwibowo
Department of Mechanical and Energy Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
julfanhafiz@pg.student.pens.ac.id, arradgs@pens.ac.id, teguhhady@pens.ac.id

Abstract – Nanoparticles are widely used to improve the performance of thermal systems because these substances can improve the thermophysical properties of fluids. This study utilizes nanoparticles to improve the thermal performance of the R22-based refrigeration system. In this experiment, CuO were selected as nanoparticles with variations of 0 %, 0.2%, 0.4%, 0.6%, based on the concentration of weight. The cycle performance with nanoparticles shows that evaporator capacity is increased by 13.3%, the energy consumption is decreased by 3.7%, and the COP is increased by 17%. The best result was obtained with a 0.6% mass fraction of the refrigerant.

Keywords: Water Chiller, vapor compression cycle, nanomaterial, COP, R22, CuO.

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Numerical Study of the Effect of Rib Width Angle on Elbow Erosion

Muhammad Hanif Mufadhol, Lohdy Diana, Rif'ah Amalia
Department of Mechanical Engineering and Energy
Electronic Engineering Polytechnic Institute of Surabaya
Surabaya, Indonesia
hanifmufadhol@gmail.com, lohdydiana@pens.ac.id, rifahamalia@pens.ac.id

Abstract – Pipes are components that are widely used in various industries. Pipes are used to transfer fluids from one place to another. Erosion often occurs at the elbow pipes due to the impact of particles carried by the fluid flowing in them, especially elbow pipes. Sand particles collide with the elbow extrados at one point causing erosion. Based on computational fluid dynamic method, it was found that velocity can affect the erosion rate on the extrados side of the elbow. With a velocity variation of 10-30 m/s, the greatest erosion rate occurs at a velocity of 30 m/s. The resulting erosion is oval shape at an angle of 60º and followed by a "V "shape after. Increasing the width of the rib angle, may not necessarily reduce the erosion rate. Adding a rib with an angle width of 20º is the best choice based on consideration of total erosion at the elbow and the rib, with the maximum erosion rate reduction by 15%.

Keywords: CFD, Elbow, Erosion, Pipe, Rib.

Analysis Comparison of Linear Interpolation and Quadric Interpolation Methods for Forecasting a Growth Total of Electricity Customers in Kotawaringin West Regency at 2022-2025 Years

[1]Sujito, [2]Langlang Gumilar, [3]Ridho Riski Hadi, [4]M. Rodhi Faiz, [5]Syafriyudin, [6]Zory Satrio Nugroho

[1,2,3,4,6]Electrical Engineering Department, Universitas Negeri Malang, Malang, Indonesia

[5]Electrical Engineering Department, IST AKPRIND, Yogyakarta, Indonesia

[1]sujito.ft@um.ac.id, [2]langlang.gumilar.ft@um.ac.id,
[3]ridhoriskihadi.1805366@students.um.ac.id, [4]mohamad.rodhi.ft@um.ac.id,
[5]dien@akprind.ac.id, [6]zory.satrio.1805366@students.um.ac.id

Abstract – The modern times, necessary of electrical energy cann't be separated from human daily life. In order to keep an electricity demand fulfilled, it is necessary to connect the supply of electrical energy according to demand and load forecasting that will take place in the future. This research used independent variables like population, Gross Regional Domestic Product (GRDP), and City/Regency Minimum Wage (UMK) to predict a dependent variable like electricity loador growth for each sector, such as household, business, industrial, and general sectors. In this study, the interpolation method is used to describe the annual data into monthly form before forecasting is carried out. The interpolation method were used a linear interpolation and quadratic interpolation. The results of interpolation with a linear regression method were used to predict a growth of electrical load. A test for accuracy a forecasting, it were used two test methods such as Mean Percentage Error (MAPE) and Root Mean Square Error (RMSE). From the results of this analysis that have been done, a forecasting with linear interpolation has MAPE values of 0.63% and RMSE 2953.87 while quadratic interpolation has MAPE values of 0.58% and RMSE 2945.77. Based on the MAPE and RMSE values, forecasting with quadratic interpolation have a better accuracy value than linear interpolation.

Keywords: linear interpolation, quadratic interpolation, linear regression, mean percentage error, root mean square error.

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A Novel Power Switching Control Method of the Wind Power MPPT System Based on the Switching System Theory

Xin Guo[1], Wei-Peng Li[2], Yuan Pan[3], Jun Liu[4]

[1,4]Shaanxi Key Laboratory of Complex System Control and Intelligent Information Processing, Xi'an University of Technology, Xi'an, China

[2,3]School of Automation and Information Engineering, Xi'an University of Technology, Xi'an, China

[1]guoxin@xaut.edu.cn, [2]2210320133@stu.xaut.edu.cn, [3]2210320106@stu.xaut.edu.cn, [4]liujun0310@sina.com

Abstract – In order to effectively utilize the wind energy, the max power point tracking (MPPT) control was widely used in the wind power system. The MPPT control of the wind power system is actually the control of the power electronic converters connected with the wind turbine. However, due to the existing of the power switching devices, the converters were the typical nonlinear system. The traditional linearization modeling methods cannot accurately describe the working process of the converter and the control strategies based on the linearized model of the converter can only guarantee the performance of the system under a certain working point. They were not suitable to the wind power MPPT system, which has the variable wind speeds and the variable max power points. In this paper, a power switching control method based on the power switched model is proposed for the wind power MPPT system with Boost converter. The main contributions of the work are: (1) The proposed power switched model realizes the accurate description of the converter working process, which directly focus on the power states of the wind power system. (2) The proposed switching control method realizes the direct power switching control of the converter for the MPPT of the wind power system, which has merits of simple control structure, no control parameter, no pulse width modulation block and strong robustness under circuit parameters uncertainty. The simulation results verify the effectiveness and the superiority of the proposed methods.

Keywords: Wind Power System, MPPT, Switched Model, Power Switching Control.

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Maximum Power Point Tracking with Constant Power Generation of Photovoltaic System Based on Artificial Neural Network Under Partial Shading Condition

Brenda Nathania Passandaran, Eka Prasetyono, Dimas Okky Anggriawan
Department of Electrical Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
brendanathania@pe.student.pens.ac.id, eka@pens.ac.id, dimas@pens.ac.id

Abstract – Solar panels are widely used by the community to support reducing the adverse effects of change. Installation of solar panels is mostly done in large buildings in urban areas. There are several obstacles to installing solar panels. One of the obstacles to installing solar panels is the shadow of objects around installation of solar panels. Many buildings now use solar panels but the installation of rooftop solar panels does not get maximum energy because the solar panels are covered by the shadows of other tall buildings and shadows from trees. One of the problems in the solar power generation system is the instability of the power generated by the solar panels caused by the influence of shadows on the PV. To overcome this problem, the Maximum Power Point Tracker (MPPT) method is used which can make PV operate at the GMPP point so that the power generated is maximized. However, the maximum power in the PV can cause an overvoltage in the power grid. Therefore, the Constant Power Generation (CPG) method is used when it reaches the rated voltage to avoid overvoltage in the load. MPPT works when the output power of the PV is less than 100 watts. While CPG works when the power exceeds 100 watts so that the power remains constant at 100 watts. The power that exceeds the load power causes damage to the load so that the power needs to be maintained according to the power required by the load.The method used is the Artificial Neural Network (ANN) method where the SEPIC Converter duty cycle can be adjusted continuously to get the maximum solar panel output power. The results showed that the Artificial Neural Network was able to track GMPP in partial shading conditions. The partial shading condition causes the power to be trapped in the LMPP so that the use of the ANN algorithm helps to get the GMPP value. From the results of data collection, the output power obtained is limited to a value of 100 watts. The use of the Artificial Neural Network method can reach a maximum power of 5.31% greater than without the method.

Keywords: Photovoltaic, Artificial Neural Network, Maximum Power Point Tracking, Constant Power Generation, Partial shading.

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Design Analysis Of Fullbridge Converter On Proton Exchange Membrane Fuelcell

Fifi Hesty Sholihah, Himami Firdausia, Joke Pratilastiarso
Power Plant Engineering
Department of Mechanical Engineering and Energy
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
fifi@pens.ac.id, firdausiyah@pg.student.pens.ac.id, joke@pens.ac.id

Abstract – Fuel Cell is an electrochemical energy conversion device that converts hydrogen that reacts with oxygen into water, simultaneously producing electrical and thermal energy in a process. Fuel cell is a simple form of technology such as a battery that can be refueled to get its energy back, in this case the fuel is hydrogen. The implementation of this study simulated the Fuel Cell and added the use of a Fullbridge DC - DC type power converter that uses isolated which is able to raise the voltage with a voltage ratio that can maintain its efficiency well. This study presents fuelcell and fullbridge modeling to obtain high efficiency using PSIM applications. And performed openloop integration on fuelcell with AVISTA PEM and Fullbridge SPECS. In this trial, researchers varied the fuelcell temperature using 3 temperature variations, namely $60°C = 333.15K$, $80°C = 353.15K$ and $100°C = 373.15K$. From this temperature variation, it produces increased power and produces a fairly good efficiency of $82 – 84\%$. As well as keeping a constant voltage of 311 volts with an error of 1.5%. With this, humans can be used to become an alternative source of energy needed, one of which is in the automotive world.

Keywords: Fuel Cell, Proton Exchange Membrane (PEM), Fullbridge Converter

State of the Art in Floating Tidal Current Power Plant Using Multi-Vertical-Axis-Turbines

Sony Junianto[1], Wahyu Nur Fadilah[2], Ahmad Firyal Adila[3], Tuswan[4], Melinda
Dendy Satrio[5], Siti Musabikha[6]
[1,2]Department of Mechanical and Energy Engineering, [3]Department of Electrical
Engineering, [4]Department of Naval Architecture, [5]Department of Ocean
Engineering, [6]Research Center for Metallurgy National Research and Innovation
Agency (BRIN), South Tangerang, Indonesia
[1,2,3]Politeknik Elektronika Negeri Surabaya, Surabaya, Indonesia
[4]Universitas Diponegoro, Semarang, Indonesia
[5]Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia
sony@pens.ac.id, wahyunur@pens.ac.id, firyal@pens.ac.id,
tuswan@lecturer.undip.ac.id, dendy.satrio@its.ac.id, siti.musabikha@brin.go.id

Abstract – A floating tidal current power plant may be used to extract near-surface tidal current velocity into electricity. To capture energy from the tidal current which changes direction, a vertical axis tidal current turbine is needed. And, to increase capacity, tidal current turbines are arranged in multi-system. This power plant consists of multi-turbines, electrical systems, and a floating structure as a support. With the superposition of power from each turbine, this system may keep the performance of the power plant by using a floating structure. The performance of tidal current turbines may be affected by the motion responses of the floating structures as the supporting structure. This effect may reduce the efficiency of the turbine. Therefore, the selection of supporting structures is an important topic in the study of the tidal current power plant. Several researchers have previously selected the supporting structure to maintain the performance of the tidal current turbine in a relatively good condition. These researchers have investigated structures, i.e pontoon, semi-submersible, tension leg platform, and spar, including the development of spar into quad-spar. These structres were investigated according to the effect of their motion responses on turbine performance. The lower the motion response, the smaller the effect on changes in turbine performance. Therefore, the configuration of the supporting structure is chosen by considering the responses. The development of this research provides a new foundation for continuing this topic. Therefore, this paper presents the state of the art from previous research regarding the selection of supporting structures and the arrangement of multi-turbines in a floating tidal current power plant.

Keywords: Floating Power Plant, Tidal Current Energy, Multiturbines Power Plant, Floating Structure, Vertical Axis Turbines.

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Study of a hybrid system with various types of energy storage in Wetar Island

Ruly Bayu Sitanggang
Research Institute PT (PLN) Persero
Jakarta, Indonesia
rully.bs@pln.co.id

Abstract – Indonesia's electrification ratio until September 2020 is 99.2%, while Maluku province only reached 92%. PLN, as a utility company, plans to increase the availability of electricity, especially in remote areas. Ilwaki District, a part of Wetar Island, located at coordinates 7048'19" South Latitude, 126015'58" East Longitude, and the electricity conditions served by PLN to the extent it has only been on for twelve hours. The purpose of this study is to identify the potential for renewable energy resources that can be used to produce electricity in the Ilwaki district and to design and analyze the economics of the electrical energy generation system in the area by looking at the cost of providing electricity from the design configuration. In this study, a study on the utilization of renewable energy potential in the area of electricity is carried out using a technoeconomic simulation of the cost of electricity supply using the HOMER Pro software. From the simulation results with an average solar energy potential of 6.11 kWh/m2/day and a wind speed of 5.79 m/s, it was found that the optimum configuration to meet the Ilwaki system load, the most optimal hybrid system configuration with the lowest COE value was obtained by the configuration of a 209-kW solar panel, 27 units wind turbine, 400 kW diesel engine, 893 units of battery and 96 kW converter. This configuration results in a CoE value of $0.213/kWh and a total net present cost of $1,385,209.

Keywords: Remote Area, Hybrid Power System, Renewables, Homer Pro, Energy Storage.

Two Dimensional Computational Fluid Dynamics Simulation of Tilting Burner Boiler to Characteristic Emission NO

Muchamad Ilham Aditiyansyah, Rif'ah Amalia, Teguh Hady Ariwibowo
Department of Energy Mechanical Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
aditiansyahilham@pg.student.pens.ac.id, rifahamalia@pens.a.id,
teguhhady@pens.ac.id

Abstract – This research discusses the effect of variations in the tilting angle of a boiler on the formation NO gas emissions during the combustion process. NO gas emissions during the combustion process formed through thermal NO and fuel NO. In this research, observations were done toward of thermal N and fuel NO by setting the configuration of the normal burner angle to a tilting angle allowing the burner to be moved up and down. The angle variations used are -200, -100, +100, dan +200. The method used in this research is the CFD method and solved using CFD software to perform the analysis. Several parameters used to discuss the formation of NO gas emissions are temperature, mass fraction pollutant NO, and NO rate. The simulation result of these tilting angle variations showed that by changing the tilting angle can reduce temperature, mass fraction pollutant NO, and NO rate. The tilting angle variation of -200 has a good trend in the formation of NO gas emissions in terms of parameters temperature, mass fraction pollutant NO, and NO rate.

Keywords: Tilting Angle, Gas NO, Combustion Prosses, Temperature, Mass Fraction Pollutant NO, Computational Fluid Dynamic (CFD).

Parametric Study Of A Vertical Axis Tidal Turbine Blade Using The CFD Method To Achieve High Turbine Performance

Nu Rhahida Arini[1], Stephen Turnock[2], Mingyi Tan[3]
[1]Power Plant Engineering, Department of Mechanical Engineering and Energy
Politeknik Elektronika Negeri Surabaya, Surabaya, Indonesia
[2,3] Department of Civil, Maritime and Environmental Engineering Faculty of
Engineering and Physical Sciences University of Southampton, Souhampton,
United Kingdom
arini@pens.ac.id

Abstract – The aim of this paper is to identify numerically the influence of some vertical axis tidal turbine blade design parameters to the turbine performance. The parameters are inlet fluid velocity, initial angle of attack, number of response motions, blade material stiffness constant. The blade is initially (before variations) exposed in a set of environmental condition which is executed by high Reynolds number (3,07x10-6) flow. The turbine blade performance is evaluated from the time history lift, drag, and moment coefficients. A 2D CFD model of a single vertical axis tidal turbine blade is developed using OpenFOAM. The blade utilizes NACA 0012 profile. The performance of parametric models is compared to the performance of initial condition model. The results show that velocity and angle of attack variations significantly affect to the blade performance. It is also found that the number of response and stiffness constant variations generate unsteadiness in the turbine blade coefficients. This indicates that tidal velocity and blade orientation is more favourable to improve turbine's performance.

Keywords: Parametric Study, Vertical Axis Tidal Turbine, Turbine Blades Performance

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Performance Study of Organic Rankine Cycle (ORC) Using Low-Temperature Waste Heat With Zeotropic Refrigerants

Habibatu Nihayah, Fara Nabilah Sakina, Teguh Hady Ariwibowo, Arrad Ghani Safitra
Power Plant Engineering
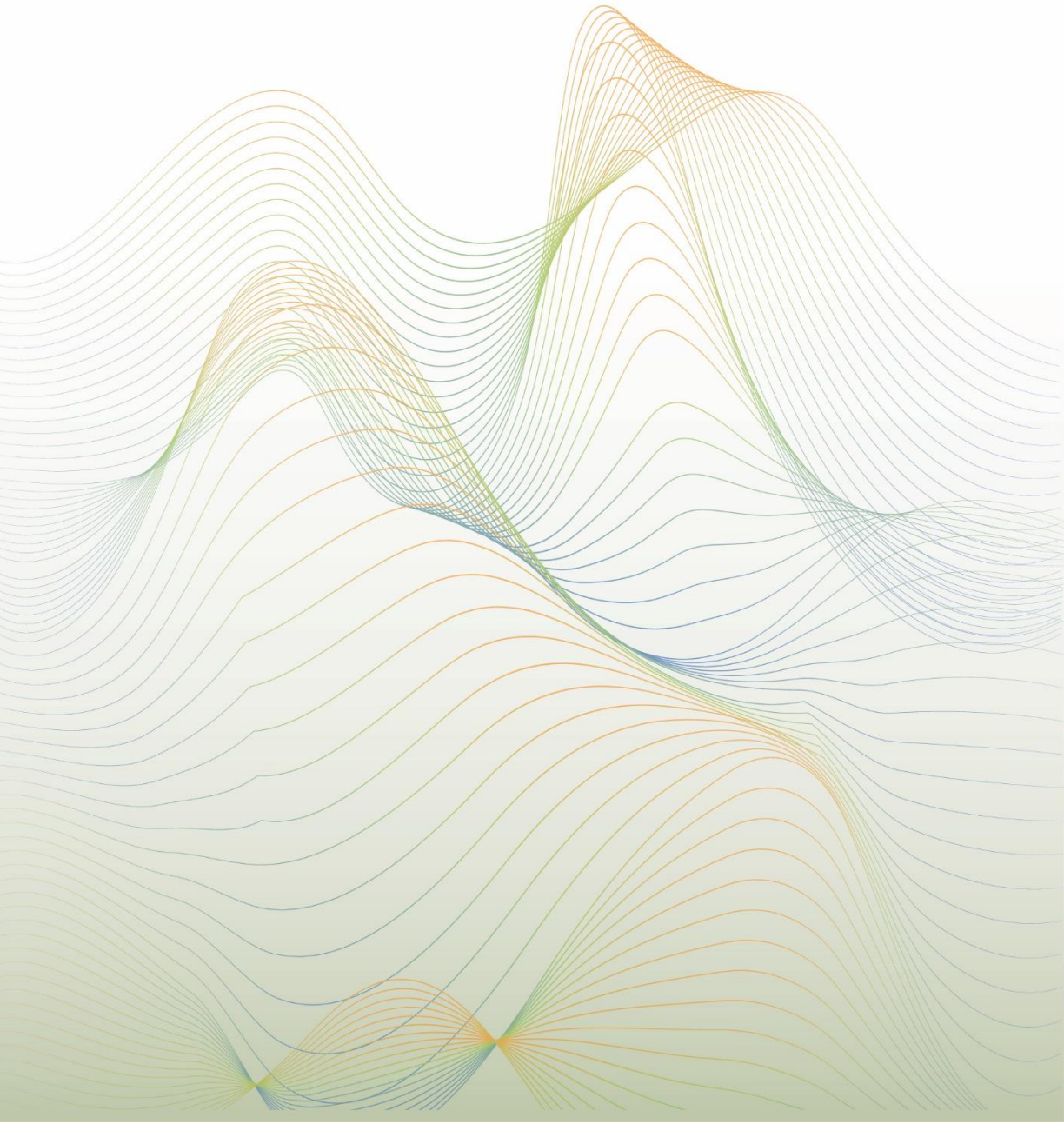Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
habibatunnihayah@pg.student.pens.ac.id, faranabilah@pg.student.pens.ac.id,
teguhhady@pens.ac.id, arradgs@pens.ac.id

Abstract – Low-temperature thermal energy still has the potential to revive electricity using the Organic Rankine Cycle (ORC) system. In this study, the performance of the Organic Rankine Cycle (ORC) from a low-temperature heat source (>150°C) using four variations of zeotropic working fluids, namely R-407A, R-422C, R-410A, and R-404A was analyzed based on simulations in commercial software cycle simulation. Thermophysical properties of refrigerants were calculated using commercial fluid properties database software. The refrigerant were simulated in two modified cycles, with the addition of a regenerator and recuperator. The basic cycle is used as a benchmark performance of modified cycles. The working fluid is simulated with a mass flow rate of 0.5 kg/s at the exit temperature of the evaporator 85°C and at the exit temperature of the condenser $18°C − 29$ °C. The recuperative ORC cycle produces the best efficiency with R-422C working fluid with an efficiency of 7.854% and net power of 5.34 kW. The basic orc cycle with R-410A working fluid generates the lowest efficiency with an efficiency of 3.738 % and a net power of 4.69 kW.

Keywords: Organic Rankine Cycle (ORC), cycle performance, low temperature, zeotropic fluids.

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Real Time Monitoring System of Drinking Water Quality using Internet of Things

Zainul Abidin[1], Eka Maulana[2], Muhammad Yogi Nurrohman[3], Fitri Candra Wardana[4], Warsito[5]

[123]Department of Computer Engineering Faculty of Computer Science, Universitas Brawijaya, Malang, Indonesia

[4]Master Program in Environmental Resources and Development Management, Postgraduate School, Universitas Brawijaya, Malang, Indonesia

[5]Department of Chemistry Faculty of Mathematics and Natural Sciences Universitas Brawijaya, Malang, Indonesia

[1]zainulabidin@ub.ac.id, [2]ekamaulana@ub.ac.id, [3]myogi_nurrohman@student.ub.ac.id, [4]fitri_fia@ub.ac.id, [5]warsitoub@ub.ac.id

Abstract – In order to reduce Polyethylene Terephthalate (PET) bottle plastic waste, Universitas Brawijaya (UB) provided reverse osmosis drinking water in some buildings. Water monitoring is needed to keep the water quality. Therefore, a water monitoring system based on Total Dissolved Solids (TDS), pH, and water flow was proposed. Since the UB buildings have good internet connection (WiFi), Internet of Things (IoT) was employed to the system to support real time monitoring. So, data of TDS, pH, and water flow can be periodically sent to cloud and displayed to a specific website. The system worked very well and the data can be summarized and used by operator as indicators of performance of the reverse osmosis machine. When water quality and performance decrease, operator must check filters membrane or water pump for further maintenance to support long life use. Although the sensors have been calibrated properly, some measurement errors occur. The measurement error percentages of TDS and pH are 0.62% and 0.94%, respectively.

Keywords: Water Quality Monitoring, Real Time, Internet Of Things, Total Dissolved Solids, pH.

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Air Purification System for Air Quality Monitoring In-Vehicle

Kyle Vonmar T Agullo, John Patric A Sasis, Julius T Sese
School of Electrical, Electronics and Computer Engineering
Mapua University
Intramuros, Manila Philippines
kvtagullo@mymail.mapua.edu.ph, jpasasis@mymail.mapua.edu.ph,
jtsese@mapua.edu.ph

Abstract – Air contaminants can be found outside and inside our houses and automobiles. We used autos for transportation daily. A vehicle was also used by some people as an extension of their home. According to the World Health Organization, air pollution kills seven million people per year. Because our vehicle recirculates air from the outside, dangerous pollution levels are higher inside. Related research has primarily focused on air quality measurement rather than how to maintain good air quality within a given area through monitoring. The researchers presented a purification system that automatically filters contaminants such as hazardous gases, particulate matter, etc. At the same time, the device continues to monitor the air quality, based on previous studies linked to air quality monitoring. The design prototype passed the two-point calibration tests with the commercial sensor in a controlled environment and provided accurate and precise values compared to the commercial sensor. The test findings showed that the air quality inside the vehicle is good or regarded as safe for people and that the suggested prototype can filter VOC and other dangerous particles better than other existing air purifiers designed specifically for vehicles.

Keywords: Air Purification, Air Quality Monitoring, AQI, Vehicular Air Quality.

Controlling 3D Model of Human Hand Exploiting Synergistic Activation of The Upper Limb Muscles

Firman Isma Serdana
Electronics Engineering Department
Electronics Engineering Polytechnic Institute of Surabaya
Surabaya, Indonesia
firmanisma@pens.ac.id

Abstract – Surface electromyography (EMG) based control of hand exoskeleton has been developed in numerous methods, but a proportional control of multiple degrees of freedom (DOF) exoskeleton is still rarely seen in recent years. This paper proposes an alternative to the most recent solutions for proportionally estimating multiple DOFs of the hand. Highdensity electromyography (HD-EMG) was used to estimate the joint angle of five fingers in sophisticated gestures. The gestures were the ten alphabets of American Sign Language (A B C D F I K L O W). The association between HD-EMG and kinematics was mapped by using a neural network (NN) and k-Nearest Neighbour (kNN). The estimation accuracy was around 70-95 % (R index) for the eleven DOFs in four normal-bodied subjects' hands. Furthermore, kNN performed better than NN, even in the case of input feature reduction. The regression results also were able to distinguish 9 of 10 alphabets (except O), with the false interpretation because of the identical muscle activity and kinematics between O and C. The approach described in this paper provides a practical solution to proportionally and simultaneously control multiple DOFs for the hand exoskeleton.

Keywords: High-Density Electromyography, Hand Kinematics, Neural Network, K-Nearest Neighbor.

Numerical simulation of thermal performance of porous metal heatsink for cooling the CPU

Subhasini Muduli, Upasana Panigrahi
Department of mechanical engineering
Bhubaneswar engineering college
Bhubaneswar, India
subhasini415@gmail.com, drupasana.engr@gmail.com

Abstract – The thermal design and use of a heat sink for cooling the central processing unit (CPU) of a compact laptop has become increasingly challenging mainly because of the difficulty of optimizing the configuration and modification of fin shapes under design constraints with the motive to achieve the minimum thermal resistance at a possible low-pressure drop. Despite many cooling technologies are designed to remove heat from the whole system, the primary objective of the thermal management of a microprocessor is to have the cooling module concentrated at a high hot spot density location to remove the heat instantly as soon as it is released. This paper presents the simulation study of thermal performance assessment of porous aluminum, which is used as a heat sink for cooling a laptop's CPU. The Nusselt number evaluates the heat transfer rate of the heat sink. The parametric analysis of heat transfer coefficient and pressure drop due to increased porosity of heat sink and height of heat sink are investigated. CFD simulations show that the porous aluminum heat sink's thermal performance is better than the finned heat sink. Owing to the porous aluminum heat sink, the cooling of the CPU is more effective and under desired range as compared to that of the finned heat sink.

Keywords: Porous Aluminum, Heat Sink, CPU, Nusselt Number, Electronics Cooling.

Smart DC Home for Energy Saving with Android-Based Real-Time Energy Monitoring

Falia Innocentia Ananda Sunarko[1], Epyk Sunarno[2], Diah Septi Yanaratri[3], Eny Kusumawati[4]

[123]Department of Electrical Engineering Politeknik Elektronika Negeri Surabaya, Surabaya, Indonesia

[4]Department of Mechanical and Energy Engineering, Politeknik Elektronika Negeri Surabaya, Surabaya, Indonesia

[1]faliavicky1128@gmail.com, [2]epyk@pens.ac.id, [3]diahsepti@pens.ac.id, [4]eny-k@pens.ac.id

Abstract – Operating household electrical appliances non-stop, due to heavy use of electricity, such as turning on lights and fans every day without supervision, would result in large bills. The Smart DC Home system can be monitored by monitoring the use of electrical energy in the household, using a DC source connected to the Internet of Things. Smart DC Home is designed and implemented to control and monitor the energy use of DC electrical appliances in DC households such as fans and LEDs. Energy use from DC loads is measured using the ACS712 current sensor and a voltage divider circuit that functions as a voltage sensor. The Smart DC Home system was built using the STM32F407 Discovery microcontroller and NodeMCU ESP8266. Motion sensors are used to activate electric fans when human movement is detected in the room. The lighting will turn on when no sunlight is detected outside the house, or when someone is moving in the room, it will be detected by a combination of the motion sensor and a light-dependent resistor (LDR) sensor. Energy usage monitoring can be done through the Android application with an Android phone connected to the internet. The results of this study indicate that the Smart DC Home system can save household energy use by up to 21.29%.

Keywords: Smart Home, Energy, Motion Sensors, Light Sensor, Home Appliances, Android.

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Congestion Monitoring System
Using Infrared Sensor

Taiki Kimura[1], Thatsanee Charoenporn[2], Virach Sornlertlamvanich[3]
[123]AAII, Department of Data Science, Musashino University, Tokyo, Japan
[3]Faculty of Engineering Thammasat University Pathum Thani, Thailand
[1]s1922074@stu.musashino-u.ac.jp, [2]ORCID: 0000-0002-9577-9082, [3] ORCID:
0000-0002-6918-8713

Abstract – Social-distancing is one of the measurements to prevent and reduce COVID-19 infection risk. An easy and effective way to keep a distance in a confined space is to limit the number of people in that area at a time. In this paper, we develop a congestion monitoring system using an existing motion sensor to indicate the occupation in the recreation area where a number of students will get together during break time. For the first phase, an infrared sensor, HC-SR501, and Raspberry Pis have been manipulated to collect motion data in order to generate graph visualization together with a heat map of the density of congestion. In the next phase, video images will also be used to identify the occupancy for higher accuracy.

Keywords: Congestion, Occupation, Monitor, Sensor, IOT.

Implementation of Fall Detection for The Elderly Home Support using 24-GHz Radar

Amran, Elly Purwantini, Ardik Wijayanto, Rusminto Tjatur Widodo, Budi Nur
Iman, Edi Satriyanto, Eru Puspita, Hary Oktavianto
Electrical Engineering Department
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
ranamran20@gmail.com
hary@pens.ac.id

Abstract –In this paper, we propose a development of a smart home system for
assisting elderly people by implementing a fall detection using 24-GHz radar
sensor. The system is mounted on the ceiling of the room and the system records
the doppler frequency shift signals of a body moving with a duration of 2.5 seconds.
The recorded signals are transformed into spectrogram images with a size of 119 x
65 pixels. Then the spectrogram images are recognized by the Convolutional Neural
Network (CNN) algorithm. There are 3 classes to be recognized, namely: falling,
vacant, and walking. The dataset was acquired, built, and trained by using Edge
Impulse platform. The hardware used in the deployment phase is Arduino Nano 33
BLE Sense. The experimental results show an accuracy rate of the training phase
and the testing phase of 98.1% and 96.30%, respectively.

Keywords: Elderly home support, fall detection, 24-GHz radar sensor, edge
impulse

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Electrode Engineering in Memristors Development for Non-/Erasable Storage, Random Number Generator, and Synaptic Applications

Firman Mangasa Simanjuntak[1], Fayzah Talbi[2], Adam Kerrigan[3], Vlado K. Lazarov[4], Themistoklis Prodromakis[5]

[1]School of Electronics & Computer Science University of Southampton Southampton, SO17 1BJ, U.K.

[2,3,4]Department of Physics University of York York, YO10 5DD, U.K.

[5]School of Engineering University of Edinburgh Edinburgh, EH9 3FB, U.K.

[1]f.m.simanjuntak@soton.ac.uk

Abstract –We report the process development of ZnO-based memristors and observe various switching phenomena by means of electrode engineering, such as digital-to-analogue transformation, irregular and uniform endurance, and non-erasable switching; we also discuss the potential applications for each of these switching phenomena. The use of inert electrodes induces a high injection of electrons into the switching layer triggering abrupt current changes and, in some cases, resulting in a device breakdown. Meanwhile, a low work function and oxidizable electrode encourage Ohmic contact at the oxide/electrode junction and exhibit gradual switching characteristics. This work addresses the importance of electrode configuration to achieve the desired switching behaviour for specific low-powered electronic applications.

Keywords: memristor, WORM, data storage, random number generator, synaptic, resistive memory, semiconductor fabrication.

Internet of Things and Data Encryption in the Agricultural Sector Using the AES Cryptosystem

R Ryan Rama Maulana[1], Moch. Zen Samsono Hadi[2], Amang Sudarsono[3]

[1,2,3] Department of Electrical Engineering Electronic Engineering Polytechnic Institute of Surabaya (EEPIS) Surabaya, Jawa Timur, Indonesia

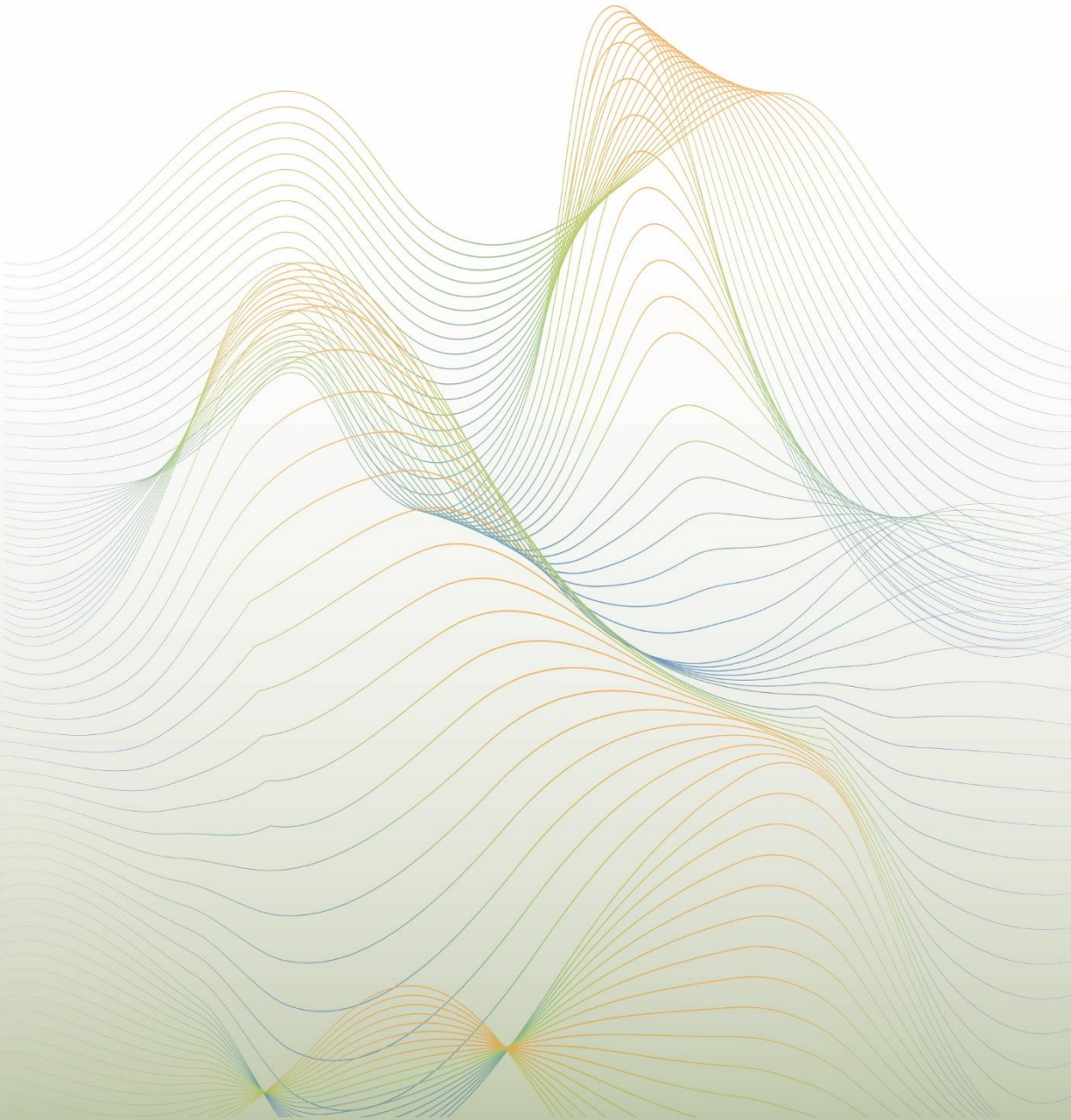[1] rykuro@te.student.pens.ac.id
[2] zenhadi@pens.ac.id
[3] amang@pens.ac.id

Abstract – In today's technologically advanced world, a great deal of information is shared online between internet users, including financial information, educational information, personal information, and others. Because there is so much information being shared online, it is no surprise that thieves desire access to it. As a result, information that should only belong to those with an interest in obtaining it might end up in the wrong hands and be stolen. The creation of this title is intended to assist commercial actors in the agricultural sector in safely exchanging or gaining access to information about their agricultural holdings without worry that this information may circulate online. Agricultural actors will be able to access their land information through a website that can be seen from their laptop or smartphone. This project uses an internet of things device as a tool to retrieve agricultural land data from agricultural actors. The data taken are PH data and soil moisture. The study's findings are summarized sensor data, namely the results of Very Bad, Bad, Average, Good, and Very Good. Each of these results will be protected to make it difficult for outsiders to infer the outcomes. The study's sensors were 95 percent accurate for the soil moisture sensor and 95.7 percent accurate for the soil PH sensor.

Keywords: Internet of Things, AES Cryptosystem, Fuzzy Logic, HTML, MySQL.

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Fiber to the Home Design and Analysis for Urban Housing of Cluster Garuda

Jonathan Panangian Christopher[1], Muhammad Hafizh[2], Adli Aulia Fattah Harahap[3], Ida Ayu Vadanti Locana Diwy[4], Nicholas Gautama Chandra[5], Rachmah Attalia[6], Catur Apriono[7]

[1,2,3,4,5,67] Department of Electrical Engineering Universitas Indonesia, Depok, Indonesia

[1]jonathan.panangian@ui.ac.id
[2]muhammad.hafizh91@ui.ac.id
[3]adli.aulia@ui.ac.id
[4]ida.ayu81@ui.ac.id
[5]nicholas.gautama@ui.ac.id
[6]rachmah.attalia@ui.ac.id
[7]catur@eng.ui.ac.id

Abstract – This paper presents a GPON FTTH access network design in Cluster Garuda, South Tangerang, Banten. The proposed design considers 1 ODC and 3 ODP. Each ODP can serve up to 16 houses. This study calculates and analyzes parameters of link power budget, rise time budget and component costs estimation to evaluate the proposed design's feasibility. The results show that the proposed FTTH design achieved all the parameters: the receive power -22.2725 dBm for uplink and -22.1975 for downlink. The system rise time for uplink is 0.26543 ns and for downlink is 0.26762 ns. Meanwhile, the maximum rise time for uplink is 0.58333 ns, and for downlink is 0.291667 ns.

Keywords: FTTH, Fiber Optic, Planning, GPON.

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Performance of MIMO-OFDM System Based on Single RF using Linear Detection

I Gede Puja Astawa[1], Yoedy Moegiharto[2], Akuwan Saleh[3], Budi Aswoyo[4], Anang Budikarso[5], Ida Anisah[6]

[1,2,3,4,5,6]Electrical Engineering Departement Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
[1]puja@pens.ac.id

Abstract – Multicarrier OFDM is a modulation technique with orthogonal subcarriers, allowing overlapping between subcarriers so that bandwidth usage is more efficient. MIMO (Multiple Input Multiple Output) uses multiple antennas on the transmitter and receiver, so data transmission is better than the SISO system.The use of the front-end Radio Frequency (RF) terminal is proportional to the number of antennas used on the transceiver side. The use of many antennas in terms of hardware dimensions also requires ample space, whereas, to save production costs and save space, of course, the most diminutive possible hardware dimensions are needed. This results in this technology being ineffective in terms of production costs.An antenna with a Single Radio Frequency (RF) system can efficiently use the front-end RF terminal to solve the above problems. However, using a single RF antenna is also computationally heavier at the receiver because this technique will cause an expansion of the H matrix components that are processed in the equalizer for each linear detector, namely the Zero Forcing (ZF) Minimum Mean Square Error (MMSE) algorithms. This algorithm is easy to implement on the system because it has a low level of complexity. This paper aims to determine the performance of the MIMO-OFDM system using a single RF-based antenna as indicated by the channel estimation curve of magnitude and phase and the BER curve as a function of SNR. This system is expected to reduce the use of front-end RF terminals in conventional MIMO-OFDM systems

Keywords: MIMO, OFDM, ZF, MMSE, Single RF

High Speed Wireless Transmission System at 190–320 GHz

Muhammad Agus Zainuddin[1], Sritrusta Sukaridhoto[2]
[1,2]Teknologi Multimedia Broadcasting (MMB))
Politeknik Elektronika Negeri Surabaya (PENS))
Surabaya, Indonesia
[1]magusz@pens.ac.id
[2]dhoto@pens.ac.id

Abstract – The development of technology in the field of wireless communication is very rapid. It is predicted that the wireless transmission rates will reach several Terabits per second (Tbps) in the next few years. Currently, terhertz band (0.1-10 THz) communication channel is being developed to achieve a transmission rate of Tbps. Many applications in wireless communication require very high transmission rates, such as: autonomous vehicles while driving at high speeds, back-haul in 5G or 6G cellular networks, HD holographic video conferencing, and so on. Terahertz channel is characterized as very high path loss so that the suitable for short distance applications, i.e., only a few tens of meters. In this research, we investigated the communication performance at the operating frequency 190–320 GHz sub-terahertz in term of channel capacity to determine the maximum transmission rate can be achieved and the image quality at the receiver for uncompressed image transmission applications. The results show that the transmission rate can reach speeds of 1 Tbps for distances less than 10 m and the quality of the received image is the same as transmitted image while the transmission is less than 2 m.

Keywords: Wireless communications, sub-THz band, THz channel capacity, THz image transmission

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Energy Efficiency in D2D Cooperative Communication System UAV-Assisted for Energy Harvesting Process at Source and Relay

Annysa Aprilya[1], Meyra Chusna Mayarakaca[2], Arifin[3], Hendy Briantoro[4], Yoedy Moegiharto[5]

[1,2,3,4,5] Telecommunication Engineering
Electronic Engineering Polytechnic Institute of Surabaya
Surabaya, Indonesia
[1] annysaprilya@te.student.pens.ac.id
[2] meyrachus@te.student.pens.ac.id
[3] arifin@pens.ac.id
[4] hendy@pens.ac.id
[5] ymoegiharto@pens.ac.id

Abstract – This work studies a D2D communication AF relaying protocol with UAV assisted to support the harvesting energy process at source and multiple relays by transmitting the RF signal. The best relay is selected by using the Partial Relay Selection (PRS) strategy, and the Time Switching Relaying (TSR) protocol is used for energy harvesting process. From the simulation results, can be shown that the high transmit power of UAV, low altitude of UAV, high value of harvesting efficiency factor, and time switching factor will result the good energy efficiency (EE) performance.

Keywords: D2D communication, RF-energy harvesting, partial relay selection, energy efficiency.

Pseudonymous Identities Generated from RSS-Based Secret Key Generation in A Join Protocol Process

Amang Sudarsono[1], Mike Yuliana[2]
[1,2]Dept. of Electrical Engineering,
Politeknik Elektronika Negeri Surabaya (PENS),
Electronics Engineering Polytechnic Institute of Surabaya (EEPIS),
Surabaya, Indonesia.
[1]amang@pens.ac.id, [2]mieke@pens.ac.id

Abstract – Join protocol in an anonymous authentication is an interactive communication between participating mobile nodes and an authorized entity such as a Group Manager (GM) to ob-tain some credentials before actively and anonymously involving in the system. Some keys are equipped to the participating mobile nodes in their credentials including some pseudonymous identities (PIDs) could be embedded. These PIDs are usually unique and their existence should be secured from the adversaries. In this paper, we adopted a received signal strength (RSS) based secret key generation between participating mobile nodes and GM to uniquely provide some PIDs. We introduce two scenarios of interactive join protocol mechanism between participating mobile nodes and the GM. First scenario when the GM is in an immobile position and the second scenario when the GM is in mobile position. Performance evaluation is evaluated by varying the traffic conditions as communication impairment between mobile nodes and GM in the first scenario, and mobile nodes' speed from 20 km/h to 60 km/h in both scenarios with ping time interval from 7 ms to 20 ms. The evaluation result showed that the PIDs generated properly with the number of PIDs ranges from 6 to 10 in the first scenario, and 3 to 5 in the second scenario. The highest correlation 0.99 is achieved, whilst the lowest one is 0.90. Meanwhile, utilized quantization worked properly for both two scenarios with 3000 data input in the first scenario and 6000 in the second scenario. Furthermore, both scenarios successfully achieve zero key disagreement rate (KDR).

Keywords: anonymous authentication; pseudonym; received signal strength; secret key generation; join protocol

The implementation of Optimal K-Means Clustering for Indoor Moving Object Localization

Syafira Salma Salsabila[1], Prima Kristalina[2], Tribudi Santoso[3]

[1,2,3]Departement of Electrical Engineering

Politeknik Elektronika Negeri Surabaya

Surabaya, Indonesia

[1]syafirasalmas@te.student.pens.ac.id, [2]prima@pens.ac.id, [3]tribudi@pens.ac.id

Abstract – An indoor positioning system (IPS) is offered to estimate the object's position indoors to track missing persons in the crowd. This localization technique was created to replace the Global Positioning System (GPS) role for a narrower coverage area. One of the ranging parameters commonly used in IPS is the Received Signal Strength Indicator (RSSI), which is a radio signal emitted from a certain distance by the transmitter and received on the receiving device. The signal received is used to estimate the position of an object around the transmitter device based on its proximity. This paper proposes a method of Wi-Fi signal clusterization that has been collected using the fingerprint technique. K-means algorithm is retrieved to determine the optimal k value on each Access Point in the observation area. The assignment of this value is carried out by silhouette score and elbow method. Furthermore, with the predefined k, the classification by K-means is executed. In the online phase, the received signal data from each Access Point is compared with the data that has been clustered, afterward, the most enormous RSSI value is obtained, which expresses the proximity of the object to one of the Access Points. RSSI data collection and the appearance of position estimation results are carried out using the MyTect application. This application is designed for easy localization access in one application. The experiment result shows that the average optimal k value on each Access Point was 4, and the accuracy of the resulting position estimation reached 77%.

Keywords: Indoor Localization, Received Signal Strength Indicator, K-Means, Fingerprint

Energy Efficiency of The Cooperative Communication Systems With Energy Harvested at Source and Relay Using Battery Power at Relay

Ines Sastre Umayya[1], Annysa Aprilya[2], Meyra Chusna Mayarakaca[3], Muhamad Milchan[4], Yoedy Moegiharto[5], Hendy Briantoro[6]
[1,2,3,4,5,6]Telecommunication Engineering
Electronic Engineering Polytechnic Institute of Surabaya
Surabaya, Indonesia
[1]inessastreumayya@te.student.pens.ac.id
[2]annysaprilya@te.student.pens.ac.id
[3]meyrachus@te.student.pens.ac.id
[4]milchan@pens.ac.id
[5]ymoegiharto@pens.ac.id
[6]hendy@pens.ac.id

Abstract – The effects of the energy harvested (EH) technology and battery power at relay which are used together in a cooperative communication system with amplify and forward (AF) relaying protocol are investigated in this work. The Time Switching based Relaying (TSR) protocol is used for harvesting energy process at source and at relay. Also the optimal relay selection scheme is used to select a best relay among three relay nodes. From the simulation results, it can be shown that the high time switching factor (ρ) of TSR protocol, the low battery transmit power of access point at relay (PAp), and the low noise gain (N0) will result the good EE performance. At a distance of 160 meters, each addition of 0.05 ρ has an effect on increasing the EE performance of the system by about 0.88%; beside that, if PAp value is reduced by 0.01 watts, the EE performance will increase by about 2.46%; also, each 10 dBm N0 reduction will give up to 11.8% better EE performance.

Keywords: energy harvesting, time switching relaying protocol, energy efficiency.

Realtime Weather Prediction System Using GRU with Daily Surface Observation Data from IoT Sensors

Hendri Darmawan[1], Mike Yuliana[2], Moch. Zen Samsono Hadi[3]
[1,2,3]Department of Electrical Engineering,
Electronics Engineering Polytechnic Institute of Surabaya (EEPIS),
Surabaya, Indonesia
[1]hendridarmawan@te.student.pens.ac.id, [2]mieke@pens.ac.id, [3]zenhadi@pens.ac.id

Abstract – Weather is an essential part of everyone's life, but its dynamic nature makes weather forecasting difficult. In this research, we propose a system that makes daily weather predictions in Sedati, an administrative district in the Sidoarjo Regency, Indonesia. The system uses Gated Recurrent Unit (GRU) algorithm that is fed with historical weather data from the BMKG Juanda Meteorological Station. On the test data, the GRU regression model resulted in the best average RMSE for four days' worth of prediction with humidity, wind speed, temperature, sea level pressure, maximum wind speed, minimum temperature, maximum temperature, and dew point at 3.7325; 1.31; 0.64; 0.85; 2,065; 0.7125; 0.6825; and 0.705. However, the average RMSE score of those variables after we integrated the model with local IoT devices were 5.6; 2.3; 1.56; 0.57; 2.47; 3.04; 1.78; and 0.55, respectively. The sequence GRU model for rain classification achieved an accuracy of 0.88, and the accuracy after the model was integrated with the IoT devices was 0.75.

Keywords: Weather Prediction, RMSE, Internet of Things, Gated Recurrent Unit, Time Series Data

Analysis of Lightweight Boat Communication Equipment Performance for Data Transmission onVHF Long Range (LoRa) Onshore Network System

Okkie Puspitorini[1], Ari Wijayanti[2], Haniah Mahmudah[3], Nuradi Siswandari[4]
[1,2,3,4]Program Studi Telecomunikasi Department Teknik Eletro Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
[1]okkie@pens.ac.id, [2]ariw@pens.ac.id, [3]haniah@pens.ac.id, [4]nuradi@pens.ac.id

Abstract – Traditional fishermen with boats measuring 30 GT and below often do not meet communication and navigation safety standards equipment to avoid get lost and violate national border. This research conducted is to design a ship communication equipment in the VHF maritime frequency band using Long Range technology for data communication in coastal area. VHF channel was chosen because the characteristics of wave propagation are more resistant to interference for communication in the maritime sector. By a modem device on each fishing boat as a node   that can send and receive messages and become repeaters. The data receiver system and gateway are the wireless transceiver module and raspberry pi on coastal area. They are used to process information packages from fishermen equipment's while forwarding the information to the database server. The distances between two nodes that communicate is determined by Haversine method through two coordinates of each node. Each device on a boat equipped with a Global Positioning System (GPS) to determine the coordinates of the ship's position in real-time and accurate. The interface on the communication device on the fishing boat is implemented using the Liquid Crystal Display (LCD) screen and input button to facilitate the fishery in its operation. As indicated by the experiments base evaluation, showed that the VHF Wireless Transceiver radios could reach 7.27 kilo meters distance with 27dBm transmission power. Total Packet Error Rate is 5,98% occurs because the transceiver module working on the VHF frequency and lower bandwidth. Based on analysis of the results, communication devices for light-weight boat with Long Range network are able to overcome problems in boat to boat onshore communication.

Keywords: data transmission, VHF, Long Range network, onshore communication

IDEA Encryption System for Data Acquisition on Autonomous Underwater Vehicle

Nanang Syahroni[1], Hari Wahjuningrat S[2], Djoko Santoso[3], Widya Andi Palupi[4],
Risky Ageng Kharisma[5]
[1,2,3,4,5]Program Studi Teknik Telekomunikasi
Departemen Teknik Elektro
Politeknik Elektronika Negeri Surabaya
Kampus PENS, Jalan Raya ITS Sukolilo, Surabaya 60111
Phone (031) 594 7280; Fax: (031) 594 6114
Email:[1]nanang@pens.ac.id, [2]hari@pens.ac.id, [3]djoko@pens.ac.id

Abstract – One of the equipment that was previously only used for military purposes, but is now being expanded as a commercial facility that can be used for research is Autonomous Underwater Vehicles (AUV). This vehicle has been used for oceanographic studies and for military purposes for several years. And now the AUV is more concentrated as an investigative tool for underwater research.
Many sensors support the work system of the AUV itself and also as a parameter of a real condition during research. From the data, it can also be concluded that the model or condition of the underwater area on that side can be concluded. With the facts on the ground regarding the importance of monitoring the underwater state data, we provide a new breakthrough for monitoring the data automatically. So that the confidentiality of data that is information from the machine is not spread widely, an IDEA (International Data Encryption Algorithm) data encryption is used. For sending and receiving of machine information data.

Keywords: AUV, IDEA, Sensor, Encryption

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Towards Shortest Path Finding System Using Fuzzy-Dijkstra Method for Emergency Routing Problem

Gholyf Al Mustafid[1], Prima Kristalina[2], and I Gede Puja Astawa[3]
Department of Electrical Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
[1]gholyf@te.student.pens.ac.id, [2]prima@eepis-its.edu, [3]puja@pens.ac.id

Abstract –An accident is an event that no one expected, and if it happens, the indispensable action is quick to help the victim. Traffic congestion is one of the causes of slow assistance to accident victims in a big city. With such a large population and high mobility, the highway becomes the choice of travel access from the origin to the destination. The accumulation of traffic during peak hours on the road causes difficulty in accessing ambulances in charge of transporting accident victims or cops in charge of breaking traffic jams, to quickly go to the accident scene. The method of finding the shortest path is the right solution to get an alternative route that can be used by ambulance drivers or cops to go to their destination immediately. This paper proposes a combination of the Fuzzy-Dijkstra method for finding the shortest path. This method is an improvement of the Dijkstra, which only takes into account distance as a weight in determining the shortest path. By adding the Fuzzy Sugeno method, we set the road density and road section length as the weight parameters of each path. The Dijkstra algorithm will be executed using the weights that have been generated from Fuzzy, to calculate the shortest path. The experimental results showed that the weight value of the Fuzzy with 5 membership functions yields a shorter path better than 3 membership functions. The more reference nodes that are used as vertexes on the graph, it forms the shorter and more compact path. Meanwhile, the accuracy of the proposed system is 86.72% when compared to the optimal distance by Google Map. The reason is that Google Map has a large coverage area and more detailed geographical information.

Keywords: Fuzzy-Dijkstra, shortest path, weighted, emergency.

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Analysis Performance of QoS and QoE Digital Television in Urban Area

Yorda Safiro Doveriandi[1], Ari Wijayanti[2], Martianda Anggraeni[3], and Ida Anisah[4]
Department of Electrical Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
[1]yordadoveri@te.student.pens.ac.id, [2]ariw@pens.ac.id,
[3]martiandaerste@gmail.com, [4]idaanisah12@gmail.com

Abstract –Indonesia is currently starting to implement a digital TV broadcasting system where digital TV provides benefits in the form of cleaner, clearer, and more stable images and sound. Despite using a more sophisticated system, it is hoped that the use of existing devices can still be used to receive digital TV broadcasts so that users do not need to upgrade their devices. With a dense and diverse population of utilities, the implementation of broadcasting in urban areas often experiences problems on the user side. Objects such as trees, houses, or high-rise buildings, cause the signal from the transmitter undergoes multipath fading to be received by the user which cause the quality of service and quality of experience is not as expected. Measurements were made for two TV stations that have broadcast digitally in Surabaya, namely channels 27 UHF and 41 UHF. Both of these transmitters are located in Sambikerep sub-district. Field measurement were taken in 10 locations in Surabaya for fixed condition. The measurement results using the Yagi Uda antenna show that this antenna can still be used for digital TV reception in urban area. While digital TV broadcasts are acceptable, some locations show poor quality results due to multipath fading. From the measurement results in 10 locations in Surabaya, for QoS measurement, 80% has a good classification, 15% has a fair classification, and 5% has a poor classification. For QoE measurement, 15% have good classification and 85% have fair classification.

Keywords: DVB-T2, Urban Area, Quality of Service, Quality of Experience, Field Measurement.

Symmetric Key Generation Use Received Signal Strength for V2V Communication

Izza Saputra[1], Amang Sudarsono[2], and Mike Yuliana[3]
Department of Electrical Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
[1]izzasaputra17@te.student.pens.ac.id, [2]amang@pens.ac.id, [3]mieke@pens.ac.id

Abstract –This paper proposes a symmetric key generation scenario to secure information on V2V (Vehicle-to-Vehicle) communications. This research uses the Raspberry Pi 3 as an OBU (On-Board Unit), which is installed on each vehicle. The key generation mechanism uses the Ad-Hoc network to get the RSS (Received Signal Strength) value between two communicating vehicles for further processing to produce an equivalent key between vehicles. The key that has been generated is used to secure the information so that it cannot be captured or stolen by others. When retrieving RSS data, various speed and ping time interval scenarios are used to see system performance. Based on the test results, it can be seen that the Kalman Filter can increase the correlation of RSS data up to 0.967. The resulting key can produce the highest KGR of 9.600 bit/s, and the KDR in all scenarios can reduce to 0%.

Keywords: V2V, received signal strength, symmetric key, Kalman Filter.

IoT Based Climate Prediction System Using Long Short-Term Memory (LSTM) Algorithm as Part of Smart Farming 4.0

Devina Shafa Anindya[1], Mike Yuliana[2], and Mochammad Zen Samsono Hadi[3]
Department of Electrical Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
[1]dvn2999@te.student.pens.ac.id, [2]mieke@pens.ac.id, [3]zenhadi@pens.ac.id

Abstract –Climate is an important element in human life. Climate change can cause many impacts in various fields such as industry, agriculture, livestock, and others. Agriculture is one sector that takes advantage of climatic conditions to maintain the quality of crop production. In this paper, a climate prediction system is proposed to support smart farming 4.0 to produce good quality and quantity of crop production and reduce losses. This system provides climate prediction information using Long Short-Term Memory (LSTM) method. The weather elements used in this research are temperature, humidity, rainfall, duration of sunlight, and wind speed with sensors data retrieval and processing supported by the Internet of Things. Predictions of the amount of monthly rainfall are processed to produce climate types and crop planning in a certain area. The results of the prediction model training test using the LSTM algorithm with filtering obtained the best model with a monthly data resample scenario with a value of n or time steps is 2 months, distribution of 80% train data and 20% test data, 48 batch size usage, amount of LSTM units 120 with 256 hidden layer neurons. Produce an RMSE value of 30.54, R2 score of 0.74, a loss of 0.0247, a validation loss of 0.0282, a prediction computation time of 1.746 seconds on the train data, and 0.068 seconds on the test data.

Keywords: climate prediction, smart farming, Internet of Things, Long Short-Term Memory.

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3-Dimensional Static Environment Multihop Communication System for SAR Team

[1]Amalia Rizki Fadhila, [2]Mochammad Zen Samsono Hadi, and [3]Prima Kristalina
[1]Surabaya City Sar Team, Indonesia
[1,2,3]Department of Electrical Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
[1]amaliarizkifadhila@te.student.pens.ac.id, [2]zenhadi@pens.ac.id, [3]prima@eepis-its.edu

Abstract –Natural disasters are events that often occur beyond human predictions. In early 2021, a natural disaster struck Indonesia with many casualties. In evacuating disaster victims, a good communication system is needed between the SAR Team, but damage to telecommunication infrastructure due to natural disasters can hinder the SAR Team's communication. Along with the development of technology, WSN (Wireless Sensor Network) developed a multihop communication system using Zigbee communication module, where the sensor nodes will forward each other packets to other nodes to the Local Database. This prototype can facilitate the communication of the SAR Team in determining rescue priorities with the haversine method as a determinant of the closest distance between the rescue point and the victim monitoring point. This communication system can help the SAR team to determine the priority of the closest rescue point, although the average value obtained is 0.001 meters but it is very important in priority rescue.

Keywords: 3D Communication System, Multihop, Zigbee, SAR Team, Haversine.

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Environmental Condition Monitoring and Decision Making System Using Fuzzy Logic Method

Hasan Hasan[1], Haryadi Amran Darwito[2], and Amang Sudarsono[3]
Department of Electrical Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
[1]hasan@te.student.pens.ac.id, [2]amran@pens.ac.id, [3]amang@pens.ac.id

Abstract –Currently, air pollution is still a problem that requires special attention, especially in big cities. Air pollution can come from motor vehicle fumes, factory smoke or other particles. To overcome these problems, a system is made that can monitor environmental conditions in order to know the good and bad of air quality in an environment and is expected to be a solution to reduce air pollution that occurs. The system created will utilize the Wireless Sensor Network (WSN) combined with Smart Environment PRO, so that later data will be obtained in the form of temperature, humidity, CO levels and CO_2 levels. From the sensor data that has been processed on Smart Environment PRO, it will then be used as input for data processing using a fuzzy algorithm. The classification obtained from sensor data processing using fuzzy to monitor environmental conditions there are 5 classifications, namely Very Good, Good, Average, Bad and Dangerous. Later the data that has been collected will be distributed to a gateway and will be stored in the database. The process of sending information between one party to another needs to pay attention to the confidentiality of data and information. The final result of the implementation of this research is that the system is able to classify values using fuzzy algorithms and is able to secure text data that will be sent to the database via Gateway, and is able to display data sent to the website in real time.

Keywords: Wireless Sensor Network, Internet of Things, Fuzzy Logic, Advanced Encryption Standard.

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INDONESIA SECTION

Multihop Communication System in 2D and 3D Environments on WSN for Disaster Applications using NS-3

Hestina Novi Dianti[1], Mochammad Zen Samsono Hadi[2], Aries Pratiarso[3], and Prima Kristalina[4]

Department of Electrical Engineering

Politeknik Elektronika Negeri Surabaya

Surabaya, Indonesia

[1]hestinanovi@te.student.pens.ac.id, [2]zenhadi@pens.ac.id, [3]aries@pens.ac.id, [4]prima@eepis-its.edu

Abstract –Indonesia is a country prone to natural disasters. This natural disaster results in disaster victims. In the search for victims of this disaster, an additional communication system is used to facilitate the evacuation of victims, namely by using the Wireless Sensor Network (WSN). The implementation of a multihop communication system with WSN is carried out in a network routing simulation on the Network Simulator (NS-3) software that is able to streamline the use of communication systems used by the Search and Rescue Team in the search for victims of natural disasters. The best QoS result based on the research that has been done is with the use of the DSDV routing protocol. In the simulation of disaster areas with this protocol, results were obtained in the form of a throughput of 4.9925 kbps with a delay of 50.025 ms. In addition to that, there was a Packet Delivery Ratio (PDR) of 98.24% with a packet loss of 1.76%.

Keywords: WSN, Multihop, NS-3.

System Design for Air Quality Monitoring and Classification using Artificial Neural Network with Hyperparameters Optimization

Andika Kusmahendra[1], Haniah Mahmudah[2], and Rahardhita Sudibyo[3]
Department of Electrical Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
[1]andikak@te.student.pens.ac.id, [2]haniah@pens.ac.id, [3]widi@pens.ac.id

Abstract –Indonesia Air pollution in both urban and rural areas was estimated to have died 4.2 million people worldwide, with developing countries accounting for 91% of these deaths. Indonesia, a developing country, is one of the world's ten most polluted countries. AQMS (Air Quality Monitoring Station) which is static and only numbered 36 units throughout Indonesia make the process of monitoring air quality less evenly distributed to the regions. Therefore, in this research will be made a device to monitor and classify air quality by mobile. This study will focus on monitoring air quality with sensors and then displaying the results on a website to make it easier for users to access and read the results of air quality mapping, this website is GIS-based website. ULPSM sensors were used in this study for gas parameters CO, NO2, O3, and SO2, and PMS5003ST sensors for PM2.5 and PM10 parameters. The air quality classification method using ANN (Artificial Neural Network) with hyperparameter tuning approach for a better model performance. The best hyperparameter variables is confirmed trough the experiments resulting the better prediction accuracy.

Keywords: Air Quality, Hardware design, Neural Network, Internet of Things, Smart City.

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Improvement of PSNR by Using Shannon-Fano Compression Technique in AES-LSB StegoCrypto

Wildan D Walidaniy[1], Mike Yuliana[2], and Hendy Briantoro[3]
Department of Electrical Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
[1]wildanwalidany21@te.student.pens.ac.id, [2]mieke@pens.ac.id, [3]hendy@pens.ac.id

Abstract –One way to write information data is by using cryptography and steganography. Cryptography converts information messages into a form that can no longer be understood. In comparison, steganography is used to insert a secret message into the container media such as images or sounds so that someone will not be aware of the existence of the secret message. The combination of cryptography and steganography methods aims to provide a high level of security for information data. In this paper, we propose the use of the Shannon-Fano compression technique to increase the PSNR (Peak Signal-to-Noise Ratio) value of the steganography image. The StegoCrypto algorithm used is the AES (Advanced Encryption Standard) cryptographic algorithm which is the current standard for symmetric key encryption and the LSB (Least Significant Bit) steganography method. The use of the compression technique with the Shannon-Fano method aims to reduce the amount of embedded data so that it increases the value of the PSNR steganography image. From the test results, the resulting performance for the PSNR value from the combination of methods produces a value above 40, which means it is still above the criteria for a good steganography image and up to 2.785 dB or 89% better than a system that does not use a compression process.

Keywords: Advanced Encryption Standard, Least Significant Bit, Shannon-Fano, PSNR

Information Loss of Secret Key from Improper Quantization Decision in Wireless Physical-Layer Security with False Channel Statistics Knowledge

Apirath Limmanee

King Mongkut's Institute of Technology Ladkrabang, Thailand

apirath.li@kmitl.ac.th

Abstract –In wireless physical-layer security, it is usually suggested in literature that eavesdroppers need to locate themselves near legitimate transmitters or receivers if they want to steal some secret key information. By means of scenario analysis, this paper shows that if the eavesdropper knows the channel statistics better than the legitimate stations, e.g., know the K-factor estimates of Rician fading channel, they can exploit these knowledges to derive some secret key information. We define a concept called "improper quantization decision loss (I_IDL)" as the entropy loss in the generated key that can be obtained by the eavesdropper. We show step-by-step how the eavesdropper can obtain such information. We also propose mathematical expressions of I_IDL based on empirical values of channel parameters available in literature. If the legitimate parties are aware of this approximated I_IDL, they will be able to design suitable privacy amplification scheme for preventing key information loss.

Keywords: Physical-Layer Security, Wireless Communication, Channel Quantization, Cryptography.

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Implementation of Air Quality Monitoring for Traffic Routing

Rahajeng Rahmadhani[1], Mike Yuliana[2], and Rahardhita Sudibyo[3]
Department of Electrical Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
[1]rahajenggr@te.student.pens.ac.id, [2]mieke@pens.ac.id, [3]widi@pens.ac.id

Abstract –The air condition on the streets in big cities like Surabaya which tends to be exposed to pollution, makes the roads not good for health, especially for motorists. People who want to drive do not know which road areas have good air quality. In this paper, a traffic routing system based on air quality will be proposed. Several air quality parameters used include carbon monoxide (CO), carbon dioxide (CO_2), and methane (CH_4). From the test results, it can be seen that the traffic routing that has been made can avoid the U (Unhealthy) area by 79.9%, avoid the VU (Very Unhealthy) area by 20%, and avoid the D (Dangerous) area by 30%. With this traffic routing system, it is hoped that users will be more aware of air conditions when driving, help them become aware of air pollution, especially in Surabaya, and hope that many will follow and reduce air pollution in Surabaya.

Keywords: air condition, traffic routing system, air quality.

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INDONESIA SECTION

RAMI: Security System of Information Exchange Based on Shared Key Generation in Vehicle-to-Vehicle Communication

Muhamad Ramdhan Syaadillah[1], Amang Sudarsono[2], and Mike Yuliana[3]
Department of Electrical Engineering
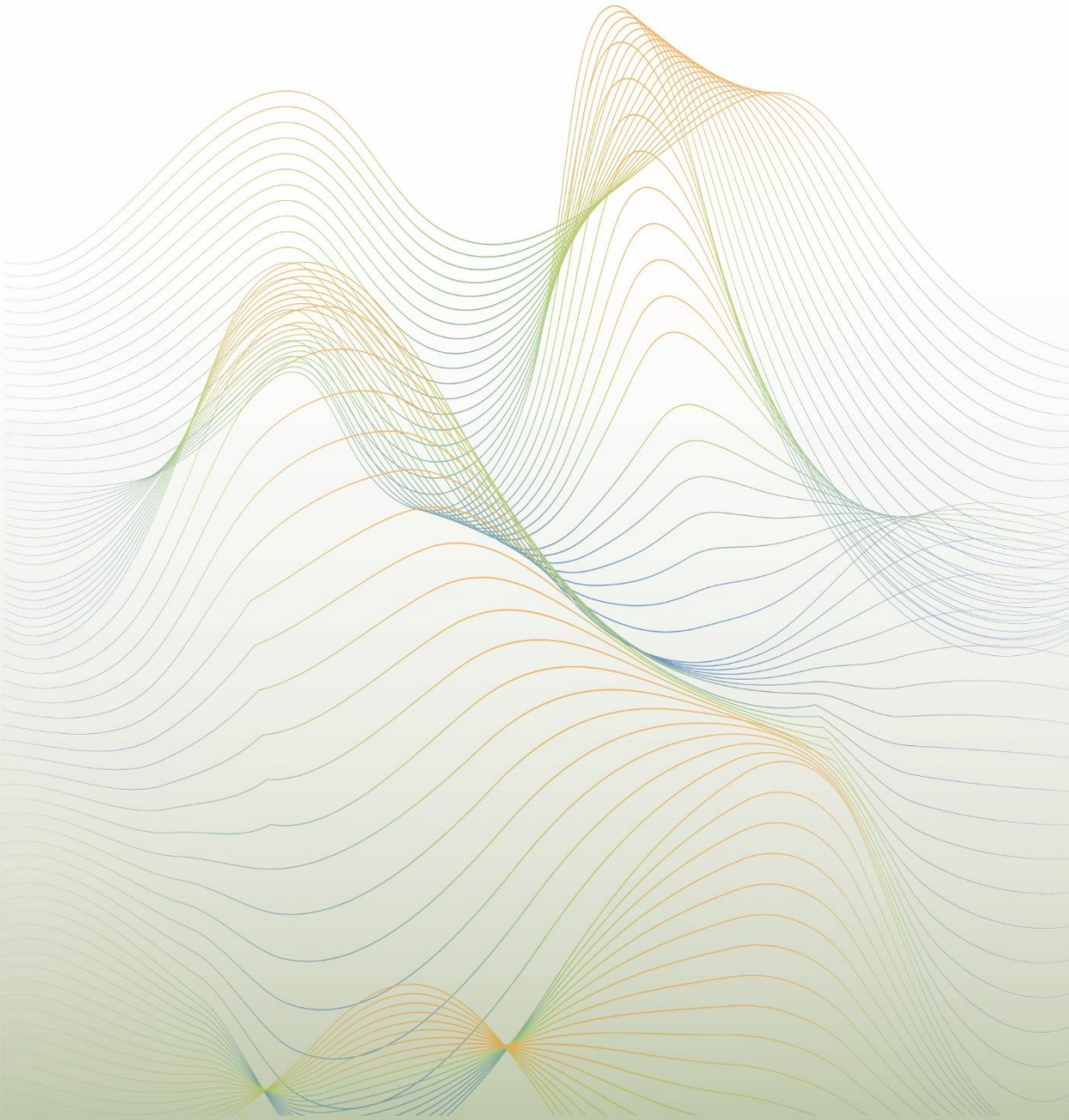Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
[1]dhansyaadillah@te.student.pens.ac.id, [2]amang@pens.ac.id, [3]mieke@pens.ac.id

Abstract –V2V (Vehicle-to-Vehicle) communication is an intelligent transportation system technology that prioritizes driving safety. We propose a system called RAMI that uses the unique RSS (Received Signal Strength) signal strength on a wireless network to generate a shared secret key. We varying testing in speed and of certain ping intervals of time. The correlation of the data obtained from the RSS value is improved by using the Kalman filter. Meanwhile, single-bit quantization with Mathur quantizer combined with Level Crossing is used to suppress the key disagreement ratio (KDR) value. The remaining bit errors will be corrected with the BCH Code, to increase the value of the key generation rate (KGR). To scramble the bits, Universal Hash is used and SHA-256 is used for validation and verification. Triple-DES algorithm works to secure information that will be exchanged between vehicles in the form of latitude and longitude location points. The experimental results show that the practicality of the RAMI system produces a minimum of 4 keys and a maximum of 6 keys generated with an average system time of 11 seconds.

Keywords: V2V, secret key, RSSI, SHA-256, Triple DES.

04. [IES-ETA]

Robotics Technology and Control Systems

ERSOW Robot's Orientation Data Estimation Based on Landmark L-shape Recognition

Erna Alfi Nurrohmah[1], Iwan Kurnianto Wibowo[2], and Mochamad Mobed Bachtiar[3]
Department of Informatics and Computer Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
[1]ernaalfinur14@gmail.com, [2]reiwan30@gmail.com,
[3]mochamadmobed@gmail.com

Abstract –In this paper, the Robot's Orientation Data Estimation System was created based on Landmark L-shape Recognition to reduce the error value in the robot's orientation data. The estimation system is carried out based on the recognition of unique landmarks on the soccer field in the form of "L"-shaped lines to get the reference distance between the landmarks and the robot. The reference distance is used to get the orientation of the robot above the field according to the perception of the omnidirectional camera. In the orientation of the robot between the angle of -135° to -180°, the largest error value from the orientation of the robot produced by vision is 5.5° and the average error is 1.99°. In the robot orientation between the angles of 135° to 180° it has the largest error value from the robot orientation generated by vision is 4.6° with an average error of 1.77°.

Keywords: Orientation Robot, ERSOW robot, Data Estimation, omnidirectional camera, Landmark L-shape.

Development and Control of an Unmanned Ground Vehicle (UGV) Robotic Arm for Volcanic Material Sampling Based on Kinematics Modelling

Syafira Salsabilah[1], Mohamad Nasyir Tamara[1], Setiawardhana[2], Bima Sena Bayu Dewantara[2], Riyanto Sigit[2], Muhammad Anwar Sanusi[2]

[1]Department of Mechanical Engineering and Energy
[2]Department of Informatic and Computer Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
syafira.salsabilah04@gmail.com, nasir_meka@pens.ac.id, setia@pens.ac.id,
bima@pens.ac.id, riyanto@pens.ac.id, anwarsanusi0@gmail.com

Abstract –The Unmanned Ground Vehicle (UGV) Robot Arm is needed to take samples of volcanic material, namely material samples in the form of rocks from the Volcano which will later be studied more accurately. The focus of this research is on developing a robotic arm to take samples of volcanic material mounted on the UGV. The Robot Arm consists of 3-DOF (Degree Of Freedom) equipped with a Gripper to make it easier to take samples of the material from the Top of the Volcano. The Robot Arm is placed on the upper front of UGV Robot body. The movement of the Robot Arm utilizes Rotational Motion in each DOF. The Kinematic Model of this 3-DOF robotic arm was built using the Denavit Hartenberg method. This study discusses the movement of the robot arm with 3 degrees of freedom where the robot used has one kinematic strand consisting of 3 joints with the revolute type. The angle at each joint can be determined using a method used in this research, namely forward kinematics and inverse kinematics. Experimental activity shows that the error occurs because the mechanical system is less precise rather than the method used.

Keywords: UGV, Robot Arm, DOF, Denavit Hartenberg, Forward Inverse Kinematics

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Design and Realization of UVG Robot with Combined of Geared Wheel and Walked Mechanism for Uncertain Terrain in Volcanic Observation

Ronny Febriyanto[1], Mohamad Nasyir Tamara[1], Setiawardhana[2], Bima Sena Bayu Dewantara[2], Riyanto Sigit[2], Muhammad Anwar Sanusi[2]
[1]Department of Mechanical Engineering and Energy
[2]Department of Informatic and Computer Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
ronnyfebriyanto13@gmail.com, nasir_meka@pens.ac.id, setia@pens.ac.id, bima@pens.ac.id, riyanto@pens.ac.id, anwarsanusi0@gmail.com

Abstract - This paper focuses on the manufacture of mobile robots for volcanic observation. The robot moves with a semi-autonomous system, which use a remote, IMU sensor and lidar/ultrasonic sensor to assist the navigation. A new mechanical model incorporating the system and crawling is proposed to improve mobility in irregular areas of the volcano. And the proposed control method is behavior-based control, which shows that the IMU sensor and lidar/ultrasonic sensor are able to assist the robot's navigation to get past obstacles and the robot's initial destination, even if it is given a disturbance to change direction. With the new mechanical model the robot can pass through sandy terrain and other ground conditions with ease.

Keywords: UGV Robots, GUI, robot observation, wheel and walked system.

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Intelligent Biped Robot Simulation Locomotion using Deep Q Network

Hasan Imaduddin[1], Azhar Aulia Saputra[1], Indra Adji Sulistijono[2], Naoyuki Kubota[1]
[1]Mechanical Systems Engineering Tokyo Metropolitan University, Tokyo, Japan
[2]Department of Mechanics Engineering and Energy, Politeknik Elektronika Negeri Surabaya, Surabaya, Indonesia
hasan-imaduddin@ed.tmu.ac.jp, aa.saputra@tmu.ac.jp, indra@pens.ac.id, kubota@tmu.ac.jp

Abstract - This research suggests a deep Q-network learning approach coupled with a layered neural-based locomotion. An analog signal is produced by central pattern generation (CPG) in the higher layers and sent to motor neuron pools in the lower levels. Motor neurons produce joint angular velocity in the lower levels. The neural oscillator model in the spinal cord serves as the foundation for the central pattern generation. It reacts to the pattern of the driving model. Then, using a human musculoskeletal model, the inner state of motor neurons was constructed based on muscle activation. Additionally, the motor neuron (MN) pool is linked to the sensory neuron (SN), which transmits internal feedback from the robot. A humanoid robot simulation using the proposed concept has been used to carry various loads. Adjustments to the robot's behavior to maintain its stance.

Keywords: deep q network, neural-based locomotion, central pattern generation

Optimization of Chasing and Catching Skills on Robot Soccer ERSOW

Fadl Lul Hakim Ihsan, Bima Sena Bayu Dewantara, Iwan Kurnianto Wibowo
Department of Informatics and Computer Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
hakim@ce.student.pens.ac.id, bima@pens.ac.id, reiwan30@gmail.com

Abstract - The wheeled soccer robot competition is held annually in Indonesia and internationally through the Indonesian Robot Contest and Robocup Middle Size League (MSL) competitions. The rate of occurrence of the ball moving freely on the field during the match is quite high. At this time the movement of the ERSOW robot to catch the ball is by chasing and following the path of the ball on the field without taking into account the speed of the ball. The movement of the ERSOW Robot with this method is very vulnerable and can still be optimized. The ball is very susceptible to failure to be caught due to being controlled by the opponent or the ball being out. In addition, chasing the ball requires a longer time due to the path of the robot that continues to change following the current position of the ball movement. So the development of robot skills in chasing and blocking the ball is needed to increase the chance of controlling the ball. Based on the results of the literature study, was found a ball blocking ability on the soccer ball intercept robot. This research is focused on how the robot can chase and catch the ball with the ability to intercept. The robot's ability to know the direction of the ball's movement and cut the ball's movement or intercept is needed. By utilizing data processing from vision to obtain ball speed data and speed algorithm calculations, a more optimal method of chasing and catching the ball is obtained. Based on the results of the 180-degree angle experiment, the success of ERSOW in catching the ball using this method was 94.7%.

Keywords: Robot Soccer ERSOW, Ball Interception, Point Prediction, Ball Chasing, Robot Movement Optimization.

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UV-C Disinfection Robotic

Mohamed Zied Chaari, Mohamed Abdelfath, Christopher Loreno,
Rashid Al-Rahimi
Qatar Scientific Club (Fablab)
Doha, Qatar
chaari zied@ieee.org, mohamed.abdelfatah@qsc.org.qa,
ralrahimi@qsc.org.qa, chrisphjp@yahoo.com

Abstract - The authors and team developed a disinfection robot to achieve fast and precise disinfection under a specific disinfection zone. It solves problems with traditional robots that pay less attention to levels, efficiency, and disinfection zones. A digital system is applied to the disinfection robot to support and guarantee regular running for the whole system. The study aims to achieve a safe and high-efficiency disinfection system using a mobile robot. The designed robot comprises a mobile platform and an ultraviolet-C (UV-C disinfection batten). The UV-C lamps are installed on the end-effector to achieve large-scale, precise manipulation. By utilizing a range of ultrasonic sensors and creating an intuitive client interface, it is possible to enable remote control, path planning, data monitoring, and custom disinfection. We tested the feasibility of the development in the fabrication lab by disinfecting surfaces in three different locations, observing the dose distribution, and observing its effectiveness. The robot can disinfect an area quickly, precisely, and thoroughly.

Keywords: Medical robot, Disinfection, UltravioletC, Covid-19, UVC robot

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INDONESIA SECTION

Mechanical Design and Forward Kinematics Analysis of T-FLoW 3.0 Prosthetic Robot Hand: Lever-based Finger Movement Mechanism

Kevin Ilham Apriandy[1], Bima Sena Bayu Dewantara[1],
Raden Sanggar Dewanto[2], Dadet Pramadihanto[1]
[1]Department of Informatics and Computer Engineering
[2]Department of Mechanics Engineering and Energy
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
kevpasca@gmail.com, bima@pens.ac.id, sanggar@pens.ac.id, dadet@pens.ac.id

Abstract - In this research, a prosthetic robot hand that features a lever-based finger movement mechanism is proposed as the new approach to the T-FLoW 3.0 humanoid robot's hand development. The proposed approach performs both grasping and releasing movements by pushing or pulling the finger-attached lever. The lever is pushed or pulled by micro-servo, which uses a stiff bar to transfer the force from the servo-horn to the finger's lever. Our prosthetic robot hand is equipped with six joints, six SG92R micro-servos as actuators, and six force-sensitive resistors (FSR) as grasping feedback. 3D printing manufacturing technology is utilized to give the hand a realistic appearance, and PLA filament material is used in the manufacturing process to provide low-cost, lightweight, and easy maintenance. Static structural analysis simulation result lead to the conclusion that our prosthetic robot hand could sustain a load of around 30N. With the lever-based finger movement mechanism, the proposed approach is expected to overcome mechanical slip issues from finger movements, which are often experienced in the old approach of the T-FLoW 3.0 humanoid robot's hand development.

Keywords: T-FLoW 3.0 robot's hand development; prosthetic robot hand; mechanical design; lever-based finger movement mechanism; 3D printing; SG92R micro-servo; forward kinematics analysis; static structural analysis

Human Target Distance Estimation System Using Mono-camera On Human-Following Mobile Robot

Yohanes Dimas Tirta Tri Wicaksana, Akhmad Hendriawan, Niam Tamami
Department of Electrical Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
yohanesdimast@gmail.com, hendri@pens.ac.id, niam@pens.ac.id

Abstract - A reliable and accurate target distance estimation system is very much needed in the human-following mobile robot system. Because the distance estimation system is used as input to control the mobile robot so that it can follow the human and stably maintain the distance. In other studies, additional proximity sensors have been used, such as LiDAR, ultrasonic, and laser range sensors. But the use of additional proximity sensors requires more power and for components that are more accurate usually also require more power, thus saving power consumption is an important aspect of human-following mobile robots because of the limited battery capacity. In this paper, a human-following mobile robot system is proposed that uses a mono-camera as the primary sensor without additional sensors for the human target distance estimation to save power consumption. By using Google's human detection framework, Mediapipe, which can capture key points of the human body, this distance estimation system can be more efficient. Because it does not require additional energy by using the same output from the Mediapipe detection results, unlike using additional proximity sensors. The test results show that the use of the proposed method does not increase the power used during the detection and distance estimation process, and the results of the estimated distance have a small error with an average error of 1.3% with the human target being at a distance of 60cm to 180cm.

Keywords: human tracking, range finder, object distance, human detection, PID controller

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Automated Library System Mobile Robot using A-Star Algorithms

Heri Nur Alim, Niam Tamami, Ali Husein Alasiry
Department of Electrical Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
herinuraliim@ee.student.pens.ac.id, herinuraliim@ee.student.pens.ac.id,
niam@pens.ac.id, ali@pens.ac.id

Abstract - Currently, libraries have realized many aspects of information technology such as book purchases, book collections, RFID, databases and other technologies that improve library management and service levels. One of the technologies used is library robots. Library robots are the integration of automation and information in daily library applications, which can increase the level of library automation. One of the automation systems that need to be applied in the library management system is a robotics system that can arrange books into bookshelf automatically in order to facilitate an automatic and structured book return system. An example is in a library where books must be arranged according to category or title, so that readers can easily find books. But if someone has finished reading a book, sometimes someone forget to put the book back in its place. Placing books in the wrong place can make it difficult for someone to find the book, this will also increase the work of the librarian. For this reason, library management system need an automated mobile robot system to solve the above problem using RFID to recognize book title and A-Star Algorithm to mobile robot move. The a-star algorithm will be used to calculate the closest path for the mobile robot when finding the location of the bookshelf to place books, so that it will shorten the time the mobile robot returns book to the bookshelf. Based on the results of the A-Star algorithm calculation in the case of finding the closest route in the library area, get accurate results and get the closest path from start to finish by considering the final result of the calculation $f(n) = g(n) + h(n)$. Therefore, the A-Star algorithm is recommended to find the closest route calculation which in this case is used to find the fastest route in returning books to the shelves in the library.

Keywords: library, book, mobile robot, RFID, A-Star algorithm

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INDONESIA SECTION

The Comparison of Image Enhancement Methods for A Realtime Under Water Vision System of The Break Water Implementation

Bayu Sandi Marta, Muhammad Amin A, Dewi Mutiara Sari,
Haryo Dwito Armono
Departement of Informatics and Computer Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
bayu@pens.ac.id, abdullahm181@ce.student. pens.ac.id,
dewi.mutiara@pens.ac.id, armono@oe.its.ac.id

Abstract - The implementation of computer vision in the field of underwater image is currently very popular. However, Indonesia's vision system for breakwater work has not yet been implemented. The work of the vision system is still manual using divers [1]. In addition, the application of computer vision in underwater images has a big obstacle because the resulting image in an underwater environment has poor color and contrast. This poor color and contrast are due to a density nearly 1000 times denser than air. This density directly affects the light transmission, which affects the resulting image, which has less color and contrast than the image taken through the air. So it takes image processing such as Image Enhancement and Image Color Restoration [2]. Another issue is building a real-time system. If the system that is built is not real-time, this makes the possibility of data reading errors being significant, and the movement of information is slow [3]. This research presents methods regarding image enhancement and color restoration built in the Graphical User Interface (GUI). The methods applied in this research are Histogram Equalization (HE), Contrast Limited Adaptive Histogram Equalization (CLAHE), and Multi-Scale Retinex with Color Restoration (MSRCR). Those methods are applied to the images produced by the two cameras and run on the single board processor and laptop for the comparison. The result by using 71 underwater images shows that for Underwater Color Image Quality Evaluation (UCIQE) value of the Histogram Equalization (HE) Method yields 20%, meanwhile for Contrast Limited Adaptive Histogram Equalization (CLAHE) yields 8%, and the MultiScale Retinex with Color Restoration (MSRCR) method yields 72%.

Keywords: Image Enhancement, Image Color Restoration, HE, CLAHE, MSRCR, UIQM, UCIQE

Implementation of Deep Learning on Obstacle Avoidance System PENSHIP Ship robot

Hendika Putra Madani, Iwan Kurnianto Wibowo, Mochamad Mobed Bachtiar
Departement of Informatics and Computer Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
mrhendikaputra@gmail.com, reiwan30@gmail.com,
mochamadmobed@gmail.com

Abstract - This study proposes an autonomous system for detecting objects in the form of a ball which is assumed to be the trajectory of the PENSHIP ship robot. In following the trajectory, the ship robot is prohibited from being operated manually by remote control or using additional sensors such as ultrasonic sensors, laser sensors, proximity sensors or GPS tracking. This study uses an image/camera detection option using Deep Learning with YOLO model to identify obstacles in the ship robot's track area, which will be implemented on the PENSHIP ship robot. The resistance data will be labeled and use the YOLO model. The results of this object recognition system succeeded in detecting the type of obstacle in the form of a ball with a YOLOv5 model with an accuracy of 90% at a distance of 2-5 meters from the obstacle. In the process of forming the Obstacle Avoidance System, the centroid value was successfully detected for each object bounding box and the simulation test results from the Obstacle Avoidance System that classified the movement direction of the ship was successful with 100% accuracy with PWM duty cycle 30% for BLDC Motor speed. With this system, the PENSHIP Robot Ship will continue to follow the trajectory and avoid crash with the obstacles in front of it.

Keywords: Obstacle Avoidance, Vision Processing, Deep Learning, Autonomous Ship, Tensorflow, YOLO

# Estimation of Ball Position Using Depth Camera for Middle Size Goalkeeper Robot

Dekasari Putri Suwandi Iwan Kurnianto Wibowo, Mochamad Mobed Bachtiar
Departement of Informatics and Computer Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
dekasari@ce.student.pens.ac.id, reiwan30@gmail.com,
mochamadmobed@gmail.com

Abstract - EEPIS Robot Soccer On Wheeled (ERSOW) has a goalkeeper robot used as a defense to prevent the opposing team from scoring goals. The ability to detect the ball is one of the main abilities that a goalkeeper robot must-have. The goalkeeper robot needs the ability to able to detect the ball when it bounces in the air. In this research, a ball detection system will be designed for the goalkeeper robot using a Depth Camera which is placed above the robot's head and facing perpendicular to the front from the robot's point of view. The depth camera was chosen because it has a 3D-based object recognition feature so that it can be used to calculate the distance between the robot's position and the ball even though the ball is soaring in the air. Data from the depth camera will be presented in Red, Green, Blue, and Depth (RGB-D) formats. The image from the camera reading with the Depth format will be processed for estimation of the ball's position. The results of the position estimation test get an average position error on the X, Y, and Z axes of 69.53 mm, 46.11 mm, and 65.77 mm.

Keywords: Estimation of ball position, ERSOW goalkeeper robot, RGB-D Camera, Deep Learning

05. [IES-KCIC]
Knowledge Base and Engineering
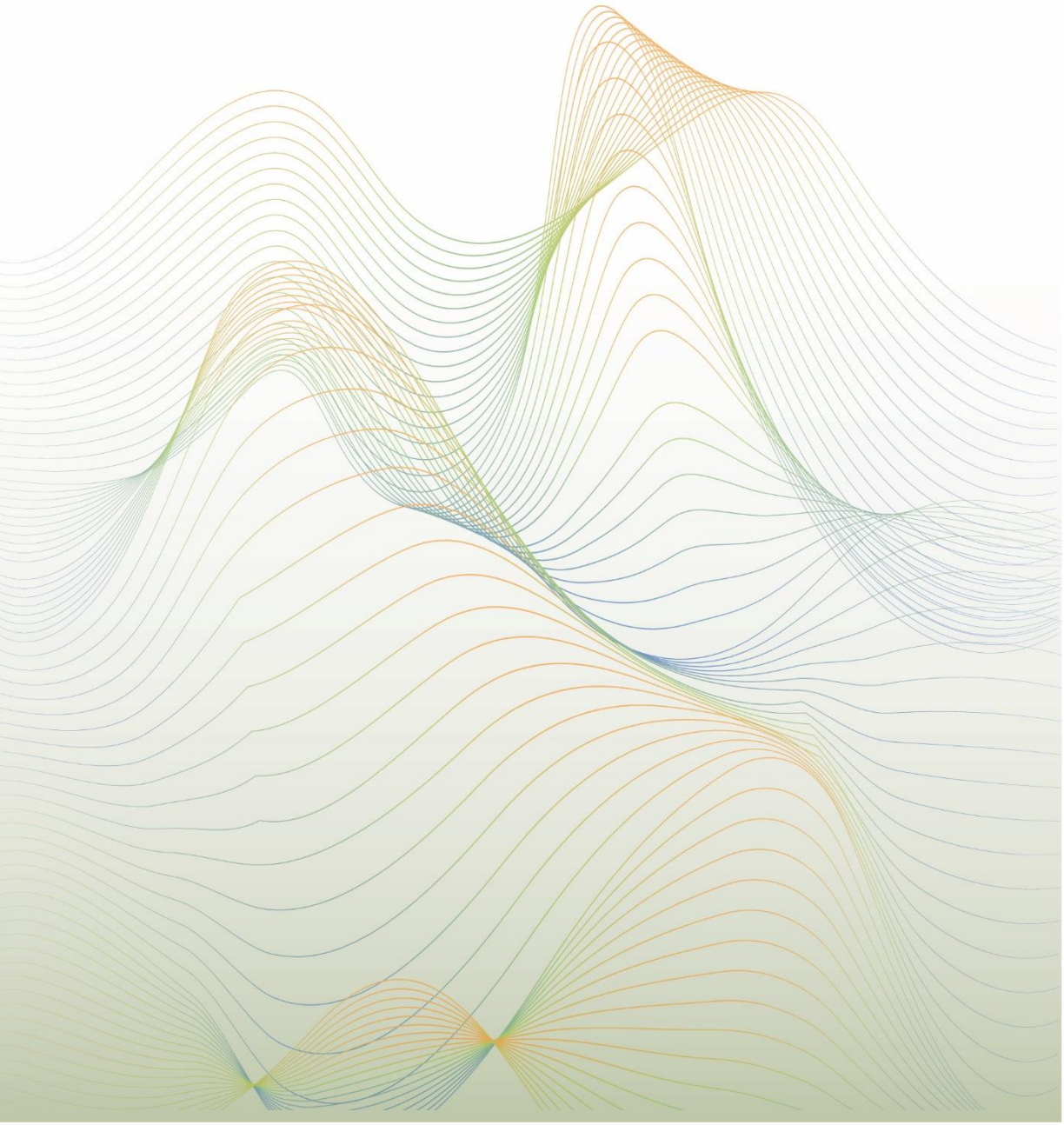
Movies Analysis on DBpedia and Wikidata Using Community Detection and Centrality Algorithms

Tri Puspa Rinjeni, Sri Suci Indasari, Ade Indriawan, Nur Aini Rakhmawati
Department of Information Systems
Institut Teknologi Sepuluh Nopember
Surabaya, Indonesia
pusparinjeni@gmail.com, sri.suciindasari@gmail.com, aindriawan1@gmail.com,
nur.aini@is.its.ac.id

Abstract - The entertainment industry, especially movies, has a wide spectrum of markets. The popularity of the movie can be seen from several aspects, such as actors who play, genres, directors, producers, and opinions. This research aims to conduct movie analysis using community detection and centrality algorithms. The dataset used was taken from DBpedia and Wikidata using Federated SPARQL Query. We detect the community using the Speaker-Listener Label Propagation Algorithm (SLPA). In addition, the study observes the dataset using two centrality algorithms, Closeness and Betweenness. The findings showed that Lincoln is the most popular movie. This movie belongs to the genre of found footage, thriller movie, horror movie, science fiction movie, speculative fiction movie, and pseudo-documentary. The famous actor is Desmond Llewelyn, who played in popular film.

Keywords: DBpedia, Federated SPARQL Query, Knowledge graph, Movie genre, Community detection, Centrality algorithms, Wikidata

Semantic Software Traceability Using Property Listing Task: Pilot Study

Adhatus S. Ahmadiyah, Siti Rochimah, Daniel Siahaan
Department of Informatics
Institut Teknologi Sepuluh Nopember
Surabaya, Indonesia
adhatus@if.its.ac.id, siti@if.its.ac.id, daniel@if.its.ac.id

Abstract - In recent years, the quest for finding practical software traceability approaches has intensified. Several existing approaches have not utilized every level of information in creating trace link pairs, so their accuracy is low. Since software artifacts are term-heavy, semantics becomes an essential feature. This study proposes a comprehensive concept-based Property Listing Task (PLT) encompassing semantic, structural, and physical features for traceability. PLT is a novel concept in software traceability in which it extracts properties from software artifacts. PLTs from source and target software artifacts are used as a guide in finding the trace link. Based on our case study experimentation on Coffee Maker Project, the result indicates that the proposed Property Listing Task can generate an accurate trace link.

Keywords — property listing task, semantic, software, traceability.

RIP and OSPF Routing Protocol Analysis on Defined Network Software

Arief Agus Sukmandhani, Muhammad Aulia, Jenny Ohliati
Binus Online Learning, Bina Nusantara University, Indonesia
arief.sukmadhani@binus.edu, muhammad.aulia007@binus.ac.id,
jenny.ohliati@binus.ac.id

Abstract - In building a network, routing technology is needed to connect between networks. Software-Defined Network (SDN) is a network paradigm where the control plane is separate from the data plane, making it easier for us to configure on the control plane side, so in this final project, a simulation is carried out to determine the performance of OSPF and RIP routing protocols on a small-scale SDN network using an emulator mininet and POX controller. The results of performance testing of RIP and OSPF routing implementations on SDN networks show that the value of service quality with a total of 128Kbps packets on RIP is 1.05Mbps throughput, 0.361ms delay, 0.0118ms jitter, and 0% packet loss. OSPF simulation includes 1.05 Mbps throughput, 0.06708ms delay, 0.0349ms jitter, and 0% packet loss. The results of comparing SDN simulation performance with OSPF routing and RIP routing in service quality prove that RIP is superior to OSPF for jitter parameters. At the same time, OSPF is better than RIP in delay parameters. Simulations were also carried out with the addition of traffic loads with several traffic capacities; from this result, the RIP protocol was better for packet loss and jitter parameters, while for OSPF throughput parameters, it was better. For the delay parameter, OSFP is better for heavy traffic.

Keywords : Mininet, Software-defined network, RIP, OSPF, POX, Quality of Services

IoT Framework Development for Health Conditions Monitoring

M. Udin Harun Al Rasyid[1], Budi Utomo[2], Huai-Kuei Wu[3], Isbat Uzzin Nadhori[4], Ardian Kristya Pratama[5]
[1,4]Politeknik Elektronika Negeri Surabaya, Indonesia
[2]Universitas Airlangga, Indonesia
[3]Asia Eastern University of Science and Technology, Taiwan
[1]udinharun@pens.ac.id, [2]budiutomo@fk.unair.ac.id, [3]hkwu@mail.aeust.edu.tw,
[4]isbat@pens.ac.id, [5]ardiankristo16@gmail.com

Abstract — Chronic disease is one of the most common causes of death in the world, including in Indonesia, where disease managements is still lacking when compared to the increasing prevalence of chronic diseases. Applications of medical devices in the Internet of Things (IoT) sector also participates in preventing an increased risk of chronic disease. IoT includes smart objects or devices that combine sensors with network technology, cloud computing, and data. In implementing the use of IoT tools in the health sector, there are already many types of tools provided by various agencies, but from the tool developer side, there is no specific framework that developers can use to develop IoT applications for the health sector. This research proposes an IoT framework for developing IoT applications called EWARAS. EWARAS is an IoT framework that works in the cloud and serves to simplify and speed up the process of developing IoT tools for the health sector. The services provided by EWARAS are divided into two parts, namely back-end services and frontend services. The back-end service functions to receive, send, store, and process data, while the front-end service functions to retrieve and display the results to users. The basic types of features provided by the code base of EWARAS include real-time data monitoring, frequency of health check sessions, Python-based health data analysis components, and history of health check sessions. There are two experiments carried out in the data analysis section of this study, namely the experiment of sending data from the sensor and performing calculations or getting the health condition output from the dataset. The test results prove that real-time data transmission and data analysis done smoothly using the python spawn process from the JavaScript code side.

Keywords — Cloud service, EHealth, Framework, Health sensor, IoT.

Sense-IT: An Aquaculture-Specific Autonomous Data Acquisition and Monitoring System

[1]Syed Mohammad Kamruzzaman, [2]Md. Fahim Shahariar Sakib, [3]Lafiz Maruf Rahman, [4]Tanvir Ahmed, [5]MD Shahed Alam, [6]Mohsinul Bari Shakir, [7]Monirul Islam Pavel

[1,2,3,4,5,6,7]MUSA Technologies Limited, Dhaka, Bangladesh
[7]Center for Artificial Intelligence Technology, Faculty of Information Science &Technology, The National University of Malaysia, Selangor, Malaysia
E-mail: {[1]kamruzzaman, [2]fahim.shahariar, [3]lafiz.maruf, [4]tanvir.ahmed, [5]shahed.alam, [6]mohsinul.shakir}@musatech.net, [7]pavel@ieee.org

Abstract — Aquaculture is now on an equal level with conventional fisheries in terms of economic impact. and by 2030, aquaculture will account for 60% of world fish consumption, while fishing will account for 40%. Aiming to enhance the process, a design of IoT-based real time data logger system for monitoring and visualizing water health by measuring associated water parameters of any aquaculture is presented in this work. The datalogger, named Sense-IT is designed as a microcontroller-driven configuration where the program is developed in the C programming language. Water pH, Total dissolved solids (TDS), Electrical Conductivity (EC), Dissolved Oxygen (DO), Water Salinity, Oxidation-reduction potential (ORP), Dissolved ammonia, fluorine, chlorine, and other parameters can be measured with this device. The microcontroller uses the RS-485 RTU communication protocol to connect with the sensors. This device collects all sensor data and sends it to the system's cloud server. This device is controlled and configured via a PHP Laravel-based web application that also allows the user to visualize the current status of the target water body. This device is adaptable since it can connect through Wi-Fi or GSM depending on the user's preference or network availability. The sensors provide robust accurate data and constantly monitors different environmental conditions of the target waterbody and records with a timestamp.

Keywords — sensor, iot, aquaculture, rs-485, data logging.

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Characteristics of Accuracy Function on Multiclass Classification Based on Best, Average, and Worst (BAW) Subset of Random Forest Model

Ronny Susetyoko[1], Wiratmoko Yuwono[2], Elly Purwantini[3], Budi Nur Iman[4]
[1,2]Department of Informatics and Computer Engineering
[3,4]Department of Electrical Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
rony@pens.ac.id alfaruqi@pens.ac.id moko@pens.ac.id elly@pens.ac.id

Abstract — This study aims to determine the effect of percentage of training data and number of features on average accuracy of classification model. Characteristics of the accuracy function of 2 datasets with different feature data types were also studied. All possible random forest models were calculated for accuracy based on some percentage level of training data and number of features. The accuracy function was constructed based on subsets of best accuracy (Best), average accuracy (Average), and worst accuracy (Worst) using polynomial regression. There were no significant difference in the average accuracy of various percentage levels of training data. However, there were significant difference in the average accuracy based on the number of features. The best polynomial model for average accuracy function of the 2 datasets had R2 99.50% and R2 96.99%, respectively. Based on individual testing (with a 95% confidence level), there was a linear effect of the percentage of training data on the average accuracy, and there were linear and quadratic effects on the number of features on the average accuracy. In the first dataset, classification model using 7 features obtain classification accuracies ranging from 96.9% – 97.6%. In the second dataset using 7 features, the classification accuracies range from 74.0% – 75.0%. Characteristics of the Best, Average, and Worst accuracy (BAW) functions could be an important description of the accuracy function characteristics and to determine the number of features.

Keywords — random forest, best accuracy, average accuracy, worst accuracy, polynomial regression.

Effective Building Data Warehouse Infrastructure by Code in Cloud Platform

Andi Abdul Salam Sabil, Hero Yudo Martono, Desy Intan Permatasari
Department of Informatics and Computer Engineering
Electronic Engineering Polytechnic Institute of Surabaya
Surabaya, Indonesia
abdulsalam@it.student.pens.ac.id, hero@pens.ac.id, desy@pens.ac.id

Abstract — Over time the data generated by a market is getting bigger and more diverse. So, it takes a larger container to store the data. The solution is to use a data warehouse. On the other hand, network infrastructure is needed to handle data collection. Improper infrastructure can potentially stop the storage system and cause data loss. So, we need a method to build a network infrastructure that can handle this. Considering the availability of infrastructure (high availability) and the ease of construction. This study aims to build a network infrastructure with code to improve consistency and speed until it is ready to be used for Business Intelligence needs. BIAPP is an application that is used to process network infrastructure development using code. In addition, this application can immediately be used for Business Intelligence needs when the infrastructure has been created. Speed results are obtained when building network infrastructure using code and conventional. An average of 207.63% of code usage was obtained faster than the conventional method. In addition to getting results from infrastructure speed, the results of this application can already carry out Business Intelligence processes. One of the results obtained is the number of products repurchased by customers. The data can be used to determine the number of products to be purchased on the next purchase.

Keywords — Infrastructure as a code, Data warehouse, Business Intelligence.

Improving Maintainability in GraphQL Authorization using Dynamic Authorization

Muhammad Riza Nafis[1], Umi Sa'adah[2], Ahmad Syauqi Ahsan[3], Willy Achmat Fauzi[4]

[1,2,3]Informatics and Computer Engineering Department,
Politeknik Elektronika Negeri Surabaya
[4]PT. Sinergi Dimensi Informatika
Surabaya, Indonesia
[1]riza.nafis@gmail.com, [2]umi@pens.ac.id,[3]syauqi@pens.ac.id,
[4]willy@sindika.co.id

Abstract — GraphQL is the new way to build an API that Facebook has developed. The rising trend of GraphQL has intrigued developers as it solves the REST API problems like under-fetching and over-fetching. Still, at the same time, it also brings additional security issues like authorization. GraphQL authorization is one of the most challenging and hot issues. As a state-of-the-art method to solve GraphQL Authorization uses hard-coded authorization rules, it increases the burden for a developer to develop in a maintainable way. This paper proposes a platform that alleviates the authorization problem in GraphQL in a maintainable way. This platform will showcase how to solve this problem in a microservices system. Authorization services will decouple the application, increasing the separation of concern between the application and security contexts. The experiment on the proposed system tested with an identical system shows that dynamic authorization will increase software maintainability, proved by the class coupling decreasing by 21%. Although the proposed design uses GraphQL technology, the approach is helpful for any distributed computing technology.

Keywords — GraphQL, software maintainability, dynamic authorization, distributed computing.

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Human Joint Skeleton Tracking Using Multiple Kinect Azure

Azhar Aulia Saputra[1], Adnan Rachmat Anom Besari[2], Naoyuki Kubota[3]
Graduate School of Systems Design
Tokyo Metropolitan University
Tokyo, Japan
[1]aa.saputra@tmu.ac.jp, [1]azhar.aulia.s@gmail.com, [2]anom.tmu@gmail.com,
[3]kubota@tmu.ac.jp

Abstract — Development of human skeleton tracking requires high accuracy with affordable installation to enlarge their applicability. This paper proposes human skeleton tracking using multiple cameras to minimize occlusion. We combined multiple human tracking modules from Azure based on ONNX Runtime. Each module uses passive infrared as the human segmentation and recognition process and depth information to transform to the 3D position. Each module's output skeleton data is separated into six parts: right-upper limb, left-upper limb, right-lower limb, left-lower limb, head, and torso. Then those part is compared and combined based on the confidence evaluation based on the occlusion probabilistic. Furthermore, 35 joint skeleton angles are also generated based on the anatomy of the human musculoskeletal model. The effectiveness of the proposed model has been validated from the comparison with related work and some applications of human muscle activity monitoring.

Keywords ─ Human skeleton tracking, Multiple camera integration, Kinect Azure DK.

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Adaptive Beamforming Based on Linear Array Antenna for 2.3 GHz 5G Communication using LMS Algorithm

Budi Aswoyo[*], Muhamad Milchan[*], Anang Budikarso[*]
[*] Department of Electrical Engineering,
Electronic Engineering Polytechnic Institute of Surabaya,
Surabaya City, East Java 60111, Indonesia
budias@pens.ac.id; milchan@eepis-its.edu; anang_bk@eepis-its.edu

Abstract — In this paper, the results of the adaptive beamforming with beam pattern synthesis on a linear array antenna applied to 5G communication with operating frequency is 2.3 GHz, specifically at 2.330 GHz using the Least Mean Square (LMS) algorithm are presented. What is meant by adaptive beamforming here is the form of the result of beam pattern synthesis, capable of adapting by directing the main beam towards the desired channel (we call Signal of Interest or SOI), and at the same time suppressing as low as possible of interference channel (we call Signal of Not Interest or SNOI) directions. The comparison between the signal levels of SOI and SNOI from the synthesis of the pattern, will produce a parameter that represents the performance of the system, and is called the Signal of Interference Ratio (SIR). Simulations were carried out to evaluate the performance of the system on the effect of the number of element arrays, with SOI directions varying from $0°$, $20°$, $40°$, and $50°$ with SNOI=$60°$, with a convergence constant value of the LMS algorithm 0.001, and a minimum threshold value of 40 dB SIR. From the simulation results, it is concluded, if the angle difference between SOI and SNOI is relatively far ($60°$, $40°$ and $20°$), then the adaptive beamforming successfully places these signals in the predetermined SOI and SNOI directions, with relatively high SIR, at above the threshold value of 40 dB. The smaller the difference between SOI and SNOI anther angles, the smaller the resulting SIR value. When the angle between SOI and SNOI is $10°$, the adaptive beamforming formation does not succeed in placing the signal at the specified angle, and the SIR threshold value is smaller than the 40 dB threshold value.

Keywords — linear array antenna; beamforming; LMS algorithm; 5G communication.

Spatial-Temporal Visualization of Tuberculosis Vulnerability in East Java, Indonesia, Using the Kmedoids Clustering Algorithm

Sarah Ummul Afifah, Arna Fariza, Arif Basofi
Informatics and Computer Eng. Dept.
Politeknik Elektronika Negeri Surabaya Surabaya, Indonesia
sarahafifah@it.student.pens.ac.id, arna@pens.ac.id, ariv@pens.ac.id

Abstract — East Java is one of the provinces in Indonesia with a high tuberculosis rate. East Java has the second-highest rate of tuberculosis cases in Indonesia, and it still has a significant health issue that has to be resolved. An overview of the correlation between geographic locations and susceptibility levels can be obtained from tuberculosis susceptibility mapping. Using spatial analysis, community-based tuberculosis initiatives can be planned more successfully by identifying the pattern of illness distribution and potential causes. The K-medoids clustering technique is used in this paper to provide a new approach for mapping the degree of tuberculosis susceptibility in East Java. The attributes used as factors that influence vulnerability consist of the total number of TB cases, unhealthy houses, population density, and health facilities. These criteria have a strong correlation with each other to determine the level of susceptibility to tuberculosis. Tuberculosis susceptibility level is divided into low, medium, and high levels. The mapping is visualized spatially-temporal from 2016-2020. The results of the average silhouette of the K-medoids clustering 2016-2020 data are 0.445 with the number of clusters 3, 0.423 with the number of clusters 4, and 0.342 with the number of clusters 5. The silhouette value shows that the K-medoids calculation is better with the number of clusters 3. The results of the average variance of the K-medoids method is 0.041 while the K-means method is 0.048. This shows that the K-medoids algorithm is better at forming clusters than K-means.

Keywords —Tuberculosis, vulnerability mapping, K- medoids algorithm, spatial analysis.

Rollator with Random Forest Implementation for Footstep Prediction using IMU Sensor

Rizky Benniah Arvind Gunawan, Reesa Akbar, Ardik Wijayanto
Electrical Engineering Department
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
benniah23@ee.student.pens.ac.id, reesa@pens.ac.id, ardik@pens.ac.id

Abstract — The problem that often and commonly occurs in the elderly or people with walking disorders is falling when walking using a static assistive device. This causes the fall rate of people with walking disorders to be high. One way to prevent this is to use a non-static device that can move more flexibly, one of which is a rollator which has a system that can assist the user by detecting the user's footstep with Random Forest method and then processed by the rollator to assist user with motor DC and servo for brake angle. The reason why we use Random Forest Classifier method is because in our preliminary experiments, the Machine Learning Random Forest Classifier method is effective enough to be used in microcontrollers with limited memory because the memory usage is relatively low but is quite effective in reading the user's footsteps. In the technique of reading the user's footsteps which is the most important thing, we use the IMU 6 DoF sensor which consists of three accelerometer axes and three gyroscope axes with a total of 4650 data per gesture recorded which is divided into 31 sets of movements, 150 samples from 3 accelerometer axes and 3 gyroscope axes then used as a dataset to be processed as trained data on machine learning Random Forest method for footstep detection and then apply it to actuators to help users with dc motors through fuzzy with several parameters. The average total accuracy of 90% is continuous in the machine learning process that is run with a microcontroller which is quite good and accurate.

Keywords — fall, walking disorders, rollator, elderly, footstep detection, random forest classifier, fuzzy, IMU sensor.

06. [IES-KCIC]
Computational Intelligence
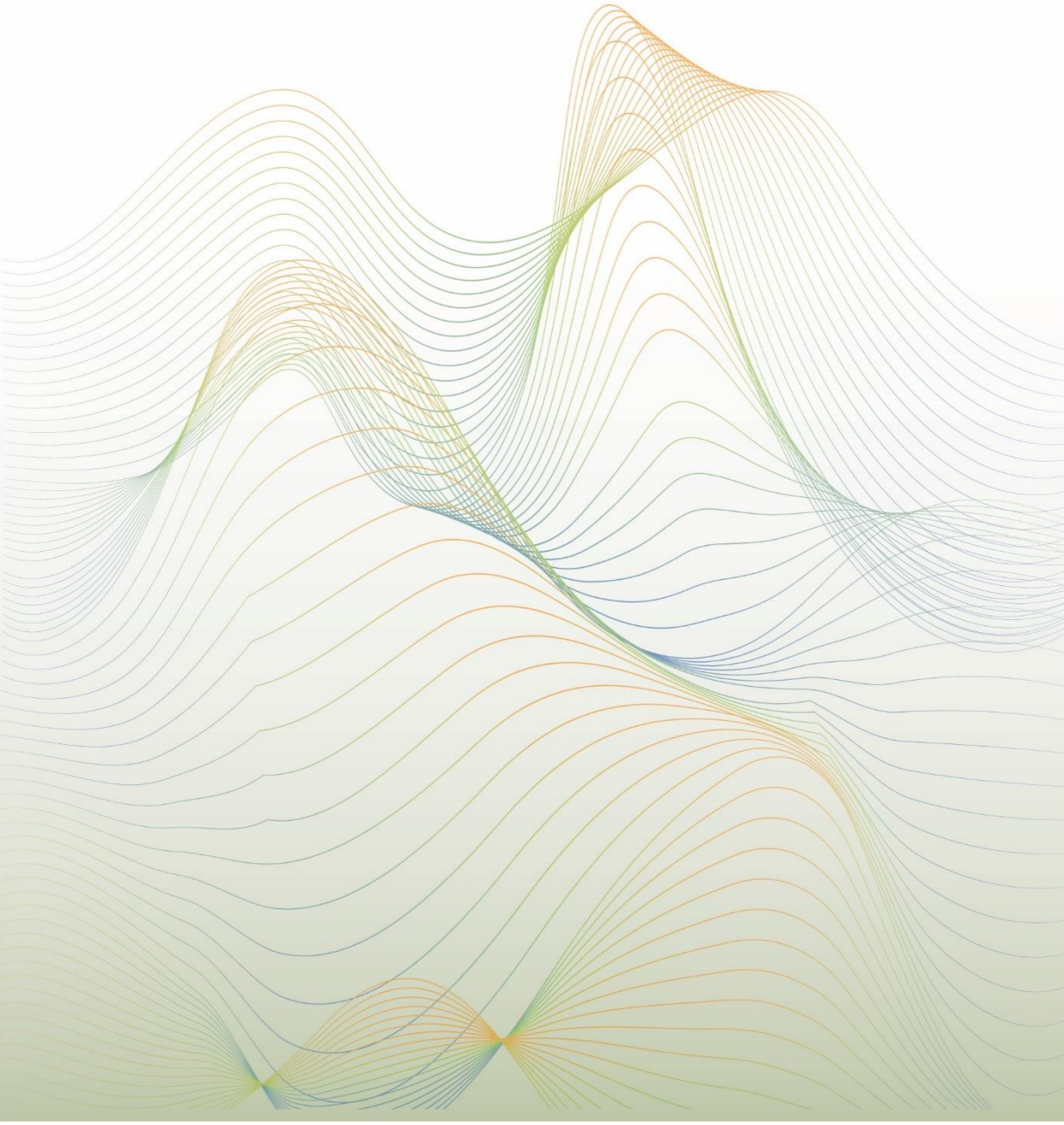
Improving Power Transformer Lifetime Prediction using Hyperparameter Optimization

Ayu Ahadi Ningrum[1], Ihdalhubbi Maulida[2], Rudy Ansari[3], Iwan Syarif[4]

[1,2,3]Department of Informatics, Universitas Muhammadiyah Banjarmasin
Banjarmasin, Indonesia

[4]Department of Informatic and Computer Engineering Electronic Engineering
Polytechnic Institute of Surabaya
Surabaya, Indonesia

[1]ayuahadi@umbjm.ac.id, [2]ihdal@umbjm.ac.id, [3]rudy@umbjm.ac.id
[4]iwanarif@pens.ac.id

Abstract — Since the global pandemic has significantly impacted human life, technology has become a vital role in various sectors. The more technology used, the more we need the electricity supply. The stability of the electricity supply is an absolute thing to customers. Power Transformer is essential equipment for delivering electricity to customers. So the condition of the power transformers should be an essential thing that must be considered. Deep Learning is part of artificial intelligence that is widely applied to facilitate the human need. Based on its role, accuracy in the prediction results will be absolute. Hyperparameter optimization is the essential methods in the machine learning process. Errors in assigning hypermeter values can harm producing predictive values. This study discusses how to optimize the prediction results of the lifetime prediction on a power transformer. With optimal prediction results, it can help electricity management companies monitor conditions. Thereby minimizing the risk of disruption of electricity supply to customers. Models are tested and verified using a real dataset from a power transformer in several locations. The best hyper-parameter for this dataset is Bayesian Search, producing 0,001343 for Mean Absolute Error (MAE).

Keywords — component, formatting, style, styling, insert (key words)

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SDGs India Index Analysis using SHAP

Takako Hashimoto[1], Yukari Shirota[2], Basabi Chakraborty[3]

[1]Chiba University of Commerce Commerce and Economics Chiba, Japan

[2]Gakushuin University Faculty of Economics Tokyo, Japan

[3]Iwate Prefectural University, Faculty of Software and Information Science Iwate, Japan

[1]takako@cuc.ac.jp, [2]yukari.shirota@gakushuin.ac.jp, [3]basabi@iwate-pu.ac.jp

Abstract — We evaluate SDGs India Score (composite score) and the 15 SDGs score by 28 states in India. The method is a machine learning regression and the results are interpreted by SHAP values. The target variable is SDGs India score (composite score) calculated by NITI (National Institution for Transforming India) Aayog and the predictors are 15 SDGs Indexes scores except for SDGs14:LifeBelowWater and SDGs17:Partnership. The advantage of the SHAP approach is that we can evaluate which predictor's contribution to the target is higher than others. From the SHAP analysis, we found that the most important factor in 2018 was SDGs3:Health and in 2020 that was SDGs1:NoPoverty.

Keywords — Sustainable Development Goals (SDGs), India, Machine Learning, SHAP

Path Planning Based on Deep Reinforcement Learning Towards Human-Robot Collaboration

Rokhmat Febrianto[1], Muhtadin[2], I Ketut Eddy Purnama[3], Mauridhi Hery Purnomo[4]
[1234]Department of Electrical Engineering
[234]Department of Computer Engineering
Faculty of Intelligent Electrical and Informatics Technology (ELECTICS)
Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia
[1]rokhmat.206022@mhs.its.ac.id, [2]muhtadin@ee.its.ac.id, [3]ketut@te.its.ac.id,
[4]hery@ee.its.ac.id

Abstract – Visual navigation is required for many robotics applications, ranging from mobile robotics for movement manipulation to automated driving. One of the visual navigation technologies that are often used is path planning. This method considers a way to find a valid configuration sequence to move from the starting point to the destination point. Deep reinforcement learning (DRL) provides a mapless trainable approach by integrating path planning, localization, and image processing in a single module. Therefore, the approach can be optimized for a specific environment. However, DRL-based navigation is mostly validated in a simple simulation environment with a size that is not too large. Therefore, we propose a new visual navigation architecture method using deep reinforcement learning. We have designed a realistic simulation framework that resembles a room's state with several models of goods in it. Agents in the simulator will carry out the learning process by applying deep reinforcement learning to path planning with the support of A2C network, LSTM and auxiliary tasks. We evaluated the agent's method in a simulation framework conducted 10 times, and each experiment was carried out in 1000 randomly generated environments. Training takes about 18 hours on a single GPU. The result is that in the broader simulation environment, our method has a success rate of 99.81% in finding the destination of a given image. These results make the proposed method can be applied to a broader environment and this approach can be used towards human-robot collaboration.

Keywords: Deep Reinforcement Learning, Vision-based Navigation, Path Planning.

Identification of the effect of different feature samples on Handwritten Japanese Character Recognition using YOLOv4

Tita Karlita, Andro Aprila Adiputra, Entin Martiana Kusumaningtyas
Department of Informatics and Computer Engineering
Electronic Engineering Polytechnics Institute of Surabaya
Surabaya, Indonesia
tita@pens.ac.id, androaprila12@gmail.com, entin@pens.ac.id

Abstract – Handwritten Japanese character recognition has been one of the major tasks in the computer vision field. Previously, various approaches to distinguish characters had proposed, ranging from traditional machine learning, end-to-end model, images retrieval and object detection model. Most research focuses on model performances in ideal conditions with a similar feature distribution and produces an excellent result. In the character recognition task, one of the most efficient ways is to utilize an end-to-end object detection model to avoid sequences and robust against different feature distributions. YOLOv4 is one of the end-to-end object detection models that applies various concepts such as a bag of freebies and bag of specials to increase the robustness of the model by improving the context generalization. In this research, our target is to identify the effect of different feature distributions applied to ideal datasets using YOLOv4 on Japanese character recognition tasks. The result of classification reveals both F1-score and Map accuracy of mAP@50 in the ideal dataset achieve 99%. While in the combined dataset, the performance degradation is 12% lower compared to the ideal dataset. YOLOv4 backbone has proven to be robust generalize different feature distributions.

Keywords: YOLOv4, Handwritten Japanese Character, Deep Learning.

Mobile Application for Cholesterol Detection Using Iridology with Image Processing and Support Vector Machine

Entin Martiana Kusumaningtyas, Alfian Haidar Setyawan, Ali Ridho Barakbah
Departement of Informatics and Computer Engineering
Electronic Engineering Polytechnic Institute of Surabaya, EEPIS
Surabaya, Indonesia
entin@pens.ac.id, alfianhaidar@it.student.pens.ac.id, ridho@pens.ac.id

Abstract – Cholesterol is one of the factors than can cause disability and other diseases that is fatal to one's life. Data from World Health Organization (WHO) said that around 4.4 million people die because of cholesterol related diseases and 40.4 million people are disabled because of cholesterol. To avoid this, people usually check their cholesterol rate so that they can control their cholesterol. That said the current method for checking cholesterol is by doing blood test, which is an inefficient method if we want to check our cholesterol regularly because it is time consuming and money consuming. This paper presents an application based on mobile to detect cholesterol rate using iridology with the use of Image Processing and Support Vector Machine. By taking a picture of someone eye, which will go through the process such as pre-processing, segmentation, normalization, and classification, it will return three kind of output which is "Normal", "Medium", and "High". By analyzing data from Mugi Barokah Clinic, we managed to create a system to extract the feature of an image and a SVM model to classify the said image with the final result of 80% accuracy.

Keywords: High Pressure Turbine, Vibration, Fatigue Failure, Fast Fourier Transform, GNU Octave.

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Human Pose Estimation for Fitness Exercise Movement Correction

Atharian Rahmadani, Bima Sena Bayu Dewantara, Dewi Mutiara Sari
Dept. of Informatics and Computer Engineering
Electronic Engineering Polytechnic Institute of Surabaya
Surabaya, Indonesia
atharianrahmadani@gmail.com, bima@pens.ac.id, dewi.mutiara@pens.ac.id

Abstract – This paper proposes the application to detect and evaluate a fitness practitioner movements based on computer vision technology. Several fitness movements such as lifting weights, squat jumps, and pull-ups that are very beneficial for health and body fitness become the main movement for body building. However, those kinds of activities may be very dangerous if done incorrectly. Based on the problem, we developed an application based on computer vision to recognize and correct the pose accuracy of fitness practitioners by using input in the form of videos that record the movements of fitness practitioners continuously. This system uses the support vector machine (SVM) method to classify the types of fitness sports movements. The results of the classification will be displayed on the monitor screen. The result shows that the accuracy of the system is 96.87% by using SVM with the Radial Basis Function (RBF) kernel type and can make corrections to four types of fitness movements with a testing accuracy of 90.62%.

Keywords: Human Pose Estimation, OpenPose, Sports, Skeleton, Fitness.

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Topological based Environmental Reconstruction for Efficient Multi-Level Control of Robot Locomotion

Azhar Aulia Saputra[1], Chin Wei Hong[2], Mohamad Yani[3], Fernando Ardilla[4], Adnan Rachmat Anom Besari[5], Yuichiro Toda[6], and Naoyuki Kubota[7]

[1,2,5,7]Tokyo Metropolitan University, Japan
[3]Universiti Teknologi Malaysia, Malaysia
[4]Electronic Engineering Polytechnic Institute of Surabaya, Indonesia
[6]Okayama University, Japan

[1]aa.saputra@tmu.ac.jp, [2]weihong@tmu.ac.jp, [3]yani.muhammad97@gmail.com, [4]nando@pens.ac.id, [5]adnan-rachmat-anom-besari@ed.tmu.ac.jp, [6]ytoda@okayama-u.ac.jp, [7]kubota@tmu.ac.jp

Abstract – Multi-legged locomotion is generated from multi-level control integration, from lower to higher. It is still become challenging for a robotic developer. This research builds the locomotion model that integrates embodiment, perception, cognition, and knowledge building. The proposed model considers internal sensory information and external sensory information. It involves a multi-level control to solve the complexity of multi-modal system integration, a neuro-science and ecological psychology approach to developing the proposed system architecture, and a topological approach to enable knowledge building and external sensory processing. This paper focuses on the environmental reconstruction module based on topological based approach. The Topological based approach represents the data flow from sensing to knowledge building. We use dynamic density growing neural gas algorithm as the based of reconstruction module. It implies the dynamic granularity of topological structure of reconstructed environment. The module presents continuous real-time environmental reconstruction building from topological information generated by dynamic density growing neural gas. The reconstructed topological map composes as 3-D map nodes position and normal vector of the node, and their edges. We conducted several experiments showing efficient locomotion behavior could be realized using the proposed model for validating our proposed model.

Keywords: Environmental Reconstruction, Topological Based Approach, Multi-level Locomotion Control.

Voice Recognition System for Home Security Keys with Mel-Frequency Cepstral Coefficient Method and Backpropagation Artificial Neural Network

Ziyadatus Shofiyah, Haniah Mahmudah, Tri Budi Santoso, Okkie Puspitorini, Ari Wijayanti, Nur Adi Siswandari
Department of Telecommunication Engineering
Politeknik Elektronika Negeri Surabaya
ziyashofiyah@te.student.pens.ac.id, haniah@pens.ac.id, tribudi@pens.ac.id, okkie@pens.ac.id, ariw@pens.ac.id, nuradi@pens.ac.id

Abstract – In this paper, we present the design of a home door lock control system that is activated by automatic speaker recognition (biometrics). Access to a house or building with various conventional keys, PINs, or smartcards is not reliable enough to increase security because it cannot detect the real key owner. Furthermore, the introduction of the speaker as the key to the house door is applied to overcome this problem. Speaker recognition is the process of automatically recognizing someone who is speaking based on the sound characteristics of the input speech. This technique allows the use of the speaker's voice to verify identity and control access to their homes. It is proposed mainly since votes cannot be stolen, copied, forgotten, lost, or accurately guessed. The proposed system uses Mel-frequency Cepstral Coefficient for feature extraction and Artificial Neural Network Backpropagation for speech recognition. The results of this study for voice recognition show that the success rate in distinguishing homeowners reaches 97% with optimal conditions, namely in quiet environmental conditions (34 dB) with a sound collection distance of about 10 cm.

Keywords: Biometric, Voice Recognition, Mel-Frequency Cepstral Coefficients (MFCC), JST Backpropagation.

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Implementation of Face Recognition Using Discrete Cosine Transform on Convolutional Neural Networks

Ari Setiawan, Riyanto Sigit, Rika Rokhana
Department of Informatics and Computer Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
ari1setiawan@pasca.student.pens.ac.id, riyanto@eepis-its.edu, rika@pens.ac.id

Abstract – Authentication in a system is one way to protect user data, several methods to authenticate are with passwords, fingerprints and face recognition. The use of deep learning in face recognition requires relatively large and large datasets. Convolutional neural network (CNN) is the method used in this experiment, but this method requires a large enough storage space so that it becomes one of the problems in terms of data storage. The application of discrete cosine transform (DCT) is one way in terms of image compression to reduce storage space on the platform. The use of the DCT image compression method in this study was carried out to compare the image datasets transported by DCT and those that were not transported to the speed of the learning process and the results of the learning process. From the results of experiments carried out that changes to the activation function and epoch it was found that the application of the sigmoid activation function was the most optimal compared to other activation functions. The application of DCT to all activation functions found that on average the learning process could be completed faster. the accuracy value on the sigmoid both from the dataset with DCT application or not, the accuracy value is above 95%, with the optimal value at the 60th epoch the accuracy value reaches 99.8% without -DCT and 99.6% with DCT.

Keywords: Face Recognition, Image, Compressing, DCT, Activation Function, Accuracy.

Road Damage Detection and Alert Application Using Smartphone's Built-In Sensors

[1]Dicha Nada Puspita, [1,2]Dwi Kurnia Basuki, [1]Bima Sena Bayu Dewantara
[1]Politeknik Elektronika Negeri Surabaya, Indonesia
[2]Tokyo Metropolitan University, Indonesia
dichapuspita@ce.student.pens.ac.id, dwiki@pens.ac.id, bima@pens.ac.id

Abstract – Road damage is truly inconvenient for drivers. It possibly results in accidents. Drivers may get a warning to avoid it if the damaged location has been detected. Road damage detection can be done using the built-in sensors on a smartphone. This research was conducted using the Machine Learning method. The final results were road damage detection and warning applications. TensorFlow Lite was needed for visual detection, while motional detection utilized an accelerometer. A warning application was synced with Firebase Cloud Messaging to send notifications 25 meters to the damage point. This allows the driver to avoid such damage. From the test results, the accuracy of visual detection reached 85.03% and motional detection reached 73.71%. In the warning application, it successfully sent notifications with 64.28% accuracy.

Keywords: Road Damage Detection, Built-in Sensors, Machine Learning, TensorFlow Lite, Accelerometer, Firebase

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Emotion Recognition Based on Facial Expression by Exploring Batch Normalization Convolutional Neural Network

Rochimatus Sadiyah, Arna Fariza, Entin Martiana Kusumaningtyas
Department of Informatics and Computer Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
rochimatus22@it.student.pens.ac.id, arna@pens.ac.id, entin@pens.ac.id

Abstract – Emotions are intense and complex feelings directed at someone or something as a reaction to something. Emotions are generally displayed subconsciously in a variety of ways, and one of the easiest ways to see them is through facial expressions. Convolutional neural networks are a class of deep neural networks that are useful for analyzing visual images in deep learning, but there are no set guidelines for how to construct the best model or how many layers are required. Batch normalization is another feature of deep learning that serves as a regularizer, enabling much higher learning rates and laxer initialization requirements. This paper presents an emotion recognition system based on human facial expressions. Exploring batch normalization and other layers in the algorithm provides improved recognition accuracy. This study uses the KDEF dataset as a training dataset and partly as a test dataset. Several architectures are built to compare accuracy, and the results are quite good. Compared to other case architecture models, the model that gets the best accuracy, consists of 6 convolutional layers, 3 Batch Normalization, 2 Fully Connected, an Average Pooling, and a dropout. It got 98.51% training accuracy compared to other models.

Keywords: Batch Normalization, Filters, Analyzing Visual Images.

Smart Victims Detection in Natural Disaster using Deep Learning

M. Adamu Islam Mashuri, Moch. Zen Samsono Hadi, Rahardhita Widyatra
Sudibyo, Prima Kristalina, and Aries Pratiarso
Department of Informatics and Computer Engineering
Electronic Engineering Polythecnic Institute of Surabaya (EEPIS)
Surabaya, Jawa Timur, Indonesia
adamuislam16@pasca.student.pens.ac.id, zenhadi@pens.ac.id, widi@pens.ac.id,
prima@pens.ac.id, aries@pens.ac.id

Abstract – Nowadays, artificial intelligence has been widely implemented in agriculture, animal husbandry, education, and many more. The most widely developed model at this time is the Deep Learning model. To get maximum results, the best Deep Learning architecture is needed. In this paper, we will compare methods for detecting victims of natural disasters based on the Deep Learning model. The models that we will compare are the You Only Look Once (YOLO) algorithm, namely YOLOv5, and Convolutional Neural Network (CNN) with the MobileNet model and the VGG-16 model. We train each algorithm through a natural disaster victim training data set and analyze performance to determine what model is the most optimal. To identify the types of victims ofnatural disasters. From our results, the MobileNet model is superior to other models with 98% accuracy.

Keywords: Artificial Intelligent, Deep Learning, YOLOv5, Convolutional Neural Network

Audio Based Action Recognition for Monitoring Elderly Dementia Patients

Dwi Kurnia Basuki[1], Rizky Zull Fhamy[2], Mahaputra Ilham Awal[3], Luqmanul Hakim Iksan[4], Sritrusta Sukaridhoto[5], Kazuyoshi Wada[6]
[1,2,3,4]Department of Informatics and Computer Engineering
[5]Department of Electronic Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
[1,6]Faculty of Systems Design
Tokyo Metropolitan University
Tokyo, Japan
[1]dwiki@pens.ac.id, [2]rizkyzullfhamy@gmail.com, [3]mahaputrailham98@gmail.com, [4]luqmanhakimiksan@gmail.com,
[5]dhoto@pens.ac.id, [6]k_wada@tmu.ac.jp

Abstract – Dementia is a disease that causes a decrease in memory and thinking. This condition has an impact on their lifestyle, social skills, and their daily activities. Generally, people with dementia live with care without a family companion. Treatment for dementia patients can be in the form of therapy for activities of daily living. Due to the limitations of the medical side in supervision, one way to find out the activities carried out by patients can be done by using voice. The system that will be used is Audio Based Action Recognition which can monitor the activities of dementia patients through voice data. The voice data is processed by sound signal processing using a deep learning Convolutional neural network (CNN) method to get the output about activities carried out by dementia patients. The system will record the voice of the dementia patient every 5 seconds. Then do feature extraction from audio data to get spectrogram data. Spectrogram data will be labeled according to the action wanted to identify. Then the system performs training and action classification using CNN. Action data of dementia patients recognized will be sent to the server to be used as a habit analysis of dementia patients. In testing, the system recognized the action with the pre-trained model for ResNet101 getting 69% accuracy, DenseNet 87%, InceptionV3 89%, MobileNet 95%, and the author's design model got 98% accuracy in a noise level of 30db.

Keywords: Dementia, Audio Based, Action Recognition, Deep Learning, Convolutional Neural Network.

Hand Gesture Recognition Based on Keypoint Vector

Heru Arwoko[1], Eko Mulyanto Yuniarno[2], Mauridhi Hery Purnomo[3]
[1,2]Departement of Computer Engineering
[3]Departemen of Electrical Engeering
Institut Teknologi Sepuluh Nopember
Surabaya, Indonesia
[1]heru_a@staff.ubaya.ac.id, [2]eko_mulyanto@ee.its.ac.id, [3]hery@ee.its.ac.id

Abstract – Human-computer interaction is usually associated with using popular input devices such as a mouse or keyboard. In other cases hand gestures can actually be useful for human-computer interaction when hand gestures are needed to make the game controls more interesting. There are three basic controls as input mouse: move, click, and drag. Hand movements that vary in orientation from person to person make non-linearity present in this problem. Recent research has proven the success of the Deep Neural Network (DNN) for representation and high accuracy in hand gesture recognition. DNN algorithms can study complex and non-linear relationships between features by applying multiple layers. This paper proposes hand gesture recognition based on the normalized keypoint vector using DNN. The model was trained on 2250 hand datasets which were divided into 3 classes to identify the mouse movement. The network design uses multilayer with neuron sizes (13, 13, 14) and achieves the best accuracy of 97.56% for normalized features. The important work in this research is the use of keypoint vector from hand gestures as features to be fed to the DNN to achieve good accuracy.

Keywords: Hand Gesture Recognition, Keypoint, Normalized Vector, Deep Neural Network.

Javanese Script Text Image Recognition Using Convolutional Neural Networks

Goldy Najma Adli Kesaulya, Arna Fariza, Tita Karlita
Informatics and Computer Eng. Dept
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
goldynajma@it.student.pens.ac.id, arna@pens.ac.id, tita@pens.ac.id

Abstract –Javanese script is one of the traditional Indonesian scripts used on the island of Java, which is currently starting to decline in its usages due to the difficulty in learning the many, complex, and similar forms between characters. This can have an impact on the preservation of the declining Javanese script culture, which if left ignored will cause the loss of one of the characteristics of Indonesia. This study aims to overcome these problems by creating an application that can work well in recognizing images of Javanese script text. The method used in this study is Convolutional Neural Network (CNN) with a new approach to transfer learning using the pre- trained model ResNeXt. The dataset used for model training stage is obtained by merging Javanese script images dataset publicly available on Kaggle website with manually collected images and by applying image augmentation techniques on the collected dataset. The recognition process used in this application is based on Optical Character Recognition (OCR) with preprocessing, segmentation, feature extraction and classification, and post-processing stages. The best CNN model testing results were obtained in an experiment with a combination of using Adam optimizer, learning rate of 0.0001 without a scheduler, and freezing first 4 layers of the 10-layer CNN ResNeXt model, with a testing accuracy value of 98.19%. Meanwhile the OCR processes in the mobile application are tested on 11 images captured from Javanese Pepak book achieving an average character error rate of 38.09%.

Keywords: Javanese script, convolutional neural network, transfer learning, ResNeXt, optical character recognition

Support Vector Machine: Melanoma Skin Cancer Diagnosis based on Dermoscopy Image

Tirta Farisaldi Ibrahim, Dr. Setiawardhana, ST. MT, Riyanto Sigit, ST. M.Kom., P.hd
Computer Engineering Department
Electrical Engineering Polytechnic
Surabaya, Indonesia
ntiirtan@gmail.com, setiawardhana @pens.ac.id, riyantosigit@pens.ac.id

Abstract – Until now, the diagnosis of melanoma skin cancer is still using the biopsy method, which is the procedure of taking a small portion of tissue from the patient's body to be examined using a microscope. This method is considered less effective because to find out the type of melanoma skin cancer requires a long preparation and a slightly longer wound healing time. Melanoma is one of the most deadly types of skin cancer. Although melanoma is only about 4% of cases of all cases of skin cancer in the United States, but melanoma has been the cause of 75% of cases of death caused by all skin cancers in the country. However, if this melanoma can be diagnosed from the start, then for patients suffering from malignant melanoma tumors that can be treated immediately, the percentage for the patient's recovery will be higher. Therefore, in this study, a fast dermoscopy image computerized analysis system was created so that it can be used to overcome the above problems by using the support vector machine (SVM) method, which is one of the methods in machine learning. This method is quite good and accurate in performing dermoscopy image recognition which is used as input or for later image processing. The system for diagnosing melanoma will be implemented in an interface that makes the user interface easier. The results of this study will be in the form of information about whether the cancer is classified as malignant (malignant melanoma) or not (nevus) in the hope of helping dermatologists in diagnosing melanoma malignancy quickly and accurately. minimum of 80 %.

Keywords: Skin cancer, Melanoma, Image Processing, GLCM, Support Vector Machine

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Crowd Counting in Public Places Using MultiScale Convolutional Neural Network

Tita Karlita, Muhammad Mujir, Nana Ramadijanti
Department of Informatics and Computer Engineering
Electronic Engineering Polytechnic Institute of Surabaya
Surabaya, Indonesia
tita@pens.ac.id, muhammadmujir011@gmail.com, nana@pens.ac.id

Abstract – Crowd of people in public places is a serious problem that needs attention because uncontrolled crowd conditions will cause problems, especially with the Covid19 pandemic which requires people not to congregate. This research uses the Multi Scale Convolutional Neural Network method to overcome the main problems in crowd images, namely object scale variations, difficulty distinguishing between people objects and the background, as well as overlapping between people objects. The Multi Scale CNN implementation in this research uses the feature extractor layer from VGG16 as the low level feature extractor layer (frontend layer) and the Inception-Restnet-A module from Inception-Resnet-v2 as the high level feature extractor (backend layer). The datasets used to train the model are the ShanghaiTech and UCF_QNRF datasets which already contain the location information of the people in the image. Prior to the training process, ground-truth was made by conducting a convolution process using a Gaussian filter at the point where people are. Then, the Multi Scale CNN model will be trained with these 2 datasets. In the trained model, the input image will be convoluted to produce a density map. The results of the crowd calculation are obtained by adding up all the density map values. The use of Multi Scale CNN is proven to provide a good accuracy value with the MAE loss value being 78.0 for the ShanghaiTech Part A dataset and 10.75 for the ShanghaiTech Part B dataset.

Keywords: crowd counting, inception, VGG16

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Design and Implementation of Real-time Object Detection for Blind using Convolutional Neural Network

Kartika Merdekawati Mulyono, Tri Budi Santoso, Rahardhita Widyatra Sudibyo
Department of Electrical Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Jawa Timur, Indonesia
merdekakartika17@gmail.com, tribudi@pens.ac.id, widi@pens.ac.id

Abstract – In 2017 the Indonesian Ministry of Health estimated that there were 3.75 million blind and visually impaired people living in Indonesia. In this paper, we propose a device in the form of smart glasses as an object detection system and as a system for detecting barriers / obstacles in front of blind that equipped with earphone as speakers to convey object information to support and facilitate blind people's activities. The system is composed of a Pi Noir V2 camera is used for taking pictures of objects, ultrasonic sensors to determine the distance an object from user. Data processing is carried out on the Raspberry Pi used and further gives a sound-shaped output about the results of image processing and its position, through headphones. The detecting system used the MobileNet SSD v2 model and the Convolutional Neural Network method. The accuracy of system is verified through experiments. The effectiveness is confirmed through experiments with the optimal mAP and loss values determined by the model parameter testing process.

Keywords: Blind, Object Detection, CNN, Mobilenet SSD

Analysis of Steel Bridge Trunk Conditions Based on Loads and Corrosion Levels with Fuzzy Sugeno

Berlian Al Kindhi[1], Wahyuniarsih Sutrisno[2], Masca Indra Triana[3], Aan Fauzi[4]
[1]Department of Electrical Automation Engineering
Institut Teknologi Sepuluh Nopember Surabaya, Indonesia
[2]Department of Civil Engineering
Institut Teknologi Sepuluh Nopember Surabaya, Indonesia
[3]Department of Civil Engineering
University of 17 August 1945 Surabaya Surabaya, Indonesia
[4]Department of Infrastructure Civil Engineering
Institut Teknologi Sepuluh Nopember Surabaya, Indonesia
[1]berlian@its.ac.id, [2]wahyuniarsih@its.ac.id, [3]mascatriana@untag-sby.ac.id,
[4]aan@its.ac.id

Abstract – Bridges built with reinforced concrete base materials, over time, the reinforcing steel is likely to corrode. Corrosion can be caused by the presence of electrolyte fluid that propagates around the reinforcement. The humidity level of the surrounding air can also trigger the corrosion of steel. Steel that has a high corrosion rate, can cause the bridge to collapse if it supports a heavy load it can result in a fatal accident. One solution is to check the level of corrosion on steel bridges regularly. The results of these checks can be used for further actions on steel. In this study, we propose a fuzzy method that is able to rate the corrosion rate of a steel point on a bridge. The input parameters of the proposed Fuzzy Logic are the load and corrosion rate by generating the condition of the bridge. The results of the fuzzy analysis are recommendations for the corrosion rate of steel, making it easier for field officers to carry out maintenance in accordance with the condition of the steel. The test results show that the Fuzzy method is able to analyze the condition of the bridge for the accident prevention process because the bridge collapses properly.

Keywords: Fuzzy, Concrete, Corrosion, Smart Assessment

Implementation Augmented Intelligence on Drug Inventory Management Forecasting

Naufal Adi Satrio[1], Sritrusta Sukaridhoto[2], Muhammad Udin Harun Al Rasyid[3], Rizqi Putri Nourma Budiarti[4], Evianita Dewi Fajrianti[5], Ilham Achmad Al Hafidz[6], Amma Liesvarastranta Haz[7]

[1,2,3,6]Informatics and Computer Engineering, Politeknik Elektronika Negeri Surabaya, Indonesia

[4]Department of Information Systems, Universitas Nahdlatul Ulama Surabaya, Indonesia

[5]Electrical Engineering, Politeknik Elektronika Negeri Surabaya, Indonesia

[7]Department of Electrical Engineering, Institut Teknologi Sepuluh Nopember, Indonesia

[1]naufaladisatrio001@gmail.com, [2]dhoto@pens.ac.id, [3]udinharun@pens.ac.id, [4]rizqi.putri.nb@unusa.ac.id, [5]evianita08@gmail.com, [6]ilhamachmada@gmail.com, [7]liesvarastranta@gmail.com

Abstract –The administration of medications at many hospitals is not governed by an inventory forecasting system, which is common in the management of many hospitals. This might either result in an excessive amount of pharmaceuticals being available in the hospital or a serious shortage of them. Because of this, it is essential for the hospital to have inventory forecasting for the management of drugs; this will assist the hospital in determining when the medicine will run out of supply. As a result of this, it is essential for the hospital to have inventory forecasting for the management of drugs. The author of this study builds an augmented intelligence with the help of a stacked LSTM model. Augmented intelligence is a kind of intelligence that supports stakeholders in getting a broad grasp of inventory projections for the foreseeable future. Using event-driven architecture, the systems are developed independently so that they will not interfere with the workings of the current hospital administration system. We test the model on 19 different drug stocks using a total of 1000 days of data for each medication, and the results reveal that stacked LSTM is able to correctly predict with average values for the R2 coefficient, RMSE, MSE, and MAE being 0.9972, 1.95, 3.81, and 1.26 respectively. The results also show that the proposed system can work.

Keywords: Augmented Intelligence, Event Driven Architecture, Database Monitoring, Inventory Management, Forecasting

Classification of Ocular Diseases on Fundus Images Using Weighted MobileNetV2

Rika Rokhana[1], Wiwiet Herulambang[2], Rarasmaya Indraswari[3]
[1]Department of Electrical Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
[2]Department of Informatics
Universitas Bhayangkara Surabaya
Surabaya, Indonesia
[3]Department of Information Systems
Institut Teknologi Sepuluh Nopember
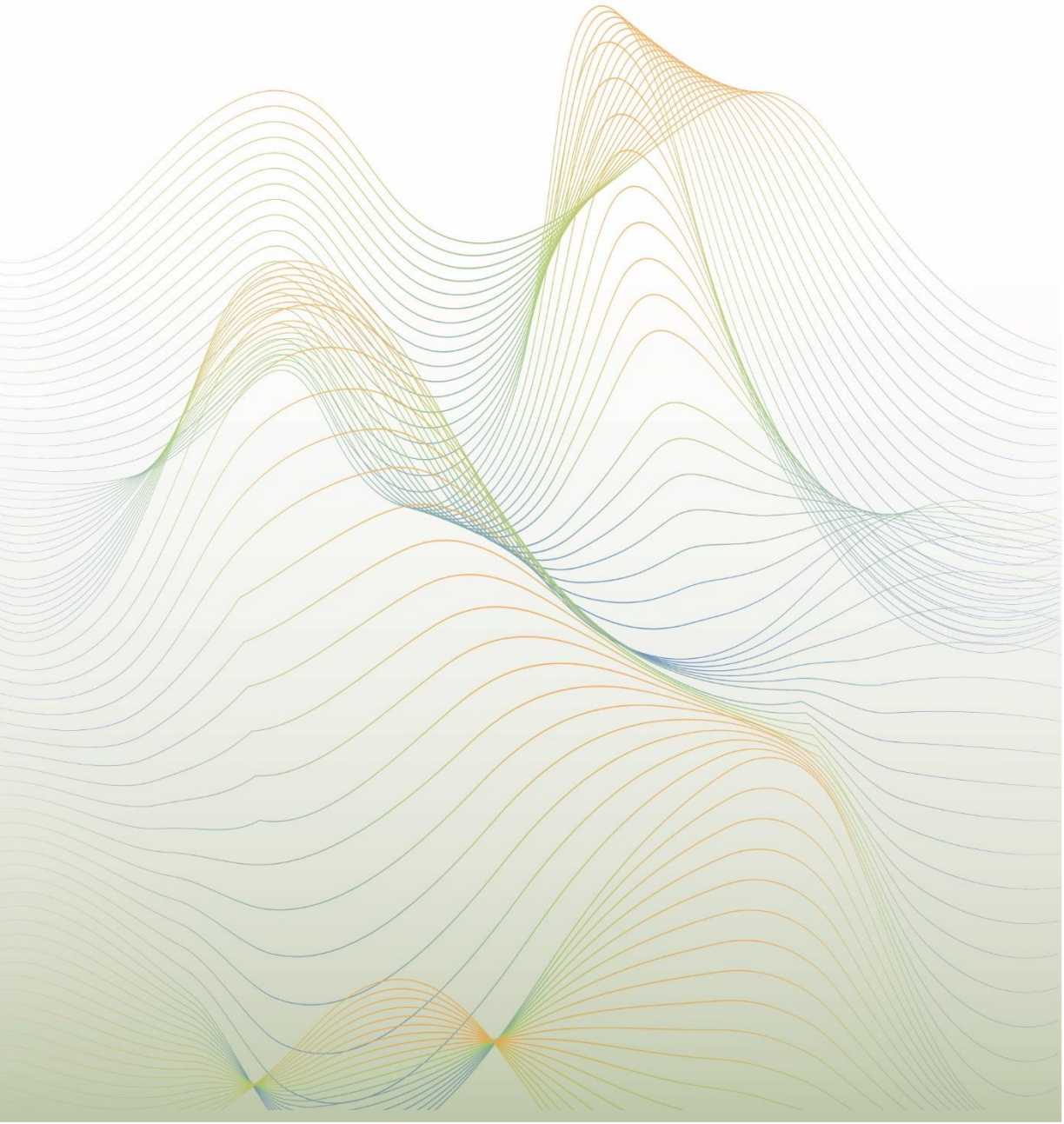Surabaya, Indonesia
[1]rika@pens.ac.id, [2]herulambang@ubhara.ac.id, [3]raras@its.ac.id

Abstract – The major cause of blindness in children and adolescents is the ocular disease. It is anticipated that there will be 1.76 billion people worldwide who will lose their eyesight by 2050. However, if the eye condition that caused it can be identified and treated quickly, blindness can be avoided. Therefore, in this research, we proposed a weighted MobileNetV2 to classify ocular disease on fundus images. MobileNetV2 network is chosen because it has a lightweight architecture that allows data to be processed faster. This research also proposed a weighted cost function to improve the performance of the network in handling imbalanced dataset problems. This is needed because usually, the medical dataset has a much lower number of data in the abnormal class than in the normal class, which may cause the deep learning algorithm to fail in detecting the abnormal class. Experimental results on a fundus image dataset that consists of 4 classes ("Normal", "Cataract", "Glaucoma", and "Retina Disease") shows that the proposed weighted cost function can improve the performance of the network on an imbalanced dataset with the accuracy of 66%, precision of 61%, recall of 58%, F1-score of 57%, and running time of 353.81 seconds. Moreover, the proposed weight calculation formula also gives the best performance among other weight calculation formulas.

Keywords: ocular disease, MobileNetV2, fundus image, imbalanced dataset, weighted cost function, image classification

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Concentration Patterns Estimation Method in Deskwork by Using Time-series k-means

Tyler Inari, Takafumi Nakanishi
Department of Data Science
Musashino University
Tokyo, Japan
s1922054@stu.musashino-u.ac.jp, tnakani@musashino-u.ac.jp

Abstract – In this paper, we present a concentration patterns estimation method in desk work using time-series k-means. Maintaining focus is very significant when working on tasks daily. Sustaining a high level of concentration helps to work more efficiently. Most people don't recognize their concentration. Furthermore, there is no opportunity to be consciously aware of trying to recognize concentration. To improve the quality of concentration, we need to recognize concentration during work. In this paper, we propose a method to recognize and visualize concentration. Our method enables people to recognize daily concentration by clustering and visualizing concentration types. We define the word of concentration pattern is the type of user's concentration level transition. The concentration patterns are divided into several clusters by clustering function. Each cluster has its own features, indicating that are multiple types of concentration. The visualizing function makes it easy to be aware of concentration daily. The experimental results show that our method is very effective in recognizing the concentration of the self. We also present how this method works.

Keywords: concentration, patterns estimation, time-series k- means, vital data

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Factors Influencing the Adaption of Online Pharmacy in Oman: Pilot Study

Abir AlSideiri[1], Zaihisma Binti Che Cob[2], Sulfeeza Bte Mohd Drus[3]
[1]College of Computing and Informatics
Department of Information Technology
Universiti Tenaga National (UNITEN), Kajang, Selangor, Malaysia
[1]Buraimi University Collage, Buraimi, Oman
[2,3]College of Computing and Informatics
Universiti Tenaga National (UNITEN), Kajang, Selangor, Malaysia
[1]abir@buc.edu.om, [2]zaihisma@uniten.edu.my, [3]sulfeeza@uniten.edu.my

Abstract – Online pharmacy is seen as one of the advanced personal innovations in the physical health sector to effectively address many issues the consumers face, especially concerning conveniences, value-added information, and feedback to the pharmacist. While online pharmacy has been widely adopted in developed countries with resounding progress, its adoption in developing countries such as Oman is still very low, with many challenges. There is a lack of empirical studies on the factors determining the adoption and actual use of online pharmacies in Oman. This research proposes a conceptual model that identifies the factors that influence the adoption of online pharmacy in Oman by combining the Unified Theory of Acceptance and Use of Technology (UTUAT-2) Theory and the Technology Acceptance Model (TAM) theory. 12 Hypotheses were later drawn for the research using the two theories. A survey questionnaire was administered to 35 interested respondents in this pilot study to allow the running of proper statistical testing procedures in order to examine the reliability of the collected data. covariance matrix method was used to calculate the descriptive function so that all of the variables could be included in the analysis. The results indicate that the proposed factors had a significant effect on the adoption of Online Pharmacy in Oman This research shows that for the successful adoption of Online Pharmacy in Oman, the top management and policymakers need to improve health literacy, consumer awareness, and understanding necessary for making informed health decisions. This will make them maximize the benefits of consumers' adoption and minimize the hazards connected with using online pharmacies.

Keywords: Online Pharmacy, Technology Adoption, TAM, UTAUT2, Pilot study

Decision Tree and Fuzzy Logic in The Audit of Information System for Tax Letter Issuance

Irfanur Ilham Febriansyah, Riyanarto Sarno, Ratih NE Anggraini
Informatics Department
Institut Teknologi Sepuluh Nopember
Surabaya
irfanur.ilham@gmail.com, riyanarto@if.its.ac.id, ratih_nea@if.its.ac.id

Abstract – An information system audit is a way that can be taken to ensure the quality of information systems in an organization. One of the problems faced is objectivity in assessing quality which can be overcome by mining the processes, where the audit process utilizes event logs from the audited information system. In the domain of government in Indonesia, information system audit has not been widely conducted, as has never been done in the information system for tax letters issuance at the Regional Revenue Agency of East Java Province. An audit is conducted to determine whether the information system has been running in accordance with the needs of the organization. This study implements part of the process mining: the system conformance assessment using Fuzzy. The dataset used as input comes from the event log classification process using the Decision Tree classifier. The study results indicate that the system alignment score is 2.754031 or medium predicate.

Keywords: Information System Audit, Process Mining, Tax Letters Issuance, Decision Tree, Variable Correlation, Fuzzy

Android and Desktop Based Ground Control Station (GCS) Interface Design for Unmanned Aerial Vehicle (UAV) Communication and Monitoring

Hafizh Irfansyah Putra, Mochamad Mobed Bachtiar, Maretha Ruswiansari
Department of Informatics and Computer Engineering
Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
havesirfan@ce.student.pens.ac.id, mochamadmobed@gmail.com,
maretha@pens.ac.id

Abstract – The Indonesian Flying Robot Contest (KRTI) is a competition organized by the National Achievement Center of the Indonesian Ministry of Education, Culture, Research, and Technology. One of the KRTI categories, Technology Development, competes with the work of Unmanned Aerial Vehicle (UAV) technology in the field of Ground Control Station (GCS). GCS serves to communicate and monitor the condition of the UAV in the air. Generally, GCS is only available in applications designed specifically for certain brands of UAVs, resulting in GCS not being able to be used for other types of UAVs. UAVs can experience wind disturbances as well as urgency due to depleted battery capacity. Based on the problems that have been outlined, in this research, a solution was created to design the interface of an Android and Windows-based GCS application for the communication and monitoring of UAVs. The built GCS provides an alternative communication medium with Radio Telemetry for long-distance coverage and Wi-Fi for short- range coverage. The constructed GCS analyzes the roll value movement of the IMU sensor with the linear regression method to inform the UAV stability condition and analyzes the data of GPS sensors, altitude sensors, and UAV battery capacity sensors with the fuzzy inference system method to inform the urgency of the UAV return time. GCS meets real- time needs running on the lowest versions of Windows 10 and Android 5.0 (Lollipop) with an average data runtime of 3,427 milliseconds for Windows and 16,724 milliseconds for Android. The usability of the GCS design is rated Excellent with an effectiveness rate of 84%. Round-Trip-Time USB UART communication media of 13,518 milliseconds at the test limit distance of 100 meters and Wi-Fi UDP Relay of 3,125 milliseconds at an optimal distance of 25 meters.

Keywords: KRTI, UAV, GCS, Linear Regression, Fuzzy Inference System.

Cross-cultural analysis of the American, German, and Japanese newspaper coverage on COVID-19

Yukiko Sato
Faculty of Foreign Studies Sophia University
Tokyo, Japan
yukisato@sophia.ac.jp

Abstract – As the news coverage on COVID-19 continues to accumulate, there is a need to analyze this coverage to critically examine the role of the mass media during the pandemic. This cross-cultural study conducts a qualitative analysis and quantitative comparison of the American, German, and Japanese quality newspaper coverage of COVID-19. Following a thematic analysis approach, this study analyzed 117 newspaper articles through the creation of a codebook with 133 codes. Results show how the media in all countries underrated the risk of the pandemic in its initial stage, while also focusing on people's fear of the pandemic. In American and Japanese newspapers exists a tendency for criticism against the Chinese government, while German newspaper articles appear critical of the use of face masks. The methodological approach of this study highlights the merits of combining qualitative analysis and quantitative comparison to identify and cross-culturally compare elusive themes in media texts.

Keywords: COVID-19, newspapers, cross-cultural content analysis, thematic analysis.

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A Multilayered Analytical Visualization Method for assessing Forest-Urban-Disaster Resilience

Amane Hamano, Shiori Sasaki
Faculty of Data Science
Musashino University
Tokyo, Japan
s2122067@stu.musashino-u.ac.jp, ssasaki@musashino-u.ac.jp

Abstract – This paper presents a method of multilayered analytical visualization for detecting time-series changes in urban vegetation and forest distribution by integrating distributed time-series geographic information data, socioeconomic indicator data, and natural disaster data. As the world's large areas have been deforested seriously in recent years, there has been a growing demand for methods that accurately assess the importance of forests and their effects and impacts. This study aims to establish a method to assess the role of forests in terms of urban disaster resilience. Specifically, the method is designed to analyze the relationship between 1) forest distribution and population density, 2) forest distribution and urban infrastructure development, and 3) forest distribution and disaster occurrence, using GIS, satellite data, demographic, highway, flood, and inundation data. From the results of the analysis, the relationship between forest- urban development and natural disasters will be evaluated. This paper demonstrates the feasibility of the proposed method for the realization of SDG 15 and the potential for integrated use of various and distributed open data through the experiments conducted in the Kanto region of Japan.

Keywords: Forest, vegetation, urbanization, infrastructure, disaster, SDGs, SDG 15, SDG 9, SDG 11, data integration, GIS, geography, time-series data, multi-dimensional data

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Flood Vulnerability Mapping in Lamongan District, Indonesia, using Fuzzy Analytical Hierarchy Process - Natural Breaks

Arna Fariza, Firyal Zahwa Salsabila, Arif Basofi
Informatics and Computer Eng. Dept, Politeknik Elektronika Negeri Surabaya,
Surabaya, Indonesia
arna@pens.ac.id, firyalzahwa@it.student.pens.ac.id, ariv@pens.ac.id

Abstract— Lamongan is one of the districts in East Java Province, Indonesia, which is often hit by floods, as evidenced by the occurrence of floods every year. The occurrence of floods in Lamongan itself has an impact on hampering residents' activities and can cause material losses and other aspects such as health, economy, and the environment. Flood risk assessment studies are an important factor to identify critical or high-risk zones. It is useful as a flood disaster preparedness system and as a decision support system for the government and the community. This research proposes the level of flood vulnerability mapping in Lamongan based on multi-criteria using the Fuzzy Analytical Hierarchy Process (FAHP) – Natural Breaks method. The multi-criteria used consisted of population density, availability of pumps, Bengawan Solo river level, elevation, history of flooding, and rainfall. The weight of the FAHP results will be classified using a natural breaks algorithm which produces a low, medium, and high flood susceptibility index in 27 sub-districts. This system is built based on the mobile device to display the vulnerability map spatially. Based on the GVF calculation, the FAHP-Natural breaks of 0.75 have a better priority and grouping value than the AHP-Natural breaks of 0.69.

Keywords: flood vulnerability, fuzzy, analytical hierarchy process, natural breaks, spatial mapping

Hydrometeorological Disaster Vulnerability Mapping in East Java Using Hierarchical Clustering

Belinda Anindya Kusuma Wardhani, Arna Fariza, Ira Prasetyaningrum
Informatics and Computer Eng. Dept, Politeknik Elektronika Negeri Surabaya,
Surabaya, Indonesia
belindaanindya@it.student.pens.ac.id, arna@pens.ac.id, ira@pens.ac.id

Abstract –East Java Province is an area with a high increase in cases of hydrometeorological disasters every year with as many as 620 disaster cases occurring. The absence of information related to the level of vulnerability of an area to hydrometeorological disasters has resulted in the magnitude of the risk and impact of disasters that occur on humans as well as increasing damage to facilities and buildings. In this study, a website-based application is created that can map the level of vulnerability of an area to hydrometeorological disasters in East Java. In conducting the mapping, several criteria are needed to determine the vulnerability of an area. The criteria are taken from the hazard/threats and vulnerability criteria. Then the criteria data are grouped using the Centroid Linkage method. This method groups the data based on the level of similarity of the data that is processed by calculating the centroid (middle) distance between the clusters so that the distance of the two clusters that are at least minimal will be combined into a new cluster. The vulnerability level is divided into 3 clusters, namely low, medium, and high which are visualized on a map with a period from 2016 to 2020. Cluster testing is done by calculating the silhouette coefficient value and it is known that the average of each year is 0.370168.

Design of Corrugated Road Detection System using LoRa Communication

Muhammad Dicky Athalla, Izzuddin Ahmad Afif, Moch. Zen Samsono Hadi,
Aries Pratiarso
Department of Electrical Engineering, Politeknik Elektronika Negeri Surabaya,
Surabaya, Indonesia
dickyathallah@gmail.com, izzuddinafif@gmail.com, zenhadi@pens.ac.id,
aries@pens.ac.id

Abstract –Roads are land transportation infrastructure that is very important in supporting the economic, social, and cultural fields and other aspects of people's lives. The high activity of the community will be directly proportional to the accident that becomes high. One of the factors causing the accident was the corrugated road conditions. The problem solution is to create a system that can detect corrugated roads, display data in the form of locations, and take pictures of the site of the corrugated road. The data is then transmitted through LoRa to the database to be displayed on the webGIS (Web Geolocation Information System) so that users can see the location of the corrugated road on the map view. This study produced a device that can use to detect the presence of corrugated roads and display the results on the website. Road users can find the location of the corrugated road simply by accessing a website that can run on all devices. The average delay generated when sending data using LoRa is 0.67 ms. Sending data in the form of latitude and longitude strings from GPS can be done using a LoRa device. The average accuracy of GPS locations with corrugated roads is 2.285 meters. The ideal speed for detecting is around 30-40 km/hour.

Keywords: Internet of Things, Detection, Corrugated Road, LoRa, WebGIS.

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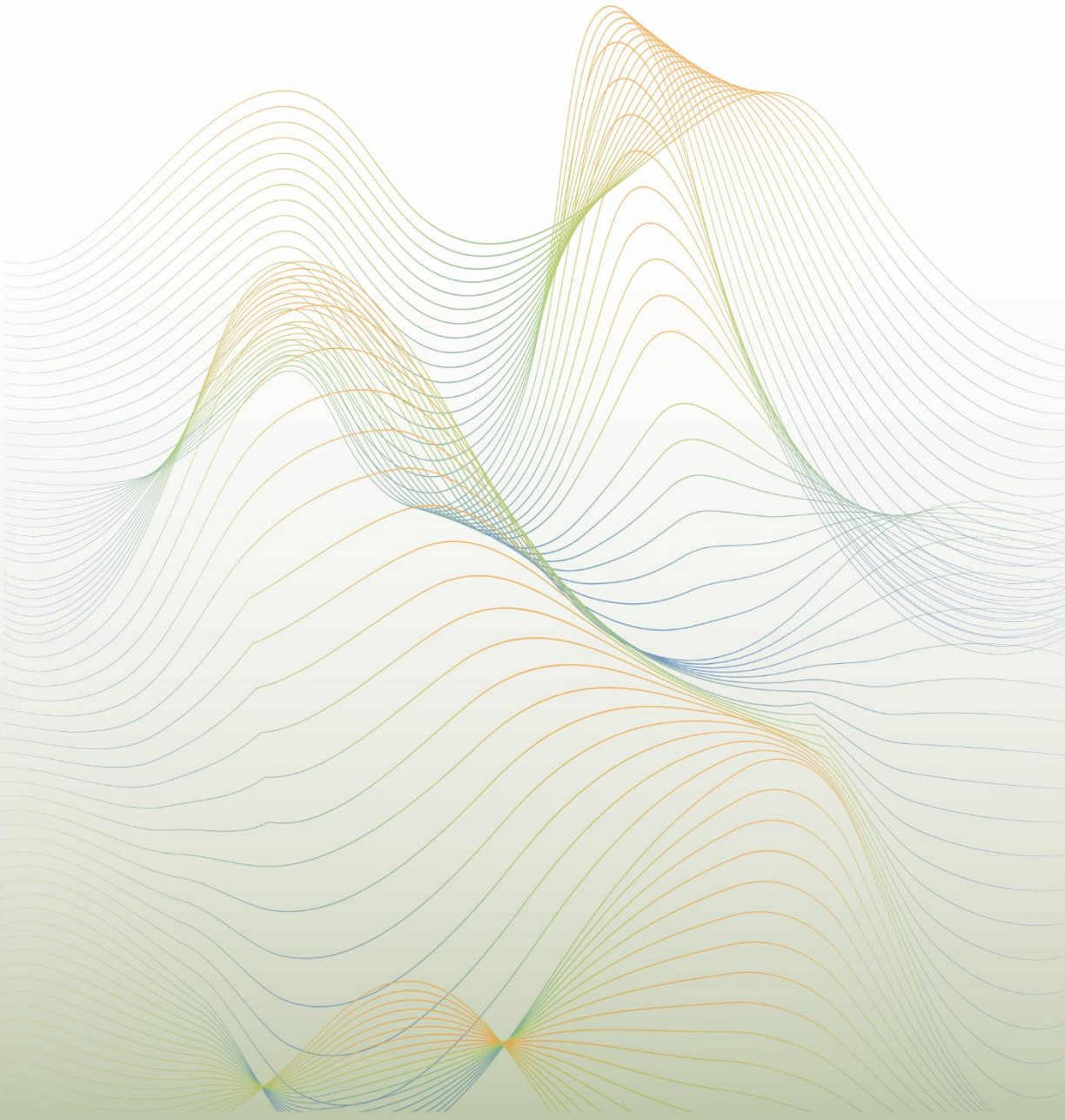
Heatmap Visualization and Badminton Player Detection using Convolutional Neural Network

Muhammad Abdul Haq[1], Shuhei Tarashima[2], Norio Tagawa[3]
[1,3]Faculty of Systems Design, Tokyo Metropolitan University Tokyo, Japan
[2]Innovation Center, NTT Communications Corporation Tokyo, Japan
[1]dmuhabdulhaq@gmail.com, [2]tarashima@acm.org, [3]tagawa@tmu.ac.jp

Abstract –Badminton coaches and analysts are more interested in how well athletes do in games by watching video matches. However, they still keep watching the whole video by hand, which is inconvenient and might cause them missing important information in the video. Most studies for sports video analysis have been done on soccer and volleyball, but badminton has not been fully focused on. Based on this observation, in this work we aim to build an automated system that can track the position of a player from an input badminton broadcast video, and visualize its position statistics on a heatmap. Convolutional neural network is used to track players and their position is projected on 2D court map using homography. In this paper we validate our approach using videos collected from the Badminton World Federation (BWF) channel on YouTube.

Keywords: multiple object tracking, convolutional neural network, homography.

Design and Implementation of WebXR Health Learning Module Application

Kirana Hanifati[1], Sritrusta Sukaridhoto[2], Dwi Kurnia Basuki[3], Rizqi Putri Nourma
Budiarti[4], Evianita Dewi Fajrianti[5], Ilham Achmad Al Hafidz[6]

[1,2,3,5,6]Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
[3]Tokyo Metropolitan University, Japan
[4]Universitas Nahdlatul Ulama Surabaya, Indonesia
[1]kiranahani@ce.student.pens.ac.id, [2]dhoto@pens.ac.id, [3]dwiki@pens.ac.id,
[4]rizqi.putri.nb@unusa.ac.id, [5]evianita08@pasca.student.pens.ac.id,
[6]ilhamachmada@pasca.student.pens.ac.id

Abstract –The Corona-Virus Disease Pandemic of 2019 (COVID-19) has impacted every part of our lives, including schooling. Measures to prevent virus transmission have also been taken, such as the Work From Home policy. It caused various problems in understanding the lesson, especially for medical students, because most medical schools have a lot of practical lessons. Unfortunately, the practical lesson can not be done in this situation. To keep clinical learning on track in the face of a pandemic, the Environment must adjust to better train future clinicians. The authors of this work develop an immersive platform of medical learning to aid medical education in the clinical evaluation future and competency development in the healthcare education field via virtual education via a web-based extended reality (XR) experience (WebXR). This WebXR provides standard operating procedures for doing intramuscular injection and has various features like creating an account to access the Environment of intramuscular injection, giving the explanation of what VR, AR, and MR are, and also explaining more about intramuscular injection based on medical module handbooks. The authors decided to interact with the object using pointing, clicking, and dragging. This platform is a multi-cross XR platform which means it can be run on mobile VR devices, PCVR, android as AR devices, Magic Leap 1, and Hololens 2 as MR devices, so the WebXR will be a flexible web that can be accessed with various devices. Therefore, it gives advantages because of the flexibility. The authors evaluated the system using the PIECES framework and some questionnaires to give a better result.

Keywords: COVID-19, Medical education, WebXR, Extended reality.

Implementation of Speech Commands on Construct 3 In Developing A Renewable Energy Gamification

Rifa'atul Mahmudah Burhan[1], Hestiasari Rante[2], Nu Rhahida Arini[3]
[1]Department of Information Technology and Computer, Politeknik Elektronika Negeri Surabaya, Surabaya, Indonesia
[2]Department of Creative Multimedia Technology, Politeknik Elektronika Negeri Surabaya, Surabaya, Indonesia
[3]Department of Mechanical Engineering and Energy, Politeknik Elektronika Negeri Surabaya, Surabaya, Indonesia
[1]rifa.amb@gmail.com, [2]hestiasari@pens.ac.id, [3]arini@pens.ac.id

Abstract –A learning process that always relies on books makes students less interesting and less motivating in learning. Because of the Covid-19 pandemic, the learning utilizes learning applications and social media such as short message applications. This has a bad impact because it can affect the mentality of the learning process [1], so it is necessary to make adjustments for improvements in the development of a more enjoyable learning process, one of which is by using game applications. It needs an improvement in the development of a more fun learning process, one of which is by using game applications. Game development in learning has not been too focused on the world of education, even though currently many games can be a good learning medium. This research develops a learning media gamification method with speech commands support features contained in Construct 3. This application can be used with mouse clicks or speech commands. The use of gamification with game elements outside of game contests has proven to be effective in increasing students' motivation and interest in learning.

Keywords: construct 3, educational media, interactive media, game application, gamification.

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Virtual Reality Application for Co-Bot Training

Amma Liesvarastranta Haz[1], Muhtadin[2], I Ketut Eddy Purnama[3], Mauridhi Hery Purnomo[4], Sritrusta Sukaridhoto[5]

[1,2,3,4]Department of Electrical Engineering, Institut Teknologi Sepuluh Nopember, Indonesia

[2,3]Department of Computer Engineering,Institut Teknologi Sepuluh Nopember, Indonesia

[5]Informatics and Computer Department, Politeknik Elektronika Negeri Surabaya, Indonesia

[1]ammahaz.206022@mhs.its.ac.id, [2]ketut@te.its.ac.id, [3]muhtadin@ee.its.ac.id, [4]muhtadin@ee.its.ac.id, [5]dhoto@pens.ac.id

Abstract –The direction of robot technology development is now towards human-centric robots where co-bots are starting to be in demand as assistants for human work. Working together means needing to get used to each other's behavior so as to create collaborative interactions between each other. To create that sense of familiarity, Co-Bot Interaction Virtual Training (CBIVT) was developed. CBIVT is used in wireless all-in-one VR devices thereby increasing user-friendliness. As a simulation scenario of the interaction between the Co-Bot and the user, the furniture assembly procedure was chosen. And, with the help of the path finding algorithm, the behavior of the Co-Bot AI to follow and approach the user is also created. To assess the importance and satisfaction of CBIVT, 32 participants were assigned to complete scenarios and then complete a questionnaire. Using the PIECES framework to assess the above parameters, we get results of 3.95 out of 5 for importance level and 3.99 out of 5 for satisfaction level.

Keywords: Virtual Reality, Serious Game, Human Computer Interaction, Collaborative Robot.

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Implementation of Immersive Technology on Medical Education

Muhammad Ivan Muntahir[1], Sritrusta Sukaridhoto[2], Dwi Kurnia Basuki[3], Rizqi Putri Nourma Budiarti[4], Ilham Achmad Al Hafidz[5], Evianita Dewi Fajrianti[6], Kirana Hanifati[7], Naufal Adi Satrio[8]

[1,2,3,5,6,7,8]Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
[3]Tokyo Metropolitan University, Japan
[4]Universitas Nahdlatul Ulama Surabaya, Indonesia
[1]ivanmuntahir17@ce.student.pens.ac.id, [2]dhoto@pens.ac.id, [3]dwiki@pens.ac.id,
[4]rizqi.putri.nb@unusa.ac.id, [5]ilhamachmada@pasca.student.pens.ac.id,
[6]evianita08@pasca.student.pens.ac.id, [7]kiranahani@ce.student.pens.ac.id,
[8]naufaladisatrio001@pasca.student.pens.ac.id

Abstract –Immersive technology has developed and impacted the revolution in the medical education sector, especially during the COVID-19 pandemic, which required adaptation to new learning methods. Medical education requires intensive learning, such as face-toface meetings with teachers and supporting equipment. During the pandemic, most learning activities use online video meetings and video learning. The learning method may be helpful for theory-based learning, but in practice-based education, several aspects, such as the absence of supporting equipment, must be considered. In this paper, the author designs a learning scenario in the medical field, namely a simulation of infusion installation on the web XR platform and VR applications. Here, we will show how these two immersive technologies differ and a more effective platforms for use in virtual simulation-based learning scenarios. The Native VR applications can only be run on VR devices, while WebXR is a multi-cross platform that can run on PCVR, Android as AR devices, Oculus Quest 2 as VR devices, Magic Leap 1, and HoloLens 2 as MR devices. The author will also evaluate using the PIECES framework to get test results between the two platforms. The satisfaction predicate on VR application has a higher overall average with 4.7 meanwhile the WebXR overall average value is 4.35.

Keywords: COVID-19, virtual reality, web XR, medical education.

Integrated Ticketing Website for Cultural Events in Covid-19 Endemic Transition Era Using Heuristic Evaluation Method

Shinta Amalia Hapsari, Aries Pratiarso, Haniah Mahmudah, Okkie Puspitorini and Ari Wijayanti, Nur Siswandari
Politeknik Elektronika Negeri Surabaya, Surabaya, Indonesia
shintamalia@te.student.pens.ac.id, aries@pens.ac.id, haniah@pens.ac.id, okkie@pens.ac.id, ariw@pens.ac.id, nuradi@pens.ac.id

Abstract –During this endemic transition era of the Covid19 as today, all activities to do must still comply health protocols as an effort to prevent the return of high cases of Covid-19. By allowing the return of offline cultural events, it is hoped that it will help the welfare of cultural actors after experiencing difficulties during the Covid-19 pandemic. Innovation is required to develop a system for managing events without using any physical contact (contactless). One type of technology that can be used for is QR code which is used to access the venue for cultural events. There are several important aspects related to the usability of UI/UX design in making a digital system. The purpose of this paper is to develop the "Dewishinta" system as a solution for managing cultural events that are effective, environmentally friendly, and real time using an integrated ticketing system. The method chosen to be used in the usability testing of this system is Heuristic Evaluation with ten usability aspects and a total of 24 evaluation points which are tested to get severity rating values. As a final result of the test, there are 13 usability problems finding in the cosmetic problem category which means it do not really need improvements because not affect the comfort of use with an average usability validation value of 92%. For target market validation data, an average validation of 98.25% from 200 user testing respondents state the feasibility of implementing the system as a solution to existing problems.

Keywords: Heuristic Evaluation, Severity Rating, QR Code, UI/UX, Cultural Events.

Background Blurring and Removal for 3D Modelling of Cultural Heritage Objects

Nurul Istiqomah Budianti[1], Muhammad Gibran[2], Anhar Risnumawan[3], Martianda
Erste Anggraeni[4], Aestatica Ratri[5]

[1,2,3]Mechatronics Engineering Division, Politeknik Elektronika Negeri Surabaya,
Kampus PENS, Sukolilo, Surabaya

[4]Multimedia Engineering Technology, Politeknik Elektronika Negeri Surabaya
Kampus PENS, Sukolilo, Surabaya

[5]Telecommunication Engineering Division, Politeknik Elektronika Negeri
Surabaya Kampus PENS, Sukolilo, Surabaya

nurulistiqomah@me.student.pens.ac.id[1], gibranev@me.student.pens.ac.id[2],
anhar@pens.ac.id[3], martianda@pens.ac.id[4], ratri@staff.pens.ac.id[5]

Abstract –Cultural heritage, such as relics, is a heritage of historical and artistic values created through wisdom and human work in a society that needs to be preserved. These objects are important for humanity because they contain historical stories and should be maintained well. Therefore, digitizing cultural heritage is crucial for modern people to maintain and recover the missing part through 3d modeling and provide access to the public. In this paper, we study the effect of background blurring and removal for 3d modeling of cultural heritage, followed by an automatic method for blurring and removing the background. Background blurring and removal are essential to improve the camera pose estimation in Structure from Motion (SfM), as the image matching will focus on the desired object. SfM algorithm is applied to images captured by a camera with the photogrammetry technique. The camera captures the image of objects from different views, and the images are processed with the SfM algorithm to obtain the 3d reconstruction. We hope that this work could bring a great benefit to digitizing and preserving cultural heritage objects.

Keywords: Cultural heritage, relics, photogrammetry, structure from motion, 3d modeling.

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Personal Community-member Information Management System with Facial Identification Functions

Shiori Sasaki, Li Xing
Musashino University, Japan
shiori.sasaki@gmail.com

Abstract –This paper presents an implementation method of a system to manage "personal" community-members' information with an individual face recognition function for the purpose of judging a person's name and related information. Recently, it is pointed that there are not a few people who cannot identify the face of his/her acquaintance (a.k.a. face-blindness, prosopagnosia). Even if you do not have a face-blindness symptom, you may have an experience when you happen to meet someone and you cannot recall his/her name though you recognize the face of him/her. In this research, a design and an implementation method for a system is presented, which calculates the similarity between the input face photo and a user's personal photo database and indicates the name and related information of the identified person to the user. The feature of this research is that it emphasizes the protection of privacy such as personal relationships, and the database to be referred to is constructed as a time series for each individual. The system is implemented by OpenCV for the purpose of implementing the goal of storing photos and related information on a person-by-person basis. To show the feasibility of the system, we conducted several preliminary experiments to identify the input image's person from a user's personal photo database of famous people.

Keywords: Face Recognition, Classification, Similarity, Image, Information Provision.

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Developing Microframework based on Singleton and Abstract Factory Design Pattern

Jauari Akhmad Nur Hasim[1], Umi Sa'adah[2], Desy Intan Permata Sari[3], Fardani
Annisa Damastuti[4], Fatkul Nur Koirudin[5]
[1,4]Multimedia Creative Technology Departement Politeknik Elektronika Negeri
Surabaya Surabaya, Indonesia
[2,3,5]Informatics and Computer Department Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
jauari@pens.ac.id[1], umi@pens.ac.id[2], desy@pens.ac.id[3], fardani@pens.ac.id[4],
fatkul@it.student.pens.ac.id[5]

Abstract –There are many frameworks to develop web applications, ranging from Full stack frameworks to microframeworks. The full stack framework is a framework providing almost everything needed to build an application with many features, requiring longer learning duration, longer execution process and high memory, as well as large project file size. This study utilizes a microframework with the PHP programming language using a singleton design pattern and an abstract factory. The singleton design pattern is employed to ensure that there is only one instance with a global access. The Abstract Factory design pattern is implemented in the HTTP Response feature in order to create data responses in the form of views or documents, as well as to effortlessly customize the response results. Performance testing on single page type pages, dynamic pages have an average load of 14734 milliseconds with an average throughput of 3, 6280 requests/second. Static pages have an average load of 7505 milliseconds with an average throughput of 10.9391 requests/second. Performance testing on multi-page type pages, has an average load of 44688 milliseconds with an average throughput of 2.1606 requests/second. Performance testing on the API has an average load of 10783.545 milliseconds with an average throughput of 5.0945 requests/second. The conducted experiments indicate that the average load generated is at a low point, to rapidly access the web with the higher resulting throughput; thus, it is more optimal in handling requests and responses.

Keywords: Microframework, web framework, design pattern singleton, design pattern abstract factory.

Implementation of Augmented Reality in Medical Education

Alfis Syahry[1], Dwi Kurnia Basuki[2], Sritrusta Sukaridhoto[3], Rizqi Putri Nourma
Budiarti[4], Evianita Dewi Fajrianti[5], Muhammad Ivan Muntahir[6], Kirana Hanifati[7]
[1,2,3,5,6,7]Politeknik Elektronika Negeri Surabaya
Surabaya, Indonesia
[2]Tokyo Metropolitan University, Japan
[4]Universitas Nahdlatul Ulama Surabaya, Indonesia
[1]alfissyahry@ce.student.pens.ac.id, [2]dwiki@pens.ac.id, [3]dhoto@pens.ac.id,
[4]rizqi.putri.nb@unusa.ac.id, [5]evianita08@pasca.student.pens.ac.id,
[6]ivanmuntahir17@ce.student.pens.ac.id, [7]kiranahani@ce.student.pens.ac.id

Abstract –The Covid-19 pandemic has hit Indonesia since the beginning of 2020 and is still continuing. The education sector has experienced a considerable impact, face-to-face learning must be replaced with all-online activities. Many problems arise from online learning, such as inadequate infrastructure, an ineffective learning system and difficulties in understanding the material. Medical education has an impact on the current situation because most of the learning uses infrastructure and direct practice, it is necessary to have alternative learning methods that can improve the quality of learning. Currently, video conference media technology can assist learning activities so that instructors can still explain material to students through virtual media. For medical students who need practice and infrastructure facilities, this technology is still not enough to support their learning media. The idea came up "Application of Learning Module in Health Field based on Extended Reality (sub chapter: Augmented Reality)" This application combines Virtual Reality, Augmented Reality, and Mixed Reality. Augmented reality is a technology that is suitable to be implemented in medical learning because students do not need to prepare anything to perform simulations, just devices and internet networks. For feeding and drinking to the elderly, some items are needed to start the practicum, with this augmented reality there is no need to prepare all of these items, and also reduce contact with other people during a pandemic like this. Users can connect to each other in different devices and environments according to their respective devices. In this application, Augmented Reality acts as a technology that combines the real and virtual worlds by adding virtual objects into the real world. Users can use devices that have cameras such as cellphones or laptops so they can see virtual objects. This virtual object can be seen by all users and each user is able to interact with it in real time. As for the temporary test results, it was found that Augmented

Reality has been tested and integrated with other immersive technologies with Web-XR. Interaction in Augmented Reality on Web-XR using a touch screen as well as several nursing SOP have been created and simulated using Augmented Reality technology. As for the final test in this final project, Augmented Reality technology based on WebXR has been running smoothly according to the specifications of the device used to open WebXR. If the device used to access WebXR has a high specification, then WebXR will run optimally, otherwise when the device specification is low, WebXR will not run optimally. The interaction used in WebXR-based Augmented Reality is touchscreen. The author tested this system to the user, the user here is a medical student. testing proves that this system is very helpful in terms of efficiency, users don't need to prepare tools repeatedly when they want to do simulations, just open WebXR and users can do the simulations provided. In testing the system, the author uses the PIECES framework (Performance, Information, Economics, Control and Security, Efficiency, Service) and produces an average score of 4.1. Then the user is categorized as satisfied with the system that was built.

Keywords: Augmented Reality, Medical Education, Education, Unity, Covid-19.