

ICECOS 2018 CONFERENCE

PROVINCE OF BANGKA-BELITUNG
INDONESIA



Proceeding of 2018 International Conference on Electrical Engineering and Computer Science (ICECOS)

ISBN : 978-1-5386-5719-5

ICECOS

2018

INTERNATIONAL CONFERENCE
ON ELECTRICAL ENGINEERING
AND COMPUTER SCIENCE

PROCEEDING

ICECOS 2018 CONFERENCE

**“Future energy brings the quality of human life through
applied techniques and ICT Innovations”**

October 02-04, 2018
Province of Bangka-Belitung
Indonesia

Organized by :



Co-Organized by :



Partner :



Technical Co-Sponsored by :



[2018 International Conference on Electrical Engineering and Computer Science \(ICECOS\)](#) took place October 2-4, 2018 in Pangkal Pinang, Indonesia.

ISBN: 978-1-5386-5720-1

Copyright and Reprint Permission: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923. For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Operations Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved. Copyright © 2018 by IEEE.

**INTERNATIONAL CONFERENCE ON ELECTRICAL ENGINEERING
AND COMPUTER SCIENCE (ICECOS) 2018**

Organizing Committee

International Advisory Committee

Gopakumar, Indian University of Science Bangalore, (Power Electronics) IEEE fellow
Haitham Abu-Rub texas A&M University, Qatar
Z. Y. Dong, University of Sidney
Akhtar Kalam, Victoria University, Melbourne, Australia
Azha binti Mohamed, Universiti Kebangsaan Malaysia
Nasrudin bin Abd Rahim, Universiti Malaya

Steering Committee

Yanuarsyah Haroen, Institut Teknologi Bandung
Zainal Salam (UTM) Malaysia
Zainuddin Nawawi, Universitas Sriwijaya
Suwarno, Institut Teknologi Bandung
Hussein Ahmad, (UTHM) Malaysia
Anton Satria Prabuwono, King Abdulaziz University

General Chair

Siti Nurmaini, Universitas Sriwijaya, Indonesia

General co-Chairs

Hiroyuki Iida, Japan Advanced Institute of Science and Technology
Muhammad Abu Bakar, Universitas Sriwijaya, Indonesia
Rahmat Budiarto, Al-baha University, Saudi Arabia
Zolkafle Buntat, Universiti Teknologi Malaysia, Malaysia

Publication Chairs

Deris Stiawan, Universitas Sriwijaya, Indonesia
Firdaus, Universitas Sriwijaya, Indonesia
Tole Sutikno, Universitas Ahmad Dahlan, Yogyakarta, Indonesia

Finance Chairs & Treasurer

Rizda Fitri Kurnia, Universitas Sriwijaya, Indonesia
Caroline, Universitas Sriwijaya, Indonesia

Public Relation Chairs

Muhammad Irfan Jambak, Universitas Sriwijaya, Indonesia
Mochammad Facta, Universitas Diponegoro, Semarang, Indonesia
Teguh Bharata Aji, Universitas Gadjah Mada, Indonesia
Zulfatman, Universitas Muhammadiyah Malang, Malang, Indonesia
Noor Akhmad Setiawan, Universitas Gadjah Mada, Indonesia
Muhammad Syafrullah, Universitas Budi Luhur, Jakarta, Indonesia
Anton Yudhana, Universitas Ahmad Dahlan, Yogyakarta, Indonesia

Endra Pitowarno, Politeknik Elektronika Negeri Surabaya – PENS, Indonesia
Rudi Kurianto, Universitas Tanjungpura, Indonesia

Technical Program Chairs

Reza Firsandaya Malik, Universitas Sriwijaya, Indonesia
Mohd. Riduan Ahmad, Universiti Teknikal Malaysia Melaka, Malaysia
Munawar A. Riyadi, Universitas Diponegoro, Semarang, Indonesia
Herlina Wahab Universitas Sriwijaya, Indonesia
Imam Much Ibnu Subroto, Universitas Islam Sultan Agung, Semarang, Indonesia

International Scientific Committee

Brian Kurkoski, School of Information Science Japan Advanced Institute of Science and
Technology (JAIST), Japan
Dejan Gjorgjevikj, SS Cyril and Methodius University, Skopje, Macedonia
Ion Tutanescu, University of Pitesti, Romania
Ahmad Hoirul Basori, King Abdulaziz University, Saudi Arabia
Germano Lambert-Torres, Universidade Federal de Itajuba, Brazil
Serhat Şeker, Istanbul Technical University, Turkey
Ildar Z Batyrshin, Mexican Petroleum Institute, Mexico
Wazir Mustafa, Universiti Teknologi Malaysia
Mohammed Yahia Alzahrani, Al-baha University, Saudi Arabia
Ahmed Alahmadi, Al-baha University, Saudi Arabia
Gorakanage Arosha Chandima Gomes (UPM) Malaysia
Montserrat Ros (Wolongong University) Australia
Malik Elbuluk (The University Of Akron) USA
Rudi Heriansyah (Umm Al-Qura University) Saudi Arabia
Vernon Coray (Uppsala University) Sweden
Mike Inggs, South Africa
Ilhan Kocaarslan (Istanbul University)
Gamal Abdel Fadeel Khalaf, Faculty of Engineering, Helwan University, Cairo, Egypt
Dana Prochazkova. PhD., DrSc, Czech Technical University, Czech Republic
Serdar Ethem Hamamci, Inonu University, Turkey
Gökhan Gökmen, Marmara University, Turkey
Mohd. Yazid Idris, Universiti Teknologi Malaysia
Audrius Senulis, Klaipeda University, Lithuania
Peng Peng, Sr. Development Engineer at Seagate Technology, United States
Kamal Bechkoum, School of Science and Technology, Northampton, United Kingdom
Simon Xu, Algoma University College, Canada
Aydin Nusret Güçlü, METU, Ankara, Turkey
Sultan Noman Qasem, Al- Imam Muhammad Ibn Saud Islamic University, Saudi Arabia
Tahir M. Lazimov, Azerbaijan Technical University, Azerbaijan
Tahir Cetin Akinci, Kirklareli University, Turkey
Siti Zaiton Mohd Hashim, Universiti Teknologi Malaysia, Malaysia

Local Chairs

Bhakti Yudho Suprpto, Universitas Sriwijaya, Indonesia
Djulil Amri, Universitas Sriwijaya, Indonesia
Irmawan, Universitas Sriwijaya, Indonesia
Abdul Haris Dalimunthe, Universitas Sriwijaya, Indonesia
Dessy Windiasari, Universitas Sriwijaya, Indonesia
Hera Hikmarika, Universitas Sriwijaya, Indonesia
Hermawati, Universitas Sriwijaya, Indonesia
Rahmawati, Universitas Sriwijaya, Indonesia
Suci Dwi Jayanti, Universitas Sriwijaya, Indonesia
Saparudin, Universitas Sriwijaya, Indonesia
Ermatita, Universitas Sriwijaya, Indonesia
Hadi Purnawan Satria, Universitas Sriwijaya, Indonesia
Ade Silvia, Polytechnic State of Sriwijaya, Indonesia
Nyanyu Latifah Husni, Polytechnic State of Sriwijaya, Indonesia
Syarifah Fitria, Universitas Sriwijaya, Indonesia
Dina Yunika, Universitas Sriwijaya, Indonesia
Sarifah Putri Raflesia, Universitas Sriwijaya, Indonesia
Samsuryadi, Universitas Sriwijaya, Indonesia
Rosi Pasarella, Universitas Sriwijaya, Indonesia
Sutarno, Universitas Sriwijaya, Indonesia
Sukemi, Universitas Sriwijaya, Indonesia
Ahmad Heryanto, Universitas Sriwijaya, Indonesia
Alfarisi, Universitas Sriwijaya, Indonesia
Pacu Putra, Universitas Sriwijaya, Indonesia

2018 International Conference on Electrical Engineering and Computer Science (ICECOS)

Table of Content

RFI Suppression Based on Time-Frequency Spectrogram for FMCW Radar	1
<i>Oktanto Dedi Winarko (Labs247); Andrian Andaya Lestari (Labs247, Indonesia)</i>	1
Performance Consideration in Signal Acquisition for High Dynamic Application in Tropical Environment	7
<i>Syed Mohd Fairuz Syed Mohd Dardin and Akram Abdul Azid (Universiti Pertahanan Nasional Malaysia, Malaysia); Zuhairi Abdul Rashid (Universiti Pertahanan Nasional Malaysia ; Engineering Faculty, Malaysia); Asnor Mazuan Ishak and Ahmad Shukri Abu Hasim (Universiti Pertahanan Nasional Malaysia, Malaysia)</i>	7
Benchmarking Low Latency Kernel and Xenomai for a Network Gateway Encryption Application	13
<i>Mastura Diana Marieska (Sriwijaya University, Indonesia); Achmad Imam Kistijantoro (Bandung Institute of Technology, Indonesia)</i>	13
Dual Circular-Polarized Slot Antenna Design for Wireless MIMO System at 2.4 GHz	19
<i>Nornikman Hassan and Badrul Hisham Ahmad (Universiti Teknikal Malaysia Melaka, Malaysia); Mohamad Zoinol Abidin Bin Abd Aziz (Universiti Teknikal Malaysia Melaka ; Hang Tuah Jaya, Malaysia); Mohd Riduan Ahmad, Zahriladha Zakaria and Chew Siang (Universiti Teknikal Malaysia Melaka, Malaysia); Mona Riza Mohd Esa (Universiti Teknologi Malaysia, Malaysia)</i>	19
Application of WSNs for Detection Land and Forest Fire in Riau Province Indonesia	25
<i>Evizal Abdul Kadir, Sri Listia Rosa and Ana Yulianti (Universitas Islam Riau, Indonesia)</i>	25
Optimization of Coffee Bean Drying Using Hybrid Solar Systems and Wi-Fi Data Communication	29
<i>Devita Ayu Larasati and Ike Fibiriani (University of Jember, Indonesia); Dedy Wahyu Herdiyanto and Guido Kalandro (Universitas Jember, Indonesia); Widyono Hadi and Catur Suko Sarwono (University of Jember, Indonesia)</i>	29
Fabrication of Integrated Power Divider and Filter for X Band Radar Applications	33
<i>Folin Oktafiani (Indonesian Institute of Sciences (LIPI), Indonesia); Yuyu Wahyu (Indonesia Institute of Science LIPI, Indonesia); Yussi Saputera (Indonesian Institute of Sciences, Indonesia)</i>	33
Object Position Estimation Using Naive Bayes Classifier Algorithm	39
<i>Reza Firsandaya Malik (University of Sriwijaya ; Faculty of Computer Science, Indonesia); Eko Pratama, Huda Ubaya and Rido Zulfahmi (Universitas Sriwijaya, Indonesia); Deris Stiawan (University of Sriwijaya, Indonesia); Kemahyanto Exaudi (Universitas Sriwijaya, Indonesia)</i>	39
Optimal Route Driving for Leader-Follower Using Dynamic Particle Swarm Optimization	45
<i>Bambang Tutuko (Sriwijaya University, Indonesia); Siti Nurmaini (University of Sriwijaya, Indonesia); Putri Sahayu (Intelligent System Research Group, Universitas Sriwijaya, Indonesia)</i>	45

Electronic Transaction Device Based on Contact Smart Card Using Programmable System-on-Chip	51
<i>Trio Adiono (Institut Teknologi Bandung, Indonesia); Reynhart Malingkas and Adi Candra Swastika (Bandung Institute of Technology, Indonesia); Syifaul Fuada (Institut Teknologi Bandung, Indonesia)</i>	
	51
Visual Servoing Design and Control for Agriculture Robot; a Review	57
<i>Tresna Dewi (Politeknik Negeri Sriwijaya, Indonesia); Pola Risma (Sriwijaya Polytechnic, Indonesia); Yurni Oktarina (Polytechnic Sriwijaya Palembang-Indonesia, Indonesia); Selamat Muslimin (State Polytechnic of Sriwijaya, Indonesia)</i>	
	57
Design and Implementation of Analog Transceiver Circuit for Patient Monitoring System Based on OWC	63
<i>Trio Adiono and Radhian Fereh Armansyah (Institut Teknologi Bandung, Indonesia); Amy Hamidah Salman (Institut Teknologi Bandung, Korea); Syifaul Fuada (Institut Teknologi Bandung, Indonesia)</i>	
	63
Multistage Scanning Method on 64-Channels ECVT Sensor	69
<i>Arbai Yusuf (Universitas Indonesia ; C-Tech Labs Edwar Technology, Indonesia); Agus Santoso Tamsir, Dodi Sudiana and Harry Sudibyo (Universitas Indonesia, Indonesia)</i>	
	69
Enhancement of the Fuzzy Control Response with Particle Swarm Optimization in Mobile Robot System	73
<i>Siti Nurmaini (University of Sriwijaya, Indonesia); Febrina Setianingsih (Universitas Sriwijaya, Indonesia)</i>	
	73
A Comparison of Back Propagation Neural Network and Elman Recurrent Neural Network Algorithms on Altitude Control of Heavy-lift Hexacopter Based on Direct Inverse Control	79
<i>Bhakti Yudho Suprpto (University of Sriwijaya, Indonesia); Benyamin Kusumoputro (Universitas Indonesia, Indonesia)</i>	
	79
Multisensors System for Real Time Detection of Length, Weight, and Heartbeat of Premature Baby in the Incubator	85
<i>Sri Purwiyanti (Unila, Indonesia); Sri Ratna Sulistiyanti and Arinto Setyawan (University of Lampung, Indonesia); Helmy Fitriawan, Billy Wibisono and Ketut Atmaja (Lampung University, Indonesia)</i>	
	85
Using Pressure Sensors Towards Pipeline Leakage Detection	89
<i>Kemahyanto Exaudi, Rossi Passarella, Rendyansyah Rendyansyah and Rido Zulfahmi (Universitas Sriwijaya, Indonesia)</i>	
	89
Different Types of Fuzzy Logic in Obstacles Avoidance of Mobile Robot	93
<i>Ade Handayani, ASH (Politeknik Negeri Sriwijaya ; Engineering Electrical, Indonesia); Andry Meylani (Politeknik Negeri Sriwijaya, Indonesia); Ciksadan Dansadan (State of Polytechnic Sriwijaya, Indonesia); Nyayu Latifah Husni (Politeknik Negeri Sriwijaya, Indonesia); Siti Nurmaini (University of Sriwijaya, Indonesia); Irsyadi Yani (Universitas Sriwijaya, Indonesia); Carlos Sitompul (Politeknik Negeri Sriwijaya, Indonesia)</i>	
	93
Development of Computational Intelligence-based Control System Using Backpropagation Neural Network for Wheeled Robot	101

<i>Karlisa Priandana, Iqbal Abiyoga, Wulandari Wulandari, Sri Wahjuni, Medria Hardhienata and Agus Buono (Bogor Agricultural University, Indonesia)</i>	101
Optimal Kernel Classifier in Mobile Robots for Determining Gases Type	107
<i>Nyayu Latifah Husni and Muhammad Muhaajir (Politeknik Negeri Sriwijaya, Indonesia); Ekawati Prihatini (State Polytechnic of Sriwijaya, Indonesia); Ade Handayani, ASH (Politeknik Negeri Sriwijaya ; Engineering Electrical, Indonesia); Siti Nurmaini (University of Sriwijaya, Indonesia); Irsyadi Yani (Universitas Sriwijaya, Indonesia)</i>	107
Optimal Gas Sensors Arrangement in Odor Searching Robot	111
<i>Nyayu Latifah Husni (Politeknik Negeri Sriwijaya, Indonesia); Ade Handayani, ASH (Politeknik Negeri Sriwijaya ; Engineering Electrical, Indonesia); Siti Nurmaini (University of Sriwijaya, Indonesia); Irsyadi Yani (Universitas Sriwijaya, Indonesia)</i>	111
Smart Parking Using Wireless Sensor Network System	117
<i>Anggi Sahfutri (State Polytechnic of Sriwijaya, Indonesia); Nyayu Latifah Husni (Politeknik Negeri Sriwijaya, Indonesia); Muhammad Nawawi, Iskandar Lutfi and Evelina Ginting (State Polytechnic of Sriwijaya, Indonesia); Ade Handayani, ASH (Politeknik Negeri Sriwijaya ; Engineering Electrical, Indonesia); Ekawati Prihatini (State Polytechnic of Sriwijaya, Indonesia)</i>	117
Safety Communicational System Using Shifting Cryptography in Smart Parking	123
<i>Wulan Dari (State Polytechnic of Sriwijaya, Indonesia); Nyayu Latifah Husni (Politeknik Negeri Sriwijaya, Indonesia); Evelina Ginting, Iskandar Lutfi and Muhammad Nawawi (State Polytechnic of Sriwijaya, Indonesia); Ade Handayani, ASH (Politeknik Negeri Sriwijaya ; Engineering Electrical, Indonesia); Dewi Permata Sari (State Polytechnic of Sriwijaya, Indonesia); Adella Rialita (Politeknik Negeri Sriwijaya, Indonesia)</i>	123
Analyzing of Different Features Using Haar Cascade Classifier	129
<i>Ratna Yustiwati (State Polytechnic Of Sriwijaya, Indonesia); Nyayu Latifah Husni (Politeknik Negeri Sriwijaya, Indonesia); Evelina Ginting (State Polytechnic of Sriwijaya, Indonesia); Sabilal Rasyad (State Polytechnic Of Sriwijaya, Indonesia); Iskandar Lutfi (State Polytechnic of Sriwijaya, Indonesia); Ade Handayani, ASH (Politeknik Negeri Sriwijaya ; Engineering Electrical, Indonesia); Niksen Alfarizal (State Polytechnic Of Sriwijaya, Indonesia); Adella Rialita (Politeknik Negeri Sriwijaya, Indonesia)</i>	129
Power Consumption Optimization in Cooling System Using Knowledge Base Temperature System	135
<i>Andi Adriansyah, Akhmad Wahyu Dani and Krisna Brotoatmodjo (Universitas Mercu Buana, Indonesia)</i>	135
A Secure Voice Channel Using Chaotic Cryptography Algorithm	141
<i>Munawar A Riyadi, M Reza Khafid, Natanael Pandapotan and Teguh Prakoso (Diponegoro University, Indonesia)</i>	141
Image Steganography Using Combine of Discrete Wavelet Transform and Singular Value Decomposition for More Robustness and Higher Peak Signal Noise Ratio	147
<i>Adam Nevriyanto and Erwin E (Universitas Sriwijaya, Indonesia); Sutarno Sutarno (University of Sriwijaya, Indonesia); Sri Desy Siswanti (Universitas Sriwijaya, Indonesia)</i>	147

Game Complexity Factor: A Collaborative Study of LeBlanc Taxonomy and Function Points Method	153
<i>Renny Sari Dewi (Universitas Internasional Semen Indonesia, Indonesia); Sholiq Sholiq and Apol Pribadi Subriadi (Institut Teknologi Sepuluh Nopember, Indonesia)</i>	
	153
Removal of Modulo as Hashing Modification Process in Essay Scoring System Using Rabin-Karp	159
<i>Errissya Rasywir (Sekolah Tinggi Ilmu Komputer Dinamika Bangsa Jambi, Indonesia); Yovi Pratama (Stikom Dinamika Bangsa, Indonesia); Hendrawan Hendrawan and Marrylinteri Istoningtyas (Sekolah Tinggi Ilmu Komputer Dinamika Bangsa Jambi, Indonesia)</i>	
	159
Real Time Detection on Face Side Image with Ear Biometric Imaging Using Integral Image and Haar-Like Feature	165
<i>Fachruddin Fachruddin (Sekolah Tinggi Ilmu Komputer Dinamika Bangsa Jambi, Indonesia); Yovi Pratama (Stikom Dinamika Bangsa, Indonesia); Errissya Rasywir, Desi Kisbianty, Hendrawan Hendrawan and Maria Borroek (Sekolah Tinggi Ilmu Komputer Dinamika Bangsa Jambi, Indonesia)</i>	
	165
Automatic Cost Estimation Analysis on Datawarehouse Project with Modified Analogy Based Method	171
<i>Yovi Pratama (Stikom Dinamika Bangsa, Indonesia); Errissya Rasywir (Sekolah Tinggi Ilmu Komputer Dinamika Bangsa Jambi, Indonesia)</i>	
	171
Analysis on Knowledge Layer Application for Knowledge Based System	177
<i>Maria Borroek and Errissya Rasywir (Sekolah Tinggi Ilmu Komputer Dinamika Bangsa Jambi, Indonesia); Yovi Pratama (Stikom Dinamika Bangsa, Indonesia); Fachruddin Fachruddin and Marrylinteri Istoningtyas (Sekolah Tinggi Ilmu Komputer Dinamika Bangsa Jambi, Indonesia)</i>	
	177
Fast Fourier Transform (FFT) Data Sampling Using Hamming and Blackman Method for Radar	183
<i>Sulis Tyaningsih (Indonesian Institute of Science (LIPI), Indonesia); Prasetyo Putranto, Winy Desvasari and Pamungkas Daud (Indonesian Institute of Sciences, Indonesia)</i>	
	183
Radar Software Development for the Surveillance of Indonesian Aerospace Sovereignty	189
<i>Yussi Saputera (Indonesian Institute of Sciences, Indonesia); Sulis Tyaningsih (Indonesian Institute of Science (LIPI), Indonesia); Topik Teguh Estu (PPET LIPI, Indonesia); Mashury Wahab (PPET-LIPI, Indonesia)</i>	
	189
Quality Assessment Level of Quality of Cocoa Beans Export Quality Using Hybrid Adaptive Neuro - Fuzzy Inference System (ANFIS) and Genetic Algorithm	195
<i>Gayatri Dwi Santika, Diah Ayu Wulandari, DARW and Fitriyana Dewi (Jember University, Indonesia)</i>	
	195
Automated Examination Timetabling Optimization Using Greedy-Late Acceptance-Hyperheuristic Algorithm	201
<i>Ahmad Muklason, Putri C Bwananesia and Sasmi Hidayatul Y T (Institut Teknologi Sepuluh Nopember, Indonesia); Nisa Angresti (Sepuluh Nopember Institute of Technology, Indonesia); Vicha Azthanty Supoyo (Institut Teknologi Sepuluh Nopember, Indonesia)</i>	
	201

Artificial Neural Network for Health Data Forecasting, Case Study: Number of Dengue Hemorrhagic Fever Cases in Malang Regency, Indonesia	207
<i>Wiwik Anggraeni, Graha Pramudita and Edwin Riksakomara (Institut Teknologi Sepuluh Nopember, Indonesia); Radityo Prasetyanto Wibowo (Institut Teknologi Sepuluh Nopember, Indonesia); Febriliyan Samopa (Institut Teknologi Sepuluh Nopember, Indonesia); Puji Adi (Ministry of Health, Indonesia); Renny Sari Dewi (Universitas Internasional Semen Indonesia, Indonesia)</i>	
	207
Using Metadata in Detection Spam Email with Pornography Content	213
<i>Dewi Wardani (Universitas Sebelas Maret, Indonesia); Retisa Siwi (Badan Pemeriksa Keuangan, Indonesia); Bambang Harjito (Sebelas Maret University, Indonesia); Maysa Marshallia (Universitas Sebelas Maret, Indonesia)</i>	
	213
Automatic Features Extraction Using Autoencoder in Intrusion Detection System	219
<i>Yesi Novaria Kunang (Universitas Sriwijaya, Indonesia); Siti Nurmaini and Deris Stiawan (University of Sriwijaya, Indonesia); Ahmad Zarkasi and Firdaus Firdaus (Universitas Sriwijaya, Indonesia); Jasmir Jasmir (STIKOM Dinamika Bangsa Jambi, Indonesia)</i>	
	219
Emotional Design on User Experience-based Development System	225
<i>Andhika Giri Persada (Universitas Islam Indonesia, Indonesia)</i>	
	225
Review of Automatic Emotion Recognition Through Facial Expression Analysis	231
<i>Dewi Yanti Liliana (Universitas Indonesia ; State Polytechnic of Jakarta, Indonesia); Chan Basaruddin (Universitas Indonesia, Indonesia)</i>	
	231
Breast Cancer Classification Using Deep Learning	237
<i>Jasmir Jasmir (STIKOM Dinamika Bangsa Jambi, Indonesia); Siti Nurmaini (University of Sriwijaya, Indonesia); Reza Firsandaya Malik (University of Sriwijaya ; Faculty of Computer Science, Indonesia); Dodo Abidin (STIKOM Dinamika Bangsa Jambi, Indonesia); Ahmad Zarkasi, Yesi Novaria Kunang and Firdaus Firdaus (Universitas Sriwijaya, Indonesia)</i>	
	237
Techno-Economic Analysis of Sea Floating PV/Diesel Hybrid Power Plant with Battery Arrangement Scheme for Residential Load at Remote Area in Indonesia (Case Study: Small Kei Island, South East Moluccas)	243
<i>Achmad Tofani and Iwa Garniwa (University of Indonesia, Indonesia); Fidel Rezki Fajry (Universitas Indonesia, Indonesia)</i>	
	243
A 250 kW Three Phase Induction Motor Design for Electric Bow Thruster	247
<i>Asep Andi Suryandi (BPPT ; ITB, Indonesia); Cuk Supriyadi Ali Nandar (Agency for the Assessment and Application of Technology, Indonesia); Dewi Rianti Mandasari and Katri Yulianto (BPPT, Indonesia)</i>	
	247
Comparative Analysis of Applications Off-Grid PV System and On-Grid PV System for Households in Indonesia	253
<i>Aryulius Jasuan (University of Sriwijaya, Indonesia); Zainuddin Nawawi (Universitas Sriwijaya, Indonesia); Hazairin Samaulah (Universitas Tridianti Palembang, Indonesia)</i>	
	253
Techniques for Analysis of Chaotic Pulse Trains Generated by Lightning: A Review	259

<i>Chin-Leong Wooi (Universiti Malaysia Perlis, Malaysia); Zulkurnain Abdul-Malek (UTM, Malaysia); M. N. K. H. Rohani (University Malaysia Perlis ; UNIMAP, Malaysia); Syahrudin Nizam Md Arshad Hashim (Universiti Malaysia Perlis, Malaysia); Ahmad Muhiddin Bin Yusof (Faculty of Engineering Technology, Universiti Malaysia Perlis (Unimap), Malaysia)</i>	259
Comparative Study; Different Types of PWM Control Scheme in Three-Phase Four-Wire Shunt Active Power Filter (APF) Topology	265
<i>Ahmad Shukri Abu Hasim (Universiti Pertahanan Nasional Malaysia, Malaysia); Zulkiflie Bin Ibrahim (Universiti Teknikal Malaysia Melaka, Malaysia); Syed Mohd Fairuz Syed Mohd Dardin, Akram Abdul Aziz and Asnor Mazuan Ishak (Universiti Pertahanan Nasional Malaysia, Malaysia)</i>	265
An Improved Circuit-Based Grounding Electrode Considering Frequency Dependence of Soil Parameters	271
<i>Ruqayyah Othman (Universiti Teknologi Malaysia ; Faculty of Electrical Engineering, Malaysia); Zulkurnain Abdul-Malek (University Technology Malaysia, Malaysia)</i>	271
Selection of Single-tuned Filter and High Pass Damped Filter with Changes of Inverter Type to Reduce Harmonics on Microgrid AC-DC	275
<i>Rudy Setiabudy (Universitas Indonesia (UI), Indonesia); Guru Wibowo (Universitas Indonesia, Indonesia); Herlina Wahab (Sriwijaya University ; University of Indonesia, Indonesia)</i>	275
Distance Effect on Lightning Electromagnetic Pulse over Lossy Ground	281
<i>Muhammad Irfan Jambak (Faculty of Engineering, Universitas Sriwijaya Ogan Ilir, Malaysia); Mohammed Imran Mousa and Zulkurnain Abdul-Malek (University Technology Malaysia, Malaysia); Mona Riza Mohd Esa (Universiti Teknologi Malaysia, Malaysia); Zainuddin Nawawi (Universitas Sriwijaya, Indonesia); Muhammad Abu Bakar Sidik (Faculty of Engineering, Universitas Sriwijaya Ogan Ilir, Indonesia)</i>	281
Power Generation from Wave Energy Using Floating Device	287
<i>Asnor Mazuan Ishak, Ahmad Shukri Abu Hasim, Syed Mohd Fairuz Syed Mohd Dardin and Akram Abdul Aziz (Universiti Pertahanan Nasional Malaysia, Malaysia)</i>	287
Electricity Demand Forecasting of Household Sector in Papua Province 2050	291
<i>Yosef Lefaan and Rinaldy Dalimi (Universitas Indonesia, Indonesia)</i>	291
Wavelet Analysis of the Onset of VHF and Microwave Radiation Emitted by Lightning	297
<i>Shamsul Ammar Shamsul Baharin, Mohd Riduan Ahmad, Dinesh Periannan, Muhammad Haziq Mohammad Sabri and Seah Boon York (Universiti Teknikal Malaysia Melaka, Malaysia); Mohamad Zoinol Abidin Bin Abd Aziz (Universiti Teknikal Malaysia Melaka ; Hang Tuah Jaya, Malaysia); Mohd Muzafar Ismail (University Tecnical Malaysia Melaka, Malaysia); Mona Riza Mohd Esa and Sulaiman Ali Mohammad (Universiti Teknologi Malaysia, Malaysia); Zulkurnain Abdul-Malek (UTM, Malaysia); Norbayah Yusop (Utem, Malaysia); Vernon Cooray (Uppsala University, Sweden); Gaopeng Lu (Chinese Academy of Sciences ; Institute of Atmospheric Physics, P.R. China)</i>	297
VHF Emissions Prior to the Onset of Initial Electric Field Changes of Intracloud Flashes	301
<i>Muhammad Haziq Mohammad Sabri, Mohd Riduan Ahmad, Dinesh Periannan and Seah Boon York (Universiti Teknikal Malaysia Melaka, Malaysia); Mohamad Zoinol Abidin Bin Abd Aziz (Universiti Teknikal Malaysia Melaka ; Hang Tuah Jaya, Malaysia); Mohd Muzafar Ismail (University Tecnical Malaysia Melaka,</i>	

<i>Malaysia); Mona Riza Mohd Esa and Sulaiman Ali Mohammad (Universiti Teknologi Malaysia, Malaysia); Zulkurnain Abdul-Malek (UTM, Malaysia); Norbayah Yusop (Utem, Malaysia); Vernon Cooray (Uppsala University, Sweden); Gaopeng Lu (Chinese Academy of Sciences ; Institute of Atmospheric Physics, P.R. China)</i>	301
Performance Analysis of Stacked Capacitive Antenna for Lightning Remote Sensing	305
<i>Jin Ying Ong and Mohd Riduan Ahmad (Universiti Teknikal Malaysia Melaka, Malaysia); Mona Riza Mohd Esa (Universiti Teknologi Malaysia, Malaysia); Muhammad Haziq Mohammad Sabri, Dinesh Periannan and Seah Boon York (Universiti Teknikal Malaysia Melaka, Malaysia); Sulaiman Ali Mohammad (Universiti Teknologi Malaysia, Malaysia); Gaopeng Lu (Chinese Academy of Sciences ; Institute of Atmospheric Physics, P.R. China); Norbayah Yusop (Utem, Malaysia); Mohd Muzafar Ismail (University Tecnical Malaysia Melaka, Malaysia); Vernon Cooray (Uppsala University, Sweden); Mohamad Zoinol Abidin Bin Abd Aziz (Universiti Teknikal Malaysia Melaka ; Hang Tuah Jaya, Malaysia); Zulkurnain Abdul-Malek (UTM, Malaysia)</i>	305
Shaft Mechanical Design of 250 kW Electric Motor	309
<i>Budi Fadjrin and Harry Purnama (BPPT, Indonesia); Muhammad Adhynugraha (The Agency for the Assessment and Application of Technology, Indonesia); Cuk Supriyadi Ali Nandar (Agency for the Assessment and Application of Technology, Indonesia)</i>	309
Development and Validation of Rogowski Coil with Commercial High Frequency Current Transformer for Partial Discharge Detection	315
<i>Chaganti Lakshmana Geetha Pavan Kumar, Nur Hazirah Abdul Khalid and Mohd Hafizi Ahmad (Universiti Teknologi Malaysia, Malaysia); Zainuddin Nawawi (Universitas Sriwijaya, Indonesia); Muhammad Abu Bakar Sidik (Faculty of Engineering, Universitas Sriwijaya Ogan Ilir, Indonesia); Muhammad Irfan Jambak (Faculty of Engineering, Universitas Sriwijaya Ogan Ilir, Malaysia); Eka Waldi (Andalas University, Indonesia); Aulia Aulia (Universitas Andalas, Indonesia); Rizda Kurnia (University of Sriwijaya, Indonesia)</i>	315
The Effect of Surface Mounted Device (SMD) Configuration Array on Light Distribution on LED Lamp	321
<i>Herlina Wahab (Sriwijaya University ; University of Indonesia, Indonesia); Rudy Setiabudy (Universitas Indonesia (UI), Indonesia); Muhammad Rully Syahputra (Universitas Indonesia, Indonesia)</i>	321
Power Transistor 2N3055 as a Solar Cell Device	327
<i>Yohandri Bow, Tresna Dewi, Ahmad Taqwa, Rusdianasari Rusdianasari and Zulkarnain Zulkarnain (Politeknik Negeri Sriwijaya, Indonesia)</i>	327
Face Movement Detection Using Template Matching	333
<i>Ahmad Zarkasi (Universitas Sriwijaya, Indonesia); Siti Nurmaini and Deris Stiawan (University of Sriwijaya, Indonesia); Firdaus Firdaus and Huda Ubaya (Universitas Sriwijaya, Indonesia); Yogie Sanjaya (Institut Teknologi Bandung, Indonesia); Yesi Novaria Kunang (Universitas Sriwijaya, Indonesia)</i>	333
Measurement of Component Performance (Sensor) on Internet of Thing (IoT)	339
<i>Sharipuddin Sharipuddin and Kurniabudi Kurniabudi (STIKOM Dinamika Bangsa, Indonesia); Benni Purnama (STIKOM Dinamika Bangsa Jambi ; STIKOM Dinamika Bangsa Jambi, Indonesia); Deris Stiawan (University of Sriwijaya, Indonesia); Darmawijoyo Hanapi (Sriwijaya University, Indonesia); Rahmat Budiarto (Al Baha University, Saudi Arabia); Dimas Wahyudi, Fepiliana Fepiliana and Sri Suryani (Universitas Sriwijaya, Indonesia)</i>	339

Preprocessing and Framework for Unsupervised Anomaly Detection in IoT: Work on Progress	345
<i>Kurniabudi Kurniabudi (STIKOM Dinamika Bangsa, Indonesia); Benni Purnama (STIKOM Dinamika Bangsa Jambi ; STIKOM Dinamika Bangsa Jambi, Indonesia); Sharipuddin Sharipuddin (STIKOM Dinamika Bangsa, Indonesia); Deris Stiawan (University of Sriwijaya, Indonesia); Darmawijoyo Hanapi (Sriwijaya University, Indonesia); Rahmat Budiarto (Al Baha University, Saudi Arabia)</i>	
	345
Monitoring Connectivity of Internet of Things Device on Zigbee Protocol	351
<i>Benni Purnama (STIKOM Dinamika Bangsa Jambi ; STIKOM Dinamika Bangsa Jambi, Indonesia); Sharipuddin Sharipuddin and Kurniabudi Kurniabudi (STIKOM Dinamika Bangsa, Indonesia); Deris Stiawan (University of Sriwijaya, Indonesia); Darmawijoyo Hanapi (Sriwijaya University, Indonesia); Rahmat Budiarto (Al Baha University, Saudi Arabia)</i>	
	351
An Analysis of Points System of Hotel Loyalty Program Based on the Return on Investment	357
<i>Long Zuo and Hiroyuki Iida (Japan Advanced Institute of Science and Technology, Japan); Shuo Xiong (Huazhong University of Science and Technology, P.R. China)</i>	
	357
MSME Recommendation Application Using Collaborative Filtering Method and Realtime Database (Case Study: Salatiga City)	361
<i>Radius Tanone and Yoga Adi Dharma (Satya Wacana Christian University, Indonesia)</i>	
	361
Function Points Method in Game Casual Context	367
<i>Renny Sari Dewi and Trias Andari (Universitas Internasional Semen Indonesia, Indonesia); Apol Pribadi Subriadi and Sholiq Sholiq (Institut Teknologi Sepuluh Nopember, Indonesia)</i>	
	367
Analysis of Counter-Strike: Global Offensive	373
<i>Muhammad Nazhif Rizani and Hiroyuki Iida (Japan Advanced Institute of Science and Technology, Japan)</i>	
	373
An Integrated Child Safety Using Geo-fencing Information on Mobile Devices	379
<i>Dinda Lestarini (Sriwijaya University, Indonesia); Sarifah Putri Raflesia (Universitas Sriwijaya ; Institut Teknologi Bandung, Indonesia); Firdaus Firdaus (Universitas Sriwijaya, Indonesia)</i>	
	379
Web Scraping Techniques to Collect Weather Data in South Sumatera	385
<i>Fatmasari Asmuni (Universitas Binadarma, Indonesia); Yesi Novaria Kunang (Universitas Sriwijaya, Indonesia); Susan Purnamasari (Universitas Bina Darma, Indonesia)</i>	
	385
Modified Logistic Maps for Discrete Time Chaos Based Random Number Generator	391
<i>Magfirawaty Magfirawaty (Universitas Indonesia, Indonesia); Andriani Adi Lestari (Sekolah Tinggi Sandi Negara, Indonesia); Suryadi Suryadi and Kalamullah Ramli (Universitas Indonesia, Indonesia)</i>	
	391
Conceptual Modeling for Intelligent Knowledge-Based System in Agriculture: Case Study of Indonesia	397
<i>Sarifah Putri Raflesia (Universitas Sriwijaya ; Institut Teknologi Bandung, Indonesia); Dinda Lestarini (Sriwijaya University, Indonesia); Firdaus Firdaus (Universitas Sriwijaya, Indonesia); Siti Nurmaini (University of Sriwijaya, Indonesia); Anugrah Pamosoaji (Universitas Atma Jaya Yogyakarta, Indonesia)</i>	
	397

Measuring Customer Satisfaction Using CRM Scorecard in Canteen FASILKOM UNSRI	403
<i>Ali Ibrahim (Sriwijaya University, Indonesia); Aris Pratiwi, Devi Indra Meytri, Madri Madri, Muhammad Aziz Kurniawan and Nadia Yuniarti (Universitas Sriwijaya, Indonesia)</i>	
	403
Identification of the Reproductive Apparatus of Tarantula Genus Brachypelma Using Linear Discriminant Analysis Method	409
<i>Apriandy Angdresey and Meylan Wongkar (De La Salle Catholic University, Indonesia)</i>	
	409
Acoustic Partial Discharge Detection Using Low-cost Pre-amplified Piezoelectric Transducer and Coated Optical Fiber Sensor	415
<i>Chaganti Lakshmana Geetha Pavan Kumar, Izzul Hilmi Arizu and Mohd Hafizi Ahmad (Universiti Teknologi Malaysia, Malaysia); Zainuddin Nawawi (Universitas Sriwijaya, Indonesia); Muhammad Abu Bakar Sidik (Faculty of Engineering, Universitas Sriwijaya Ogan Ilir, Indonesia); Muhammad Irfan Jambak (Faculty of Engineering, Universitas Sriwijaya Ogan Ilir, Malaysia); Rizda Kurnia (University of Sriwijaya, Indonesia); Muhammad Yusof Mohd Noor (Universiti Teknologi Malaysia, Malaysia); Asrul Izam Azmi (Universiti Teknologi Malaysia ; The University of New South Wales, Malaysia); Eka Waldi (Andalas University, Indonesia); Aulia Aulia (Universitas Andalas, Indonesia)</i>	
	415
Comparison Double Dielectric Barrier Using Perforated Aluminium for Ozone Generation	419
<i>Syarifa Fitria and Zainuddin Nawawi (Universitas Sriwijaya, Indonesia); Muhammad Abu Bakar Sidik (Faculty of Engineering, Universitas Sriwijaya Ogan Ilir, Indonesia); Dwirina Yuniarti (Universitas Sriwijaya, Indonesia); Rizda Kurnia (University of Sriwijaya, Indonesia); Zolkafle Buntat (Universiti Teknologi Malaysia, Malaysia)</i>	
	419
Evaluation of the Existence of Initial Breakdown Process for Cloud-to-Ground Flashes	425
<i>Mohd Riduan Ahmad (Universiti Teknikal Malaysia Melaka, Malaysia); Muhammad Abu Bakar Sidik (Faculty of Engineering, Universitas Sriwijaya Ogan Ilir, Indonesia); Muhammad Zikri (Universitas Sriwijaya, Indonesia); Mona Riza Mohd Esa (Universiti Teknologi Malaysia, Malaysia); Muhammad Haziq Mohammad Sabri and Dinesh Periannan (Universiti Teknikal Malaysia Melaka, Malaysia); Gaopeng Lu (Chinese Academy of Sciences ; Institute of Atmospheric Physics, P.R. China); Zhang Hongbo (Institute of Atmospheric Physics, Chinese Academy of Sciences, P.R. China)</i>	
	425
Enhancement of Cogging Torque Reduction on Inset Permanent Magnet Generator by Using Magnet Edge Shaping Method	429
<i>Tajuddin Nur (Atma Jaya Catholic University, Indonesia); Herlina Wahab (Sriwijaya University ; University of Indonesia, Indonesia)</i>	
	429
Variation of Pattern and Cavity Diameter of Aluminium Perforated with Single Glass Dielectric Barrier for Ozone Generation	435
<i>Muhammad Abu Bakar Sidik (Faculty of Engineering, Universitas Sriwijaya Ogan Ilir, Indonesia); Akhbar Wista Arum and Zainuddin Nawawi (Universitas Sriwijaya, Indonesia); Muhammad Irfan Jambak (Faculty of Engineering, Universitas Sriwijaya Ogan Ilir, Malaysia); Rizda Kurnia (University of Sriwijaya, Indonesia); Zolkafle Buntat (Universiti Teknologi Malaysia, Malaysia); Syarifa Fitria (Universitas Sriwijaya, Indonesia)</i>	
	435
Effects of Cold Plasma Treatment on the Growth Rate of Corn and Eggplant	441

Muhammad Abu Bakar Sidik (Faculty of Engineering, Universitas Sriwijaya Ogan Ilir, Indonesia); Zolkafle Buntat (Universiti Teknologi Malaysia, Malaysia); Zainuddin Nawawi (Universitas Sriwijaya, Indonesia); Muhammad Irfan Jambak (Faculty of Engineering, Universitas Sriwijaya Ogan Ilir, Malaysia); Yahya Buntat and Fatin Musa (Universiti Teknologi Malaysia, Malaysia) 441

Non-thermal Plasma for Removal of NO_x from Diesel Engine Vehicle: A Simulation Study 447

Muhammad Abu Bakar Sidik (Faculty of Engineering, Universitas Sriwijaya Ogan Ilir, Indonesia); Zolkafle Buntat (Universiti Teknologi Malaysia, Malaysia); Zainuddin Nawawi (Universitas Sriwijaya, Indonesia); Muhammad Irfan Jambak (Faculty of Engineering, Universitas Sriwijaya Ogan Ilir, Malaysia); Hafezaidi Mat Saman and Fatin Musa (Universiti Teknologi Malaysia, Malaysia) 447

Design of a Solar Micro Power Plant for Home Lighting 453

Julie Rante, Lianly Rompis and Alexander Patras (Universitas Katolik De La Salle Manado, Indonesia) 453

The Performance Evaluation of Capacitive Antenna with Various Structures and Permittivity Values 454

Seah Boon York and Mohd Riduan Ahmad (Universiti Teknikal Malaysia Melaka, Malaysia); Mona Riza Mohd Esa (Universiti Teknologi Malaysia, Malaysia); Dinesh Periannan and Muhammad Haziq Mohammad Sabri (Universiti Teknikal Malaysia Melaka, Malaysia); Sulaiman Ali Mohammad (Universiti Teknologi Malaysia, Malaysia); Gaopeng Lu (Chinese Academy of Sciences ; Institute of Atmospheric Physics, P.R. China); Mohamad Zoinol Abidin Bin Abd Aziz (Universiti Teknikal Malaysia Melaka ; Hang Tuah Jaya, Malaysia); Norbayah Yusop (Utem, Malaysia); Mohd Muzafar Ismail (University Tecnical Malaysia Melaka, Malaysia); Vernon Cooray (Uppsala University, Sweden); Zulkurnain Abdul-Malek (UTM, Malaysia); Noor Azwan Shairi (Universiti Teknikal Malaysia Melaka, Malaysia) 454

Face Movement Detection Using Template Matching

Ahmad Zarkasi*
Intelligence System Research
Group Faculty of Computer
Science
Universitas Sriwijaya
Palembang, Indonesia
zarkasi98@gmail.com

Siti Nurmaini
Intelligence System Research
Group Faculty of Computer
Science
Universitas Sriwijaya
Palembang, Indonesia
sitinurmaini@gmail.com

Deris Stiawan
Intelligence System Research
Group Faculty of Computer
Science
Universitas Sriwijaya
Palembang, Indonesia
deris.stiawan@gmail.com

Firdaus
Intelligence System Research
Group Faculty of Computer
Science
Universitas Sriwijaya
Palembang, Indonesia
firdaus_civil@yahoo.com

Huda Ubaya
Intelligence System Research
Group Faculty of Computer
Science
Universitas Sriwijaya
Palembang, Indonesia
huda_ubaya@yahoo.com

Yogie Sanjaya
Intelligence System Research
Group Faculty of Computer
Science
Universitas Sriwijaya
Palembang, Indonesia
yogie.sanjaya@ymail.com

Yesi Novaria Kunang
Intelligence System Research
Group Faculty of Computer
Science
Universitas Sriwijaya
Palembang, Indonesia
yesinovariakunang@binadarma.ac.id

Abstract— *Face recognition process can be used for individual verification and identification. Generating an image that can be used for identification, manipulation, modeling, pattern recognition, and object search is the main thing on face area determination. The template matching method used the intercourse between the input image pattern and the referral face pattern along with its features. In this paper will be purposed about face detection use template matching method on movement face. The technique used is to determine the face region by separating the skin region to non-skin region. Detected face area is dynamic. Faces can move horizontal or vertical. Then the results of the process is a face image model. The face image model will show whether the skin is a face region, which will also produce coordinates of the face region*

Keywords— *Face recognition, template matching, movement face detection.*

I. INTRODUCTION

Humans often use face detection to recognize other individuals. Initially, face recognition algorithm used simple geometric model, then this model continues to better evolve so that it becomes the representation of advanced mathematics and matching processes. The last ten to fifteen years, great advances and initiatives have encouraged face recognition technology into an alternative method. Face recognition process can be used for individual verification and identification. In another case, partial face recognition development has generated a lot of literature, but only part of the study has tried to analyze whether and how the partial face biometry actually appears to have the negative effect on the level of accuracy and error [1].

Detecting an object is part of computer technology, especially in computer vision. This field will image processing of an object and the computer vision can interact to recognize the specified part of an object. For example

human faces, fruits, leaves, buildings, trees, cars and others. The object that will be processed can be obtained from the digital image or video frame. Face detection algorithm is based on how to determine whether there is a face in the picture or not [2]. In other words, face detection is a process of searching automatically for a face object displayed on a picture or video [3].

Identify the target face on an observation, where the face is placed regardless of position, scale, orientation, lighting conditions, expression, etc. Faced with these challenges, previous face detection research had focused on computer vision [4]. Generating an image that can be used for identification, manipulation, modeling, pattern recognition, and object search is the main thing on face area determination.

In this paper will be discussed the face detection use template matching method on moving face. The technique used is to determine the face region by separating the skin region to non-skin region. Detected face area is dynamic. Faces can move horizontal or vertical. Then the results of the process is a face image model. The face image model will show whether the skin is a face region, which will also produce coordinates of the face region.

II. DIGITAL IMAGE DETECTION

A. Digital Image

The reference image is the original image captured by a camera, that can also be called a digital image or RGB. The next reference image will be processed by the specified method. A digital image display system or so-called a reference image can be seen in Figure 1. A Digital image can be obtained automatically by sampling process of a three-dimensional object that will form a matrix. The value of light intensity is the elements of the matrix.



Fig. 1. Image reference

A Digital image is an image in a two-dimensional field. Images are also values with certain functions. An Image is a collection of colors in RGB, which can look beautiful, have patterns, abstracts, etc. By type, the image is divided into two types: the still image and the moving image. Still, an image is a single stationary object that does not move. While moving image is a collection of still objects that displayed sequentially within a certain time range, making it visible as a moving image. Each image in the sequence is called a frame [2] [5].

B. Image Detection

The face image is an important analysis in the interaction between human-computer (Human-Computer Interaction / HCI) based on computer vision study. Face detection is a series of process to find solutions where the position of the image should be determined. The goal is to identify all areas of the image containing a face. In the case, the process must not ignore the positioning factor of three-dimensional, direction, and lighting conditions.

Display images such as pose, scale, rotation and image orientation, face expressions, are difficulties related to face detection systems due to variations in images. Face detection is when fluctuating image is given, face detection will determine whether there is a face or not in the image, and if there is a face, the location and extent of the image will be determined. The things that effect in face detection are; position, the presence of structural components, face expression, occlusion, image direction, and image condition. Skin color has been used and proven to be an effective feature used in face detection. Although each human being has different skin color, the main difference is in the intensity of the color.



Fig. 2. Image detection

In the process of face detection, if given an image whose variations in the position change, this would make the detection process becomes a little complex. The detection process would check periodically whether or not there was a face in the image. If the face image was found, it will be determined the location and area of the image. Human Skin

Color was an effective character in the face detection process. Although every human being has a different skin color. but which are seen in the process was the color skin intensity.

III. MATERIAL AND METHOD

A. Template Matching

The Template Matching Method was generally used for getting the face areas, with the greatest possibility to be a human face. A Template was the examples from the object or the facial features that are the main target. The template matching method used the intercourse between the input image pattern and the referral face pattern along with its features. In other words, matching the two face image features to find the closeness of the data. This approach also used some predefined templates, whose the purpose was for detecting faces. This method will compare the sub-regions and the predetermined template in a way of executing the pixel intensity data which is obtained before [1].

The used template matching algorithm can be seen on Fig.3. in that picture there was a Data. Data was a representation of the whole entire face detection process. The data has stages of the process that must be done. The final result of the process was face detection. The results could be viewed as in Fig.2. The steps are as follows: 1) assign a face image as the original image data. This image is obtained from the camera; 2) Resized the obtained image. the objective of image resize was to get an ideal resolution of the image so that could used in the image processing process; 3) Processing the skin color model with the lore of the color space. Then calculate the similarity of color, color conversion to grayscale, segment the image (skin segmentation) to get skin color or not skin color; 4) Displays the results of the process that has been done, if the possibility of the face area is detected it will be displayed as a skin region.

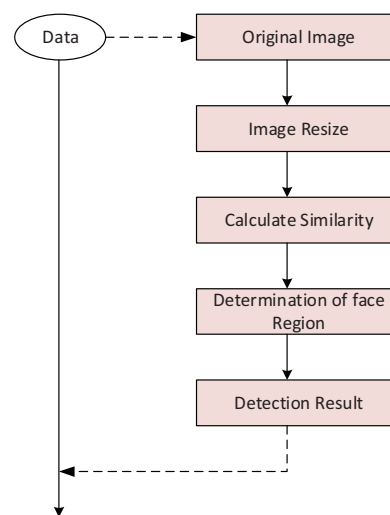


Fig. 3 Method Flowchart

B. Skin Segmentation

In face detection algorithm, the first step is skin segmentation. Skin segmentation aims for disposing of as

many imageries as indicated as skin areas. By applying Gaussian distribution on the skin color model, will obtain the possibility of skin for any pixels from images, as seen on fig.4. There are two ways that can be used in segmentation based on skin color, there is convert RGB image to YCbCr space or using the RGB to HSV method. But in this paper will use the RGB method into the YCbCr space. This is because this method has the advantage of eliminating the effects of luminance when converting an image to YCbCr space. To get the value of skin color spread can be searched with this allowing Gaussian model equation, $N(m, C)$

Rerata : $m = E(x)$, dengan $x = (r \ b)^T$
 Kovarians : $C = E\{(x - m)(x - m)^T\}$

The color histogram on Fig 5 showing the spread of skin tones for the various people who are clumped in chromatic color space. In the RGB space, each component image (red, green, and blue) has different brightness levels. Therefore in the YCbCr space, all information about the brightness level is given by component Y, because the components of Cb (blue) and Cr (red) are independent of luminance. For the equation is as follows.

$$P(CrCb * |skin) = \frac{[CrCb*]_{skin}}{Total_{skin}} \quad (1)$$

And the conditional probability of a pixel color in the YCrCb space, considering it is a pixel with non-skin color:

$$P(CrCb * |nSkin) = \frac{[CrCb*]_{nSkin}}{Total_{nSkin}} \quad (2)$$

We can use the Bayesian classifier, with the minimum cost decision rule [10]:

$$\frac{P(CrCb * |nSkin)}{P(CrCb * |skin)} \leq \alpha \quad (3)$$

Where:

- $[CrCb *]_{skin}$ is the number of pixels with the CrCb* color in the skin histogram;
- $[CrCb *]_{nSkin}$ is the number of pixels with the CrCb* color in the non-skin histogram;
- $Total_{skin}$ is the total number of pixels counted in the skin histogram;

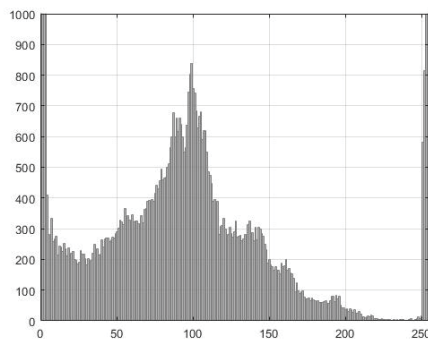


Fig.4 Skin histogram for Thresholding

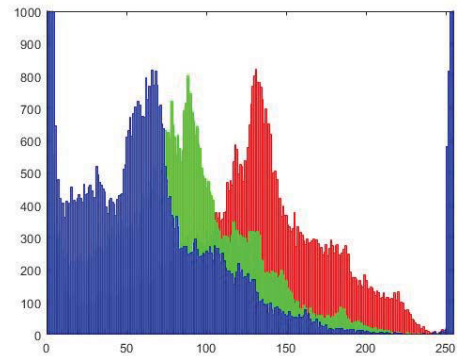


Fig.5 Skin histogram for RGB

C. Skin Region

The skin area was defined as a closed region in an image, which can have 0, 1 or more holes in it. The color restrictions were represented by pixels with number 1 for binary imagery. All holes in a binary image had a pixel value 0 (black area). Number of holes in a skin area The number of holes in a region could be searched by counting Euler's number from the region, which is defined as follows: $H = CE - C$ with E = Euler's number C = number of connected components H = number of holes in an area Center of mass To learn the skin area, it was necessary to determine the area and center from the skin area. One of the ways was by calculating the centroid from the skin area. Center area in the binary image was the same as the mass center and could be calculated as follows.



Fig. 5 Skin Region at a certain angle

Most faces were used in a vertically oriented face detection. Nonetheless, there were images with a bit of tilt angle. for getting a high compatibility in rotating a corresponding face of the model with the angle that fit the original image needed a proper way. θ slope angle given by the following formula.

$$\theta = \frac{1}{2} \tan^{-1} \frac{b}{a - c}$$

with

$$a = \sum_{i=1}^n \sum_{j=1}^m (x'_{ij})^2 B[i, j]$$

$$b = 2 \sum_{i=1}^n \sum_{j=1}^m x'_{ij} x'_{ij} B[i, j]$$

$$c = \sum_{i=1}^n \sum_{j=1}^m (y'_{ij})^2 B[i, j]$$

and $x' = x - \bar{x}$; $y' = y - \bar{y}$

D. Framework

In this paper proposes a template data processing technique that minimizes the detection area so that it matches the ROI. The detection area includes the front face area and right and left side faces. Face data retrieval for right and left side, done by rotating face periodically. This rotation is done up to an angle of 90° . Method to be described in this paper has the following goal

- Find the template based position of faces in an image,
- Find the template rotate the position of faces in a image.

We assume that:

- The environment lighting is controlled and stable,
- The camera where the system will work is dynamic (moving),

The system will detect for some angles face positions. In this section, the research is focused on the design of face detection system and using the cheap device but has good performance. In outline, steps will be done as in Fig 6.

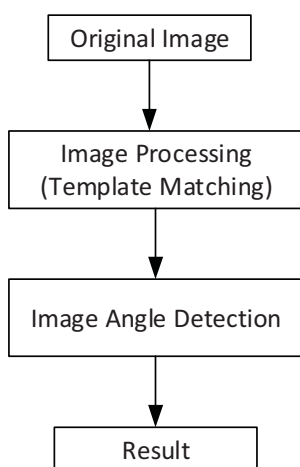


Fig. 6 Framework

The system will detect for some angles face positions. In this section, the research is focused on the design of face detection system and using the cheap device but has good performance. In outline, steps will be done as in Fig 6. Described in the preceding section. After that, shooting is continued by turning the face. The rotation on the face is done clockwise and counterclockwise. The maximum rotation angle is 90° . The next process is to display face results in a quadrilateral ROI like Fig.5

IV. RESULT AND ANALYSIS

The results of the experiments performed will be discussed in this section. The obtained results are divided into two parts, the first is the result data for the neutral position and the second is the position in some corner of the catch image of the face (rotating position). The data retrieval process consists of 4 processes namely 1) Displaying the reference of image data; 2) displays the grayscale conversion image; 3) displaying skin

segmentation result image; 4) displays the image of thresholding; 5) displays the image of face detection in ROI. All the views can be seen in figure 9.

Captured face image data from the camera will be displayed in the original. This process does not require any specific algorithms or techniques. See figure 8 (a). Any results obtained from the camera will be displayed in intact. Both from the side of the face as well all the color attributes of the features that come with it. The resolution used in capturing the image is 320×240 pixels. This is the standard resolution used in the retrieval of an image. Afterward, an image that has been obtained in RGB format, will be converted first into the grayscale format. It is aimed to know the value of color intensity level. The colors are black, gray, and white. Gray levels here are the color of gray with various levels from the black to the closest to white.

The next step is to process the original face image data into the skin segmentation. This process aims to ensure that the obtained image data is skin or not a facial skin. The results can be seen in figure 8 (b). In that picture, all image features other than the facial skin image will be removed. The point is that only skin color is displayed, besides the skin color will be blackened. The next process is thresholding. This process aims at the grayscale image process into binary or black and white images so that it can be known which region includes the object and background of the image clearly. The results of this process can be seen in figure 8 (c). Everyone has a different face skin color, therefore needed adaptive thresholding process in order to obtain the optimal value.

The final step of this process is to show the results of face detection in the frame of the region of interest (ROI). The results can be seen in figure 8 (d). The template matching process is a process for obtaining cross-correlation values between the skin areas indicated as the face area with the model facial image. Once the system decides that the processed skin area corresponds to the human face, it will be determined a new image (gray level imagery) with the area declared as facial skin replaced with the face of the model. Then the face is marked as an inspection box on the reference image. This indicates that the face area is detected.

A. Neutral Position

An object image is placed right in front of the camera. So the image of the face that is captured is the face of the front. The illustrations can be seen in figure 7. In the picture, there are two images that are oriented head looks up. An empty circle image indicates a head with an unknown face position. Then the circle image is poked down and leveled, is ahead illustration with a face facing the arrow. This indicates that the face is in the front position. Furthermore, this position is called neutral position. This position is the first data position in the face detection process. The result will show full face detection, as shown in figure 8.

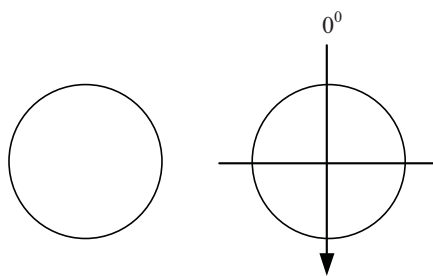
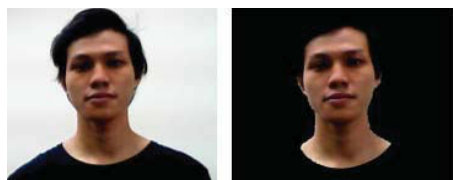
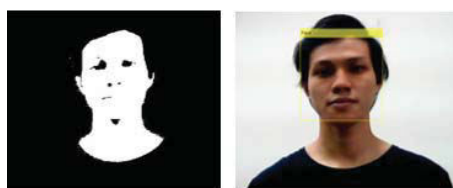


Fig 7. Top view of the Neutral position



(a) (b)



(c) (d)

Fig 8. Face detection for neutral position

B. Rotating Position

Rotating position is the process of taking face image in several positions. This is illustrated in figure 8. In the picture, the face image rotates in two directions, That is clockwise and counterclockwise. The number of image positions in opposite directions is two positions. These positions are located at the 45° and -90° angles. This position is illustrated by two arrows that rotate in the opposite direction of the clock. See figure 8 (a). The range of the two arrows indicates the reference angle of 0°. This also applies to the clockwise position. See figure 8 (b). But that distinguishes only the direction of rotation. The image positions are located at 45° and -90° angles from the angle range 0°. The overall result view of this process can be seen in figure 9.

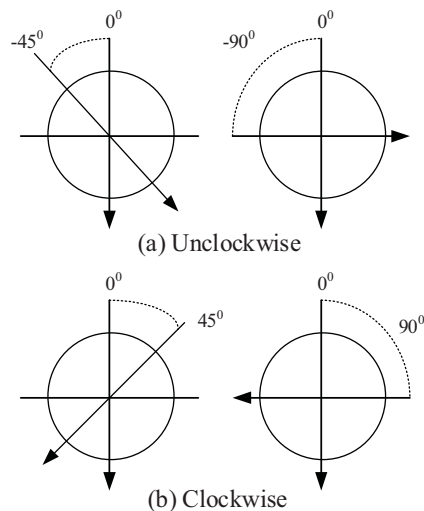


Fig 9. Top view of rotating position



Fig 10. Face detection for rotating the position

CONCLUSION

Any results obtained from the camera will be displayed in intact. Both from the side of the face as well all the color attributes of the features that come with it. The resolution used in capturing the image is 320 x 240 pixels. Rotating position is the process of taking face image in several positions, which is illustrated in figure 9. In the picture, the face image rotates in two directions, That is clockwise and counter clockwise.

ACKNOWLEDGMENT

This work was supported by The Faculty of Computer Science, Universitas Sriwijaya, Indonesia and Intelligence System Research Group faculty of Computer Science Universitas Sriwijaya, Palembang, Indonesia.

REFERENCES

- [1] Naveena M, G Hemantha Kumar, Prakasha M, P Nagabhushan "Partial Face Recognition by Template Matching," International Conference on Emerging Research in Electronics, Computer Science and Technology, ICERECT 2015, 7499034, pp. 319-323.
- [2] Ali Sharifara, Mohd Shafry Mohd Rahim and Yasaman Anisi, "A General Review of Human Face Detection Including a Study of Neural Networks and Haar Feature-based Cascade Classifier in Face Detection" Proceedings -2014 International Symposium on Biometrics and Security Technologies, ISBAST 2014, 7013097, pp. 73-78.
- [2] Liying Lang; Weiwei Gu, "Study of Face Detection Algorithm for Real-time Face Detection System," Electronic Commerce and Security, 2009. ISECS '09. Second International Symposium on , vol.2, no., pp.129,132, 22-24 May 2009.
- [3] Ing Ren Tsang; Magalhaes, J.P.; Cavalcanti, G. D C, "Combined AdaBoost and gradientfaces for face detection under illumination problems," Systems, Man, and Cybernetics (SMC), 2012 IEEE International Conference on , vol., no., pp.2354,2358, 14-17 Oct. 201
- [4] Berbar, M.A.; Kelash, H.M.; Kandeel, A.A., "Faces and Facial Features Detection in Color Images," Geometric Modeling and Imaging--New Trends, 2006 , vol., no., pp.209-214, 2006.
- [5] Siyang Yan, Haiying Wang, Zhao Fang, Chan Wang Ming-Hsuan Yang , " A Face detection method combining improved AdaBoost algorithm and template matching in video sequence", 8th International Conference on Intelligent Human-Machine Systems and Cybernetics, IEEE, 2016.
- [6] Tarun Kumar, Kushal Veer Singh and Shekhar Malik. "Artificial Neural Network in Face Detection". International Journal of Computer Applications 14(3):5-7, January 2011. Published by Foundation of Computer Science.



Advertisement

< Previous | Back

Conferences > 2018 International Conference...

Face Movement Detection Using Template Matching

Publisher: IEEE

<< Results | < Previous

Ahmad Zarkasi ; Siti Nurmaini ; Deris Stiawan ; Firdaus ; Huda Ubaya ; Yog... [View All Authors](#)

34
Full
Text Views

Abstract

Document Sections

- I. Introduction
- II. Digital Image Detection
- III. Material And Method
- IV. Result and Analysis
- 5. Conclusion

Authors

Figures

References

Keywords

Metrics

More Like This

Abstract: Face recognition process can be used for individual verification and identification. Generating an image that can be used for identification, manipulation, modeling, patt... [View more](#)

Metadata

Abstract: Face recognition process can be used for individual verification and identification. Generating an image that can be used for identification, manipulation, modeling, pattern recognition, and object search is the main thing on face area determination. The template matching method used the intercourse between the input image pattern and the referral face pattern along with its features. In this paper will be purposed about face detection use template matching method on movement face. The technique used is to determine the face region by separating the skin region to non-skin region. Detected face area is dynamic. Faces can move horizontal or vertical. Then the results of the process is a face image model. The face image model will show whether the skin is a face region, which will also produce coordinates of the face region.

Published in: 2018 International Conference on Electrical Engineering and Computer Science (ICECOS)

Date of Conference: 2-4 Oct. 2018

INSPEC Accession Number: 18374560

Date Added to IEEE Xplore: 10 January 2019

DOI: 10.1109/ICECOS.2018.8605215

Publisher: IEEE

ISBN Information:

Conference Location: Pangkal Pinang, Indonesia

Need Full access for you

REQUEST

More Like This

A Real-Time Face from Video Sequer Model and Eigenfa
2006 Canadian Co and Computer Eng
Published: 2006

Adaptive BPSO ba and skin detection removal for enhan
2013 Fourth Natio Computer Vision, F Image Processing (NCVPRIPG)
Published: 2013

Top Organization on Technology This Article

- ORGANIZATION 4
- ORGANIZATION 3
- ORGANIZATION 2
- ORGANIZATION 1

IEEE A

Incr
You
Imp

IEEE websites place cookies on your device to give you the best user experience. By using our websites, you agree to the placement of these cookies. To learn more, read our Privacy Policy.

[Contents](#)

Accept & Close

I. Introduction

IEEE websites place cookies on your device to give you the best user experience. By using our websites, you agree to the placement of these cookies. To learn more, read our [Privacy Policy](#).

Accept & Close