



**Book of Abstracts**

**The 2<sup>nd</sup> International Conference  
on Vocational Education and  
Electrical Engineering  
(ICVEE) 2017**

**Best Western Papilio Hotel Surabaya**

**November 9<sup>th</sup> 2017**

**Organized by:  
Electrical Engineering Department  
Engineering Faculty  
Universitas Negeri Surabaya  
2017**



## **Book of Abstracts**

# **The 2<sup>nd</sup> International Conference on Vocational Education and Electrical Engineering (ICVEE) 2017**

**Edited by ICVEE Team**

Copyright © 2017 and published by Electrical Engineering Department, Engineering Faculty, Universitas Negeri Surabaya. All rights reserved.

*No part of this book may be reproduced in any form, nor may it be stored in a retrieval system or transmitted in any form, without written permission from the publisher. The full paper are available in CD.*

# **The 2<sup>nd</sup> International Conference on Vocational Education and Electrical Engineering (ICVEE) 2017**

## **HONORARY COMMITTEE**

Prof. Dr. Warsono, M.S.  
Prof. Ekohariadi, M.Pd.  
Prof. Dr. Bambang Suprianto, M.T.

## **GENERAL CHAIRMAN**

Prof. Dr. Munoto, M.Pd.

## **STEERING COMMITTEE**

Prof. Dr. Supari Muslim – Unesa, Indonesia  
Prof. Dr. Bambang Suprianto, M.T. – Unesa, Indonesia  
Dr. Wirawan, DEA – ITS, Indonesia  
Dr. Ade Gafar Abdullah – UPI, Indonesia  
Ir. Wijono, Ph.D – Universitas Brawijaya, Indonesia  
Dr. Eng. Adi Wibowo, S.Si., M.Kom – Undip, Indonesia  
Dr. IGP Asto Buditjahjanto – Unesa, Indonesia  
Dr. Son Kuswadi – PENS, Indonesia  
Iwan Kustiawan, Ph. D – UPI, Indonesia  
Eppy Yundra, Ph. D – Unesa, Indonesia  
Didin Wahyudin, Ph.D, – UPI, Indonesia  
Dr. Lilik Anifah – Unesa, Indonesia  
Krismadinata, Ph. D – Universitas Negeri Padang, Indonesia  
Heri Suryoatmojo, ST., MT., Ph.D – ITS, Indonesia  
Dr. Eng. Asep Bayu Dani Nandiyanto – UPI, Indonesia  
Dr. Elly Matul Imah, S.Si., M.Kom. – Unesa, Indonesia

## ORGANIZING COMMITTEE

Prof. Dr. Munoto – Conference Chairman  
Lusia Rakhmawati, S.T., M.T.- Co-Chairman  
Hapsari Peni A. T., S.Si, M.T. – Secretary  
Yulia Fransisca, S.Pd., M.Pd. – Treasury  
Pradini Puspitaningayu, S.T., M.T. – Protocols  
Reza Rahmadian, S.ST., MengSc – Protocols  
Mahendra Widyartono, S.T., M.T.- Publication  
Widi Ariwibowo, S.T., M.T.- Publication  
Dr. Euis Ismayati, M.Pd. – Fund raising  
Ibrohim S.T., M.T. – Fund raising  
Subuh Isnur Haryudo, S.T., M.T. – Proceeding  
Farid Baskoro, ST., MT. – Proceeding  
Rifqi Firmansyah, S.T., M.T. – Proceeding  
Arif Widodo, S.T., M.Sc. – Proceeding  
Ir. Achmad Imam Agung, M. Pd – Logistic  
Nur Kholis, S.T., M.T. – Logistic  
Endryansyah, S.T., M.T. – Logistic  
Dr. Wiryanto, M.Si – Lodging and Transportation  
Aditya Chandra H., S.T., M.T – Lodging and Transportation

## LIST OF ABSTRACT

### Keynote Speaker

No.	Author(s)	Title	Page
1	Siti Nurhidayah, Naqiah Abdull Rani, Herlina Abdul Rahim	Non-Linear Prediction System in Crude Palm Oil using Near Infrared Spectroscopy	1
2	Mochamad Ashari	Intelligent Identification of Industrial Motor Faults Using Support Vector Machine	2
3	Wenny Rahayu	Managing Privacy Issues in Big Databases - algorithmic based privacy preservation mechanisms	3

### Engineering Education (EE)

No.	Author(s)	Title	Page
1.	Ahmad Hanafi, Ismet Basuki	Student Team Achievement Divisions: Its Effect On Electrical Motor Installation Knowledge Competence	4
2.	Aulia Akhrian Syahidi, Arifin Noor Asyikin, Asy'ari	Applying Student Team Achievement Divisions (STAD) Model on Material of Basic Programme Branch Control Structure to Increase Activity and Student Result	5
3.	Bagus Dwi Cahyono	Development Of Ultrasonic Testing Based On Delphi Program As A Learning Media In The Welding Material Study Of Detection And Welding Disables In The Environment Of Vocational Education	6
4.	Yoni Nilasari, Dasi Ning	Curriculum Development Based On INQF and Business/Industries Sector for Improvement Competency of Basic Pattern Making Students at	7

		Vocational High School	
5.	Endryansyah Anca, Puput Wanarti Rusimamto, Adam Ridiyanto, Hariyadi Sugiarto	Development of Servo Motor Trainer for Basic Control System in Laboratory of Electrical Engineering Control System Faculty of Engineering Universitas Negeri Surabaya	9
6.	Gustav Mandigo Anggana Raras	Interactive learning media based on flash for basic electronic engineering development for SMK Negeri 1 Driyorejo – Gresik	10
7.	Supari Muslim, Bambang Suprianto, Nahindi Putra Gitama	Development Module (Lab Report) As a Media of Learning in Vocational Education Viewed by Gender	11
8.	Permata Ika Hidayati, Syahminan Husein	Learning Media Application Based On Microcontroller Chip Technology In Early Age	12
9.	Nur Kholis, Muhamad Syariffuddin Zuhrie, Reza Rahmadian	Innovation Online Teaching Module Plus Digital Engineering Kit with Proteus Software through Hybrid Learning Method to Improve Student Skills	13
10.	Subuh Isnur Haryudo, Achmad Imam Agung, Rifqi Firmansyah	Developing Learning Tool Of Control System Engineering Using Matrix Laboratory Software Oriented On Industrial Needs	14
11.	Lipur Sugiyanta, Moch. Sukardjo	Adjusted Framework of M- Learning Analysis in Blended Learning System for Mathematics Study Field of Junior High School Level VII	15
12.	Moch Sukardjo, Lipur Sugiyanta	Measurement of Usability for Multimedia Interactive Learning Based on Website in Mathematics for SMK	17
13.	Edy Sulistiyo, Djoko Kustono, Purnomo, Eddy Sutaji	The implementation of Project- Based Learning in courses Audio Video to Improve Employability Skills	19
14.	Soeparno, Supari M.	Effectiveness of E-Learning for Students Vocational High School Building Engineering Program	20
15.	Rina Harimurti, Andi	Building Automatic Grading Tools	21

	Iwan Nurhidayat, Asmunin	for Basic of Programming Lab in an Academic Institution	
16.	Imam Agung, Amat Mukhadis, Purnomo	The intention Technopreneur and Strategy to Dig Business Opportunities in Students of Vocational School in the Era of the ASEAN Economic Community (AEC)	22
17.	Irma Russanti	Competency-Based Assessment in Fashion Design	23
18.	Yeni Anistiyasari, Wiyli Yustanti	Predictive validity of admission test for student academic performance	24
19	Munoto, Meini Sondang, Satriana FMS	Profile Students For Practical Lazy In Unesa Engineering Faculty	25
20	Lusia Rakhmawati, Fariz Irwansyah Febriyanto	CCTV Prototype Development as A Practical Approach to Learning Electronic Appliance Repair and Maintenance Course in Vocational Education	26
21	M S Zuhrie, I Basuki, I G P Asto B, L Anifah	Design of Smart Educational Robot as a Tool For Teaching Media Based on Contextual Teaching and Learning to Improve the Skill of Electrical Engineering Student	27

## Electricals (EES)

No.	Author(s)	Title	Page
1	A B Kusumaningtyas, M N Hidayat, F Ronilaya	Implementation of Particle Swarm Optimization Method for Voltage Stability Analysis in 50 kV Sub System Grati – Paiton East Java	28
2	Angga Nur Rahmat, Mohamammad Noor Hidayat, Ferdian Ronilaya	Design of Stand-Alone Hybrid Power Generation System at Brumbun Beach Tulungagung East Java	29
3	B Setiawan, A M Damayanti, A Murdani, I I A Habibi, and R N	Fixed Nadir Focus Concentrated Solar Power Applying Reflective Array Tracking Method	30

	Wakidah		
4	Joko , Gayuh Septia Wulandari	The Development of Learning Management System Using Edmodo	31
5	M Widyartono and R Rahmadian	OTEC Potential of East Nusa Tenggara Province in Indonesia	32
6	Tedy Juliandhy , T.Haryono , Suharyanto , Indra Perdana	Breakdown Voltage of Dichlorotrifluoroethane Gas an Alternative to Sulphur Hexafluoride Gas using High Voltage Tests and Bonding Energy Methods	33
7	A N Rahmat, M N Hidayat , F Ronilaya	Design of Stand-Alone Hybrid Power Generation System at Brumbun Beach Tulungagung East Java	34

## Electronics (ETS)

No.	Author(s)	Title	Page
1	Ilham A.E. Zaeni , Aji P. Wibawa , Aripriharta , Siti Sendari	Implementation of Fuzzy Decision to Control Patient Room Facilities using Eye Blink	35
2	Sofyan Shafiudin, Nur Kholis	Monitoring System and Temperature Controlling On Pid Based Poultry Hatching Incubator	36
3	Mochamad Arif Irfai, Diah Wulandari, Sutriyono, Eko Marsyahyo	Effect of NaOH Treatment On Bending Strength of The Polyester Composite Reinforced By Sugar Palm Fibers	37

## Telecommunications (TLS)

No.	Author(s)	Title	Page
1	M A Syakur, B K Khotimah, E M S Rochman, B D Satoto	Integration K-Means Clustering Method and Elbow Method For Identification of The Best Customer Profile Cluster	38
2	Eppy Yundra, Ghaluh	Study of Allocation Guaranteed Time Slot Wireless Body Area	39



	Dhatuningtyas Harsono	Networks Based On IEEE 802.15.4	
3	Isa Mahfudi, Moechammad Sarosa, Rosa Andrie Asmara, M Azrino Gustalika	Indonesian Sign Language Number Recognition using SIFT Algorithm	40
4	Naim Rochmawati, Setya Chendra Wibawa	Opinion Analysis on Rohingya using Twitter Data	41
5	Pradini Puspitaningayu	The Development of Wireless Body Area Network for Motion Sensing Application	42
6	T S Sollu, Alamsyah Zakaria, M Bachtiar, A G Sooai	Patients Heart Health Monitoring System Based on Wireless Sensor Network	43
7	Arga C Pamungkas, Alma A Putra, Pradini Puspitaningayu, Yulia Fransisca, Arif Widodo	Multi-Parameter Wireless Monitoring and Telecommand of a Rocket Payload: Design and Implementation	44
8	Hapsari P A Tjahyaningtjas	Brain Tumor Image Segmentation in MRI Image	45

## Instrumentation and Control (ICS)

No.	Author(s)	Title	Page
1	Farid Baskoro, Bagus Rio Rynaldo	Detection of Lock on Radar System Based on Ultrasonic US 100 Sensor and Arduino Uno R3 With Image Processing GUI	46
2	H. Aripin, Nurul Hiron, Edwin Priatna, Nundang Busaeri, Asep Andang, Suhartono, Svilen Sabchevski	Automated Temperature Control with Adjusting Outlet Valve of Fuel in the Process of Cooking Palm Sugar	47
3	Humaidillah Kurniadi Wardana, Elly Indahwati, Lina Arifah Fitriyah	Measurement of Non-Invasive Blood Glucoses Level Based Sensor Color TCS3200 and Arduino	48

4	Mohammad Rifki, Tri Rijanto	Prototype Setup Of Household Lightening With Solar Cell Based Iot (Internet Of Things)	49
5	M. Syarifuddin Zuhrie, Munoto, Eko Hariadi, Supari Muslim.	The Design of Artificial Intelligence Robot Based on Fuzzy Logic Controller Algorithm	50
6	Rafi Sidqi, Bagus Rio Rynaldo, Satya Hadi Suroso, Rifqi Firmansyah	Arduino Based Weather Monitoring Telemetry System Using Nrf24l01+	51
7	Sriwati, Nur Ikhsan Ilahi, Musrawati, Syarifuddin Baco, Ansar Suyuti, Andani Achmad, Ejah Umrihanah	Early Leakage Protection System of LPG (Liquefied Petroleum Gas) Based on ATMega 16 Microcontroller	52
8	Syahminan husein permata ika hidayati	Classification Of Children Intelligence With Fuzzy Logic Method	53
9	E. Rahmanita, V T Widyaningrum, Y Kustiyahningsih, J Purnama	Model Multi Criteria Decision Making With Fuzzy ANP Method For Performance Measurement Small Medium Enterprise (SME)	54

# Non-Linear Prediction System in Crude Palm Oil using Near Infrared Spectroscopy

Siti Nurhidayah Naqiah Abdull Rani<sup>1</sup>, Herlina Abdul Rahim<sup>1\*</sup>  
<sup>1</sup>Faculty of Electrical Engineering, Universiti Teknologi Malaysia, 81310  
Skudai, Johor.  
herlina@utm.my

## Abstract

Near infrared (NIR) spectroscopy has always been of great interest in the food and agriculture industries. The development of predictive models has facilitated the estimation process in recent years. In this research, 176 crude palm oil (CPO) samples acquired from Felda Johor Bulker Sdn Bhd were studied. A FOSS NIRSystem was used to take absorbance measurements from the sample. The wavelength range for the spectral measurement is taken at 1600nm to 1900nm. Free fatty acid (FFA) content of each sample was determined by chemical titration method and prediction models were developed relating FFA value to spectral measurement. Prediction model built from Artificial Neural Network (ANN) yielded R of 0.9999 and 0.9640 for the calibration and validation set respectively. From the results, it is shown that the NIR spectroscopy in a spectral region of 1600nm to 1900nm is suitable and adequate for FFA measurement of CPO and that the accuracy of prediction is high (range from 80.39% to 99.99% of accuracy). There is no doubt that ANN predictive model is the best among all prediction model.

# Intelligent Identification of Industrial Motor Faults Using Support Vector Machine

Mochamad Ashari

Institut Teknologi Sepuluh Nopember (ITS), Surabaya - Indonesia  
Telkom University, Bandung – Indonesia

## Abstract

Fast growing technology of information and communication, particularly in social media, mobile, artificial intelligent, cloud and internet of things directly connects human-to-human, human-to-machine and machine-to-machine. This technology as enabler creates a new wave of digital economy as shown in Figure 1. It also promotes artificial intelligent automation. At the same time, the world energy consumption is shifting from fossil into renewable energy sources for electricity, or gasoline to electric car.

# Managing Privacy Issues in Big Databases - algorithmic based privacy preservation mechanisms

Prof. Wenny Rahayu  
La Trobe University -Australia

## Abstract

The advancement of scientific discoveries, management of social issues, and enterprise innovation depend a lot on the availability of large data collection (big data). The more sophisticated technology we have for data collection, the more important data we can collect, the more critical it is to be able to derive useful knowledge from this big data collection. While in the past data collection was mainly based on user entries, data collection these days involves pervasive technologies and smart sensors with very minimum user effort and intervention.

At the same time, in this data economy era when “the world’s most valuable resource is no longer oil, but data” there is obviously an increased need and expectation to be able to make use of these available large data sets.

However, the issue of privacy has often created a barrier for the large data collection to be used for research and analysis. The main issue to be discussed in this talk is “how can big data collection be used for knowledge discovery without violating individual privacy and sensitive information”.

Sensitive information may include medical conditions, income, background, preferences, etc. These data collections are often critical for high-level decision making purposes, however it is important to ensure that individual privacy is maintained at all times. In this talk, the focus will be on the different privacy mechanisms in public data scenario, where data collection is made available for research, analysis, or marketing purposes.

A range of well-known techniques and algorithms in data generalisations and anonymization will be discussed, along side a new proposed dissection technique, for non-traditional data such as semi-structured or tree-structured data set which is often found in industries that are highly standardised/regulated.

# Student Team Achievement Divisions: Its Effect On Electrical Motor Installation Knowledge Competence

Ahmad Hanafi<sup>1</sup>, Ismet Basuki<sup>2</sup>

<sup>1,2</sup>State University of Surabaya

<sup>1</sup>[ahmadhanafi@mhs.unesa.ac.id](mailto:ahmadhanafi@mhs.unesa.ac.id), <sup>2</sup>[ismetbasuki@unesa.ac.id](mailto:ismetbasuki@unesa.ac.id)

## Abstract

Student team achievement division (STAD) was an active learning strategy with the small group inside of the classroom members. The students would work in small heterogeneous groups (of five to six members) and help one another to comprehend the material given. To achieve the objectives of the study. This research aims to know the effect of STAD on competence of electrical motor installation. The objective of the student competence was knowledge competence. The data was collected from 30 students. the participants were the students of second class at electrical installation techniques. State Vocational High School Nnumber 1 of Pungging, Indonesia. The design of empirical test in this research was one shot case study. The result of knowledge test would be compared by criteria for minimum competence, that was 75. Knowledge competence was analyzed with one sample t test technique. From the analysis got average 84.93, which meant average of student competence had reached criteria for minimum competence. From that analyze, It could be concluded that STAD was effective on electrical motor installation knowledge competence. STAD could grow student motivation to learn better than other models. But, in the application of cooperative learning teacher should prepare carefully before the learning process. This to avoid problems that could arise during group learning such as students who were less active in the groups. The problem could be resolved by a way the teachers took around to check each group. It was felt could minimize the problems.

# Applying Student Team Achievement Divisions (STAD) Model on Material of Basic Programme Branch Control Structure to Increase Activity and Student Result

Aulia Akhrian Syahidi<sup>1</sup>, Arifin Noor Asyikin<sup>2</sup>, Asy'ari<sup>3</sup>  
Master of Computer Science<sup>1</sup>, Dept. of Electrical Engineering<sup>2</sup>, Dept. of ITE<sup>3</sup>  
Brawijaya University<sup>1</sup>, State Polytechnic of Banjarmasin<sup>2</sup>, STKIP PGRI  
Banjarmasin<sup>3</sup>  
aakhriansyahidi@student.ub.ac.id<sup>1</sup>, arifin@poliban.ac.id<sup>2</sup>,  
asyari153@stkipbjm.ac.id<sup>3</sup>

## Abstract

Based on my experience of teaching the material of branch control structure, it is found that the condition of the students is less active causing the low activity of the students on the attitude assessment during the learning process on the material of the branch control structure ie 2 students 6.45% percentage of good activity and 29 students percentage 93, 55% enough and less activity. Then from the low activity resulted in low student learning outcomes based on daily re-examination of branch control control material, only 8 students 26% percentage reached KKM and 23 students 74% percentage did not reach KKM. The purpose of this research is to increase the activity and learning outcomes of students of class X TKJ B SMK Muhammadiyah 1 Banjarmasin after applying STAD type cooperative learning model on the material of branch control structure. The research method used is Classroom Action Research. The study was conducted two cycles with six meetings. The subjects of this study were students of class X TKJ B with a total of 31 students consisting of 23 men and 8 women. The object of this study is the activity and student learning outcomes. Data collection techniques used are test and observation techniques. Data analysis technique used is percentage and mean. The results of this study indicate that: an increase in activity and learning outcomes of students on basic programming learning material branch control structure after applying STAD type cooperative learning model.

# Development Of Ultrasonic Testing Based On Delphi Program As A Learning Media In The Welding Material Study Of Detection And Welding Disables In The Environment Of Vocational Education

Bagus Dwi Cahyono

Technology Education and Vocational Graduate

baguscahyono16070895013@mhs.unesa.ac.id

## Abstract

An The development of science and technology has a direct impact on the preparation of qualified workers, including the preparation of vocational high school graduates. Law Number 20 Year 2003 on National Education System explains that the purpose of vocational education is to prepare learners to be ready to work in certain fields. One of the learning materials in Vocational High School is welding and detecting welding defects. Introduction of welding and detecting welding defects, one way that can be done is by ultrasonic testing will be very difficult if only capitalize the book only. Therefore this study aims to adopt ultrasonic testing in a computer system. This system is called Delphi Program-based Ultrasonic Testing Expert System. This system is used to determine the classification and type of welding defects of the welded defect indicator known. In addition to the system there is a brief explanation of the notion of ultrasonic testing, calibration procedures and inspection procedures ultrasonic testing. In this system ultrasonic input data testing that shows defects, entered into the computer manually. This system is built using Delphi 7 software and Inno Set Up Compiler as installer. The method used in this research is Research and Development (R & D), with the following stages: (1) preliminary research; (2) manufacture of software design; (3) materials collection; (4) early product development; (5) validation of instructional media experts; (6) product analysis and revision; (8) media trials in learning; And (9) result of end product of instructional media. The result of the research shows that: (1) the result of feasibility test according to ultrasonic material testing expert that the system is feasible to be used as instructional media in welding material subject and welding defect detection in vocational education environment, because it contains an explanation about detection method of welding defect using method Ultrasonic testing in detail; (2) feasibility test results according to media experts, that this system has a very attractive visual, user friendly, compatible with windows and linux and media size that is not too large; And (3) result of test by using data of indication of welding defect in PT PAL Surabaya, obtained classification data of welding defect in accordance with calculation of welding defect classification.

The 2<sup>nd</sup> International Conference on Vocational Education and Electrical Engineering (ICVEE)  
November 9<sup>th</sup>, Best Western Papilio Hotel Surabaya, Indonesia, 2017



# Curriculum Development Based On INQF and Business/Industries Sector for Improvement Competency of Basic Pattern Making Students at Vocational High School

Yoni Nilasari<sup>1</sup>, Dasi Ning<sup>2</sup>

<sup>1,2</sup>Student of Technical and Vocational Education Postgraduate Program of  
Surabaya State University

<sup>1</sup>yonisanilla@gmail.com

<sup>2</sup>dasininglaksmi@gmail.com

## Abstract

At this era of globalization every human resource is faced with a competitive climate that will have a major impact on the development of the business and industrial sector. Therefore it is deemed necessary to research the development of curriculum based on INQF and the business/industries sector in order to improve the competence of Sewing Technique for Vocational High School Students of fashion clothing program. The development of curricula based on INQF and the business/industries is an activity to produce a curriculum that suits the needs of the business and industries sector.

The formulation of the problem in this research are: (1) what is the curriculum based on INQF and the business/industries sector?; (2) how is the process and procedure of curriculum development of fashion program profession based on INQF and the business/industries sector?; And (3) how the result of the curriculum of fashion expertise based on INQF and the business/industries sector.

The aims of research is: (1) explain what is meant by curriculum based on INQF and business/industries sector; (2) to know the process and procedure of curriculum development of fashion program profession based on INQF and the business/industries sectors ; And (3) to know result the curriculum of clothing expertise based on INQF and the business/industries sector.

The research method chosen in developing curriculum based on INQF and business / industry sector is using by 4-D model from Thiagarajan, which includes: (1) define; (2) design; (3) development; And (4) disseminate. Step 4, not done but in this study. The result of the research shows that: (1) the curriculum based on INQF and the business/industries sector is the curriculum created by applying the principles and procedures of the Indonesian National Qualification Framework (INQF) that will improve the quality of graduates of Vocational High School level 2, and establish cooperation with Business/industries as a guest teacher (counselor) in the learning process; (2) process and procedure of curriculum development of fashion program profession based on INQF and business/industries sector is process and procedure of curriculum development of fashion program profession based on INQF and business/industries sector there are several stages: feasibility study and requirement, preparation of initial concept of curriculum planning based on INQF and the business/industries sector in the field of fashion, as well as the development of a plan to implement the curriculum based on INQF and the business/industries sector in the field of fashion, this development will produce a curriculum of fashion proficiency program in the form of learning competency of sewing technology where the implementer of learning (counselor) Is a guest teacher from business/industries sector. (3) the learning device validity aspect earns an average score of 3.5 with very valid criteria and the practicality aspect of the device obtains an average score of 3.3 with practical criteria.

# Development of Servo Motor Trainer for Basic Control System in Laboratory of Electrical Engineering Control System Faculty of Engineering Universitas Negeri Surabaya

Endryansyah<sup>1</sup>, Puput Wanarti Rusimamto<sup>2</sup>, Adam Ridianto<sup>3</sup>, Hariyadi  
Sugiarto<sup>4</sup>

Universitas Negeri Surabaya

<sup>1</sup>endryansyah@gmail.com, <sup>2</sup>puputwanarti@unesa.ac.id,

<sup>3</sup>adamridianto@unesa.ac.id

Universitas Negeri Surabaya

## Abstract

In the Department of Electrical Engineering FT Unesa, there are 3 Prodi namely S1 Electrical Engineering Education, S1 Electrical Engineering and D3 Electrical Engineering. Basic Control System entered into the curriculum of the three study programs. The team of the basic control system lecturer seeks instructional innovation focused on developing trainers for student practicum in the control system laboratory. The developed trainer is a servo motor along with a practical module containing various theories about servo motors and lab manuals. This type of research is research development using Research & development (R & D) method. Where the steps applied in this study are as follows: attention to existing potentials and problems, gathering information and literature studies, designing products, validating designs, revising designs, limited trials. The result of validation of learning device of module and trainer obtained as follows: learning device validation score is 3.84; The Servo Motor module validation score is 3.64; And the student response questionnaire is 3.75. The result of the whole validation score is in the interval  $> 3.25$  to 4 under the category of "Very Valid", so it can be concluded that all instruments have a validity level and are "Very Valid" and are suitable for next learning.

# Interactive learning media based on flash for basic electronic engineering development for SMK Negeri 1 Driyorejo – Gresik

Gustav Mandigo Anggana Raras  
Universitas Negeri Surabaya  
gustavmandigoangganararas@gmail.com

## Abstract

This research aims to produce a product in the form of flash based interactive learning media on a basic electronic engineering subject that reliable to be used and to know students' responses about the media. The target of this research is X-TEI 1 class at SMK Negeri 1 Driyorejo – Gresik. The method used in this study is R&D that has been limited into seven stages only (1) potential and problems, (2) data collection, (3) product design, (4) product validation, (5) product revision, (6) field test, and (7) analysis and writing. The obtained result is interactive learning media named MELDASH. Validation process used to produce a valid interactive learning media. The result of media validation state that the interactive learning media has a 90.83% rating. Students' responses to this interactive learning media is really good with 88.89% rating.

# Development Module (Lab Report) As a Media of Learning in Vocational Education Viewed by Gender

Supari Muslim<sup>1</sup>, Bambang Suprianto<sup>2</sup>, Nahindi Putra Gitama<sup>3</sup>

<sup>1</sup>Professor of Vocational and Technology Education, State University of  
Surabaya

<sup>2</sup>Professor of Electrical Engineering, State University of Surabaya

<sup>3</sup>Student of Post Graduate Vocational and Technology Education, State  
University of Surabaya,

<sup>1</sup>suparimuslim@unesa.ac.id, <sup>2</sup>bambangsuprianto@unesa.ac.id,

<sup>3</sup>nahindigitama@unesa.ac.id

## Abstract

Module as a media of learning and training, which especially the students studying in institutions offering education at undergraduate and associate levels can employ as a PLC (Programmable Logic Controller) controlled simulator of the logic gate, timer and counter. During industrial manufacturing processes, has been actualized through this work, for the purpose of training qualified technical personnel needed by companies, who are specialized in control and electro mechanics. It was found that, students are very happy learning to use the module so with very significant contributes to a large extent to the training process in favor of faculty members, who are to train personnel for the sector, and in favor of students, who should be able to acquire proper education. Working on the training tool allows students to acquire knowledge and practical skills and then make use of those skills for troubleshooting and control of machinery.

# Learning Media Application Based On Microcontroller Chip Technology In Early Age

Permata Ika Hidayati<sup>1</sup>, Syahminan Husein<sup>2</sup>  
<sup>1,2</sup>Kanjuruhan University

<sup>1</sup>permatahidayati@unikama.ac.id, <sup>2</sup>syahminan@unikama.ac.id

## Abstract

The purpose of making dolls as a learning medium to identify the members of the body in early childhood or microcontroller-based smart smart doll ATmega16 to give lessons to identify the members of body in early childhood by giving understanding in early childhood about how to recognize parts of the body when in touch. Almost all daughters want men to love dolls by painting a medium of learning through puppets so children at an early age can recognize the different types of body parts such as, head of hair, ear, hands and so forth. Granting the right to be given in early childhood. This tool will work after the sensor touch sensor detects a touch then read microcontroller ATmega16 to command a sound corresponding to the members of the body untouched., Microcontroller ATmega16 gave orders wavecom to send berisipesan short puppet "smart" microcontroller based ATmega16 as an early childhood learning this is an experiment. Consist of hardware (1) The system microcontroller ATmega16 microcontroller as the main controller, (2) touch sensor, (3) the speaker to emit sound

# Innovation Online Teaching Module Plus Digital Engineering Kit with Proteus Software through Hybrid Learning Method to Improve Student Skills

Nur Kholis<sup>1</sup>, Muhamad Syariffuddien Zuhrie<sup>2</sup>, Reza Rahmadian<sup>3</sup>  
<sup>1,2,3</sup>Universitas Negeri Surabaya

<sup>1</sup>nurkholis@unesa.ac.id, <sup>2</sup>zuhrie@unesa.ac.id, <sup>3</sup>rezarahmadian@unesa.ac.id

## Abstract

Demands the competence (competence) needs of the industry today is a competent workforce to the field of work. However, during this lecture material Digital Engineering (Especially Digital Electronics Basics and Digital Circuit Basics) is limited to the delivery of verbal form of lectures (classical method) is dominated by the Lecturer (Teacher Centered). Though the subject of Digital Engineering requires learning tools and is required understanding of electronic circuits, digital electronics and high logic circuits so that learners can apply in the world of work. One effort to make it happen is by creating an online teaching module and educational aids (Kit) with the help of Proteus software that can improve the skills of learners This study aims to innovate online teaching modules plus kits in Proteus-assisted digital engineering courses through hybrid learning approaches to improve the skills of learners. The process of innovation is done by considering the skills and mastery of the technology of students (students) Department of Electrical Engineering - Faculty of Engineering ' Universitas Negeri Surabaya to produce quality graduates Use of online module plus Proteus software assisted kit through hybrid learning approach. In general, aims to obtain adequate results with affordable cost of investment, user friendly, attractive and interactive (easily adapted to the development of Information and Communication Technology). With the right design, implementation and operation, both in the form of software both in the form of Online Teaching Module, offline teaching module, Kit (Educational Viewer), and e-learning learning content (both online and off line), the use of the three tools of the expenditure will be able to adjust the standard needs of Information and Communication Technology world, both nationally and internationally.

# Developing Learning Tool Of Control System Engineering Using Matrix Laboratory Software Oriented On Industrial Needs

Subuh Isnur Haryudo<sup>1</sup>, Achmad Imam Agung<sup>2</sup>, Rifqi Firmansyah<sup>3</sup>

<sup>1,2,3</sup>Universitas Negeri Surabaya

<sup>1</sup>subuhisnur@unesa.ac.id, <sup>2</sup>achmadimam@unesa.ac.id,

<sup>3</sup>rifqifirmansyah@unesa.ac.id

## Abstract

The purpose of this research is to develop learning media of control technique using Matrix Laboratory software with industry requirement approach. Learning media serves as a tool for creating a better and effective teaching and learning situation because it can accelerate the learning process in order to enhance the quality of learning. Control Techniques using Matrix Laboratory software can enlarge the interest and attention of students, with real experience and can grow independent attitude. This research design refers to the use of research and development (R & D) methods that have been modified by multi-disciplinary team-based researchers. This research used Computer based learning method consisting of computer and Matrix Laboratory software which was integrated with props. Matrix Laboratory has the ability to visualize the theory and analysis of the Control System which is an integration of computing, visualization and programming which is easy to use. The result of this instructional media development is to use mathematical equations using Matrix Laboratory software on control system application with DC motor plant and PID (Proportional-Integral-Derivative). Considering that manufacturing in the field of Distributed Control systems (DCSs), Programmable Controllers (PLCs), and Microcontrollers (MCUs) use PID systems in production processes are widely used in industry.



# Adjusted Framework of M-Learning Analysis in Blended Learning System for Mathematics Study Field of Junior High School Level VII

Lipur Sugiyanta<sup>1</sup>, Moch. Sukardjo<sup>2</sup>

<sup>1</sup>Study Program of Education for Informatics and Computer Engineering/  
Faculty of Engineering, State University of Jakarta

<sup>2</sup>Study Program of Education for Electrical Engineering/ Faculty of  
Engineering, State University of Jakarta

lipurs@unj.ac.id, msoekardjo@unj.ac.id

## Abstract

The 2013 curriculum requires teachers to be more productive, creative, and innovative in encouraging students to be more independent by strengthening attitudes, skills and knowledge. Teachers are given the options to create lesson plan according to the environment and conditions of their students. At the junior level, Core Competence (KI) and Basic Competence (KD) have been completely designed. In addition, there had already guidebooks, both for teacher manuals (Master's Books) and for learners (Student Books). The lesson plan and guidebooks which already exist are intended only for learning in the classroom/in-school. Many alternative classrooms and alternatives learning models opened up using educational technology. The advance of educational technology opened opportunity for combination of class interaction using mobile learning applications. Mobile learning has rapidly evolved in education for the last ten years and many initiatives have been conducted worldwide. However, few of these efforts have produced any lasting outcomes. It is evident that mobile education applications are complex and hence, will not become sustainable. Long-term sustainability remains a risk. Long-term sustainability usually was resulted from continuous adaptation to changing conditions [4]. Frameworks are therefore required to avoid sustainability pitfalls. The implementation should start from simple environment then gradually become complex through adaptation steps. Therefore, our paper developed the framework of mobile learning (m-learning) adaptation for grade 7<sup>th</sup> (junior high school). The environment setup was blended mobile learning (not full mobile learning) and emphasize on Algebra. The research is done by RnD method

(research and development). Results of the framework includes requirements and adaptation steps. The adjusted m-learning framework is designed to be a guidance for teachers to adopt m-learning to support blended learning environments. During mock-up prototype, the adjusted framework demonstrates how to make successful implementation of early blended mobile learning through framework. The Social area is in focus of adaptation because participation is important to improve the sustainability. From the short practice of mock-up prototype, blended mobile learning can be an effective pedagogical model in supporting students in inquiry-based learning.

# Measurement of Usability for Multimedia Interactive Learning Based on Website in Mathematics for SMK

Moch Sukardjo<sup>1</sup>, Lipur Sugiyanta<sup>2</sup>

<sup>1</sup>Study Program of Education for Electrical Engineering/Faculty of Engineering State University of Jakarta Jakarta, Indonesia

<sup>2</sup>Study Program of Education for Informatics and Computer Engineering/  
Faculty of Engineering, State University of Jakarta  
msoekardjo@unj.ac.id

## Abstract

Web usability, if evaluation done correctly, can significantly improve the quality of the website. Website containing multimedia for education should apply user interfaces that are both easy to learn and easy to use. Multimedia has big role in changing the mindset of a person in learning. Using multimedia, learners get easy to obtain information, adjust information and empower information. Therefore, multimedia is utilized by teachers in developing learning techniques to improve student learning outcomes. For students with self-directed learning, multimedia provides the ease and completeness of the courses in such a way that students can complete the learning independently both at school and at home without the guidance of teachers. The learning independence takes place in how students choose, absorb information, and follow the evaluation quickly and efficiently. The 2013 Curriculum 2013 for Vocational High School (SMK) requires teachers to create engaging teaching and learning activities that students enjoy in the classroom (also called invitation learning environment). The creation of learning activity environment is still problem for most teachers. Various researches reveal that teaching and learning activities will be more effective and easy when assisted by visual tools. Using multimedia, learning material can be presented more attractively that help students understand the material easily. The opposite is found in the learning activity environment who only rely on ordinary lectures. Usability is a quality level of multimedia with easy to learn, easy to use and encourages users to use it. The website Multimedia Interactive Learning for Mathematics SMK Class X is targeted object. Usability website in Multimedia Interactive Learning for Mathematics SMK Class X is important indicators to measure effectiveness, efficiency, and student satisfaction to access the functionality of website. This usability measurement should be done carefully before the design is

The 2<sup>nd</sup> International Conference on Vocational Education and Electrical Engineering (ICVEE)  
November 9<sup>th</sup>, Best Western Papilio Hotel Surabaya, Indonesia, 2017

implemented thoroughly. The only way to get test with high quality results is to start testing at the beginning of the design process and continuously testing each of the next steps. This research performs usability testing on of website by using WAMMI criterion (Website Analysis and Measurement Inventory) and will be focused on how convenience using the website application. Components of Attractiveness, Controllability, Efficiency, Helpfulness, and Learnability are applied. The website in Multimedia Interactive Learning for Mathematics SMK Class X can be in accordance with the purpose to be accepted by student to improve student learning outcomes. The results show that WAMMI method show the usability value of Multimedia Mathematics SMK Class X is about from 70% to 90%.

# The implementation of Project-Based Learning in courses Audio Video to Improve Employability Skills

Edy Sulistiyo<sup>1</sup>, Djoko Kustono<sup>2</sup>, Purnomo<sup>3</sup>, Eddy Sutaji<sup>4</sup>

<sup>1</sup>Department of Electrical Engineering, Universitas Negeri Surabaya  
edy.unesa@yahoo.co.id

## Abstract

This paper presents a project-based learning (PjBL) in subjects with Audio Video the Study Programme Electro Engineering Universitas Negeri Surabaya which consists of two ways namely the design of the prototype audio-video and assessment activities project-based learning tailored to the skills of the 21st century in the form of employability skills. The purpose of learning innovation is applying the lab work obtained in the theory classes. The PjBL aims to motivate students, centering on the problems of teaching in accordance with the world of work. Measures of learning include; determine the fundamental questions, designs, develop a schedule, monitor the learners and progress, test the results, evaluate experience, project assessment, and product assessment. The results of research conducted showed the level of mastery of the ability to design tasks (of 78.6%), technical planning (39,3%), creativity (42,9%), innovative (46,4%), problem solving skills (the 57.1%), skill to communicate (75%), oral expression (75%), searching and understanding information (to 64.3%), collaborative work skills (71,4%), and classroom conduct (of 78.6%). In conclusion, instructors have to do the reflection and make improvements pada some of the aspects that has a level of mastery of the skills less than 60% both on the application of project-based learning courses, audio video.

# Effectiveness of E-Learning for Students Vocational High School Building Engineering Program

Soeparno<sup>1</sup>, Supari M<sup>2</sup>

<sup>1</sup>Department of Civil Engineering, Universitas Negeri Surabaya, Ketintang,  
Surabaya, 60231, Indonesia

<sup>2</sup>Department of Electrical Engineering, Universitas Negeri Surabaya,  
Ketintang, Surabaya, 60231, Indonesia

<sup>1</sup>soeparnotopuro@unesa.ac.id <sup>2</sup>suparim@unesa.ac.id

## Abstract

Implementation of vocational learning in accordance with the 2013 curriculum must meet the criteria, one of which is learning to be consistent with advances in technology and information. Technology-based learning in vocational commonly referred to as E-Learning, online (in the network) and WBL (Web Based Learning). Facts on the ground indicate that based learning technology and information on Vocational High School of Building Engineering is still not going well. Based on the above description, then the formulation of the problem in this study are as follows: (1) What are the advantages and disadvantages of learning with E-Learning?; (2) Is learning with E-Learning suitable for students on Vocational High School of Building Engineering; (3) How is the application of E-Learning method effective for students on Vocational High School of Building Engineering?; The purpose of this research is to know: (1) advantages and disadvantages of learning with E-Learning; (2) conformity of learning with E-Learning with characteristics of students on Vocational High School of Building Engineering; (3) effective learning method based on E-Learning for students on Vocational High School of Building Engineering. Research done by literature method, get the following conclusion: (1) The advantages of E-Learning is learning can be done anywhere and anytime, efficient in accessing materials and tasks, ease of communication and discussion; while the shortage is the need for additional costs for good internet access, the lack of social interaction between teachers and students (2) E-Learning learning is appropriate to basic knowledge competencies, and not appropriate at the level of advanced competencies and skills. (3) Effective E-Learning Based Learning Method on Vocational High School of Building Engineering is a mixed method (Blended) that is a mix between conventional method (face to face) and E-Learning.

# Building Automatic Grading Tools for Basic of Programming Lab in an Academic Institution

<sup>1</sup>Rina Harimurti, <sup>2</sup>Andi Iwan Nurhidayat, <sup>3</sup>Asmunin  
<sup>1,2,3</sup> Gedung A1 Jurusan Teknik Informatika, Fakultas Teknik, Universitas  
Negeri Surabaya  
<sup>1</sup>rinaharimurti@unesa.ac.id, <sup>2</sup>Andy134k5@unesa.ac.id,  
<sup>3</sup>asmunin@unesa.ac.id

## Abstract

The skills of computer programming is a core competency that must be mastered by students majoring in computer sciences. The best way to improve this skill is through the practice of writing many program to solve various problems from simple to complex. It takes hard work and a long time to check and evaluate the results of student labs one by one, especially if the number of students a lot. Based on these constrain, web propose Automatic Grading Tools (AGT), the application that can evaluate and deeply check the source code in C, C++. The application architecture consists of students, web-based applications, compilers, and operating systems. Automatic Grading Tools (AGT) is implemented MVC Architecture and using open source software, such as laravel framework version 5.4, PostgreSQL 9.6, Bootstrap 3.3.7, and jquery library. Automatic Grading Tools has also been tested for real problems by submitting source code in C/ C++ language and then compiling. The test results show that the AGT application has been running well.

# Development and Strategy of Digging the Technopreneur Intention Business Opportunities on Vocational High School Students in ASEAN Economic Community (MEA)

Achmad Imam Agung<sup>1</sup>, Amat Mukhadis<sup>2</sup>, Purnomo<sup>3</sup>

Electrical engineering department Universitas Negeri Surabaya  
Universitas Negeri Malang Universitas Negeri Surabaya

[achmadimam@unesa.ac.id](mailto:achmadimam@unesa.ac.id)

## Abstract

Technopreneur education required the existence of an understanding of how to develop and encourage the inception of technopreneur potential young while they are in school. By looking at aspects of the intention technopreneur students have gained considerable attention from researchers. Intention technopreneur can be interpreted as the search process information that can be used to achieve the objectives of the formation of a venture, attitude, behavior and their knowledge about the technopreneur will form their tendency to open new businesses in the future. This research consists of the first section, to discuss the theories technopreneur, intense technopreneur along with its findings by comparing with other countries and the strategy of digging opportunities in entrepreneurship. This research is a Research and Development, (RnD) with a quantitative approach, the results of the regression analysis indicates that the variables associated with personality, instruments, and demography together significantly determine intention technopreneur. The conclusions obtained in this study: (1) General, found that the factors that influence the intensi technopreneur different between one country with another country. Self-efficacy is proven to influence the intense in Indonesia and in Norway. The readiness of the instrument and the previous work experience intense technopreneur be a deciding factor for students of Norway. The setting was later to be the deciding factor intention education for students of Indonesia, only with the opposite direction; (2) the need for achievement, age, and gender are not proven significantly as predictors of intention technopreneur; (3) the results of the regression analysis indicates that the variables associated with personality, instruments, and demography together significantly determine intensi technopreneur; and (4) Digging through the entrepreneurial opportunity conveniently located a few steps that should be tempered so that the more digging opportunities are expected to result in an optimal answer order Era the ASEAN Economic Community (MEA)



# Competency-Based Assessment in Fashion Design

Irma Russanti

Universitas Negeri Surabaya  
irmarussanti@unesa.ac.id

## Abstract

Professional certification is a stipulation on certain competence standards issued by a professional organization to one's performance through assessment. Hence, the assessment needs to be standardized proven by the existence of general scale which aims at measuring each competency. In the field of fashion design, it is essential to develop competency-based assessment to support the process of professional certification. Competency-based assessment is a process where an assessor works with a trainee to collect evidence of competence, using the benchmarks provided by the NOS (National Occupation standards-NOS) that comprise the national qualifications. A comprehensive literature review was conducted by employing 20 journals related to competency-based assessment in the field of fashion design published in 2011 to 2017. To cope with diverse perspectives, there were several theoretical books related to the field used to support the study. By referring to those relevant and related literatures, it helps to review the definition, approach and application of competency-based assessment in the field of fashion design. Results show that there are some sectors in developing assessment sheet namely garment, apparel, and embroidery by devising performance criteria relevantly to the required qualifications.

# Predictive validity of admission test for student academic performance

Yeni Anistyasari<sup>1</sup> Wiyli Yustanti<sup>2</sup>

<sup>1,2</sup>Department of Informatics, Universitas Negeri Surabaya

<sup>1</sup>yenian@unesa.ac.id <sup>2</sup>wiyliyustanti@unesa.ac.id

## Abstract

Universities have gathered large data with reference to their student candidate's previous study from admission electronic form. The main purpose of admission system is to determine the candidates who would likely have good achievement during their study in university. Accurate prediction of student academic performance is therefore important to improve university's managerial and tutoring decision. This paper presents a case study on predicting student academic performance at early semester of undergraduate degree program according to school grades and personal grades. School grades comprise ratio of applicants and recipients, school accreditation, student's GPA according to senior high school/ vocational senior high school/ Islamic senior high school, student's understanding skill of previous year national examination, average grade of previous year admission test, and average grade of previous year national examination. In addition, personal grades are including average grade of all subjects in national examination, average grade of report study, student's achievement, and student's rank in class. The objective of this study is to obtain predictive validity of school grade parameter and personal grade to student's GPA. Double regression analysis is used to explore this predictive validity. The results reveal that it is possible to predict student academic performance at early semester of undergraduate degree program.

# Profile Students For Practical Lazy In Unesa Engineering Faculty

Munoto<sup>1</sup>, Meini Sondang<sup>2</sup>, Satriana FMS<sup>3</sup>

<sup>1</sup> Electrical Engineering, State University of Surabaya, Surabaya. E-mail:

<sup>2</sup> Informatics Engineering, State University of Surabaya, Surabaya. E-mail:

<sup>2</sup> Sipil Engineering, State University of Surabaya, Surabaya. E-mail:

<sup>1</sup>munoto@unesa.ac.id <sup>2</sup>meinison dang@unesa.ac.id <sup>3</sup>satriana@unesa.ac.id

## Abstract

This study aims to determine the characteristics of students lazy to follow practical activities. The research method is qualitative naturalistic by using participant observation technique and interview. The data validity check is done by triangulation, detailed description, extension of observation time, and observer's accuracy. The data in the analysis through the domain analysis is followed up with the analysis of taxonomy, components, and themes. The results of the study show that, lazy students have a negative attitude towards the lab activities. Motivation, effective interaction, and attention to low lab activities. While cognitive abilities vary from low to high. This study also found the cause of the low aspects studied, so that by improving aspects of the aspects studied can make students actively conduct practicum. This study gives impact to the skill of SMK teachers to build practice in SMK, so that the readiness of SMK graduate work for the better.

# CCTV Prototype Development as A Practical Approach to Learning Electronic Appliance Repair and Maintenance Course in Vocational Education

Lusia Rakhmawati<sup>1</sup>, Fariz Irwansyah Febriyanto<sup>2</sup>

<sup>1,2</sup>Department of Electrical Engineering, Universitas Negeri Surabaya

<sup>1</sup>lusiaraakhmawati@unesa.ac.id

## Abstract

This study aimed to investigate satisfaction levels, among of the eleventh grade students majoring in audio video technique, towards the instructional media CCTV trainer kit: the CCTV prototype and job sheet, and analyzed perspectives of the practical approach to learning using CCTV prototype to improve installation skills in the electronic appliance repair and maintenance class. Survey questionnaires and instructional media were applied for data collection. The students' satisfaction towards the instructional media in teaching and learning process was presented in positive responses, 91.94 % satisfied. The finding reveals that the instructional media using trainer could better to overcome the need a practical approach to learning. Furthermore, using trainer kit media creates an environment where students can support each other and receive feedback from their peers. They performed practice activities that help them apply the new information from the steps in the job sheet.

# Design of Smart Educational Robot as a Tool For Teaching Media Based on Contextual Teaching and Learning to Improve the Skill of Electrical Engineering Student

M S Zuhrie<sup>1</sup>, I Basuki<sup>2</sup>, I G P Asto B<sup>3</sup>, L Anifah<sup>4</sup>

<sup>1,2</sup> Department of Electrical Engineering, Faculty of Engineering, Universitas Negeri Surabaya, Indonesia.

<sup>3,4</sup> Department of Computer Engineering, Faculty of Engineering, Universitas Negeri Surabaya, Indonesia.

zuhrie@unesa.ac.id

## Abstract

The development of robotics in Indonesia has been very encouraging. The barometer is the success of the Indonesian Robot Contest. The focus of research is a teaching module manufacturing, planning mechanical design, control system through microprocessor technology and maneuverability of the robot. Contextual Teaching and Learning (CTL) strategy is the concept of learning where the teacher brings the real world into the classroom and encourage students to make connections between knowledge possessed by its application in everyday life.. This research the development model used is the 4-D model. This Model consists of four stages: Define Stage, Design Stage, Develop Stage, and Disseminate Stage. This research was conducted by applying the research design development with the aim to produce a tool of learning in the form of smart educational robot modules and kit based on Contextual Teaching and Learning at the Department of Electrical Engineering to improve the skills of the Electrical Engineering student. Socialization questionnaires showed that levels of the student majoring in electrical engineering competencies image currently only limited to conventional machines. The average assessment is 3.34 validator included in either category. Modules developed can give hope to the future are able to produce Intelligent Robot Tool for Teaching.

# Implementation of Particle Swarm Optimization Method for Voltage Stability Analysis in 150 kV Sub System Grati – Paiton East Java

A B Kusumaningtyas<sup>1</sup>, M N Hidayat<sup>2</sup>, F Ronilaya<sup>3</sup>  
Electrical Engineering Departemen, Malang State Polytechnic . JL  
Soekarno-Hatta No. 9 Malang 65141 East Java Indonesia  
<sup>1</sup>ajeng\_bening@yahoo.com

## Abstract

Based on the data from State Electric Company on 15 January 2013, the undistributed power in the 150 kV sub system Grati-Paiton Region IV, that consist of 26 bus 150 kV and 2 bus generation 500 kV system, was recorded 3.286,00 MW. At the same time, the frequency of the system was down to 49 Hz. This lead to a deficit generation and unstable voltage condition in the system. Fast Voltage Stability Indeks (FVSI) method is used in this research to analyze the voltage stability of the buses. For buses with unstable voltage condition, reactive power will be injected through capacitor installation. The site where the capacitor will be installed is determined using the Fast Voltage Stability Indeks (FVSI) method while the size of the capacitor is determined using the Particle Swarm Optimization (PSO) method. The PSO method has been applied in some researches, such as to determine optimal placement and sizing in radial distribution network as well as in transmission network.. In this research, the PSO method is used to find the  $Q_{\text{loss}}$  of an interconnection transmission system, which in turn, the value of the  $Q_{\text{loss}}$  is used to determine the capacitance of the capacitor needed by the system.

# Design of Stand-Alone Hybrid Power Generation System at Brumbun Beach Tulungagung East Java

Angga Nur Rahmat<sup>1</sup>, Mohamammad Noor Hidayat<sup>2</sup>, Ferdian Ronilaya<sup>3</sup>

STATE POLITECHNICAL OF MALANG  
JLN. SOEKARNO-HATTA, ,MALANG, INDONESIA

<sup>1</sup>angg4.nr@gmail.com

<sup>2</sup>m.noor@polinema.ac.id

<sup>3</sup>f3rd1r0n1@polinema.ac.id

## Abstract

Indonesian government insists to optimize the use of renewable energy resources in electricity generation. One of the efforts is launching program called Desa Mandiri Energi (DME). This program aims to fulfill the need of electricity for isolated or remote villages in Indonesia. In order to support the penetration of renewable energy resources in electricity generation, a hybrid power generation system is developed. The simulation in this research is based on the availability of renewable energy resources in Brumbun Beach, Tulungagung, East Java. Initially, the electricity was supplied through stand-alone electricity generations which are installed at each house. Hence, the use of electricity between 17.00 – 21.00 WIB requires high operational costs. Based on the problem above, this research is conducted to design a stand-alone hybrid electricity generation system, which may consist of diesel, wind, and photovoltaic. The design is done by using the HOMER software to optimize the use of electricity from renewable resources and to reduce the operation of diesel generation. The combination of renewable energy resources in electricity generation resulted in Net Present Cost (NPC) of \$ 44.680, Cost Of Energy (COE) of \$ 0,268, and CO<sub>2</sub> emissions of 0,038 % much lower than the use of diesel generator only.

# Fixed Nadir Focus Concentrated Solar Power Applying Reflective Array Tracking Method

B Setiawan<sup>1</sup>, A M Damayanti<sup>2</sup>, A Murdani<sup>3</sup>, I I A Habibi<sup>4</sup>, and R N  
Wakidah<sup>5</sup>

Electrical Engineering Departement, Malang State Polytechnic. Jl. Soekarno-  
Hatta No. 9, Malang 65141, Indonesia  
annisa\_maulidia@polinema.ac.id

## Abstract

The Sun is one of the most potential renewable energy development to be utilized, one of its utilization is for solar thermal concentrators, CSP (Concentrated Solar Power). In CSP energy conversion, the concentrator is as moving object by tracking the sunlight to reach the focus point. This method need quite energy consumption, because the unit of the concentrators has considerable weight, and use large CSP, means the existence of the usage unit will appear to be wider and heavier. The addition of weight and width of the unit will increase the torque to drive the concentrator and hold the wind gusts. One method to reduce energy consumption is direct the sunlight by reflective array to nadir through CSP with Reflective Fresnel Lens concentrator. The focus will be below the nadir direction, and the position of concentrator will be fixed position even the angle of the sun's elevation changes from morning to afternoon. So, the energy concentrated maximally, because it has been protected from wind gusts. And then, the possibility of damage and changes in focus construction will not occur. The research study, and simulation of the reflective array (mechanical method) will show the reflective angle movement. The distance between reflectors and their angle are controlled by mechatronics. From the simulation using fresnel  $1\text{m}^2$ , and efficiency of solar energy is 57.91 %. In restriction, the intensity of sunlight at the tropical circles 1KW/peak, from 6am until 6pm.



# The Development of Learning Management System Using Edmodo

Joko<sup>1</sup>, Gayuh Septia Wulandari<sup>2</sup>

<sup>1</sup>Faculty of Engineering, State University of Surabaya, Indonesia  
unesa\_joko@yahoo.com

<sup>2</sup>Electrical Engineering Education, State University of Surabaya, Indonesia  
gayuhseptia95@gmail.com

## Abstract

The development of Learning Management System (LMS) can be used as an online learning media by managing the teacher in delivering the material and giving a task. This study aims to: 1) to know the validity of learning devices using LMS with Edmodo, 2) know the student's response to LMS implementation using Edmodo, and 3) to know the difference of the learning outcome that is students who learned by using LMS with Edmodo and Direct Learning Model (DLM). This research method is quasi experimental by using control group pretest-posttest design. The population of the study was the student at SMKN 1 Sidoarjo. Research sample X TITL 1 class as control group, and X TITL 2 class as experimental group. The researcher used scale rating to analyze the data validity and students' respon, and t-test was used to examine the difference of learning outcomes with significant 0.05. The result of the research shows: 1) the average learning device validity use Edmodo 88.14%, lesson plan validity is 92.45%, pretest-posttest avality is 89.15%, learning material validity is 84.64%, and affective and psychomotor-portfolio observation sheets avality is 86.33 included very good criteria or very suitable to be used for research; 2) the result of students' response questionnaire after taught by using LMS with Edmodo 86.03% in very good category and students agreed that Edmodo can be used in learning; and 3) the learning outcome of LMS by using Edmodo with DLM are: a) there are significant difference of the student cognitive learning outcome which is taught by using Edmodo with the student who use DLM. The average of student learning outcome that is taught LMS using Edmodo is 81.69 compared to student with DLM outcome 76.39, b) there is difference of affective learning outcome that is taught LMS using Edmodo compared to student using DLM. The average of student learning outcome of affective that is taught LMS by using Edmodo is 83.50 compared student who use DLM 80.34, and c) there is difference of student psychomotor learning outcome that is taught with LMS using Edmodo compared student who use DLM. The average of student learning outcome that is taught with LMS using Edmodo is 85.60 compared to student who use DLM 82.31.

# OTEC Potential of East Nusa Tenggara Province in Indonesia

M Widyartono<sup>1</sup> and R Rahmadian<sup>2</sup>

<sup>1,2</sup>Electrical Engineering Department, Surabaya State University, Ketintang Street, Surabaya, Indonesia

<sup>1</sup>mahendrawidyartono@unesa.ac.id, <sup>2</sup>rahmadian.reza@live.com

## Abstract

Indonesia is the largest archipelago country in the world, located between Indian Ocean and Pacific Ocean. Indonesia has more than 17000 islands with 70 per cent of the region is ocean. The Growth of the economic and population in Indonesia increasing the demand of the electricity annually, in 2015 alone electricity consumption in Indonesia reaching 200 TWh and will continue increasing every year. However, East Nusa Tenggara Province electrification ratio only around 58.64%, this is the second lowest ratio in Indonesia. This electrification ratio describes the level of availability of electrical energy for the community. Power Plant with renewable source placement in East Nusa Tenggara Province or smaller district need to be prioritise to cope with the low electrification ratio. Renewable sources for power plant have a good potential to work with, in example wind power, solar power, geothermal, or biomass. In addition another renewable source that not yet known is from the ocean itself. Ocean Thermal Energy Conversion (OTEC) is one of the renewable source method from ocean. This paper will uncover the potential of OTEC in East Nusa Tenggara province so it will bring possibility to build an OTEC power plant in the future.

# Breakdown Voltage of $\text{CF}_3\text{CHCl}_2$ gas an Alternative to $\text{SF}_6$ Gas using HV Test and Bonding Energy Methods

**Tedy Juliandhy<sup>1\*</sup>, T. Haryono<sup>1</sup>, Suharyanto<sup>1</sup>, Indra Perdana<sup>2</sup>**

<sup>1</sup>Departement of Electrical Engineering and Information Technology,

<sup>2</sup>Departement of Chemical Engineering,

Engineering Faculty, Gadjah Mada University

tedy.s3te14@mail.ugm.ac.id, thr@te.ugm.ac.id, suharyanto@te.ugm.ac.id,

iperdana@chemeng.ugm.ac.id

## Abstract

For more than two decades of Sulphur Hexafluoride ( $\text{SF}_6$ ) gases is used as a gas insulation in high voltage equipment especially in substations. In addition to getting an advantage as an insulating gas.  $\text{SF}_6$  gas is recognized as one of the greenhouse effect gases that cause global warming. Under the Kyoto Protocol,  $\text{SF}_6$  gas is one of those gases whose use is restricted and gradually reduced to the presence of a replacement gas for  $\text{SF}_6$  gas. One of the alternative gas alternatives which have the potential of replacing  $\text{SF}_6$  gas as an insulating gas in Gas Insulated Switchgear (GIS) equipment in the substation is Dichlorotrifluoroethane ( $\text{CF}_3\text{CHCl}_2$ ) gas. The purpose of this paper is to enable a comparison of breakdown voltage with high voltage test and method of calculating Bonding energy to Dichlorotrifluoroethane gas as substitute gas for  $\text{SF}_6$  gas. At 0.1 bar gas pressure obtained an average breakdown voltage of 18.68 kV / mm at 25°C chamber temperature and has the highest breakdown voltage at 50°C with a breakdown voltage of 19.56 kV / mm. The  $\text{CF}_3\text{CHCl}_2$  gas has great potential as an insulating gas because it has more insulation ability high of  $\text{SF}_6$  gas, and is part of the gas recommended under the Kyoto Protocol. Gas  $\text{CF}_3\text{CHCl}_2$  has the capacity to double the value of electronegativity greater than  $\text{SF}_6$  gas as a major requirement of gas isolation and has a value of Global Warming Potential (GWP) and Ozone Depleting lower than from  $\text{SF}_6$  gas.

# Design of Stand-Alone Hybrid Power Generation System at Brumbun Beach Tulungagung East Java

A N Rahmat<sup>1</sup>, M N Hidayat<sup>2</sup>, F Ronilaya<sup>3</sup>

<sup>1,2,3</sup>Electrical Engineering Department, State Polytechnic Of Malang. Jl. Soekarno-Hatta No. 9, Malang 65141, Indonesia

<sup>1</sup>Angg4.nr@gmail.com

## Abstract

Indonesian government insists to optimize the use of renewable energy resources in electricity generation. One of the efforts is launching Desa Mandiri Energi (DME) program. This program aims to fulfill the need of electricity for isolated or remote villages in Indonesia. In order to support the penetration of renewable energy resources in electricity generation, a hybrid power generation system is developed. The simulation in this research is based on the availability of renewable energy resources in Brumbun beach, Tulungagung, East Java. Initially, the electricity was supplied through stand-alone electricity generations which are installed at each house. Hence, the use of electricity between 17.00 - 21.00 requires high operational costs. Based on the problem above, this research is conducted to design a stand-alone hybrid electricity generation system, which may consist of diesel, wind, and photovoltaic. The design is done by using HOMER software to optimize the use of electricity from renewable resources and to reduce the operation of diesel generation. The combination of renewable energy resources in electricity generation resulted in NPC of \$ 44.680, Cost Of Energy (COE) of \$ 0,268, and CO<sub>2</sub> emissions of 0,038 % much lower than the use of diesel generator only.

# Implementation of Fuzzy Decision to Control Patient Room Facilities using Eye Blink

Ilham A.E. Zaeni<sup>1</sup>, Aji P. Wibawa<sup>2</sup>, Aripriharta<sup>3</sup>, Siti Sendari<sup>4</sup>  
Department of Electrical Engineering, State University of Malang, Indonesia  
ilham.ari.ft@um.ac.id

## Abstract

This study proposed the implementation of Fuzzy decision to control patient's room facilities. In this study, four icons were sequentially displayed on the computer screen. The icons representing four option that can be selected by the patient is including switch the light on/off, switch the fan on/off, moving the bed's backrest downward, and moving the bed's backrest upward. The eye blink was extracted from subject's electroencephalograph (EEG) signals which acquired from the FP1 region. The attention was also extracted from subject's EEG signals to ensure that subject concentrate to the task. The eye blink and attention level were used for Fuzzy decision inputs, while the output is a decision that states the selection is valid or not. The selected option is the command that appears on the screen when the selection is valid. In this study, subjects were asked to choose each command several time and the accuracy was computed based on the number of correct selection.

# Monitoring System and Temperature Controlling on PID Based Poultry Hatching Incubator

Sofyan Shafiudin<sup>1</sup>Nur Kholis<sup>2</sup>

<sup>1,2</sup>Teknik Elektro, Fakultas Teknik, Universitas Negeri Surabaya

<sup>1</sup>Sofyanshafiudin@gmail.com

<sup>2</sup>nurkholis@unesa.ac.id

## Abstract

Poultry hatching cultivation is essential to be observed in terms of temperature stability by using artificial penetration incubator which applies On/Off control. The On/Off control produces relatively long response time to reach steady state conditions. Moreover, how the system works makes the component worn out because the lamp is on-off periodically. Besides, the cultivation in the market is less suitable to be used in an environment which has fluctuating temperature because it may influence plant's temperature stability. The study aims to design automatic poultry hatching cultivation that can repair the temperature's response of plant incubator to keep stable and in line with the intended set-point temperature value by using PID controller. The method used in PID controlling is designed to identify plant using ARX (Auto Regressive eXogenous) Matlab which is dynamic/non-linear to obtain mathematical model and PID constants value that is appropriate to system. The hardware design for PID-based egg incubator uses Arduino Uno R3, as the main controller that includes PID source, and PWM, to keep plant temperature stability, which is integrated with incandescent light actuators and sensors where DHTI 1 sensor as the reader as temperature condition and plant humidity. The result of the study showed that PID constants value of each plant is different. For parallel 15 Watt plant,  $K_p = 3.9956$ ,  $K_i = 0.361$ ,  $K_d = 0$ , while for parallel 25 Watt plant, the value of  $K_p = 5.714$ ,  $K_i = 0.351$ ,  $K_d = 0$ . The PID constants value were capable to produce stable system response which is based on set-point with steady state error's value is around 5%, that is 2.7%. With hatching percentage of 70-80%, the hatching process is successful in air-conditioned environment (changeable).

# Effect of NaOH Treatment on Bending Strength of The Polyester Composite Reinforced by Sugar Palm Fibers

Mochamad Arif Irfai<sup>1</sup>, Diah Wulandari<sup>1</sup>, Sutriyono<sup>2</sup>, Eko Marsyahyo<sup>2</sup>

<sup>1</sup>Department of Mechanical Engineering, State University of Surabaya,  
Kampus Unesa Ketintang Surabaya, East Java P.O. 60231, Indonesia

<sup>2</sup>Department of Mechanical Engineering, National Institute of Technology,  
Jalan Sigura-gura Malang, East Java P.O. 65145, Indonesia  
arifirfai@unesa.ac.id

## Abstract

The objective of this research is to investigate the effect of NaOH treatment on bending strength of lamina composite reinforced by sugar palm fiber. To know of mechanism fracture can be done with visual inspection of the fracture surface. The Materials used are random sugar palm fibers that have been in the treatment of NaOH, polyester resin and hardener. Sugar palm fibers after washed and dried then soaked NaOH with a long time soaking 0, 2, 4, 6 and 8 hours. The bending test specimens were produced according to ASTM D 790. All specimens were post cured at 62°C for 4 hours. The Bending test was carried out on a universal testing machine. The SEM analysis has conducted to provide the analysis on interface adhesion between the surfaces of fiber with the matrix. The result shows that polyester composite reinforced by sugar palm fiber has highest bending stress 176.77 N/mm<sup>2</sup> for 2 hours of a long time soaking NaOH, the highest flexural strain 0.27 mm for 2 hours of a long time soaking NaOH, elongation 24.05% for 2 hours of a long time soaking NaOH and the highest bending modulus 1.267 GPa for 2 hours of a long time soaking NaOH. Based on the results, it can be concluded that the polyester composite reinforced by sugar palm fiber has the optimum bending properties for a long time soaking 2 hours. The fracture surface shows that the polyester composite reinforced by sugar palm fiber pull out that indicate weakens the bond between fiber and matrix.

# Integration K-Means Clustering Method and Elbow Method for Identification of The Best Customer Profile Cluster

M A Syakur<sup>1</sup>, B K Khotimah<sup>2</sup>, E M S Rochman<sup>3</sup>, B D Satoto<sup>4</sup>  
<sup>1,2,3,4</sup>Faculty of Engineering, University of Trunojoyo Madura

## Abstract

Clustering is a data mining technique used to analyse data that has variations and the number of lots. Clustering was process of grouping data into a cluster, so they contained data that is as similar as possible and different from other cluster objects. SMEs Indonesia has a variety of customers, but SMEs do not have the mapping of these customers so they did not know which customers are loyal or otherwise. Customer mapping is a grouping of customer profiling to facilitate analysis and policy of SMEs in the production of goods, especially batik sales. Researchers will use a combination of K-Means method with elbow to improve efficient and effective k-means performance in processing large amounts of data. K-Means Clustering is a localized optimization method that is sensitive to the selection of the starting position from the midpoint of the cluster. So choosing the starting position from the midpoint of a bad cluster will result in K-Means Clustering algorithm resulting in high errors and poor cluster results. The K-means algorithm has problems in determining the best number of clusters. So Elbow looks for the best number of clusters on the K-means method. Based on the results obtained from the process in determining the best number of clusters with elbow method can produce the same number of clusters K on the amount of different data. The result of determining the best number of clusters with elbow method will be the default for characteristic process based on case study. Measurement of k-means value of k-means has resulted in the best clusters based on SSE values on 500 clusters of batik visitors. The result shows the cluster has a sharp decrease is at  $K = 3$ , so K as the cut-off point as the best cluster.



# Study of Allocation Guaranteed Time Slot Wireless Body Area Networks Based On IEEE 802.15.4

Eppy Yundra<sup>1</sup>, Ghaluh Dhatuningtyas Harsono<sup>2</sup>

<sup>1,2</sup>Department of Electrical Engineering, Universitas Negeri Surabaya,  
Indonesia

<sup>1</sup>eppyundra@unesa.ac.id, <sup>2</sup>ghaluhdarsono@gmail.com

## Abstract

This paper aims to determine the size of the Guaranteed Time Slot (GTS) on the superframe structure required for each sensor as well as to know the performance of the GTS resized system compared to the GTS standard on IEEE 802.15.4. This article proposes a scheme to improve IEEE 802.15.4 medium access control, called allocation Guaranteed Time Slot (ALGATIS). ALGATIS is expected to effectively allocate guaranteed time slot to the requested sensors, it adjusts the length of the slot in superframe duration based on the length of the packet data. This article presents a simulation experiment of IEEE 802.15.4, especially for star network, to predict the throughput of networks and average energy consumption. The simulation experiments show that the performance of ALGATIS is better than that of IEEE 802.15.4 standard in term of the throughput of networks and average energy consumption.

# Indonesian Sign Language Number Recognition using SIFT Algorithm

Isa Mahfudi<sup>1</sup>, Moehammad Sarosa<sup>2</sup>, Rosa Andrie Asmara<sup>3</sup>, M  
Azrino Gustalika<sup>4</sup>

<sup>1,2,3,4</sup>Electrical Engineering Departement, State Polytechnic of Malang. Jl.  
Soekarno-Hatta No. 9, Malang 65141, Indonesia  
isa\_mahfudi@polinema.ac.id

## Abstract

Indonesian sign language (ISL) is generally used for deaf individuals and poor people communication in communicating. They use sign language as their primary language which consists of 2 types of action: sign and finger spelling. However, not all people understand their sign language so that this becomes a problem for them to communicate with normal people. this problem also becomes a factor they are isolated feel from the social life. It needs a solution that can help them to be able to interacting with normal people. Many research that offers a variety of methods in solving the problem of sign language recognition based on image processing. SIFT (Scale Invariant feature Transform) algorithm is one of the methods that can be used to identify an object. SIFT is claimed very resistant to scaling, rotation, illumination and noise. Using SIFT algorithm for indonesian sign language recognition number result rate recognition to 82% with the use of a total of 100 samples image dataset consisting 50 sample for training data and 50 sample images for testing data. Change threshold value get affect the result of the recognition. The best value threshold is 0.45 with rate recognition of 94%.

# Opinion Analysis on Rohingya using Twitter Data

Naim Rochmawati<sup>1</sup>, Setya Chendra Wibawa<sup>2</sup>  
<sup>1,2</sup>Department of Informatics, Surabaya State University  
<sup>1</sup>naim.rochmawati@gmail.com, <sup>2</sup>setyachendra@unesa.ac.id

## Abstract

Rohingya is an ethnicity in Myanmar. Recently there was a conflict in the area between the rakhine population and the Myanmar army. Many opinions are pro and contra in addressing this issue. There is a critic, there is a support and there is a neutral. The purpose of this paper is to analyze the world public opinion about the case of Rohingya. The opinion data to be processed is taken from twitter. the reason for using twitter is because twitter has become one of the popular social media and includes the most frequently visited social media. therefore it would be a lot of data that can be taken from twitter to be processed in the process of sentiment analysis. The grouping of opinions will be divided into 3 parts of positive, negative and neutral. the method used in grouping is the naïve bayes method.

# The Development of Wireless Body Area Network for Motion Sensing Application

Pradini Puspitaningayu  
Universitas Negeri Surabaya

## Abstract

The information era has driven the society into the digitally-controlled lifestyle. Wireless body area networks (WBAN) as the specific scope of wireless sensor networks (WSN) is consistently growing into bigger applications. Currently, people are able to monitor their medical parameters by simply using small electronics devices attached to their body and connected to the authorities. On top of that, this time, smartphones are typically equipped with sensors such as accelerometer, gyroscope, barometric pressure, heart rate monitor, etc. It means that the sensing yet the signal processing can be performed by a single device. Moreover, Android opens lot wider opportunities for new applications as the most popular open-sourced smartphone platform. This paper is intended to show the development of motion sensing application which focused on analysing data from accelerometer and gyroscope. Beside reads the sensors, this application also has the ability to convert the sensors' numerical value into graphs.

# Patients' Heart Monitoring System Based on Wireless Sensor Network

T S Sollar<sup>1</sup>, Alamsyah<sup>2\*</sup>, M Bachtiar<sup>3</sup> and A G Sooi<sup>4</sup>

<sup>1,2,3</sup>Department of Electrical Engineering, Faculty of Engineering, Universitas Tadulako, Palu, Indonesia

<sup>4</sup>Department of Informatics Engineering, Faculty of Engineering, UNWIRA, Kupang, Indonesia  
alamsyah.zakaria@untad.ac.id

## Abstract

Wireless sensor network (WSN) has been utilized to support the health field such as monitoring the patient's heartbeat. Heart health monitoring is essential in maintaining health, especially in the elderly. Such an arrangement is needed to understand the patient's heart characteristics. The increasing number of patients certainly will enhance the burdens of doctors or nurses in dealing with the condition of the patients. Therefore, required a solution that could help doctors or nurses in monitoring the progress of patients' health at a real time. This research proposes a design and application of a patient heart monitoring system based on WSN. This system with using electrocardiograph (ECG) mounted on the patients' body and sent to the server through the ZigBee. The results indicated that the retrieval of data for 15 seconds in male patients, with the age of 25 years was 17 times rate or equal to 68 bpm. For 884 data packets sent for 15 minutes using ZigBee produce a data as much as 4488 bytes, throughput of 2.39 Kbps, and 0.24486 seconds of average delay. The measurement of the communication coverage based on the open space conditions within 15 seconds through ZigBee resulting throughput value of 4.19 Kbps, packet loss of 0 %, and 6.667 seconds of average delay. While, the measurement of communication range based on closed space condition through ZigBee resulting throughput of 4.27 Kbps, packet loss of 0 %, and 6.55 seconds of average delay.

# Multi-Parameter Wireless Monitoring and Telecommand of a Rocket Payload: Design and Implementation

Arga C Pamungkas<sup>1</sup>, Alma A Putra<sup>2</sup>, Pradini Puspitaningayu<sup>3</sup>, Yulia  
Fransisca<sup>4</sup>, Arif Widodo<sup>5</sup>

<sup>1,2,3,4,5</sup>Department of Electrical Engineering, Faculty of Engineering,  
Universitas Negeri Surabaya

<sup>1</sup>argapamungkas@mhs.unesa.ac.id, <sup>3</sup>pradinip@unesa.ac.id

## Abstract

A rocket system is generally consists of two parts, the rocket motor and the payload. The payload system is built of several sensors such as accelerometer, gyroscope, magnetometer, and also a surveillance camera. These sensors are used to monitor the rocket in a three-dimensional axis which determine its attitude. Additionally, the payload must be able to perform image capturing in a certain distance using telecommand. This article is intended to describe the design and also the implementation of a rocket payload which has attitude monitoring and telecommand ability from the ground control station using a long-range wireless module Digi XBee Pro 900 HP.

# Brain Tumor Image Segmentation in MRI Image

Hapsari P A Tjahyaningtjas

Electrical Engineering Department, State University of Surabaya, Indonesia  
hapsaripeni@unesa.ac.id

## Abstract

Brain tumor segmentation plays an important role in medical image processing. Treatment of patients with brain tumors is highly dependent on early detection of these tumors. Early detection of brain tumors will improve the patient's life chances. Diagnosis of brain tumors by experts usually use a manual segmentation that is difficult and time consuming because of the necessary automatic segmentation. Nowadays automatic segmentation is very popular and can be a solution to the problem of tumor brain segmentation with better performance

The purpose of this paper is to provide a review of MRI-based brain tumor segmentation methods. There are number of existing review papers, focusing on traditional methods for MRI-based brain tumor image segmentation. this paper, we focus on the recent trend of automatic segmentation in this field. First, an introduction to brain tumors and methods for brain tumor segmentation is given. Then, the state-of-the-art algorithms with a focus on recent trend of full automatic segmentaion are discussed. Finally, an assessment of the current state is presented and future developments to standardize MRI-based brain tumor segmentation methods into daily clinical routine are addressed.

# Detection of Lock on Radar System Based On Ultrasonic US 100 Sensor and Arduino Uno R3 With Image Processing GUI

Farid Baskoro

Jurusan Teknik Elektro Fakultas Teknik UNESA, Surabaya

faridbaskoro@unesa.ac.id

## Abstract

The development of electronics technology especially in the field of microcontroller occurs very rapidly. There have been many applications and useful use of microcontroller in everyday life as well as in laboratory research. In this study used Arduino Uno R3 as microcontroller based platform ATmega328 as a sensor distance meter to know the distance of an object with high accuracy. The method used is to utilize the function Timer / Counter in Arduino UNO R3. On the Arduino Uno R3 platform there is ATMEL ATmega328 microcontroller which has a frequency generating speed up to 20 MHz, 16-bit enumeration capability, and using C language as its programming. With the Arduino Uno R3 platform the ATmega328 microcontroller can be programmed with Arduino IDE software that is simpler and easier because it has been supported by libraries and many support programs. The result of this research is distance measurement to know the location of an object using US ultrasonic wave sensor US 100 with Arduino Uno R3 based on ATmega328 microcontroller which then the result will be displayed using Image Processing.



# Automated Temperature Control with Adjusting Outlet Valve of Fuel at Process of Cooking Palm Sugar

H. Aripin<sup>1</sup>, Nurul Hiron<sup>1</sup>, Edvin Priatna<sup>1</sup>, Nundang Busaeri<sup>1</sup>,  
Asep Andang<sup>1</sup>, Suhartono<sup>2</sup>, Svilen Sabchevski<sup>3</sup>

<sup>1</sup>Department of Electrical Engineering, Faculty of Engineering, Siliwangi  
University, Tasikmalaya 46115, Indonesia.

<sup>2</sup>Department of Agrotechnology, Faculty of Argiculture, Siliwangi  
University, Tasikmalaya 46115, Indonesia.

<sup>3</sup>Lab. Plasma Physics and Engineering, Institute of Electronics of the  
Bulgarian Academy of Sciences, Sofia 1784, Bulgaria.

aripin@unsil.ac.id

## Abstract

In this paper, a real-time temperature control system for coconut sugar cooking is presented. It is based on a thermocouple temperature sensor. The temperature in the closed evaporator is used as a control variable of the DC servo control system for opening and closing of a valve embedded in a gas burner. The output power level, which is necessary in order to reach the target temperature is controlled by the microcontroller ATmega328P. A circuit module for control of the valve and temperature sensors as well as software for data acquisition have been implemented. The test results show that the system properly stabilizes the temperature in the closed evaporator for coconut sugar cooking in the range from room temperature to 110°C. A set point can be reached and held with an accuracy of  $\pm 0.75^\circ\text{C}$  at a temperature of 110°C for 60 minutes.

# Measurement of Non-Invasive Blood Glukoses Level Based Sensor Color TCS3200 and Arduino

Humaidillah Kurniadi Wardana<sup>1</sup>, Elly Indahwati<sup>2</sup>, Lina Arifah  
Fitriyah<sup>3</sup>

<sup>1,2</sup> Department of Electrical Engineering, Faculty of Engineering, Universitas  
Hasyim Asy'Ari Tebuireng Jombang

<sup>3</sup> Department of Natural Science, Faculty of Science Education Universitas  
Hasyim Asy'Ari Tebuireng Jombang  
adi3\_wardana@yahoo.com

## Abstract

Design and measurement of arduino-based urinary (non-invasive) urine glucose using rgb tcs3200 sensor. This research was conducted by making use of the urine in diabetes patients detected by sensor colors then measured levels of color based on the rgb color of the urine of diabetics. The detection is done on 4 urine samples with each consisting of 3 diabetics and 1 non diabetics. Equipment used in this research, among others, arduino uno, colour sensor tcs3200, lcd 16x4. The results showed that the detection of rgb values in diabetics 230 with blue and not diabetics 200 with red.

# Prototype Setup Of Household Lightening With Solar Cell Based Iot (Internet Of Things)

Mohammad Rifki<sup>1</sup>, Tri Rijanto<sup>2</sup>  
<sup>1,2</sup>Univesitas Negeri Surabaya  
<sup>1</sup>mohammadrifki866@gmail.com

## Abstract

The development of the current era of globalization requires the development of electric power systems using renewable alternative energy, One fossil resource is solar cells. The solar cell uses 120 Wp media to convert solar energy into electricity stored on battery type vrla kayaba 65 aH 12V through charge controller 20A which later on battery power is used to supply 5 Watt LED lamp load converted by 500 watt inverter by using IOT controls (Internet Of Things) that are connected in serial communication between laptops and arduino uno R3. This research aims to find out how to make a prototype home lamp with iot-based solar cell, to find out the performance of home lighting control, and know the efficiency of home lights control between the manual system with iot. The results of analysis and characteristics testing of solar cell that is the intensity of sunlight and the highest voltage is at 13:00 the intensity of sunlight is 1030W/m<sup>2</sup> and the voltage is 21.24V, while the lowest voltage is at 17:00 ie the intensity of sunlight is 579W/m<sup>2</sup> and the voltage is 19.38V. In addition it also obtained a total and the average is for the total intensity of total sunlight 18.046W/m<sup>2</sup> and the average is 859.3333W/m<sup>2</sup>. As for the total of the overall voltage is 428.55V and the average is 20.40714V. In the analysis testing of home lighting control in getting the fastest response time is the living room lamp that is On 01.69 seconds and Off 01.72 seconds. While the longest response time is on the second terrace lamp with time response On 03.75 seconds and Off 03.14 seconds. In the analysis and the results of testing the efficiency of home lighting control between the manual system and the iot it can be concluded that the working system of the prototype of home light control is more efficient using the iot system where the power difference consumed is 29.549 Watt. Keywords: Alternative Energy, Solar Cell, LED Lights, Battery, Inverter, IOT (Internet Of Things), Arduino Uno R3

# The Design of Artificial Intelligence Robot Based on Fuzzy Logic Controller Algorithm

M. Syariffuddien Zuhrie<sup>1</sup> Munoto<sup>2</sup> Eko Hariadi<sup>3</sup> Supari Muslim<sup>4</sup>  
<sup>1,2,4</sup> Department of Electrical Engineering <sup>3</sup>Department of Computer  
Engineering ,Universitas Negeri Surabaya  
City of Surabaya, Indonesia  
<sup>1</sup>zuhrie@unesa.ac.id

## Abstract

Artificial Intelligence Robot is the smart wheeled robot driven by the DC motor that moves along the wall using the ultrasonic sensor as a detector of obstacles. This research uses ultrasonic sensors HC-SR04 to measure the distance between robots with the wall based ultrasonic wave. This robot uses Fuzzy Logic Controller Algorithm to adjust the speed of DC motor. When the ultrasonic sensor detects a certain distance, sensor data is processed on ATmega8 then the data goes to ATmega16. From ATmega16, sensor data is calculated based on Fuzzy rules to drive DC motor speed. The program used to adjust the speed of a DC motor is CVAVR program (Code Vision AVR). The readable distance of ultrasonic sensor is 3 cm to 250 cm with response time 0.5 s. Testing of robots on walls with a set point value of 9 cm to 10 cm produce an average error value of -12% on the wall of L, -8% on T walls, -8% on U wall, and -1% in square wall.

# Arduino Based Weather Monitoring Telemetry System Using Nrf24l01+

Rafi Sidqi<sup>1</sup>, Bagus Rio Rynaldo<sup>2</sup>, Satya Hadi Suroso<sup>3</sup>, Rifqi Firmansyah<sup>4</sup>

<sup>1,2,3,4</sup> Department of Electrical Engineering, Universitas Negeri Surabaya  
<sup>4</sup>rifqifirmansyah@unesa.ac.id

## Abstract

Weather is an important part of the natural environment, thus knowing weather information is needed before doing activity. The main purpose of this research was to develop a weather monitoring system which capable to transmit weather data via radio frequency by using nRF24L01+ 2,4GHz radio module. This research implement Arduino UNO as the main controller of the system which send data wirelessly using the radio module and received by a receiver system. Received data then logged and displayed using a Graphical User Interface on a personal computer. Test and experiment result show that the system was able to transmit weather data via radio wave with maximum transmitting range of 32 meters. Key words: Weather monitoring, telemetry, Arduino, temperature, relative humidity, atmospheric pressure, lux, altitude.

# Early Leakage Protection System of LPG (Liquefied Petroleum Gas) Based on ATMega 16 Microcontroller

Sriwati<sup>1</sup>, Nur Ikhsan Ilahi<sup>2</sup>, Musrawati<sup>3</sup>, Syarifuddin Baco<sup>4</sup>, Ansar  
Suyuti, Andani Achmad, Ejah Umriah<sup>5</sup>

<sup>1,2</sup>Electrical Engineering, <sup>3</sup>Industri Engineering, <sup>4</sup> Informatic Engineering of  
Makassar Islamic University, <sup>5</sup>Electrical Engineering of Hasanuddin University  
Perintis Kemerdekaan Street Km.9 No.29 Makassar  
<sup>1</sup>sriwati.dty@uim-makassar.ac.id

## Abstract

LPG (Liquefied Petroleum Gas) is a hydrocarbon gas production from refineries and gas refinery with the major components of propane gas (C<sub>3</sub>H<sub>8</sub>) and butane (C<sub>4</sub>H<sub>10</sub>). Limit flame (Flammable Range) or called gas with air. Value Lower Explosive Limit (LEL) is the minimum limit of the concentration of fuel vapor in the air which if there is no source of fire, the gas will be burned. While the value of the Upper Explosive Limit (UEL), which limits the maximum concentration of fuel vapor in the air, which is no source of fire, the gas will be burned. The protection system is a defense mechanism of human, equipment, and buildings around the protected area. Goals to be achieved in this research are to design a protection system against the consequences caused by the leakage of LPG gas based on ATmega16 microcontroller. The method used in this research is to reduce the levels of leaked LPG and turned off the power source when the leakage of LPG is on the verge of explosive limit. The design of this protection system works accurately between 200 ppm up to 10000 ppm, which is still below the threshold of explosive. Thus protecting the early result of that will result in the leakage of LPG gas.

# Classification Of Children Intelligence With Fuzzy Logic Method

Syahminan husein<sup>1</sup> permata ika hidayati<sup>2</sup>  
kanjuruhan university

<sup>1</sup>syahminan@unikama.ac.id <sup>2</sup>permatahidayati@unikama.ac.id

## Abstract

Intelligence of children is An Important Thing to Know the Parents Early on. Typing can be done With a Child's intelligence Grouping Dominant Characteristics Of each Type of Intelligence. To Make it easier for Parents in Determining The type of Children's intelligence And How to Overcome them, for It Created A Classification System Intelligence Grouping Children By Using Fuzzy logic method For determination Of a Child's degree of intelligence type. From the analysis We concluded that The presence of Intelligence Classification systems Pendulum Children With Fuzzy Logic Method Of determining The type of The Child's intelligence Can be Done in a way That is easier And The results More accurate Conclusions Than Manual tests.

# Model Multi Criteria Decision Making With Fuzzy ANP Method For Performance Measurement Small Medium Enterprise (SME)

E. Rahmanita<sup>1</sup>, V T Widyaningrum<sup>2</sup>, Y Kustiyahningsih<sup>3</sup>, J Purnama<sup>4</sup>

<sup>1</sup>Informatic Engineering, Faculty of Engineering, Trunojoyo University.

<sup>2</sup>Mechatronic Engineering, Faculty of Engineering, Trunojoyo University.

<sup>3</sup>Information System, Faculty of Engineering, Trunojoyo University.

<sup>4</sup>Industrial Engineering, Department of Engineering, UNTAG, Surabaya.

<sup>1</sup>ezarahmanita@gmail.com, <sup>2</sup>vivie\_7812@yahoo.com,

<sup>3</sup>ykustiyahningsih@trunojoyo.ac.id <sup>4</sup>jakapurnama@untag-sby.ac.id.

## Abstract

Multiple Criteria Decision Making (MCDM) is a decision-making method for establishing the best alternative based on certain criteria. Some of the MCDM performance measurement methods include Simple Additive Weighting (SAW), Weighted Product (WP), Analytic Network Process (ANP), Preferential Equation Preference Ordering Solution (TOPSIS), and Analytic Hierarchy Process (AHP). Based on the previous research approach MCDM method is less effective to handle data containing inaccuracies and uncertainties. This research uses Fuzzy Analytic Network Process (FANP) method for performance measurement. The FANP method can handle data that contains uncertainty. There is consistency index in determining decisions. Performance measurement in this study is based on a perspective of the Balanced Scorecard. This research approach integrated internal business perspective, learning, and growth perspective and fuzzy Analytic Network Process (FANP). The results of this research are framework a priority weighting of assessment indicators.



# **Integration *K-Means Clustering Method and Elbow Method* For Identification of The Best Customer Profile Cluster**

<sup>1</sup>M A Syakur, <sup>2</sup>B K Khotimah, <sup>3</sup>E M S Rochman, <sup>4</sup>B D Satoto  
<sup>1,2,3,4</sup>Faculty of Engineering, University of Trunojoyo Madura

**Abstract.** Clustering is a data mining technique used to analyse data that has variations and the number of lots. Clustering was process of grouping data into a cluster, so they contained data that is as similar as possible and different from other cluster objects. SMEs Indonesia has a variety of customers, but SMEs do not have the mapping of these customers so they did not know which customers are loyal or otherwise. Customer mapping is a grouping of customer profiling to facilitate analysis and policy of SMEs in the production of goods, especially batik sales. Researchers will use a combination of K-Means method with elbow to improve efficient and effective k-means performance in processing large amounts of data. K-Means Clustering is a localized optimization method that is sensitive to the selection of the starting position from the midpoint of the cluster. So choosing the starting position from the midpoint of a bad cluster will result in K-Means Clustering algorithm resulting in high errors and poor cluster results. The K-means algorithm has problems in determining the best number of clusters. So Elbow looks for the best number of clusters on the K-means method. Based on the results obtained from the process in determining the best number of clusters with elbow method can produce the same number of clusters K on the amount of different data. The result of determining the best number of clusters with elbow method will be the default for characteristic process based on case study. Measurement of k-means value of k-means has resulted in the best clusters based on SSE values on 500 clusters of batik visitors. The result shows the cluster has a sharp decrease is at  $K = 3$ , so K as the cut-off point as the best cluster.

## **1. Introduction**

Clustering is technique of grouping unsupervised data and data mining techniques in daily life, because it could not be separated with a number of data that produce information to meet the needs of life. One of the most important tools in relation to data is to classify or classify the data into a set of categories or clusters [1]. One clustering technique is the method of K-means algorithm using the process repeatedly. The K-Means method is the simplest and most common clustering method. K-means has the ability to group large amounts of data with relatively fast and efficient computation time [2]. However, K-Means has a disadvantage depending on the initial cluster centre determination. K-Means cluster test results in the form of solutions that are local optimal. From the trial process is expected to have similarities or closeness between data so that can be grouped into several clusters, where among cluster members have a high level of similarity. According to (Celebi et al., 2013) the K-Means algorithm is also versatile, which is easy to modify at every stage of the process, simple in the distance calculation function, and depends on iteration termination criteria. K-Means Clustering is a localized optimization method that is sensitive to the selection of the starting position from the

midpoint of the cluster. So choosing the starting position from the midpoint of a bad cluster will result in K-Means Clustering algorithm being trapped in the optimal locale [3-5]. The K-means method will choose the pattern up to k as the starting point of the centroid randomly or randomly. The number of iterations with the centroid cluster will be affected by the initial centroid cluster at random. So that can be fixed by determining the centroid cluster in the high initial data to get higher performance. Consumer segmentation based on consumer behaviour measured by consumer profiling. Customer profiling is built through information with criteria: age, gender, and residential area information. To process customer profiling using data mining by segmenting consumers can be estimated through the consumer profile, which conducted using clustering algorithm for bank customer segmentation [6]. Singh et.al 2013 proposed improvements to the classic K-Means algorithm to produce more accurate clusters. The proposed algorithm is based on data separation, to find the initial centroid according to the data distribution. The results of this study have resulted in better clusters in a short calculation time [[11]. The main objective of this research is the segmentation of bank customers to find the transactional relationship between customer and company to provide mutual solution. In other words, improving customer relationships and evaluating customer segments by predicting credentials for each group of customers and will provide a more appropriate type of transaction model with the customer [8]. Clustering results vary depending on the number of clustering parameter changes. The k-means method is a simple clustering technique and quickly takes care of the problem to determine the exact number of clusters in the data set. Customer segmentation research is proposed for the use of various regulations for various customers with high risk to the bank [8]. Elbow proposes several ways to determine k as the number of dynamically formed clusters, one of which is the elbow method [9-11]. This research will combine K-Means with elbow method to determine the actual number of clusters Customer profiling segmentation in SME. The value on k will continue to increase in each process and decrease with great value. The graph shows the elbow n of all the k values obtained. This research will find the best value of k by using elbow method. The elbow method is easy to implement by looking at the ideal k value graph with the position on the elbow along with the SSE (Sum of Square Error) which is less than 1. The best cluster k result will be the basis for clustering. The smaller the value of SSE and the elbow graph decreases the better the cluster results.

## **2. Literature Review**

### **2.1. Customer Segmentation**

One of the ways used to know customer characteristics information by doing customer segmentation. One way that can be used to manage the relationship between customers and companies is to provide different treatment according to customer characteristics of each segment. Customer segmentation is done with data mining to know the customer characteristics information hidden inside. The way to find out the customer segments of a company is clustering analysis. Clustering is the process of forming segments of a set of data by measuring similarities between data with other data [11]. The purpose of segmentation is to customize the products, services, and marketing messages for each segment. The segmentation process puts customers in line with the characteristics of similar customer groups. Customer segmentation is a preparatory step to classify each customer according to a defined customer group. Customer segmentation based on market research and demography requires understanding the characteristics of all customers to be more effective. Customer segmentation also identifies segmentation in customer behaviour. In addition, customer payment transaction data is used to gain insight into customer behaviour. Customer segmentation to form groups based on their income and expenses. It can be used to identify high-value customers and prioritize service [12-13].

### **2.2 K-Means Clustering**

The K-means algorithm is one of the algorithms with partition, since K-Means is based on determining the initial number of groups by defining the initial centroid value [12]. The K-Means algorithm

requires precise numbers in determining the number of clusters  $k$ , since the initial cluster centre may change so that this event may result in unstable grouping of data [13]. The output of K-Means depends on the selected centre values on clustering. This algorithm the initial value of the cluster's centre point becomes the basis for the cluster determination. The initial cluster centroid cluster randomly assigns an impact to the performance of the cluster (14-15). K-Means Clustering algorithm is one of the clustering methods by partitioning from set data into cluster  $K$ . It is a distance-based clustering algorithm that divides data into a number of clusters in numerical attributes.

1. Determine the number of clusters  $K$  and the number of maximum iterations.
2. Perform the initialization process  $K$  midpoint cluster, then the equation of centroid count feature:

$$C_i = \frac{1}{M} \sum_{j=1}^M x_j \quad (1)$$

Equation 1 is done as much as  $p$  dimensions from  $i = 1$  to  $i = p$

3. Connect any observation data to the nearest cluster. Euclidean distance spacing measurements can be found using equation 2.

$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2} \quad (2)$$

4. Reallocation of data to each group based on comparison of distance between data with each group's centroid [9].

$$a_{ij} \begin{cases} 1 & d = \min\{D(x_i, c_i)\} \\ 0 & \text{otherwise} \end{cases} \quad (3)$$

5. Recalculate the cluster midpoint position.

$a_{ij}$  is the value of the membership of point  $x_i$  to the centres of the group  $c_i$ ,  $d$  is the shortest distance from the data  $x_i$  to the group  $K$  after being compared, and  $c_i$  is the centre of the group to 1. The objective function used by this method is based on the distance and the value of the data membership in the group. The objective function according to MacQueen (1967) can be determined using equation.

$$J = \sum_{i=1}^n \sum_{l=1}^k a_{il} D(x_i, c_l)^2 \quad (4)$$

$n$  is the amount of data,  $k$  is the number of groups,  $a_{il}$  is the membership value of the data point  $x_i$  to the  $c_l$  group followed  $a$  has a value of 0 or 1. If the data is an anggota of a group, the value  $a_{il} = 1$ . If not, the value  $a_{il} = 0$ .

6. If there is a change in the cluster midpoint position or number of iterations <the maximum number of iterations, return to step 3. If not, then return the clustering result.

### 2.3 Elbow Criterion

Illustration of  $K$  value on Elbow combination with K-Means was graph of cluster relationship with error decreasing, increasing value of  $K$  then graph will decrease slowly until result of value of  $K$  is stable. For example, the value of the cluster  $K = 2$  to  $K = 3$ , then from  $K = 3$  to  $K = 4$ , it shows a drastic decrease to form the elbow at point  $K = 3$  then the ideal cluster  $k$  is  $K = 3$  [11]. The combined Elbow and K-Means Methods can determine the value of  $K$  at the best cluster.

1. Find  $k$  as the number of clusters formed. This study will use the elbow criterion method to select the number of  $k$  clusters to be used for grouping data on the K-Means algorithm. The elbow method is expressed by Sum of Squared Error:

$$SSE = \sum_{k=1}^K \sum_{x_i \in S_k} \|X_i - C_k\|_2^2 \quad (5)$$

With  $k =$  many clusters formed  $C_i$  is the  $i$ -th cluster,  $x$  = the data present in each cluster.

2. Determine the cluster's center point at the beginning at random. Early centroid determination is done randomly from the available objects as much as cluster  $k$ , then to calculate the next  $i$ -cluster centroid, by the following formula:

$$v = \frac{\sum_{i=1}^n x_i}{n} ; i = 1, 2, 3, \dots, n \quad (6)$$

3. Calculate the distance of each object to each centroid using the Euclidian Distance.

$$d(x, y) = \|x - y\| = \sqrt{\sum_{i=1}^n (x_i - y_i)^2}; i = 1, 2, 3, \dots, n \quad (7)$$

with  $x_i$  : Variable of object x to-i,  $y_i$  : variable output y and  $n$  : The number of objects

4. Allocate each object into the nearest centroid.
5. Allocation of objects into each cluster at iteration with k-means. Where each cluster member object has been measured the proximity distance to the cluster's center point.
6. Perform iteration, then process determine the position of new centroid by using equation (6).
7. Repeat step 3 if the new centroid position with the old centroid is not the same.

### 3. Results and Discussion

K-means clustering research is done by taking data during the last 1 month for profiling customer with parameters as attribute in the form of customer criteria. Where each criterion has a predetermined category range, for gender criteria and activity has sub criteria, following sub criteria for gender and activity. Customers have been filled out the questionnaire using 6 criteria, according to table 2.

**Table 1.** Sampel data profiling of customer

No	User Name	Age	Profession	Income (million)	Education	Quality	Gender
1	Moawi	25	Employee	1.500.000	high school	3	Female
2	Windaryanti	47	Teacher	7.000.000	S1	1	Male
3	Sulistiara	60	Pension	3.000.000	S1	5	Female
4	Mailinda	70	Entrepreneur	12.000.000	Junior high school	6	Female
5	Fania Dara	56	Farmer	1.000.000	primary school	4	Male
6	Fleni Dwi	63	Government employees	6.000.000	S1	2	Female
7	Imroatun	48	Trader	11.000.000	primary school	6	Female
8	Marjatul	20	Student	500.000	high school	1	Male
9	Yayuk	29	Employee	6.000.000	D3	3	Female
10	Siti Zainab	42	Teacher	5.000.000	S1	1	Female

**Table 2.** Process of data transformation with age group

No.	Age	Frequency/Initial
1	15-25	14
2	25-35	13
3	35-45	2
4	45-55	31
5	55-65	25
6	$x \geq 65$	16

The data contained in table 1 would not be directly processed, because there is a large number of numbers between the variables. The difference in distance or the magnitude of this number can be quite difficult in the process of grouping. One of the solutions used to minimize the number of variables between the variables with the equation 5 [11].

$$\text{Normalization} \frac{(x_i - x_{min})}{(x_{max} - x_{min})}$$

The value of the variables is normalized to the range 0 - 1. Normalization of numbers on each variable before the calculation process is done so that the centroid value on the parameter does not exist that predominates in the calculation of the distance between data [11]. The data used in the form of data on the number of visits batik sales with criteria : Profession, Income, Quality of Batik, and Gender Education. The result combined system test of K-Means method with Elbow according to Table 3.

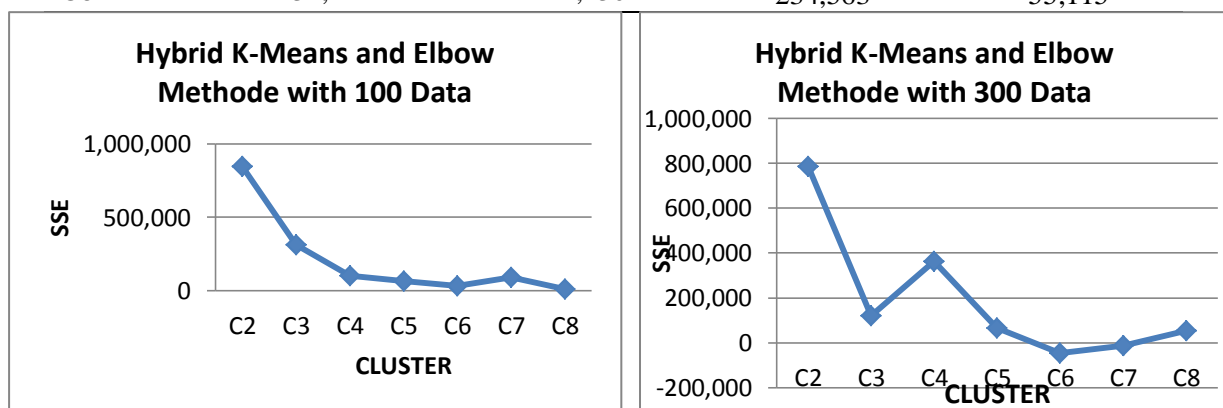
**Table 3.** Result of anaisa cluster of K-Means data method with Elbow

No	Age	Profession	Income (million)	Education	Quality	Gender	Cluster	Number
1	$25 \leq x \leq 40$	Employee, Teacher	$x \leq 2$	High School	3	Femal e	3	132
2	$41 \leq x \leq 55$	Teacher, Entrepreneur	$5 \leq x \leq 10$	S1	1	Male	2	223
3	$15 \leq x \leq 24$	Student	$2 \leq x \leq 5$	S1	5	Femal e	3	112
4	$x \leq 65$	Pension, Entrepreneur	$x \geq 10$	Junior High School	6	Femal e	1	25

Furthermore, this research performs the best cluster optimization on K-means with Elbow method. The determination of k value with Elbow Method by choosing the number of clusters or k values by seeing the decrease significantly.

**Table 4.** Sum of Square Error results from each cluster for 100 and 300 Customer Profiling

Cluster	Result of Sum Square Error for 100 data	The difference between SSE	Result of Sum Square Error for 300 data	The difference between SSE
C2	845,432	845,432	786,563	786,563
C3	532,133	313,299	665,434	121,129
C4	431,429	100,704	301,341	364,093
C5	367,232	64,197	234,453	66,888
C6	334,451	32,781	278,842	-44,389
C7	243,341	91,110	289,678	-10,836
C8	231,211	12,130	234,563	55,115



**Figure 1.** Graph of Sum of Square Error 100 Data **Figure 2.** Graph of Sum of Square Error 300 Data

Test Data used k-means clustering and uses the Elbow method at 100 and 300 Customer Profiling. The K-Means Clustering process uses the Elbow method to determine the value of k. The result of the cluster formed will be labelled or named to facilitate the company in considering the characteristics of its customers. Performance tests have used 100 and 300 customer data purchases of goods. The results of Sum of Square Error calculations of each cluster have experienced the greatest decrease in  $K = 3$  can be seen in Table 4, Figure 1 and Figure 2. In this test will find the performance of each number of clusters that are adjusted to the range of values on the Elbow method. The graph contained the SSE value in the experimental number of clusters between 2 and 8. The number of segments of 3 SSE values is 313,29, the value is not the lowest SSE value but the lower value.

#### 4. Conclusion

The results obtained from the process in determining the best number of clusters with elbow and K-Means methods that the determination of the best number of clusters can produce the same number of clusters K on the amount of different data. The result of determining the best number of clusters with elbow method will be the default for characteristic process based on case study.

#### References

- [1] Sami Ayramo, Tommi Karkkainen 2006 Introduction to partitioning-based clustering methods with a robust example, Reports of the Department of Mathematical Information Technology Series C. Software and Computational Engineering
- [2] Bain K K, Firli I, And Tri S 2016 Genetic Algorithm For Optimized Initial Centers K-Means Clustering In SMEs, Journal of Theoretical and Applied Information Technology (JATIT) **90** p 23
- [3] Bain K K 2015 Customer Segmentation of SMEs Using K-Means Clustering Method and modeling LRFM, International Conference on Vocational Education and Electrical Engineering, Universitas Negeri Surabaya
- [4] E R Hruschka and N F F Ebecken 2003 A genetic algorithm for cluster analysis, Intelligent Data Analysis **7** p 15
- [5] Celebi M E, Kingravi H A, and Vela P A 2013 A comparative study of efficient initialization methods for the k-means clustering algorithm, Expert Systems with Applications **40** p 200
- [6] Neda S and Farzad M S 2016 Customer Segmentation of Bank Based on Discovering of Their Transactional Relation by Using Data Mining Algorithms, Modern Applied Science **10** p 283
- [7] Gursharan S, Harpreet K and Gursharan S 2014 A Novel Approach Towards K-Mean Clustering Algorithm With PSO, International Journal of Computer Science and Information Technologies (IJCSIT) **5** p 5978
- [8] Antreas D A 2000 Customer Satisfaction Cues To Support Market Segmentation and Explain Switching Behavior, Journal of Business Research **47** p 191
- [9] Madhulatha T S 2012 An Overview On Clustering Methods, IOSR Journal of Engineering **4** p 719
- [10] Joshi K D and Nalwade P S 2013 Modified K-Means for Better Initial Cluster Centres. International Journal of Computer Science and Mobile Computing II **7** p 2
- [11] Singh H and Kaur K 2013 New Method for Finding Initial Cluster Centroids in K-means Algorithm. International Journal of Computer Applications, LXXIV **6** p 27
- [12] Sujatha S and Sona A S 2013 **New Fast K-Means Clustering Algorithm using Modified Centroid Selection Method. International Journal of Engineering Research & Technology II** **2** p1
- [13] Chinedu Pascal Ezenkwu, Simeon Ozuomba, Constance kalu Application of K-Means Algorithm for Efficient Customer Segmentation: A Strategy for Targeted Customer Services, (IJARAI) International Journal of Advanced Research in Artificial Intelligence, Vol. 4, No.10, 2015
- [14] Aristidis L, Nikos V, Jacob J V 2011 The global k-means Clustering algorithm IAS technical report series, IAS-UVA-01-02
- [15] Cosmin M P, Marian C M, Mihai M An Optimized Version of the K-Means Clustering Algorithm, Proceedings of the 2014 Federated Conference on Computer Science and Information Systems (ACISIS) **2** p 695