



Penerbitan & Percetakan  
**UPT UNDIP Press**  
 SEMARANG

**IJCAE** | 2012

ISBN: 978-602-097-299-2

# 1<sup>st</sup> INTERNATIONAL JOINT CONFERENCE ON ADVANCED ENGINEERING

ICT Center - Diponegoro University  
 18-19 October, 2012

**"REACH UP GREEN TECHNOLOGY"**

Faculty of Engineering  
 Diponegoro University



in collaboration with



UNSW@ADFA  
 CANBERRA • AUSTRALIA

# The 1<sup>st</sup> International Joint Conference on Advanced Engineering

18-19 October 2012  
ICT Center Diponegoro University  
Semarang-Indonesia

Organized by:



In cooperation with:



UNSW@ADFA  
CANBERRA • AUSTRALIA



*Proceeding of*

**The 1<sup>st</sup> International Joint Conference on  
Advanced Engineering**

**18-19 October 2012**

**ICT Center Diponegoro University  
Semarang-Indonesia**

**Organized by**

**Faculty of Engineering Diponegoro University**

**In collaboration with**

• Fontys University (Netherlands) • Gyeongsang National University • University Tun Hussein Onn (Malaysia) • University of Malaya (Malaysia) • Kyushu Institute of Technology (Japan) • Kyoto University (Japan) • Kyushu University (Japan) • Pukyong National University (South Korea) • Hanze University Groningen (Netherlands) • University of New South Wales-ADFA (Australia) • Eindhoven University of Technology (Netherlands) • Saxion University (Netherlands)

## **Reviewer Team**

Dr. Achmad Widodo

Dr. Rusnaldy

Dr. Wahyul Amin Syafei

Dr. MSK Tony Suryo Utomo

Dr. Bagus Hario Setiadji

Dr. Andri Cahyo Kumoro

Published in October 2012

© Faculty of Engineering, Diponegoro University

The Conference Organizing Committee is not responsible either for the statements made or for the opinions expressed in the papers in this proceeding.

Additional copies of this proceeding can be purchased from

Faculty of Engineering Diponegoro University

Jl. Prof. Soedarto, S.H., Tembalang

Semarang 50275, Indonesia

Telp. +62-24-7460053; Fax. +62-24-7460055

**Organized by:**

- Faculty of Engineering, Diponegoro University

**Co-organizing Universities:**

- University Tun Hussein Onn (Malaysia)
- University of Malaya (Malaysia)
- Saxion University (Netherlands)
- Fontys University (Netherlands)
- Pukyong National University (South Korea)
- Gyeongsang National University (South Korea)
- Kyushu University (Japan)
- Kyushu Institute of Technology (Japan)
- Kyoto University (Japan)
- Akashi University (Japan)
- Hanze University Groningen (Netherlands)
- Eindhoven University of Technology (Netherlands)
- University of New South Wales (Australia)

**Advisory Committee**

- Ir. Bambang Pudjianto, MT (Dean of Faculty of Engineering UNDIP)
- Dr. rer. nat. Imam Buchori, ST (Vice Dean for Academic Affair)
- Dr. Ir. M. Agung Wibowo, MM, MSc (Vice Dean for Finance and Administration Affair)
- Prof. Dr. Ir. Abdullah, MSc (Vice Dean for Student Affair)

**Organizing Committee**

- Dr. Dipl. Ing. Ir. Berkah Fajar TK (Chairperson)
- Ir. Sulistyono, MT
- Dr. Eng. Achmad Widodo

**International Co-organizing Committee**

- Prof. Dr. Ir. Saparudin Arifin - University Tun Hussein Onn (Malaysia)
- Dr. Azli bin Yahya - University Technology Malaysia (Malaysia)
- Ass. Prof. Dr. Faisal Rafiq bin Muhammad Adikan - University of Malaya (Malaysia)
- Prof. Eric Boer - Hanze University Groningen (Netherlands)
- Johan M. Krop - The Hague University (Netherlands)
- Prof. Yeon-Won Lee - Pukyong National University (South Korea)
- Prof. Sang-Bong Kim - Pukyong National University (South Korea)
- Prof. Han-Sik Chung - Gyeongsang National University (South Korea)
- Prof. Susumu Tohno - Kyushu University (Japan)
- Prof. Kiichi Ishihara - Kyoto University (Japan)
- Prof. Joseph Lai - University of New South Wales
- Ir. Bambang Pramujati, MSc. Eng., PhD - Institut Teknologi Sepuluh Nopember (ITS - Indonesia)
- Dr. Ir. Sulistijono, DEA, Guru Besar Teknik Material dan Metalurgi Institut Teknologi Sepuluh Nopember (ITS - Indonesia)

## Welcome Message

By Ir. Bambang Pudjianto, MT- Dean of Faculty of Engineering Diponegoro University

Distinguished Professors, Ladies and Gentlemen

It is a great honor to have the opportunity to say a few words before starting the conference. First of all, on behalf of all members of Engineering Faculty, Diponegoro University, I would like to express our greatest pleasure in welcoming all of you and in hosting the 1<sup>st</sup> Joint Conference on Advanced Engineering (IJCAE) 2012.

I would like to express my thanks to all committee members and other participants and partners who support and make this conference possible and meaningful.

This conference is planned to be held yearly with our sister university partners from 6 countries, Malaysia, Netherlands, Spain, Japan, South Korea and Australia. In my opinion, I have no doubt that the international dialogue and academic partnership in the field of engineering will be further enhanced and intensified through the IJCAE 2012.

As we witness the fast-growing and the change of technical paradigms in many areas of engineering – civil, chemical, mechanical, electrical, naval architecture, industrial, environmental, architecture, computer system as well as geology and geodetic engineering. It is our genuine hope that we may be able to exchange and share experiences, new ideas through this conference, with the gathering of learned experts in the field of engineering.

I would like to appreciate the invited plenary speakers, distinguished professors, participants from sister universities and authors who have contributed to the success of this conference.

Thank you very much for your attention and;

Have a nice conference

# IJCAE 2012 Program

<b>Wednesday October 17, 2012</b>		<b>Welcome Reception</b>	
18:30~20:00		Faculty of Engineering Building (3rd Floor)	
<b>Thursday October 18, 2012</b>		<b>Conference Day (ICT Center Building)</b>	
	<b>Plenary Hall</b>		
08:00~08:30	Registration at ICT Center Building (4th Floor)		
08:30~08:40	Performing Gambang Semarang Traditional Dance		
08:40~09:10	Opening Ceremony		
	<ul style="list-style-type: none"> <li>▪ Opening Address by Dr. Dipl. Ing. Berkah Fajar (Chair Person IJCAE 2012)</li> <li>▪ Opening Address by Ir. Bambang Pudjianto, MT (Dean of Faculty of Engineering, Diponegoro University)</li> <li>▪ Welcome Address by Prof. Sudharto P. Hadi, MES, Ph.D (Rector of Diponegoro University)</li> </ul>		
09:10~09:40	Plenary Talk 1: Prof. Dr. Ir. Saparudin bin Arifin (UTHM-Malaysia)		
09:40~10:10	Plenary Talk 2: Prof. Sudharto P. Hadi (Diponegoro University -Indonesia)		
10:10~10:40	Plenary Talk 3: Dr. Ir. Gagoek Hardiman (Diponegoro University -Indonesia)		
10:40~11:30	Coffee Break and Poster Session		
11:30~12:00	Plenary Talk 4: Prof. Tetsuo Tezuka (Kyoto University-Japan)		
12:00~12:15	Take a group photo for all participants		
12:15~13:00	Lunch		
13:00~14.30	International Committee Meeting at Plenary Hall		
	<b>Parallel Session</b>		
13:00~17:00	<b>Room A</b>	<b>Room B</b>	<b>Room C</b>
	Mechanical Engineering, Energy, Chemical Engineering	Computer Science, Robotics, Electrical Engineering	Civil Engineering, Architecture and Environmental Engineering, Geology
17:00~17:30	Coffee Break and Closing		
<b>Friday October 19, 2012</b>		<b>Cultural Tour</b>	
08:00~17:00		Dieng Plateau and Geothermal Power Plant	

For further information please visit <http://www.diengplateau.com/>

## Parallel Session Class

Room A : Mechanical Engineering, Energy, Chemical Engineering

Chairman : 1. Sulisty, 2. Kwang-Hwan Choi

Topic Group	Title	Page
A1	Sliding Wear Modeling of Artificial Rough Surfaces ( <i>Imam Syafa'at, Budi Setiyana, Muchammad and Jamari</i> )	1
A2	Study on the Performance of Multi Evaporator and Pump Down Operation and Experiment of Eco-Energy System ( <i>Chul-Su, Kim, Han-Shik Chung</i> )	5
A3	The Effect of Hydrothermal Time on the Zeolite Characteristic which Synthesized from Geothermal Sludge ( <i>Agus Purnomo Adi and Sulardjaka</i> )	14
A4	Application of Phytoremediation for Herbal Medicine Waste and Its Utilization for Protein Production. ( <i>Marcelinus Christwardana and Hadiyanto</i> )	20
A5	Potential of Microalgae Biomass from Wastewater Agro industry for Bioenergy Feedstock in Indonesia ( <i>Hadiyanto and Muhamad Maulana Azimatun Nur</i> )	27
A6	Behavior of Fatigue Crack Propagation in TIG Welded 6013-T4 Aluminum Alloy According to 3-Different Artificial Aging Condition ( <i>Gunawan Dwi Haryadi, Mochammad Ariyanto and A. P. Bayuseno</i> )	35
	BREAK	
A7	Flow Visualization of a Air Induced by Free Surface Vortex in the Pump Sump Using the Multi-phase Flow Simulation ( <i>Yeon-Won Lee and Yoon-Hwan Choi</i> )	46
A8	Study on the Performance against Variable Factors in a Dehumidifier Assisted by a Solar Desiccant Cooling System ( <i>Kwang-hwan Choi, Agung Bakhtier and Eflita Yohana</i> )	51
A9	A Study on the Dye-Sensitized Solar Cell Development with effect of dye absorption into TiO <sub>2</sub> film ( <i>Han-Shik Chung, Seung-Hwa Hwang, Jin-Seong Jeoun, Chul-su Kim and Hyo-Min Jeong</i> )	57
A10	Manufacturing of Electrolyte and Cathode Layers SOFC Using Atmospheric Spraying Method and Its Characterization ( <i>S. Sulisty, S. Ariffin and S.Mahzan</i> )	64
A11	A Study of Sound Pressure Level Attenuation during Muzzle Blast Using Numerical Simulation ( <i>Handry Afrianto, Han-shik Chung and Hyo-min Jeong</i> )	69



**Room B : Computer Science, Robotics, Electrical Engineering****Chairman : 1. Wahyul Amien Syafei, 2. Sang-Bong Kim**

Topic Group	Title	Page
B1	Moving Object Tracking and Avoidance Algorithm for Differential Driving AGV Based on Laser Measurement Technology (Pandu Sandi Pratama, Sang-Kwun Jeong, Soon-Sil Park and Sang-Bong Kim)	78
B2	3d Room Visualization On Android Based Mobile Device (With Philips™ Surround Sound Music Player) (Durio Etgar and Wahyul Amien Syafei)	84
B3	Vibration Online Condition Monitoring System for Slow Speed Slewing Bearing Based on File Transfer Protocol and Web (Wahyu Caesarendra, Prabuono Buyung Kosasih, Anh Kiet Tieu and Mohammad Arijanto)	92
B4	Backward Compatibility Examination of Next Generation WLAN IEEE 802.11ac to WLAN IEEE 802.11n (Wahyul Amien Syafei, H. Furukawa and H. Ochi)	98
B5	Development of a Navigation Control Algorithm for AGV Using D* Search Algorithm (Jeong-Geun Kim, Sang-Kwun Jeong, Hak-Kyeong Kim, and Sang-Bong Kim)	103
B6	Campus Cloud Computing Testbed at Diponegoro University (Adian Fatchur Rochim and Eko Didik Widiyanto)	109
	BREAK	
B7	Three-dimensional pattern recognition with the statistical method to recognize breast cancer thermal images (Okdy Dwi Nurhayati)	114
B8	Implementation of Trellis Detector Based MIMO Decoder in WLAN 802.11n (Yama Aryadanangjaya, Wahyul Amien Syafei, and Imam Santoso)	117
B9	Path Tracking Controller of Quadruped Robot for Obstacle Avoidance using Potential Functions Method (Giang Hoang, Hak-Kyeong Kim and Sang-Bong Kim)	122
B10	Sensorless Vector Control of AC Induction Motor Using Sliding-mode Observer (Phuc Thinh Doan, Sang-Kwun Jeong, Sea-June Oh and Sang-Bong Kim)	129
B11	AGV Trajectory Control Based on Laser Sensor Navigation (Thanh Luan Bui, Soon-Sil Park, Hak-Kyeong Kim, and Sang-Bong Kim)	136
B12	Experimental and Numerical study of Snubber in Hydrogen Compressor (M. Shiddiqur Rahman)	142
* B13	Optimization of Fuel Mix & CO2 Emissions in The Electrical Power System (Hermawan, Maman Somantri and Novio)	152

Room C : Civil Engineering, Architecture and Environmental Engineering, Geology  
 Chairman : 1. Bagus Hario S, 2. M. Arief Budihardjo

Topic Group	Title	Page
C1	Urban Wind Energy in the Built Environment as an Adaptation to Climate Change <i>(Dany Perwita Sari and Kang-Pyo Cho)</i>	157
C2	Evaluation Pavement Distresses Using Pavement Condition Index <i>(Case Study: Secondary Road in the North East Part of Libya in Koums City)</i> <i>(Ali Mohamed Ali Zaltuom, Wahyudi Kushardjoko and Epf. Eko Yulipriyono)</i>	162
C3	Shear wall's concept on home soiled earthquake <i>(Mohamad Agus Faozan)</i>	170
C4	Reaching for the Health City: The Influence of Built Environment into Community's Physical Activity – A Comparative Study of Community in Peripheral and Urban Residential of Semarang <i>(Retno Susanti, Ana Nurina and Diktya Januarista)</i>	176
C5	Gardening Space for the Elderly in Public Housing <i>(Wijayanti)</i>	186
C6	Stress Analysis And Technical Study Of The Reinforced Wall Of Smart Batako For The Knock-Down House <i>(Sugiyanto, Budi Setyana, Parang Sabdono, Han Ay Lie)</i>	189
BREAK		
C7	Relationship between geologic structure and hydrocarbon potential: A signature from the subsurface <i>(Widiastuti Nur Farida)</i>	195
C8	The Effect of Water Level on the Effectiveness of Flushing Sediment <i>(Pranoto SA and Suripin)</i>	199
C9	Development of Closed-form Backcalculation Algorithm for Three Layer Flexible Pavement Under Area Loading <i>(Bagus Hario S)</i>	216
C10	Impacts of Knowledge Management on Construction Organizations <i>(Mochamad Agung Wibowo, Rudi Waluyo)</i>	223
C11	Bioethanol Production From Organic Solid Waste (Food and Fruit Lovers) <i>(M. Arief Budihardjo, Anindita Etri Wulandari, Dian Achirully Putri and Sri Hapsari Budisulistiorini)</i>	228
C12	Analysis of Property Contractor the Work Record Base Quality of the Work Result Using Quantity and Complains Type of Customer as Parameter in The Citra Garden Residence <i>(Nurlaelah and Usman Sudjadi)</i>	238
C13	Investigating The Green Construction: The Contractor's Perspective <i>(Ehmida Muktar Ehmida Abdel Aziz, Jati Utomo DH and M. Agung W)</i>	247

# Evaluation Pavement Distresses Using Pavement Condition Index (Case Study: Secondary Road in the North East Part of Libya in Koums City)

Ali Mohamed Ali Zaltuom, Wahyudi Kushardjoko and Epf. Eko Yulipriyono

Master Program in Civil Engineering, Diponegoro University  
Jl. Hayam Wuruk 5-7, Semarang, Indonesia

## ABSTRACT

Pavement deterioration is resulted by both environmental and structural causes. It is difficult to maintain the road on the same specification that was owned at the opening and problems start to appear represented in the pavement cracks, holes and undulations and so on. Recognizing defects and understanding their causes helps us rate pavement condition and select cost-effective repairs. Periodic inspection is necessary to provide current and useful evaluation data. Maintenance is an essential practice in providing for the long-term performance and the esthetic appearance of an asphalt pavement. The purpose of pavement maintenance is to correct deficiencies caused by distresses and to protect the pavement from further damage. A condition rating of the pavement will help determine what pavement maintenance technique is necessary. A methodology was proposed to investigate the pavement condition; this study focuses on flexible pavement. A manual survey is performed following ASTM D 6433. The pavement is divided into sections. Each section is divided into sample units. The type and severity of sample distress is assessed by visual inspection of the pavement sample units and the quantity of each distress is measured. The pavement evaluation results from the manual PCI survey revealed that all sections of road were fair condition. Considered the section of road that surveyed, describing the condition pavement of the all road. The pavement that has been studied at Koums area would seem to require maintenance. Thick overlay (sometimes called surface treating) is needed in a comprehensive pavement.

**Keywords:** Pavement defects, pavement evaluation, type and severity level of distress, PCI value, pavement maintenance.

## 1. INTRODUCTION

Many exposed pavements have problems lead to a reduction of the quality of the road and reduce the degree of safety and comfort to road users. Some of these problems occur in asphalt layers, such as cracks and bleeding, and some of the lower classes occur, such as crawl and swell. Studies and researches have been shown that most of the problems faced by asphalt roads in Libya linked mainly with hot, dry climate prevail in most areas [1].

Damage appears slowly at first, and then gradually accelerates, accumulating to become visible as structural distress and tangible as ride quality reduced. If distress is observed and corrected in a timely manner, low cost

strategies will restore the road to nearly its original condition. However, if early treatment is neglected or postponed, the accumulated damage will require a more costly repair treatment. Recognizing that damage accumulation and acceleration is a key to understanding the need for early, low-level, low-cost preventive maintenance treatments.

It is easy to see why pavements deteriorate at various rates and why we find them in various stages of disrepair. Recognizing defects and understanding their causes help us of evaluate pavement condition and select cost-effective repairs. The pavement defects shown on the following pages provide a background for this process.



# Certificate of Appreciation

Is hereby awarded to

**ALI MOHAMED ALI ZALTOUM**

In recognition as  
**Paper Presenter**

**1<sup>st</sup> INTERNATIONAL JOINT CONFERENCE ON ADVANCED ENGINEERING  
FACULTY OF ENGINEERING DIPONEGORO UNIVERSITY**

ICT Center Diponegoro University  
18-19 October, 2012



**Bambang Pudjianto**  
Dean of Engineering Faculty

**Dr. Berkah Fajar TK**  
Chairperson of the Organizing Committee