

# IIUM ENGINEERING JOURNAL

Volume 21

Number 1

January 2020



IIUM  
Press

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

ISSN: 1511-788X E-ISSN: 2289-7860

<http://journals.iium.edu.my/ejournal>

# IIUM ENGINEERING JOURNAL

---

## CHIEF EDITOR

Ahmad Faris Ismail, IIUM, Malaysia

## EXECUTIVE EDITOR

AHM Zahirul Alam, IIUM, Malaysia

## ASSOCIATE EDITOR

Nor Farahidah Za'bah, IIUM, Malaysia

## LANGUAGE EDITOR

Lynn Mason, Malaysia

## COPY EDITOR

Hamzah Mohd. Salleh, IIUM, Malaysia

## EDITORIAL BOARD MEMBERS

Abdullah Al-Mamun, IIUM, Malaysia

Abdumalik Rakhimov, IIUM, Malaysia

Ali Sophian, IIUM, Malaysia

Amir Akramin Shafie, IIUM, Malaysia

Anis Nurashikin Nordin, IIUM, Malaysia

Erry Yulian Triblas Adesta, IIUM, Malaysia

Erwin Sulaeman, IIUM, Malaysia

Hanafy Omar, Saudi Arabia

Hazleen Anuar, IIUM, Malaysia

Konstantin Khanin, University of Toronto, Canada

Ma'an Al-Khatib, IIUM, Malaysia

Md Zahangir Alam, IIUM, Malaysia

Meftah Hrairi, IIUM, Malaysia

Mohamed B. Trabia, United States

Mohammad S. Alam, Texas A&M University-Kingsville, United States

Mustafizur Rahman, National University Singapore, Singapore

Ossama Abdulkhalik, Michigan Technological University, United States

Razi Nalim, IUPUI, Indianapolis, Indiana, United States

Rosminazuin AB. Rahim, IIUM, Malaysia

Waqar Asrar, IIUM, Malaysia

## AIMS & SCOPE OF IIUMENGINEERING JOURNAL

The **IIUM Engineering Journal**, published biannually, is a carefully refereed international publication of International Islamic University Malaysia (IIUM). Contributions of high technical merit within the span of engineering disciplines; covering the main areas of engineering: Electrical and Computer Engineering; Mechanical and Manufacturing Engineering; Automation and Mechatronics Engineering; Material and Chemical Engineering; Environmental and Civil Engineering; Biotechnology and Bioengineering; Engineering Mathematics and Physics; and Computer Science and Information Technology are considered for publication in this journal. Contributions from other areas of Engineering and Applied Science are also welcomed. The IIUM Engineering Journal publishes contributions under *Regular papers* and *Invited review papers*. It also welcomes contributions that address solutions to the specific challenges of the developing world, and address science and technology issues from an Islamic and multidisciplinary perspective.

## REFEREES' NETWORK

All papers submitted to IIUM Engineering Journal will be subjected to a rigorous reviewing process through a worldwide network of specialized and competent referees. Each accepted paper should have at least two positive referees' assessments.

## SUBMISSION OF A MANUSCRIPT

A manuscript should be submitted online to the IIUM-Engineering Journal website at <http://journals.iium.edu.my/ejournal>. Further correspondence on the status of the paper could be done through the journal website.

---

## **INTERNATIONAL ADVISORY COMMITTEE**

A. Anwar, United States  
Abdul Latif Bin Ahmad, Malaysia  
Farzad Ismail, USM, Pulau Pinang, Malaysia  
Hanafy Omar, Saudi Arabia  
Hany Ammar, United States  
Idris Mohammed Bugaje, Nigeria  
K.B. Ramachandran, India  
Kunzu Abdella, Canada  
Luis Le Moyne, ISAT, University of Burgundy, France  
M Mujtaba, United Kingdom  
Mohamed Al-Rubei, Ireland  
Mohamed B Trabia, United States  
Syed Kamrul Islam, United States  
Tibor Czigany, Budapest University of Technology and Economics, Hungary  
Yiu-Wing Mai, The University of Sydney, Australia.

Published by:  
IIUM Press,  
International Islamic University Malaysia  
Jalan Gombak, 53100 Kuala Lumpur, Malaysia  
Phone (+603) 6421-5014, Fax: (+603) 6421-6298

Whilst every effort is made by the publisher and editorial board to see that no inaccurate or misleading data, opinion or statement appears in this Journal, they wish to make it clear that the data and opinions appearing in the articles and advertisement herein are the responsibility of the contributor or advertiser concerned. Accordingly, the publisher and the editorial committee accept no liability whatsoever for the consequence of any such inaccurate or misleading data, opinion or statement.

ISSN 1511 - 788X



**IIUM Engineering Journal**  
ISSN: 1511-788X E-ISSN: 2289-7860

# IIUM ENGINEERING JOURNAL

## Volume 21, Issue 1, January 2020

<https://doi.org/10.31436/iiumej.v21i1>

### Table of Content

---

EDITORIAL .....	i
-----------------	---

#### CHEMICAL AND BIOTECHNOLOGY ENGINEERING

NUMERICAL STUDY OF ARGON EFFECT ON NITROGEN SEPARATION FROM AIR BY PRESSURE SWING ADSORPTION.....	1
<i>Abdulbasit Hassan Mahdi, Suhaib Shwish Salih, Heba Sa'ady Ayuob and Tushar Ghosh</i>	

#### CIVIL AND ENVIRONMENTAL ENGINEERING

RAINWATER HARVESTING QUALITY ASSESSMENT AND EVALUATION: IIUM CASE STUDY .....	12
<i>Nassereldeen Ahmed Kabbashi, Mohammed Saedi Jami, Nour Hamid Abdurahman and Noor Illi Mohamad Puad</i>	

#### ELECTRICAL, COMPUTER AND COMMUNICATIONS ENGINEERING

INVESTIGATION OF MAGNETIC PROPERTIES FOR DIFFERENT COIL SIZES OF DYNAMIC WIRELESS CHARGING PADS FOR ELECTRIC VEHICLES (EV) .....	23
--	----

*Syasya Azra Zaini, Siti Hajar Yusoff, Amira Aziera Abdullah, Sheroz Khan, Faridah Abd Rahman and Nadia Nazieha Nanda*

STEMMING IMPACT ANALYSIS ON INDONESIAN QURAN TRANSLATION AND THEIR EXEGESIS CLASSIFICATION FOR ONTOLOGY INSTANCES .....	33
---	----

*Fandy Setyo Utomo, Nanna Suryana and Mohd Sanusi Azmi*

AN ENHANCED PACKET SCHEDULING ALGORITHM FOR THE DOWNLINK COGNITIVE LONG TERM EVOLUTION-ADVANCED ....	51
<i>Huda Adibah Mohd Ramli and Mohamad 'Ismat Hafizi Mansor</i>	

STUDY OF MICROSTRIP PATCH ARRAY ANTENNA FOR SIDE LOBE SUPPRESSION IN THE X-BAND REGION USING UNIFORM, BINOMIAL AND TSCHEBYSCHEFF EXCITATION METHODS.....	61
--	----

*Ahmad Alhadi Ruslan, Sarah Yasmin Mohamad, Khairayu Badron, Ahmad Fadzil Ismail, Norun Fariyah Abdul Malek and Farah Nadia Mohd Isa*

PAVEMENT CONDITION ANALYSIS VIA VEHICLE MOUNTED ACCELEROMETER DATA.....	73
---	----

*Ahmad Jazlan, Muhammad Fahim Rosli, Noor Hazrin Hany Mohamad Hanif, Hasan Firdaus Mohd Zaki, Muhammad Afif Husman, Asan Gani Abdul Muthalif and Deepak Kumar*

PERFORMANCE ANALYSIS OF 5G PATH LOSS MODELS FOR RURAL MACROCELL ENVIRONMENT .....	85
<i>Muhammad Akramuddin Mohd Nordin and Huda Adibah Mohd Ramli</i>	

#### ENGINEERING MATHEMATICS AND APPLIED SCIENCE

USING MODIFICATION OF PRIM'S ALGORITHM AND GNU OCTAVE AND TO SOLVE THE MULTIPERIODS INSTALLATION PROBLEM .....	100
--	-----

*Wamiliana, Mustofa Usman, Warsono, Warsito and Jamal Ibrahim Daoud*

OPTIMIZATION OF THE REGULARIZATION OF THE SOLUTION TO PLATE HEAT TRANSFER PROBLEMS.....	113
<i>Fargana Akter, Abdumalik Rakhimov, Ahsan Ali Khan and Torla Hj Hassan</i>	

PARALLEL PROCESS DISCOVERY USING A NEW TIME-BASED ALPHA++ MINER.....	126
<i>Yutika Amelia Effendi and Rianarto Sarno</i>	

SOFTWARE, ALGORITHMS AND METHODS OF DATA ENCRYPTION BASED ON NATIONAL STANDARDS.....	142
<i>Rakhmatillo Djuraevich Aloev and Mirkhon Mukhammadovich Nurullaev</i>	

NUMERICAL ALGORITHM FOR FINDING OPTIMAL INITIAL CONCENTRATIONS OF CHEMICAL REACTIONS .....	167
<i>Svetlana Mustafina, Andrey Antipin, Evgenia Antipina, Elena Odinkova, Larisa Tuchkina, Konstantin Kolyazov and Sofia Mustafina</i>	

DIABETES CLASSIFICATION BASED ON KNN .....	175
<i>Ameer H. Ali, Mohammed A. T. Alrubei, Laith Falah Mohammed Hassan, Mohannad A. M. Al-Ja'afari and Saif H. Abdulwahed</i>	

ADAPTIVE SYSTEM OF FUZZY-LOGICAL REGULATION BY TEMPERATURE MODE OF A DRUM BOILER.....	182
<i>Siddikov Isamiddin Xakimovich, Umurzakova Dilnoza Maxamadjonovna and Bakhrjeva Hurshida Askarkodjaevna</i>	

## MATERIALS AND MANUFACTURING ENGINEERING

MECHANICAL PROPERTIES, MORPHOLOGY, AND HYDROLYTIC DEGRADATION BEHAVIOR OF POLYLACTIC ACID / THERMOPLASTIC POLYURETHANE BLENDS .....	193
<i>Yose Fachmi Buys, Mimi Syakina Ahmad, Hazleen Anuar, Mudrikah sofia Mahmud and Nur Aimi Mohd Nasir</i>	
STUDY OF PRODUCTIVITY IMPROVEMENT OF MANUAL OPERATIONS IN SOYA SAUCE FACTORY .....	202
<i>Zaharah Wahid, Mohd Radzi Che Daud and Kartini Ahmad</i>	
THE EFFECTS OF SUPERCRITICAL CARBON DIOXIDE ON THE DEGRADATION AND ANTIMICROBIAL PROPERTIES OF PLA BIOCOMPOSITE.....	212
<i>Hazleen Anuar, Siti Nur E'zzati Mohd Apandi, Siti Munirah Salimah Abd Rashid, Fathilah Ali, Yose Fachmi Buys, Mohd Romainor Manshor, Sabu Thomas and Nur Aimi Mohd Nasir</i>	

## MECHATRONICS AND AUTOMATION ENGINEERING .

DYNAMIC MODELING OF A SINGLE-LINK FLEXIBLE MANIPULATOR ROBOT WITH TRANSLATIONAL AND ROTATIONAL MOTIONS .....	228
<i>Dermawan Dermawan, Hammada Abbas, Rafiuddin Syam, Zulkifli Djafar and Abdul Kadir Muhammad</i>	