# IUM ENGINEERING JOURNAL

Volume 24

Number 1

January 2023



**INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA** 

ISSN: 1511-788X E-ISSN: 2289-7860 http://journals.iium.edu.my/ejournal

# **IIUM ENGINEERING JOURNAL**

Volume 24, Issue 1, January 2023 https://doi.org/10.31436/iiumej.v24i1

# **Copyright Notice**

**Consent to publish**: The Author(s) agree to publish their articles with IIUM Press.

**Declaration**: The Author(s) declare that the article has not been published before in any form and that it is not concurrently submitted to another publication, and also that it does not infringe on anyone's copyright. The Author(s) holds the IIUM Press and Editors of the journal harmless against all copyright claims.

**Transfer of copyright**: The Author(s) hereby agree to transfer the copyright of the article to IIUM Press, which shall have the non-exclusive and unlimited right to publish the article in any form, including in electronic media. For the article with more than one author, the corresponding author confirms that he/she is authorized by his/her co-author(s) to grant this transfer of copyright.

### The IIUM Engineering journal follows the open access policy.

All articles published open access will be immediately and permanently free for everyone to read, download, copy and distribute for noncommercial purposes.



IIUM Engineering Journal at https://journals.iium.edu.my/ejournal is licensed under a <u>Creative Commons Attribution-NonCommercial 4.0</u> International License.

#### **IIUM ENGINEERING JOURNAL EDITORS**

#### **CHIEF EDITOR**

Ahmad Faris Ismail, IIUM, Malaysia

**TECHNICAL EDITOR** Sany Izan Ihsan, 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

MALAY TRANSLATOR Nurul Arfah Che Mustapha, IIUM, Malaysia

#### EDITORIAL BOARD MEMBERS

Abdullah Al-Mamun, IIUM, Malaysia Abdumalik Rakhimov, IIUM, Malaysia Aishah Najiah Bt. Dahnel, IIUM, Malaysia Alya Naili Binti Rozhan, IIUM, Malaysia Norsinnira Bt. Zainul Azlan, IIUM, Malaysia Hanafy Omar, Saudi Arabia Hazleen Anuar, IIUM, Malavsia Konstantin Khanin, University of Toronto, Canada Ma'an Al-Khatib, 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 Mohamed Hadi Habaebi, IIUM, Malaysia Mohd. Sultan Ibrahim Bin Shaik Dawood, IIUM, Malaysia Muhammad Ibn Ibrahimy, IIUM, Malaysia Nor Fadhillah Mohamed Azmin, IIUM, Malaysia Waqar Asrar, IIUM, Malaysia

#### AIMS & SCOPE OF HUMENGINEERING JOURNAL

The **IIUM Engineering Journal**, published biannually (January and July), 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 https://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 AI-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.



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

# **IIUM ENGINEERING JOURNAL**

### Volume 24, Issue 1, January 2023

https:/doi.org/10.31436/iiumej.v24i1

## **Table of Contents**

#### CHEMICAL AND BIOTECHNOLOGY ENGINEERING

Solid State Fermentation of Turmeric Rhizomes with Aspergillus SP. To Improve Yield a Composition of Extracted Turmeric Oil	nd
Muhammad Yusuf Abduh, Asri Ifani Ramawati, Tinta Komariyah and Yohanes Theda	1 - 12
Effect of the lignocellulolytic substrates and fermentation process parameters on myco-co production for water treatment	agulant
Maroua Fellah, Md Zahangir Alam, Abdullah Al-Mamun, Nasserldeen Ahmed Khabbashi, N Sakinah Engliman and Sonia Hadj Arab	<i>lurul</i> 13 - 26
The Optimization of Growth Condition of the Bacteria Producing Cold-Active Proteolytic from the Antarctic Region	e Enzyme
Muhammad Asyraf Abd Latip, Noor Faizul Hadry Nordin, Siti Aisyah Alias, Jerzy Smykla, Faridah Yusof and Mohd Azrul Naim Mohamad	27 - 39
Rhodopseudomonas Palustris Collagen-Like Recombinant Protein Purification Using an Two-Phase System	Aqueous
Nursyahidatul Azwa Awang, Azura Amid and Zatul Iffah Arshad	40 - 56
ELECTRICAL, COMPUTER AND COMMUNICATIONS ENGINEERING	
Battery Energy Storage System (BESS) Modeling for Microgrid	
Zahir Zulkifly, Siti Hajar Yusoff, Nor Liza Tumeran and Nur Syazana Izzati Razali	57 - 74
Analytical Model of Subthreshold Swing for Junctionless Double Gate MOSFET Using Fo Negative Capacitance Effect	erroelectric
Hakkee Jung	75 - 87
Robust and Imperceptible Watermarking on Medical Images using Coefficient Pair Modi	fication
Ledya Novamizanti, Andriyan Bayu Suksmono, Donny Danudirdjo and Gelar Budiman	88 - 105
Multi-Objective Mayfly Optimization in Phase Optimization of OFDM	
Abdul Azeez and Suraiya Tarannum	106 - 121
Design of Miniaturized Antenna for IoT Applications Using Metamaterial	
Ahmad Zamani Jusoh, Nur Fatihah Husain, Norun Farihah Abdul Malek, Farah Nadia Mohd Isa and Sarah Yasmin Mohamad	122 – 137
Comparative Assessment of Numerical Techniques for Weibull Parameters' Estimation a Performance of Wind Energy Conversion Systems in Nigeria	nd the
Ignatius K. Okakwu, Daniel O. Akinyele, Olakunle E. Olabode, Titus O. Ajewole, Emmanuel S. Oluwasogo and Ajibola O. Oyedeji	138 - 157

#### ENGINEERING MATHEMATICS AND APPLIED SCIENCE

# Higher Derivative Block Method with Generalised Steplength for Solving First-Order Fuzzy Initial Value Problems

Kashif Hussain, Oluwaseun Adeyeye and Nazihah Ahmad

158 - 169

# **IIUM ENGINEERING JOURNAL**

# Volume 24, Issue 1, January 2023

https:/doi.org/10.31436/iiumej.v24i1

# **Table of Contents**

Contd.

## MATERIALS AND MANUFACTURING ENGINEERING

Mei Bao Lee, Chiew Tin Lee, William Woei Fong Chong and Suhaila Mohd Sanip	170 - 18
A Hybrid of Kansei Engineering (KE) And Analytical Hierarchy Process (AHP) to Develop Conceptual Designs of Portable Oil Spill Skimmer	
Rprakash Ramanathan, Lokman Bin Abdullah, Muhammad Hafidz Fazli Bin Md Fauadi, Muhammad Syafiq Bin Syed Mohamed and Khairun Najmi Bin Kamaludin	183 - 19
CHANICAL AND AEROSPACE ENGINEERING	
Terminal Control Area Complexity Measurement Using Simulation Model	
Rully Medianto, Naflah Mutiara Adinda, Yazdi Ibrahim Jenie, Hisar Manongam Pasaribu and Hari Muhammad	199 - 212
Performance Comparison Between Predictive Functional Control and PID Algorithms for a Automobile Cruise Control System	n
Mohamed Al-Sideque Zainuddin, Muhammad Abdullah, Salmiah Ahmad, Mohd Suhaimi Uzir and Zaid Mujaiyid Putra Ahmad Baidowi	213 - 225
The Ricochet of Spinning Spheres Off Water	
Riyah Najim Kiter, Mazin Yaseen Abbood and Omar Hassoon	226 - 243
CHATRONICS AND AUTOMATION ENGINEERING	
PLC-based PID controller for real-time pH neutralization process using Palm Oil Mill Efflu	ent
Azavitra Zainal, Norhaliza Abdul Wahab and Mohd Ismail Yusof	244 - 255
1124 with a Dannah, 1967 manual 116 and 17 and 6 and 1967 man 1986	on RNN-
Solar Thermal Process Parameters Forecasting for Evacuated Tubes Collector (ETC) Based LSTM	
Solar Thermal Process Parameters Forecasting for Evacuated Tubes Collector (ETC) Based	256 - 268
Solar Thermal Process Parameters Forecasting for Evacuated Tubes Collector (ETC) Based LSTM Muhammad Ali Akbar, Ahmad Jazlan, Muhammad Mahbubur Rashid,	
Solar Thermal Process Parameters Forecasting for Evacuated Tubes Collector (ETC) Based LSTM Muhammad Ali Akbar, Ahmad Jazlan, Muhammad Mahbubur Rashid, Hasan Firdaus Mohd Zaki, Muhammad Naveed Akhter and Abd Halim Embong An Integrated RRT*SMART-A* Algorithm for solving the Global Path Planning Problem in Environment	n a Static
Solar Thermal Process Parameters Forecasting for Evacuated Tubes Collector (ETC) Based LSTM Muhammad Ali Akbar, Ahmad Jazlan, Muhammad Mahbubur Rashid, Hasan Firdaus Mohd Zaki, Muhammad Naveed Akhter and Abd Halim Embong An Integrated RRT*SMART-A* Algorithm for solving the Global Path Planning Problem in Environment	n a Static 269 - 284

# Non-Verbal Human-Robot Interaction Using Neural Network for The Application of Service Robot

Repurposing A Sampling-Based Planner for A Six-Degree-Of-Freedom Manipulator to	Avoid
and Mohd Hazeli	301 - 318
Zubair Adil Soomro, Abu Ubaidah Shamsudin, Ruzairi Abdul Rahim, Andi Adrianshah	

Repurposing A	A Sampling-Based	Planner for A	Six-Degree-O	I-Freedom	Vianipulator 1	to Av
Unpredictable	Obstacles					

Hafiz Iman and Raisuddin Khan	319 - 332