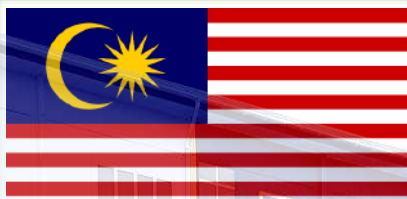


e-PROCEEDING



THE 4th INTERNATIONAL
MALAYSIA-INDONESIA-THAILAND
SYMPOSIUM ON INNOVATION AND CREATIVITY, 2021

EXTENDED ABSTRACT
24 AUGUST 2021



UNIVERSITI TEKNOLOGI MARA
PAHANG BRANCH, MALAYSIA

*'Embracing
Innovation & Creativity
in
Industrial Revolutions'*

e-Proceeding

The 4th International Malaysia-Indonesia-Thailand 
Symposium On Innovation and Creativity 2021
'Embracing Innovation & Creativity in Industrial Revolutions'

Universiti Teknologi MARA
Pahang Branch
26400 Bandar Tun Abdul Razak, Jengka
Pahang, Malaysia

EDITORIAL BOARD

Ruziana Mohamed

Nor Fadhilah Dzulkifli

Nur Asmaliza Mohd Noor

Nurun Nadhirah Md Isa

Tengku Intan Suzila Tengku Sharif

Roslina Abdul Aziz

Hasnimulyati Laoding

Nurul Syahidah Sabri

Nur Amalina Mohd Izam

Azianty Saroni

Universiti Teknologi MARA
Pahang Branch
26400 Bandar Tun Abdul Razak, Jengka
Pahang, Malaysia

Copyright © 2021 e-ISBN: 9789833289

All rights reserved. No part of this e-proceedings may be reproduced in any form or by any electronic or mechanical means, including information storage and retrieval systems, without permission in writing from the publisher, except by reviewers, who may quote brief passages in a review. Published article or photograph not necessarily reflect the opinion of the publisher. Any questions can be addressed to the publisher.

Disclaimer

All content in this publication have been prepared accordingly with the utmost efforts of the editors and publisher. The editors and publisher make no representation or warranties with respect to the accuracy, applicability, fitness or completeness of the contents of this e-proceeding.

WELCOMING REMARKS

Assalamualaikum wbt and greetings to all IMIT SIC 2021 participants.

It is a great pleasure to welcome all of you to the 4th International Malaysia-Indonesia-Thailand Symposium on Innovation and Creativity (IMIT SIC 2021). IMIT SIC is an annual program organized in shifts by universities' collaborators, as well as their strategic partners from Indonesia, Malaysia and Thailand. IMIT SIC was successfully organized by UiTM Perlis Branch in 2017, Universitas Riau (UNRI) in 2018 and Princess of Naradhiwas University (PNU) in 2019. Despite the strike of Covid-19 pandemic which has affected our academic institutions, UiTM Pahang branch has endeavoured the challenge by organizing this event via the virtual platform.



2020 and 2021 have been extremely challenging years for all of us. We struggled to keep up with the new norm caused by the pandemic, where the populations of the world were shaken, and still are. Although it has been a tough year, we must continuously move forward and face the obstacles that bring us to the adaptation of new practices.

Based on this creative adaptation approach, the ultimate objective of this symposium is to gather all researchers, scientists, experts and scholars from the Social Sciences, Business Administration, Engineering, as well as the Science Technology communities particularly in the Southeast Asian countries. Besides, it is hoped to be a channel to emphasize and empower the culture of innovation, to prepare a platform for ideas, information, and expertise as well as to expose innovators to potential investors through international partnership opportunities.

My deepest congratulations to the organizer of this important event, especially the Chairman, Associate Professor Dr Wan Mohd Nazri Bin Wan Abdul Rahman and his committee members, who have performed incredible tasks in organizing this event. Besides, I would like to convey my appreciation to all the strategic partners who have given their endless support throughout the process.

I would also like to express my gratitude to all keynote speakers and participants from Malaysia, Indonesia and Thailand. With the theme "*Embracing Innovation & Creativity in Industrial Revolution*", IMIT SIC 2021 could advance the latest developments in social sciences, science and technology, engineering, technology, art and civilization for a better future.

I hope everyone gains advantage from the abundance of knowledge and networking opportunities offered by IMIT SIC 2021. Thank you for your efforts and contributions in making this event a success. All the best, and may you have a fruitful symposium.

Thank you.

Prof. Ts. Dr Mohd Ilham Bin Adenan
Rector
Universiti Teknologi MARA Pahang Branch

WELCOMING REMARKS



Praise and gratitude to Allah SWT for all his graces and blessings.

The 4th International Malaysia-Indonesia-Thailand Symposium on Innovation and Creativity (IMIT SIC 2021) will be held virtually on 24th August by Universiti Teknologi MARA Pahang Branch, Malaysia. This is the first time IMIT SIC is conducted virtually due to Covid-19 pandemic. Hence, it is such a great achievement to have 3 keynote speakers from our strategic partners, and more than 300 products, innovation, designs and idea contributions from all over Malaysia, Indonesia and Thailand.

With the theme “*Embracing Innovation & Creativity in Industrial Revolution*”, IMIT SIC 2021 aims to bring together researchers, scientists, scholars, practitioners, and industrialists to share, expose, communicate and commercialize new innovations, inventions, products and ideas as well as research findings in the areas of social sciences, science and technology, engineering, technology, art and civilization to neighbouring countries and also to the international platform.

As the chairperson of 4th IMIT SIC 2021, I would like to express my heartfelt gratitude to the organizing committee members for their unwavering commitment to ensure the success of this symposium. I would also like to convey my sincere appreciation and congratulations to Universiti Teknologi MARA Perlis Branch, Universiti Teknologi Johor Branch, Universiti Teknologi MARA Sarawak Branch, Universitas Islam Riau, Princess of Naradhiwas University, Yala Rajabhat University, Universitas Tanjungpura, Universitas Airlangga and Phuket Rajabhat University as our strategic partners and The Malaysia Solid State Science and Technology Society for supporting this symposium.

This symposium would also not be possible without the generous assistance from the management of Universiti Teknologi MARA Pahang Branch, strategic partners, moderators, judges who have selflessly contributed to the event. I hope everyone will enjoy the content, develop new research linkages and generate more ideas through the symposium. Besides, I hope IMIT SIC will serve as a platform for researchers, scientists, industrialists and scholars in cultivating research, innovation and creativity.

Your participation today will surely strengthen and play the most meaningful role in generating, publishing, and sharing new ideas and knowledge, as well as realizing the theme of IMIT SIC 2021. I am looking at the bright future of IMIT SIC in the years to come, to deliver better than its preceding years. I hope through IMIT SIC, we can continue to synergize, spread the benefits, and gain valuable experience.

Thank you.

Assoc. Prof. Dr. Wan Mohd Nazri Bin Wan Abdul Rahman
Chairman IMITSIC 2021
Universiti Teknologi MARA Pahang Branch

MESSAGE FROM THE EDITOR

It is our pleasure to welcome you to the IMIT SIC 2021 extended abstract proceedings. The proceedings are collections of research reports contributed by researchers, academicians and students from Malaysia, Indonesia and Thailand.

My sincere gratitude goes to the authors, reviewers and technical program committee members for their contribution, hard work and support in promoting IMIT SIC 2021 in Malaysia, Indonesia and Thailand. More than 290 extended abstracts went through a peer review process and each was accepted based on its relevance, innovation and application to the respective field it represents.

The proceedings house a collection of extremely interesting and most current innovations, inventions and research findings, hence would be a valuable source of information and reference for researchers, academicians and students alike.

Thank you

Ruziana Mohamed
Chief Editor

TABLE OF CONTENT	PAGE
Editorial Board	i
Welcoming Remarks	
President	ii
Chairman	iii
Message from the Editor	iv
Table of Content	v

**SCIENCE, TECHNOLOGY AND ENGINEERING
CATEGORY A**

CARBON BASED NANOFLUIDS <i>Ong Huei Ruey, Wan Mohd Eqhwan Iskandar</i>	1
SIL-PHATE: ANTIMICROBIAL & ALCOHOL-FREE HAND SANITIZER <i>Muhammad Lazim Arif Abd Halim, Muhammad Ridzuwan Rashid, Nur Fadzeelah Abu Kasim, Wan Nordini Hasnor Wan Ismail, Mohamed Syazwan Osman</i>	2
ECO-ASPHALT: THE GREEN PAVING INNOVATION <i>Faridah Hanim Khairuddin, Mohab Yaser Alamawi, Ali Nazim Chakhuer, Nur Izzi Md Yusoff, Khairiah Badri</i>	3
COCONUT WATER AS ADDITIONAL SUPPLEMENT IN ROOT FORMATION OF <i>C. nutans</i> <i>Saiyidah Nafisah Hashim, Norrizah Jaafar Sidik, Tay Chia Chay</i>	4
HIGH WATER ABSORBENT CONCRETE FOR DECORATIVE WALL <i>Rokiyoh A-wang, Pareedah Papoh, Nuraina Yeng, Hameedah Yaena, Nurilmee Poh-oh, Abedeen Dasaesamoh</i>	5
HIGH FLAME RETARDANT ADHESIVE FOR FURNITURE INDUSTRIES <i>Amanee Chedeh, Kuhabibah Doko, Tasneem Jehlaeh, Ajaman Adair, Abeedeen Dasaesamoh</i>	6
PREPARATION AND NUTRITIONAL ANALYSIS OF STINGLESS BEE HONEY CANDY <i>Anisah Baka, Pateemoh Yalanae, Imron Meechai, Isma-ae Chelong</i>	7
SERUM DEVELOPMENT BASED ON THE ANTIOXIDANT ACTIVITY AND PHYTOCHEMICAL OF <i>Etlingera elatior</i> <i>Nor Azira Irma Muhammad, Nabila Akhmarul Nizam, Zainab Razali</i>	8
GREEN SYNTHESIS OF CARBON AND GOLD NANOPARTICLES FROM COCOA POD HUSK FOR POTENTIAL CALORIMETRIC BASED PESTICIDE IDENTIFICATION <i>Ashreen Norman, Puteri Nurhazeera Iqbal Azaham, Che Azurahanim Che Abdullah, Ahmand Kamil bin Hj Mohd Jaaffar</i>	9
CONTACTLESS AND AUTOMATIC HAND SANITIZER BASED ON ARDUINO MICROCONTROLLER AND ULTRASONIC SENSOR (ARDUIZER) FOR COVID-19 PREVENTION <i>Salihin Khusni, Amir Faris, Hafiz Kamaruddin, Nazrul Hisyam, Uwais Kamaruddin</i>	10

THE FORMULATION DEVELOPMENT OF ALGINATE BEADS FOR PROBIOTIC ENCAPSULATION USED IN FOOD PRODUCT APPLICATIONS	11
<i>Muhammad Na'im Samsudin, Siti Fairuz Che Othman</i>	
NEW FUNDAMENTAL THEORY IN SOLVING THE ROYALTY PAYMENT PROBLEM	12
<i>Wan Noor Affah Wan Ahmad, Suliadi Firdaus Sufahani, Mohd Zulariffin Md Maarof, Tamil Selvan Subramaniam, Muhaimin Ismoen</i>	
NUTRITIOUS MENU SYSTEM FOR MALAYSIAN RELIGIOUS PRIMARY SCHOOL CHILDREN TO IMPROVE GOOD MEMORIES	13
<i>Azila Md Sudin, Suliadi Firdaus Sufahani, Nadirul Hasraf Mat Nayan, Mohd Helmy Abd Wahab, Wan Mohd Khairy Adly Wan Zaimi</i>	
CARBON-FREE ENERGY USING MODIFIED LaSrCoFeO₃ CATHODE NANOPARTICLES FOR PROTON CERAMICS FUEL CELL	14
<i>Nurul Izzati Abd Malek, Suhaida Dila Safian, Nurul Waheeda Mazlan, Ahmad Nazeer Che Mat, Abdul Mutalib Md Jani</i>	
FORMULATION AND EVALUATION OF HERBAL LIPSTICK FROM NATURAL OIL	15
<i>Huswanee Sohsunsa, Amana Ma, Nisaporn Muhamad, Likit Lateh</i>	
E-MELATI DISCOVERY SYSTEM	16
<i>Alia Syahida Kamaruddin, Habsah Minhat, Nur Syazwani Tajuddin, Farahnaz Mohammad Anwar, Nurhusnina Hasya Khairulrizal, Nur Syamimi Afrina Mohamed Amin</i>	
SOCIAL DISTANCING MONITORING SYSTEM USING DEEP LEARNING	17
<i>Nur Shairah Muhd Affendy, Amelia Ritahani Ismail</i>	
SHROOMAGE: A BUTTON MUSHROOM DETECTION AND MEASUREMENT SYSTEM USING IMAGE PROCESSING	18
<i>Lio Wei Yong, Radzi Ambar, Mohd Helmy Abd Wahab, Chew Chang Choon, Muhammad Mahadi Abd Jamil</i>	
HIGH SELECTIVITY OF ECO-FRIENDLY EPOXIDE FROM PALM OLEIC ACID	19
<i>Intan Suhada Azmi, Mohd Jumain Bin Jalil, Dania Nuruddin Azlan Raofuddin, Hamzah Hafizuddin Habri, Mohamad Heiry Mohd Azmi</i>	
FACE MASK DETECTION AND FACE IDENTIFICATION BASED ON IMAGE PROCESSING	20
<i>Muhammad Mustaqim Zainal, Radzi Ambar, Mohd Helmy Abd Wahab</i>	
WASTE vs. WASTE: ULTIMATE WASTEWATER TREATMENT PROCESS	21
<i>Azlina Mat Saad, Farrah Aini Dahalan, Sara Yasina Yusuf, Naimah Ibrahim</i>	
ENHANCING USER EXPERIENCE USING AUGMENTED REALITY IN MUSEUM	22
<i>Muhammad Hafizuddin Abdul Razak, Romiza Md Nor</i>	
DESIGN AND BUILD A WATER HEATING SYSTEM USING A HELICAL TYPE HEAT EXCHANGER BY UTILIZING THE EXHAUST HEAT OF THE AIR CONDITIONER CONDENSER	23
<i>Shandy Kurniadi, Trimon S Sinaga, Dedikarni, Eddy Elfiano, Dody Yulianto Rafil Arizona</i>	
SECONDARY SEX CHARACTERISTICS OF ODESSA BARB (<i>Puntius padamya</i>)	24
<i>Wahyu Bagus Pradana, Muhlis Fajaryanto, Sadida Anindya Bahtiar, Puput Geraldina Milarossa, Shovia Finny Anggreani, Afri Arnita Sari, Darmawan Setia Budi</i>	

BRAINWAVE SIGNAL OF COGNITIVE ACTIVITIES FOR DYSLEXIA CHILDREN	25
<i>Engku Mohd Nasri Engku Mat Nasir, Norfaiza Fuad, Mohd Erwandy Marwan, Norfatin Akila</i>	
THE DEVELOPMENT OF SOLAR POWERED MOTOR GENERATOR FOR STALL HAWKERS (SPMG)	26
<i>Marshal Franklyn Revindran, Norfaiza Fuad</i>	
SECONDARY SEX CHARACTERISTICS OF SILVER RASBORA (<i>Rasbora argyrotaenia</i>)	27
<i>Eko Wahyudi, Devia Rus Widiya, Doni Setiawan, Leni Mei Ristin, Mayangsari, Nadya Almira Puspitadewi, Darmawan Setia Budi</i>	
EFFICACY OF CERAMIC SLUDGE DUST (CSD) STABILISER ON THE STRENGTH PROPERTIES OF STABILISED LATERITE SOIL	28
<i>Sharina Ibrahim, Mohamad Nidzam Rahmat, Mazidah Mukri</i>	
THE DEVELOPMENT OF ANODE FUNCTIONAL LAYERS TO ENHANCE THE PERFORMANCE OF PROTON CERAMIC FUEL CELL	29
<i>Nur Farahin Yusoff, Lidayatty Abdul Malik, Siti Hajar Zahari, Abdullah Abdul Samat, Zadariana Jamil, Nafisah Osman</i>	
FOUR DIFFERENT GRADING OF AGARWOOD OIL CLASSIFICATION TO IMPROVE THE PERFORMANCE OF MODELLING BASED ON MULTICLASS SUPPORT VECTOR MACHINE	30
<i>Aqib Fawwaz Mohd Amidon, Noratikah Zawani Mahabob, Nurlaila Ismail, Zakiah Mohd Yusoff, Mohd Nasir Taib</i>	
SECONDARY SEX CHARACTERISTICS IN ROSY BARB (<i>Puntius conchoniensis</i>)	31
<i>Febri Kurniawan Raharjo, Mahdania Aulia Rahma, Dewi Ambarwati, Suliyani, Asa Maharani Laluna, DewiSinta, Darmawan Setia Budi</i>	
IoT BASED SMART GHAT WITH MOBILE ALERTING WARNING SYSTEM	32
<i>Nur Shahidatul Shaurah Sharifunizam, Shukor Sanim Mohd Fauzi, Ray Adderley JM. Gining, Tajul Rosli Razak, Nurul Ain Mohd Zaki, Ruhaila Maskat, Mohammad Hafiz Ismail, Ruzita Ahmad</i>	
INNOVATION COMPETITION JUDGING SYSTEM (ICJS V1.0)	33
<i>Mastura Murshik, Shukor Sanim Mohd Fauzi, Ray Addeley JM Gining, Tajul Rosli Razak, Nurul Ain Mohd Zaki, Ruhaila Maskat, Mohammad Hafiz Ismail, Ruzita Ahmad</i>	
MASKED FACE DETECTION USING DEEP LEARNING APPROACH	34
<i>Anis Zahirah Azman, Sharifa Saon, Abd Kadir Mahamad</i>	
DEVELOPMENT OF SOAP FROM CRUDE EXTRACT OF <i>Pelargonium radula</i> WITH CITRONELLA OIL	35
<i>Nor Azira Irma Muhammad, Nur Izzati Hazmi</i>	
IMPROVING THE PERFORMANCE OF MODELING THE AGARWOOD OIL BASED ON PRINCIPAL COMPONENT ANALYSIS (PCA) AND THE INTELLIGENT OF ANN CLASSIFICATION	36
<i>Noratikah Zawani Mahabob, Aqib Fawwaz Mohd Amidon, Zakiah Mohd Yusoff, Nurlaila Ismail, Mohd Nasir Taib</i>	
A NOVEL INTEGRATED APPROACH FOR CONTROLLING GLYPHOSATE-RESISTANT GOOSEGRASS (<i>Eleusine indica</i>) BIOTYPE	37
<i>Muhammad Aiman Fakri, Nur Faqihah Ghazali, Zaiton Sapak, Muhammad Saiful Ahmad Hamdani, Sim Khay Chuan, Chuah Tse Seng</i>	

NICKEL OXIDE NANOPARTICLE: INNOVATIVE APPROACH TO ENHANCE THE PERFORMANCE OF PROTON CERAMIC FUEL CELL	38
<i>Noor Hidayah Aniza Zakaria, Nur Syafkeena Mohd Affandi, Muhamad Zakwan Naim Nasir, Ismariza Ismail, Nafisah Osman</i>	
VISION BASED RECYCLE WASTE DETECTION IN REVERSE VENDING MACHINE USING YOLO BASED FRAMEWORK	39
<i>Nur Syahirah Razali, Mohd. Razali Md. Tomari, Aeslina Abdul Kadir</i>	
DESPlus: NEW INSIGHT ON PLASTIC PACKAGING	40
<i>Fatin Zahra Rosli, Sarina Mohamad, Rizana Yusof, Dalina Samsudin, Roziana Mohamed Hanaphi, Nor Atikah Husna Ahmad Nasir, Khairul Farihan Kasim</i>	
HIGH CONDUCTIVITY OF POLYLACTIC ACID (PLA) BASED POLYMER ELECTROLYTE	41
<i>Fairuzdzah Ahmad Lothfy, Ab Malik Marwan Ali, Hartini Ahmad Rafeaie, Siti Zafirah Zainal Abidin</i>	
LOW RPM PERMANENT MAGNET GENERATOR FOR SIMPLE PICO- HYDROPOWER IN REMOTE AREAS	42
<i>Ismaael Kamae, Muhammadkhoiri Hayibaka, Eleeyah Saniso</i>	
THE DEVELOPMENT OF A COMPOSITE CATHODE FOR INTERMEDIATE TEMPERATURE SOLID OXIDE FUEL CELLS	43
<i>Azreen Junaida Abd Aziz, Nurul Akidah Baharuddin, Mahendra Rao Somalu, Andanastuti Muchtar</i>	
ACOU@PLAY: IDENTIFY DENTAL ANXIETY AND PREFERENCES MUSIC	44
<i>Muhamad Zafir Ashman Zulkiflee, Nur Humaira Ishak, Nur Athirah Mohd Rosli, Ain Najihah Abd Rahman, Nur Dalila Abdullah, Nor Wati @ Nur Atikah Mustafa, Aiemeeza Rajali</i>	
UTILIZATION OF EMPTY FRUIT BUNCH (EFB) TO PREPARE HYDROXYPROPYL METHYLCELLULOSE (HPMC) AS POTENTIAL OF PLANT-BASED CAPSULE MEDICINE	45
<i>Muhammad Hanis Ghazali, Shafinas Abdullah</i>	
PREDICTORS OF QUALITY OF LIFE AMONG ELDERLY IN 11TH REGIONAL HEALTH, THAILAND	46
<i>Yhodpha Ratmanee, Phattrawan Tongkumchum</i>	
SEE THROUGH WOOD	47
<i>Nur Nazihan Sofian, Wan Mohd Nazri Wan Abdul Rahman, Nor Yuziah Mohd Yunus</i>	
ETOS: EDUCATION TECHNOLOGY IN ONLINE SYSTEM AS LEARNING APPLICATION INNOVATION	48
<i>Antonio Nikolas Manuel Bonar Simamora, Chaerobby Fakhri Fauzaan Purwoko, Ayuning Dwis Cahyasari</i>	
INSURANCE CONSULTANT (InsTant): AN ANDROID-BASED APPLICATION TO INCREASE PUBLIC KNOWLEDGE ABOUT INSURANCE IN INDONESIA	49
<i>Marcel Laverda Subiyanto, Aulia Rachma Firdausy, Mokhamad In'am Hikami, Rudy Hardiyanto, Ameliatul 'Iffah</i>	

“Pay-US” APPLICATION BASED ON ANDROID FOR MARKETING OF PROCESSED ELOPS HAWAIIENSIS PRODUCT AS A POTENTIAL OF LEADING VILLAGE NEAR SURABAYA	50
<i>Salsabylla Nada Apsariny, Rita Susanti, Ega Wicaksono Rizka Sudiby, Chaerobby Fakhri Fauzaan Purwoko</i>	
IRIS (ISLAMIC TOURISM) APPLICATION AS CONTRIBUTION IN DEVELOPING INDONESIAN ECONOMIC TO INCREASE PUBLIC INTEREST IN HALAL TOURISM	51
<i>Helda Urbhani Rosa, Mochammad Firmansyah, Anggara Teguh Previan</i>	
MANUFACTURING PROCESS ABNORMAL SIGNAL(S) ANALYSER	52
<i>Cassandra Tan Hui Ming, Rohayu Mohd Salleh</i>	
UTILIZATION OF SNAIL MUCUS AS AN ALTERNATIVE NON-ALCOHOLIC HAND SANITIZER LIPUTAN (LENDIR SIPUT HAND SANITIZER)	53
<i>Dava Setyawan Putra, Edla Putri Humaira, Figo Surya Ardiyanto, Johanna Tania Victory, Sefanny Nur Ramadhani</i>	
HEALO: HEAT-HEALABLE RUBBER TILE	54
<i>Nurul Adilah Shahrul Faizal, Dalina Samsudin, Zuliahani Ahmad, Muhamad Naiman Sarip, Nor Mazlina Abdul Wahab, Mohd Syamaizar Mustafa, Noor Aishatun Majid</i>	
CUSTOMER SATISFACTION ANALYSIS USING QUALITY FUNCTION DEPLOYMENT ON MALAYSIAN DOMESTIC AIRLINES	55
<i>Chan Man Seong, Rohayu Mohd Salleh</i>	
MONITORING THE WATER DENSITY THROUGH MODELLING OF SURFACE WATER SALINITY OVER SUNGAI MERBOK, KEDAH	56
<i>Sharir Aizat Kamaruddin, Izyan Saifullah Asrif</i>	
MONITORING THE ECOSYSTEM HEALTH THROUGH MODELLING OF SURFACE WATER DISSOLVED OXYGEN OVER KUALA PERLIS, PERLIS	57
<i>Fazrul Redha Adnan, Sharir Aizat Kamaruddin</i>	
MONITORING THE WATER IMPURITIES THROUGH MODELLING OF TOTAL SUSPENDED SOLIDS FOR SUNGAI MERBOK, KEDAH AND KUALA PERLIS, PERLIS	58
<i>Nur Izzati Mohd Rizal, Sharir Aizat Kamaruddin</i>	
MONITORING THE EFFECTS OF OCEAN ACIDIFICATION THROUGH MODELLING OF SURFACE pH OVER PULAU TUBA, KEDAH	59
<i>Muhamad Nasiruddin Aiman Azaha, Sharir Aizat Kamaruddin</i>	
MONITORING THE ESTUARINE ACIDIFICATION THROUGH MODELLING OF SURFACE WATER pH OVER KUALA PERLIS, PERLIS	60
<i>Muhammad Hasif Anuar, Sharir Aizat Kamaruddin</i>	
MONITORING THE SALT-FRESH TRANSITION ZONE THROUGH MODELLING OF SURFACE SALINITY OVER PULAU TUBA, KEDAH	61
<i>Nur Iman Bt Kamarudin Azhar, Sharir Aizat Kamaruddin</i>	
MONITORING THE EFFECTS OF GLOBAL WARMING THROUGH MODELLING OF SURFACE WATER TEMPERATURE OVER PULAU TUBA, KEDAH	62
<i>Siti Nuratiqah Asman, Sharir Aizat Kamaruddin</i>	

MONITORING THE IMPACT OF HYPOXIA THROUGH MODELLING OF SURFACE WATER DISSOLVED OXYGEN OVER SUNGAI MERBOK, KEDAH <i>Asniza Zul'Azman, Sharir Aizat Kamaruddin</i>	63
MONITORING THE CLIMATE CHANGE IMPACTS THROUGH MODELLING OF SURFACE WATER TEMPERATURE OVER SUNGAI MERBOK, KEDAH <i>Nur Hidayatul Jannah Mizi, Sharir Aizat Kamaruddin</i>	64
MONITORING THE AEROBIC BIOLOGICAL PROCESS THROUGH MODELLING OF SURFACE WATER BIOCHEMICAL OXYGEN DEMAND OVER SUNGAI MERBOK, KEDAH <i>Mohamad Amirul Haziq Jalaluddin, Sharir Aizat Kamaruddin</i>	65
MONITORING THE EUTROPHICATION PROCESS THROUGH MODELLING OF SURFACE WATER AMMONIA OVER PULAU TUBA, KEDAH <i>Muhammad Nasrul Ahmad, Sharir Aizat Kamaruddin</i>	66
MONITORING THE WATER CLARITY THROUGH MODELLING OF TOTAL SUSPENDED SOLIDS AND TOTAL DISSOLVED SOLIDS OVER PULAU TUBA, KEDAH <i>Behzad Khairiah Lee Mohd Affindi, Sharir Aizat Kamaruddin</i>	67
MONITORING THE DEAD ZONES THROUGH MODELLING OF SURFACE WATER DISSOLVED OXYGEN OVER PULAU TUBA, KEDAH <i>Sharir Aizat Kamaruddin, Mohammad Fadil Shamrien Rujay</i>	68
MONITORING THE RIVER ACIDIFICATION THROUGH MODELLING OF SURFACE WATER pH OVER SUNGAI MERBOK, KEDAH <i>Nur Amshar Nazmal, Sharir Aizat Kamaruddin</i>	69
MONITORING THE ALGAE BLOOM PHENOMENA THROUGH MODELLING OF SURFACE WATER CHLOROPHYLL AND AMMONIA OVER SUNGAI MERBOK, KEDAH <i>Noordalila Ramli, Sharir Aizat Kamaruddin</i>	70
POLYESTER-MCC BIO PRIMER COATING <i>Adzrie Baharudin, Zuliahani Ahma, Muhamad Naiman Sarip, Luqman Musa</i>	71
MONITORING THE EUTROPHICATION ACTIVITY THROUGH MODELLING OF NITRATE AND PHOSPHATE OVER PULAU TUBA, KEDAH <i>Nurrul Zulaikha Zainal, Sharir Aizat Kamaruddin</i>	72
MONITORING THE OXIDIZABLE MATERIALS THROUGH MODELLING OF SURFACE WATER CHEMICAL OXYGEN DEMAND OVER SUNGAI MERBOK, KEDAH <i>Dee Arfahierra Daud, Sharir Aizat Kamaruddin</i>	73
MONITORING THE WATER NUTRIENTS THROUGH MODELLING OF SURFACE WATER PHOSPHATE OVER SUNGAI MERBOK, KEDAH <i>Muhammad Muhaimin Zulkefle, Sharir Aizat Kamaruddin</i>	74
MICROPLASTIC ACCUMULATION ON SEAGRASS BEDS IN TAK BAI RIVER, TAK BAI DISTRICT, NARATHIWAT PROVINCE, THAILAND <i>Araf Laerosa, Pongpan Suksupan</i>	75
MONITORING THE SEDIMENT QUALITY THROUGH MODELLING OF ORGANIC MATTER AND pH FOR THE STRAIT OF PULAU TUBA AND DAYANG BUNTING, KEDAH <i>Syasya Adhwa Ahmad Afiza, Sharir Aizat Kamaruddin</i>	76

BIMETALLIC Au-Cu/TiO₂ CATALYST – ENABLING SUPERIOR CATALYTIC PERFORMANCE FOR NITROPHENOL REDUCTION	77
<i>Norizwan Nordin, Hanani Yazid, Nur Jamilin Rosyidah Uzma Mohammad Yusaini, Abdul Hadi Mahmud, Abdul Mutalib Md Jani</i>	
POTENTIAL OF DES AS A CATALYST FOR REDUCING ACID VALUE OF NEEM BIODIESEL	78
<i>Asnida Yanti binti Ani, Izzati Halid, Naziatul Huda Kamaluddin</i>	
LSTM VS GRU IN PREDICTING GOOGLE STOCK PRICE	79
<i>Aida Nabilah Sadon, Shuhaida Ismail</i>	
APPROACHING REVIEW OF SNAPCHAT APPLICATION USING SENTIMENT ANALYSIS	80
<i>Wong Weng Hao, Shuhaida Ismail, Aida Nabilah Sadon</i>	
MULTIDIMENSIONAL NETWORK ANALYSIS OF STOCK MARKET BEHAVIOUR DURING COVID-19 OUTBREAK: BURSA MALAYSIA	81
<i>Goh Pei Kee, Rohayu Mohd Salleh</i>	
STOCHASTIC MODELLING OF TRAFFIC ACCIDENTS IN SKUDAI, JOHOR, MALAYSIA	82
<i>Teng Mun Jing, Rohayu Mohd Salleh</i>	
PROTOTYPE OF PORTABLE HYPOCHLOROUS ACID PREPARED FROM PATTANI SALTERN	83
<i>Acman E-tae, Hamdee Yanya, Hasan Daupor, Abedeen Dasaesamoh, Ubol Tansom</i>	
ISHA: IMPROVE SURFACE COATING AND HIGH ADSORPTION ON WASTEWATER TREATMENT	84
<i>Wan Izhan Nawawi, Nur Syazana, Muhammad Ikhwan, Nureel Imanina, Nadiyah Sabihah, Raihan Hamzah, Afiq Rosli, Mohd Azlan Mohd Ishak, Khudzir Ismail</i>	
CONVERTING AGRIWASTE TO WEALTH: CASSAVA PEEL AS NATURAL ORGANIC PRE-EMERGENCE HERBICIDE	85
<i>Siti Aisyah Mohammad Taupik, Chuah Tse Seng, Chia Poh Wai, Siti Nur Anisah Aani, Mohd Shahrul Zanudin</i>	
PERFORMANCE STUDY OF 180 WP TYPE SOLAR PANEL BASED ON THE AIR COOLING SYSTEM AND THE BOUNDARY LAYER THICKNESS ON THE PANEL SURFACE	86
<i>Yoga Fernando, Eddy Elfiano, Rafil Arizona</i>	
<i>Gracilaria changii</i> & <i>Gracilaria salicornia</i> TO BIOPLASTIC FILM – KEY FUTURE FOR ECOLOGICAL AND COMMERCIAL IMPORTANCE	87
<i>Sharir Aizat Kamaruddin, Jumiati Mohd Tahir, Muhamad Naiman Sarip</i>	
IMPLEMENTATION OF INTERNET OF THINGS IN WATER USAGE MONITORING APPLICATION FOR BOARDING HOUSES AND RENTED HOUSES	88
<i>Anggiat, Arbi Haza Nasution</i>	
DEVELOPMENT OF BIO-FERMENTED CLEANING AGENT OF FRUIT PEELS RESIDUES	89
<i>Warin Srip hongphankul, Nurlaila Buenae</i>	
JACKFRUIT SEED STARCH-PVA BLEND BASED POLYMER ELECTROLYTE	90
<i>Siti Nur Aziera Ahmad KamalAriffin, Fairuzdzah Ahmad Lothfy, Ab Malik Marwan Ali</i>	

HIGH CONDUCTIVITY OF POLYLACTIC ACID (PLA) BASED POLYMER ELECTROLYTE	91
<i>Fairuzdzah Ahmad Lothfy, Ab Malik Marwan Ali, Hartini Ahmad Rafaie, Siti Zafirah Zainal Abidin</i>	
“MuzeAR” AN AUGMENTED REALITY ANDROID BASED APPLICATION FOR UNIVERSITAS AIRLANGGA HISTORY AND CULTURE MUSEUM COLLECTION	92
<i>Muhammad Arif Yudhistira M, Rimuljo Hendradi, Ikhsan Rosyid Mujahidul Anwari</i>	
THE DEVELOPMENT OF BIODEGRADABLE STRAW FROM THE LOCAL WEED FOR COMMERCIALIZATION	93
<i>Ibrahim Sayoh, Aslan Hilae, Piyaporn Wangsirikul, Saluma Samanman, Nurhashima Pirisi, SupakornBurinchart</i>	
DEVELOPMENT OF AUGMENTED REALITY MOBILE APPLICATIONS AS LEARNING MEDIA FOR ANATOMY AND BLOOD CIRCULATION IN THE HUMAN HEART FOR JUNIOR HIGH SCHOOL	94
<i>Dimas Agung Perkasa, Rimuljo Hendradi, Endah Purwanti</i>	
VISION BASED RECYCLE WASTE DETECTION FOR REVERSE VENDING MACHINE USING YOLO BASED FRAMEWORK	95
<i>Nur Syahirah Binti Razali, Mohd. Razali Md. Tomari, Aeslina Abdul Kadir</i>	
AIRLANGGA CARE FOOD WASTE: FOOD WASTE MANAGEMENT TO SUPPORT SDGs IN ELIMINATING HUNGER AND RESPONSIBLE CONSUMPTION AND PRODUCTION IN KOTA SURABAYA	96
<i>Krisna Andrian Bimantara, Ella Arlaydes Tarnada Zanuvar, Zhiella Octabriani Flowerainsyah, Tasya Dwi Farlian Putri, Abiyyu Armijn Firman Firdaus, Nita Citrasari, Febri Eko Wahyudianto</i>	
DEVELOPMENT OF THERAPY MACHINE FOR KNEE AND ELDERLY PATIENTS	97
<i>Saman Vivanthanarod, Sofia Chaimikan, Zainab Meeteh, Arzoo Yama</i>	
3D (THREE-DIMENSIONAL) LUNG CANCER DETECTION AND IDENTIFICATION BASED ON MIXED REALITY MADE	98
<i>Mas Dwiyana Prasetya Wibawa, Ni Nyoman Ary Dewanthi, Ni Kadek Setiari, Valentinus Mahendra Aaron Quendangen</i>	
CONTINUOUS PASSIVE MOTION THERAPY DEVICE FOR ELBOW PARALYZED AND POST TOTAL ELBOW ARTHROPLASTY PATIENT	99
<i>M. Hafidh Alfa Robby, Alfian Muhammad Nur</i>	
BIOMASS DOWNDRAFT GASIFIER SYSTEMS AS SOLUTION FOR GENERATING ELECTRICITY	100
<i>Muhamd Rizaldi Bin Nuryasin, Muh. Fajar Faliasthiunus P., Muh. Rifki Ferdiansyah</i>	
A SMART HYDROPONIC SYSTEM USING INTERNET OF THINGS (IoT)	101
<i>Nur Azrina Zaini, Ansar Jamil, Zuhairiah Zainal Abidin, Mohd Helmy Abd Wahab</i>	
LORACRN: IMPLEMENTING A COGNITIVE RADIO NETWORK TESTBED BASED ON LORA WIRELESS TECHNOLOGY USING RASPBERRY PI	102
<i>Rafiza Ruslan, Muhammad Zahir Abdul Halim, Abidah Mat Taib, Rashidah Ramle, Nur Fatihah Fauzi</i>	

USING SELECTED PROBIOTIC AS A STARTER CULTURE FOR FERMENTED RICE SAUSAGE IN YALA CITY, THAILAND	103
<i>Nur-aine Hayeeyusoh Rusma da-oh, Isma-ae dolah</i>	
ReFreshEdge: A SMART DEVICE FOR ASSESSING MANGO FRESHNESS	104
<i>Aliaa Zafirah Zainal, Mohammad Hafiz Ismail, Tajul Rosli Razak, Shukor Sanim Mohd Fauzi, Ray Adderley J.M Gining, Nurul Ain Mohd Zaki, Nurul Fatihah Abd Latip</i>	
Dress4Class: DRESS CODE CLASSIFICATION SYSTEM	105
<i>Norlewani Ismail, Mohammad Hafiz Ismail, Tajul Rosli Razak, Masayu Norman</i>	
S-CalmMind: A SMART MOBILE STRESS INTERVENTION FOR STUDENTS USING PRINCIPLES OF CALM TECHNOLOGY	106
<i>Nur A'fyfah Binti Zaimy, Siti Zulaiha Binti Ahmad, Romiza Md Nor</i>	
A TIME SERIES ANALYSIS ON PERFORMANCE TOWARDS THE FOOD, BEVERAGES AND TOBACCO MANUFACTURING IN MALAYSIA	107
<i>Yew Chung Aw, Chin Hang Goh, Zhi Xuan Kek, Jia Kian Ong, Weng Hao Wong, Man Seong Chan</i>	
CR-COVID-19: DEVELOPMENT OF COUGH RECOGNITION FOR COVID-19 USING AN EDGE DEVICE	108
<i>Nurul Natalia Abd Aziz, Ray Adderley JM. Gining, Shukor Sanim Mohd Fauzi</i>	
HYPERSPECTRAL AND LiDAR (HYPERLiD) FOR SPECIES RECOGNITION, ABOVE-GROUND BIOMASS AND CARBON STOCK ESTIMATION	109
<i>Nik Ahmad Faris Nik Effendi, Nurul Ain Mohd Zaki, Zulkiflee Abd Latif, Mohd Nazip Suratman, Sharifah Norashikin Bohari, Mohd Zainee Zainal, Hamdan Omar</i>	
IoT-ML: WATER QUALITY MONITORING SYSTEM	110
<i>Mohamad 'Isa Ab Malik, Tajul Rosli Razak, Mohammad Hafiz Ismail, Masayu Norman</i>	
PYTHON-BASED: SELF-DIAGNOSIS OF DIABETES DISEASE USING FUZZY EXPERT SYSTEMS	111
<i>Mohamad Hanis Yusoff, Tajul Rosli Razak, Mohammad Hafiz Ismail, Shukor Sanim Mohd Fauzi, Ray Adderley JM. Gining, Nurul Ain Mohd Zaki</i>	
MODELLING OF STANDARD PENETRATION TEST VALUE ESTIMATION BASED ON THE SOIL PROPERTIES	112
<i>Nor Ashikin Yahaya, Mazidah Mukri, Zakiah Razak, Faizah Kamarudin, Atiqah Najwa Zainuddin</i>	
A MODELLING OF SOFT SOIL BASED ON ELECTRICAL RESISTIVITY WITH REGARD TO MOISTURE CONTENT	113
<i>Zakiah Razak, Mazidah Mukri, Faizah Kamarudin, NorAshikin Yahya, Norazlan Khalid</i>	
DESIGNING OF MICROWAVE METAMATERIAL BIOSENSOR FOR WATER POLLUTION MONITORING	114
<i>Wee Kai Boon</i>	
ADHIKARI – AUTOMATIC RICE DRYER TECHNOLOGY BASED ON THE INTERNET OF THINGS (IoT) TO OPTIMIZE AGRICULTURAL RESOURCES IN COVID-19 PANDEMIC TIME	115
<i>Hafizh Akbar, Hilal Fahrul Hamam, Krisanti Dhiyaz Ayuni, Agnes Clasrissa Puwoko, Amri Shabirin</i>	

AL-FURQAN ISLAMIC BOARDING SCHOOL PROMOTION USING AUGMENTED REALITY	116
<i>Panji Virgiawan, Ana Yulianti</i>	
MODELLING OF SOFT SOIL REINFORCED WITH INFILLED PREFABRICATED VERTICAL DRAIN (IPVD)	117
<i>Faizah Kamarudin, Mazidah Mukri, Zakiah Razak, Nor Ashikin Yahaya, Atiqah Najwa Zainuddin</i>	
TOWARDS MITIGATING ACCESS CONGESTION IN SMART HOME USING MULTI-ACCESS POINTS	118
<i>Rafiza Ruslan, Muhammad Amirul Harun, Ahmad Yusri Dak, Naginder Kaur</i>	
NACOV PORTABLE AUTOMATIC SANITIZER	119
<i>Aida Nabilah Mohd Roba'ai, Esther Anne Charles Ningkan, Noor Aira Syafira Saifuludin, Jati Kasuma Ali</i>	
FACILE SYNTHESIS OF ZnO/GRAPHENE NANOSTRUCTURES AND ITS SUPERIOR CONDUCTIVITY PERFORMANCE	120
<i>Saedah Munirah Sanusi, Ruziana Mohamed, Mohd Firdaus Malek, Hartini Ahmad Rafaie, Nurin Jazlina Ahmad, Myzatul Azlyin Muhamad, Nurul Infaza Talalah Ramli</i>	
MYSEJAHTERA SMART PORT (MySmartPort)	121
<i>Mac Arthur Dalan, Cavinus Marinus, Muhamad Fitri Azmi, Jati Kasuma Ali</i>	
SCIENCE, TECHNOLOGY AND ENGINEERING CATEGORY B	
NEURO-THERAPY: COMBINATION OF GAME-BASED AND NEUROFEEDBACK FOR ELDERLY WITH MEMORY DISORDER	122
<i>Noraziah ChePa, Nooraini Yusoff, Wan Ahmad Jaafar Wan Yahaya, Rusdi Ishak, Laura Lim Sie-Yi</i>	
DysRedia: A GAME FOR THE DYSLEXICS	123
<i>Nur Azzah Abu Bakar, Noraziah ChePa, Chan Guan Bin</i>	
THE APPLICATION FOR BEGINNERS TO CREATE DANCE (THE ABCD)	124
<i>Mohd Faridz Ahmad, Nuraimi Othman, Nurul Afiqah Bakar, Zulkifli Ismail, Masshera Jamaludin, Mohd Raziff Rosdi</i>	
CURM-L: SKIN HEALTH PRODUCT FROM CURCUMA LONGA LEAVES	125
<i>Aiza Harun, Nurhidayah Osman</i>	
Rent2U: MOBILE APPLICATION FOR RENTAL EQUIPMENT AT UiTM SHAH ALAM	126
<i>Mudiana Mokhsin, Muhammad Firdaus Suhaimi, Nor Aziah Daud</i>	
Lelong2U: ANDROID-BASED MOBILE APPLICATION FOR ONLINE AUCTION	127
<i>Mudiana Mokhsin, Muhammad Nur Nazrin Abd Rashid, Zatul Amilah Shaffiee</i>	
FRUIT WRAPPER FROM FISH GELATIN INCORPORATED WITH LEMONGRASS EXTRACT	128
<i>Salamiah Zakaria, Nur Fathin Hidayah Zamri, Sharifah Nafisah Syed Ismail</i>	

JIRINGA ANTISEPTIC CREAM	129
<i>Zurhana Mat Hussin, Shaari Daud</i>	
UTILIZATION OF BIODIESEL FROM CRUDE PALM OIL AS SOLVENT TO OVERCOME WAX PROBLEMS IN OIL FIELD	130
<i>Muslim, Annur Suhadi, Sofyan Hadi, Rifal Fauzi, Jamaludin, Antony Reki, Ramdhani Asywal, Ummi Hasanah Pertiwi</i>	
REMOTE LEARNING FOR GEOLOGY USING DIGI-FC-GEO	131
<i>Asmidar Alias, Kamisah Ariffin, Nur Asmaliza Mohd Noor, Noraida Mohd Saim</i>	
HIGHLY PHOTOACTIVE AL-DOPED ZNO PHOTOCATALYST AGAINST TEXTILE WASTEWATER	132
<i>Hartini Ahmad Rafaie, Zul Adlan Mohd Hir, Nurul Infaza Talalah Ramli, Ruziana Mohamed, Syazni Hanun Nur Ili Dedi Dasiano, Nur Ramadhan Mohamad Azaludin</i>	
SUPERACTIVE ZNO-BASED PHOTOCATALYST UNDER VISIBLE LIGHT IRRADIATION	133
<i>Hartini Ahmad Rafaie, Zul Adlan Mohd Hir, Nurul Infaza Talalah Ramli, Ruziana Mohamed, Nur Ramadhan Mohamad Azaludin, Syazni Hanun Nur, Ili Dedi Dasiano</i>	
COVID-19 SIR MODEL WITH VACCINATION	134
<i>Rizauddin Saian, Teoh Yeong Kin, Suzanawati Abu Hasan</i>	
NATURAL FRESHNESS AND DEFENSIVE SPRAY	135
<i>Nur Fatimah Shaari, Nurkhairany Amyra Mokhtar, Fatin Farazh Ya'acob, Basri Badyalina</i>	
SoIGlaz: POTENTIAL 2 IN 1 SOLAR GLAZING GLASS	136
<i>Azliana Ramli, Hanifah Hassan, Mohd Nazari Abu Bakar, Ab Malik Marwan Ali, Suhaila Sepeai, Nafisah Osman</i>	
SHELVES 4 SHOES LOVERS: ONE-STOP SPORTS SHOES	137
<i>Norfaezah, Mohd Rosli, Siti Hannariah Mansor, Poy Hua, Khor, Nuraimi Othman, Mohd Khairulanwar Md Yusof</i>	
DEVELOPMENT STRATEGY OF COASTAL AREA IN RUPAT ISLAND	138
<i>Puji Astuti, Ahmad R Batubara, Husnul Kausarian, Nadya Amalia</i>	
PROXIMATE AND SENSORY ANALYSIS OF <i>Caulerpa racemosa</i> KEROPOK LEKOR	139
<i>Zamzila Erdawati Zainol, Aziani Ahmad, Muhammad Akmal Roslani, Khairul Naim Abd. Aziz, Sharir Aizat Kamaruddin</i>	
SOCIAL MEDIA ASSISTED LISTENING 'THINK PAIR SHARE' LEARNING MODEL FOR ENGLISH UNDERGRADUATE STUDENTS AT UNIVERSITY IN INDONESIA	140
<i>Syofianis Ismail, M. Zaim, Nurhizrah Gistituati</i>	
MALAYSIAN SECONDARY BOARDING SCHOOL MENU PLANNING SYSTEM WITH POST-OPTIMALITY PROCESS	141
<i>Suliadi Firdaus, Sufahani, Mohd Fahmy Abdullah Muhammad Abdul Latiff Abu Bakar, Siti Fatimah Zaharah Mohamad Fuzi, Muhaimin Ismoen</i>	

CLASSIFICATION OF ELECTROENCEPHALOGRAM (EEG) AND GRAPHOLOGY FOR STUDENTS USING ARTIFICIAL NEURAL NETWORK (ANN)	142
<i>Norfatin Akila Abd Halim, Norfaiza Fuad, Engku Mohd Nasri Engku Mat Nasir, Mohd Erwandi Marwan</i>	
N,N-DIETHYLETHANOLAMMONIUM C/EG DEEP EUTECTIC SOLVENT AS AN ALTERNATIVE FOR IONIC LIQUID	143
<i>Roslinda Fauzi, Rusli Daik, Basirah Fauzi, Siti Nur Liyana Mamaud</i>	
APPLICATION OF MACHINE LEARNING IN DENTISTRY	144
<i>Naghah Mohammed Abdullah Al-Jaf, Mohamed Ibrahim Abu Hassan, Rohaya Megat Abdul Wahab, Wan Eny Zarina Wan Abdul Rahman, Aslan S. Abraham</i>	
STAT DECISION STARTER KIT (SDSK) v1.0: STATISTICAL ANALYSIS DECISION MAKING	145
<i>Nur Safwati Ibrahim, Noor Zafarina Mohd Fauzi, Nor Hazreeni Hamzah, Nurul Bariyah Ibrahim, Shamsunarnie Mohamed Zukri</i>	
THE COASTAL INUNDATION MODELLING DUE TO SEA LEVEL RISE (SLR) IN DUMAI CITY	146
<i>Idham Nugraha, Faizan Dalilla, Rizky Ardiansyah, Febby Asteriani, Annita Hidayah</i>	
SCAFFOLDED MULTIMEDIA LEARNING APP FOR MALAYSIAN SIGN LANGUAGE	147
<i>Nor Arzami Othman, Nurul Syuhada Sa'Aid, Mohd Nizam Osman</i>	
GROUP DECISION MAKING TOOLBOX	148
<i>Nor Hanimah Kamis, Wan Syahimi Afiq Wan Ahlim, Sharifah Aniza Sayed Ahmad</i>	
MULTIPLE REFLECTIONS OF SPIRAL AND SPRING PASTA-LIKE CARBON NANOCOILS IN ABSORBING THE EMI WAVE	149
<i>Fadzidah Mohd Idris, Idza Riati Ibrahim, Ismayadi Ismail, Rodziah Nazlan, Mohd Shamsul Ezzad Shafie</i>	
e-KubSis 2.0: STRATEGIZING MUSLIM CEMETERY IN MALAYSIA	150
<i>Nor Diana Abd Rahman, Isma Ishak, Siti Nur Ila Mat Kamal, Suhaila Osman</i>	
RESIDENTIAL REGISTRATION SYSTEM (ReRS)	151
<i>Mohd Norafizal Abd Aziz, Siti Aishah Mohamad, Eily Azer, Mat Huzaini Talib</i>	
SEJOOK 2.0: THE REUSABLE TAMARIND COLD PATCH	152
<i>Nor Atikah Husna Ahmad Nasir, Norlin Shuhaime, Nur Syafiqah Rahim, Sharir Aizat Kamaruddin, Ahmad Zuhairi Abd Rahman</i>	
JACKFRUIT (<i>Artocarpus Heterophyllus</i>) PEEL PAPER	153
<i>Fairuzdzah Ahmad Lothfy, Amran Shafie, Nur Athirah Mohd Khalid, Norihan Yahya, Ab Malik Marwan Ali</i>	

SIRS: A SOLUTION TOWARDS MONITORING STUDENTS' PARTICIPATION DURING ONLINE DISTANCE LEARNING (ODL) IN UiTM CAWANGAN PAHANG	154
<i>Muhd Eizan Shafiq Abd Aziz , Mohd. Ikhsan Md. Raus , Mohd Khairul Ikhwan Zolkefley , Juhaida Ismail , Nazirah Ramli</i>	
La_{0.8}Na_{0.2}-xLi_xMnO₃ (x = 0 and 0.15) MANGANITES: NEXT GENERATION SPINTRONIC BASED DEVICES	155
<i>Norazila Ibrahim, Nur Amirah Zahrin, Rozilah Rajmi, Zakiah Mohamed, Ahmad Kamal Yahya</i>	
<i>Swietenia macrophylla</i> MEDICATED ACNE CREAM	156
<i>Non Daina Masdar, Noor Hafizah Uyup, Muhammad Akmal Roslani, Zamzila Erdawati Zainol, Muhammad Azhar Zukffle</i>	
JIGSAW PUZZLE ANIMATION METHOD ON LEARNING CHEMICAL EQUATION AND FORMULA	157
<i>Muhammad Harith Haiqal Halmi, Nor Hayati Muhammad, Razif Muhammed Nordin, Zaidah M. Hashim</i>	
GIRANG SAINS!	158
<i>Ang Lee Sin, Mohd Hafiz Yaakob, Zaidi Ab Ghani, Norlin Shuhaime, Nur Atikah Husna Ahmad Nasir</i>	
ANIMAL HAZARDS ROAD PROFILE (AnizardsPro) APP	159
<i>Mohd Fairuz Bachok, Hairol Anuar Haron, Siti Hawa Rosli, Farah Wahida Mohd Latib, Zulfairul Zakariah</i>	
KALUMINA: POTASSIUM BASED ALUMINA SUPPORTED CATALYST FOR BIODIESEL PRODUCTION	160
<i>Muhammad Amirul Hakim Lokman NolHakim, Norshahidatul Akmar Mohd Shohaimi, Mohd Lokman Ibrahim, Wan Nur Aini Wan Mokhtar, Zul Adlan Mohd Hir</i>	
CATEX: CATALYTIC EXTRACTION OF ACIDIC PETROLEUM CRUDE OIL	161
<i>Noraini Safar Che Harun, Norshahidatul Akmar Mohd Shohaimi, Shaari Daud, Ahmad Zamani Ab Halim, Susilawati Toemen</i>	
PHYSICAL CHANGES OF CRESOL RED-DYED OLYHYDROXYETHYLMETHACRYLATE (PHEMAG) TO RADIATION	162
<i>Nur Sha'adah Zainuddin, Wan Noni Afida Ab Manan</i>	
PALM KERNEL SHELL (PKS) REFLEXOLOGY	163
<i>Liliwirianis N., Wan Zuraida Wan Mohd Zain, Mohamad Rusdi Jabani Affandi Mohamad, Eizlan Huzzaini Ma'mun, Nur Atikah Zaharulil, Nur Amira Hamid</i>	
UPIK DATA DEPOSITION SYSTEM: THE NEW WAY OF RECORDING STAFFS' EXPERTISE DATA SYSTEM	164
<i>Nur Izzati Khairudin, Lee Sin Ang, Siti Nurlia Ali, Athifah Najwani Shahidan, Shukor Sanim Mohd Fauzi</i>	

INTUITIONISTIC FUZZY TIME SERIES FORECASTING MODEL: PRESERVING THE NATURE OF DATA	165
<i>Nik Muhammad Farhan Hakim Nik Badrul Alam, Nazirah Ramli, Asyura Abd Nassir, Ainun Hafizah Mohd, Afiqah Bazlla Md Soom</i>	
EFFICACY OF NATURAL PLANT EXTRACTS ON GROWTH PERFORMANCE OF <i>Capsicum frutescens</i>	166
<i>Nur Faezah Omar, Nurul Athirah Abu Hasan, Noor Zuhairah Samsuddin</i>	
FOOT MASSAGE RUBBER PAD FROM NATURAL RUBBER LATEX/ DURAIN SKIN FIBER BLENDS	167
<i>Suradet Matchawet, Hasan Daupor, Ajaman Adair</i>	
SANDYP: FUTURE GREEN POFA SAND FOR IBS	168
<i>Siti Rahimah Rosseli, Muhd Norhasri Muhd Sidek, Nor Hafida Hashim, Nor Hafizah Hanis Abdullah, Mazlina Razali</i>	
50 COMMON MISTAKES IN C++: DISCOVER THE MISTAKES TO PREVENT MISTAKES	169
<i>Rashidah Mokhtar, Safura Adeela Sukiman, Azrina Suhaimi, Mohd Lezam Lehat</i>	
EVALUATION OF VITAMIN C IN PAEDERIA FOETIDA	170
<i>Siti Nurhajar Razihan, Nor Habibah Mohd Rosli, Norihan Yahya, Wan Siti Atikah Wan Omar</i>	
COLORIMETRIC SENSOR FOR IRON DETECTION	171
<i>Saluma Samanman, Charuwan Daengrot, Asland Hilae, Sureeluk Ma, Ibrahim Sayoh, Hafeena Yakob</i>	
UiTM FLEXIBER	172
<i>Ahmad Dzulkarnain Ismail, Ellail Ain Mohd Aznan, Mohd Syafiq Miswan, Masshera Jamaludin, Azzura Kamarudin, Nurul Farha Zainuddin</i>	
EFB BIOCHAR GREEN FILLER	173
<i>Faiezah Hashim, Nurul Aizan Mohd Zaini, Nor Hafizah Che Ismail, Siti Nor Din, Zainathul Akhmar Salim Abdul Salim</i>	
SEASHELL POLYPROPYLENE BIOCOMPOSITES	174
<i>Norihan Yahya, Nor Habibah Mohd Rosli, Fairuzdzah Ahmad Lothfy, Muhammad Rizqeen Syafri Azman, Nurul Aida Mohammed Zaffir</i>	
GET: A SOLUTION FOR INDUSTRIAL WASTEWATER TREATMENT	175
<i>Wan Izhan Nawawi, Zainab Razali, Dya Syaleyana, Nor Azira Irma, Syarifah Nursyimi, Khairunnisa, Mohd Azlan Mohd Ishak, Khudzir Ismail</i>	
VERMICOMPOSTING OF CHICKEN WASTE	176
<i>Noor Zuhairah Samsuddin, Fatin Nabila Abd Rashid, Nur Faezah Omar Norhanani Ahmad</i>	
AN ENVIRONMENTALLY AND FRIENDLY POFA-SAWDUST CONCRETE PAVEMENT	177
<i>Jamilah Abd Rahim, Nurul Faiizin Abdul Aziz, Duratulain Tholibon, Hamizah Mohktar</i>	

ZONING STUDIES AT CULTURAL HERITAGE SITES OF KOLAM TUJUH TAMBAK VILLAGE LANGGAM DISTRICT PELALAWAN	178
<i>Mira Hafizhah T, Siti Nurhaliza, Faizan Dalila, Dwita R Martania</i>	
HERBAL COUGH REDUCING PADS FROM HYDROGEL COATED NATURAL RUBBER	179
<i>Ajaman Adair, Haleesah Nadee</i>	
DURABILITY OF RESIN TREATED KELEMPAYAN WOOD (<i>Neolamarckia cadamba</i>)	180
<i>Siti Zalifah Mahmud, Norhafizah Rosman, Nur Hannani Abdul Latif, Norashikin Kamarudin, Ainul Munirah Abdul Jalil, Mazlin Kusin</i>	
PARENT TEACHER ASSOCIATIONS MOBILE APPLICATION (PTA-MA)	181
<i>Norziana Yahya, Huda Zuhrah Ab Halim, Nur Fatimah Fauzi, Nur Izzati Khairudin, Nurizatul Syarfinas</i>	
ZESA: A ZERO-ENERGY FOR SOILLESS AGRICULTURE	182
<i>Nur Nasulhah Kasim, Azlan Abdul Aziz, Nur Faezah Omar, Siti Nurlia Ali, Syarifah Nursyimi Azlina Syed Ismail, Asnida Yanti Ani, Nurul Fatimah Abd Latip, Siti Zulaikha Zainal Abidin, Umi Nabihah Muhamad Shukur, Zur Hanis Suraya</i>	
SOFTWARE SUSTAINABILITY ASSESSMENT TOOLKITS TOWARDS GREEN COMPUTING	183
<i>Ruzita Ahmad, Shukor Sanim Mohd Fauzi, Tajul Rosli Razak, Nurul Ain Mohd Zaki, Mohammad Hafiz Ismail, Ruhaila Maskat, Ray Adderley JM. Gining</i>	
GREENATION: UPCYCLING OF PLASTIC MATERIALS INTO WOOD PLASTIC COMPOSITES (WPC)	184
<i>Noorshashillawati Azura Mohammad, Siti Noorbaini Sarmin, Noryuziah Mohd Yunus, Siti Zalifah Mahmud</i>	
“EJAPANTAS”: MOBILE AUGMENTED REALITY INTERVENTION FOR DYSLEXIA EARLY PRONUNCIATION SKILLS	185
<i>Aznoora Osman, Nur Ilya Farisha Mohd Jazari, Nadia Abdul Wahab, Badrul Hisham Ahmad</i>	
THE PERFORMANCE IMPROVEMENT IN PROCESS FROZEN DURIAN PACKING. CASE STUDY: SAN FROZEN FRUIT CO.	186
<i>Narissa Patthanapreechawong, Nalina Samae</i>	
A FLEXIBLE EPOXIDIZED 30% POLY (METHYL METHACRYLATE)-GRAFTED NATURAL RUBBER POLYMER ELECTROLYTES FOR SUPERCAPACITOR	187
<i>Khuzaimah Nazir, Nabilah Akemal Muhd Zailani, Faiezah Hashim, Sharifah Nafisah Syed Ismail, Ab Malik Marwan Ali</i>	
Seringueira SEEDS: WASTE TO WEALTH FUEL FEEDSTOCK	188
<i>Siti Norhafiza Mohd Khazaai, Sarah Laila Mohd Jan, Shaari Daud, Shahida Hanum Kamarullah, Gaanty Pragas Maniam</i>	

WHITE SANDALWOOD EXTRACTION FOR PREPARATION OF SOLID PERFUME	189
<i>Supojjaneer Sansook, Aslan Hilae, Nuramalee Denamo, Narisa Binhayeeding, Nurhaseekin Yaakob</i>	
NETWORK DEFENCE ENHANCEMENT VIA PENETRATION TESTING IN SANDBOX ENVIRONMENT	190
<i>Abidah Mat Taib, Muhammad Firdaus Aiman Ahmad Zulfa, Mohd Faris Mohd Fuzi, Rafiza Ruslan, Muhammad Azizi Mohd Ariffin</i>	
KILIM AQUA MAPS 2.0 – MONITORING INSTRUMENTS FOR RIVER ACIDIFICATION AND CLIMATE CHANGE FOR SUNGAI KILIM, LANGKAWI	191
<i>Sharir Aizat Kamaruddin, Muhammad Akmal Roslani, Khairul Naim Abd.Aziz, Zamzila Erdawati Zainol, Aziani Ahmad</i>	
KOK WATER MAPS 2.0 – MONITORING INSTRUMENTS FOR COASTAL ECOSYSTEM FOR PANTAI KOK, LANGKAWI	192
<i>Sharir Aizat Kamaruddin, Muhammad Akmal Roslani, Khairul Naim Abd.Aziz, Rohayu Ramli, Jamil Tajam</i>	
ACADEMIC CONFERENCE, INVENTION, INNOVATION AND DESIGN (IID) MANAGEMENT SYSTEM	193
<i>Roger Canda, Zulazeze Sahri, Juhaida Ismail, Rozeleenda Abdul Rahman, Siti 'Aisyah Sa'adan, Mohd. Azim Bin Zainal</i>	
MICROPROPAGATION OF MEDICINAL HERB, <i>Tacca integrifolia Ker-Gawl.</i> (WHITE BATFLOWER)	194
<i>Sarina Hashim, Muzamil Mustaffa, Nor Lailatul Wahidah Musa, Ahmad Bukhary Ahmad Khair</i>	
SLOPE REHABILITATION STABILITY ESTIMATION CHART	195
<i>Mohd Mustaqim Mohd Nordin, Wan Ahmad At-Tirmidzi Wan Abdullatif, Nureen Athirah Muhammad Suhaimi, Amirah Addiana Mohtazulhasni, Muhammad Afizul Mohd Afif</i>	
WINDSTORM RISK FOREWARNING (WiskWarn) APP	196
<i>Farah Wahida Mohd Latib, Ainamardia Nazarudin, Noor Safwan Muhamad, Ahmad Amzari Yaccob, Mohd Fairuz Bachok</i>	
SEABIO CREAM –SEAWEED AND PINEAPPLE BIOACTIVE COMPLEX IN SKINCARE	197
<i>Ahmad Suhail Khazali, Sharir Aizat Kamaruddin, Nur Syafiqah Rahim, Shafinas Abdullah, Nur Faizah Ahmad Fauzi</i>	
EFFECTIVENESS OF BAMBOO VINEGAR TOWARDS THE PESTS OF HARUMANIS (MA128), <i>Mangifera indica</i> L.	198
<i>Nurul Fatimah Abd Latip, Mohd Saiful Akbar Muhammad Sahal, Mohammad Azizi Abdullah, Nur Faezah Omar, Nur Nasulhah Kasim, Yeng Fock Lai</i>	
SMART MOTORIZED GRILL	199
<i>Noor Hafiz Noordin, Ab Aziz Mohd Yusof, Mohd Fahmi Md Salleh, Hazim Sharudin, Haszeme Abu Kasim</i>	

INTERNAL COMBUSTION ENGINE MODEL	200
<i>Mohd Fahmi Md Salleh, Noor Hafiz Noordin, Ab Aziz Mohd Yusof, Hazim Sharudin, Haszeme Abu Kasim</i>	
MALAYSIA'S NATURAL KAOLINITE AS GREEN ADSORBENT FOR REMOVAL OF DYE IN AQUEOUS SOLUTION	201
<i>Ruhaida Rusmin, Izzan Salwana Izman, Mohd Rafie Johan</i>	
LICHTENBERG FIGURE ON <i>Acacia</i>'S TABLETOP	202
<i>Mazlin Kusin, Muhammad Toha Azmi, Siti Zalifah Mahmud, Norhafizah Rosman, Siti Noorbaini Sarmin</i>	
MULTI-MODAL SENSOR FOR IN-CAR-ABANDONED CHILDREN DETECTION	203
<i>Masayu Norman, Mohammad Hafiz Ismail, Zuraihan Mohamad, Fazly Amri Mohd, Ashnita Rahim, Helmi Zulhaidi Mohd Shafri</i>	
IMPLEMENTING HEUTAGOGY IN ENGLISH PRONUNCIATION FOR ONLINE DISTANCE LEARNING (ODL)	204
<i>Noorfaizalfarid Mohd Noor, Latisha Asmaak Shafie, Nuralya Maisarah Binti Kamarulzaman</i>	
PORTABLE DRESSING TABLE	205
<i>Norhafizah Rosman, Nur Syaima Zainol, Siti Zalifah Mahmud, Noorshashillawati Azura Mohamad, Mazlin Kusin</i>	
i-MediKids: CHILD HEALTH RECORD SYSTEM WITH IMMUNIZATION APPOINTMENT REMINDER	206
<i>Nadia Abdul Wahab, Nor Marlina Sahabudin, Aznoora Osman, Norfiza Ibrahim, Siti Sarah Md Ilyas</i>	
EGGSHELL – TAPIOCA COMPOSITE: AN ECO-FRIENDLY BIOPLASTIC	207
<i>Norihan Yahya, Nor Habibah Mohd Rosli, Fairuzdzah Ahmad Lothfy, Siti Nuraisyah Kamarulzaman, Zulatikah Md Khanapi</i>	
LIBRARY SYSTEM FOR MANGROVE SPECIES	208
<i>Zuraihan Mohamad, Masayu Norman, Helmi Zulhaidi Mohd Shafri, Fazly Amri Mohd, Ashnita Rahim, Ahmad Yusri Dak</i>	
DEVISING IMPACTFUL WEBSITE FOR RESEARCHERS	209
<i>Noorfaizalfarid Mohd Noor, Nurul Ain Mohd Zaki, Nor Athirah A'sri</i>	
BIODEGRADABLE RICE-HUSK PLATE	210
<i>Mohd Syamaizar Mustafa, Zuliahani Ahmad, Nor Mazlina Abdul Wahab, Naiman Sarip, Sharifah Nafisah Syed Ismail</i>	
INDUCTING EFFICACIOUS ACADEMICS' PROFILE WEBSITE TENETS	211
<i>Noorfaizalfarid Mohd Noor, Fazly Amri Mohd, Nur Farah Waheeda Zaidi</i>	

VIRTUAL RUN MANAGEMENT SYSTEM (VRMS) <i>Nur Alishah Hamzah, Noor Wahida Jamil, Nur Syuhada Muhammad Pazil, Nurul 'Azwa Kamarudin</i>	212
REAL-TIME MONITORING OF RIVER WATER POLLUTION USING MULTIPLE SENSOR SYSTEM <i>Evizal Abdul Kadir, Apri Siswanto, Sri Listia Rosa</i>	213
IDENTIFICATION OF FIRE HOTSPOT ON PEATLAND AREA IN RIAU PROVINCE, INDONESIA <i>Evizal Abdul Kadir, Abdul Syukur, Sri Listia Rosa</i>	214
COMPARISON OF MD6, SHA3(KECCAK) AND BLAKE2B HASH BASED ON TIME AND AVALANCHE <i>Palaniappan Shamala, Ahmed Fadel, Muruga Chinniah</i>	215
A NEW FLEXIBLE BIOPOLYMER NANOCOMPOSITE ETHANOL GAS SENSOR <i>Vicinisvarri Inderan, Hooi Ling Lee, Norain Isa, Mohamed Syazwan Osman</i>	216
CorrBreak: ANTICORROSIVE AGENT FROM TANNIN FOR ALLOY PROTECTION <i>Solhan Yahya, Afidah Abdul Rahim, Rohana Adnan</i>	217
 SOCIAL SCIENCE & HUMANITIES CATEGORY A 	
COMPLAINING STRATEGIES USED BY SURABAYAN STUDENTS AND MADURESE STUDENTS: A CROSS CULTURAL STUDIES <i>Alda Fitriani Suwand</i>	218
REQUEST LIKE, COMMENT AND SUBSCRIBE ON YOUTUBE CHANNEL: COMPARISON OF INDONESIAN AND MALAYSIA CULTURE <i>Awaliyah Ainun Niswah, Ni Wayan Sartini</i>	219
COMPLAINING STRATEGIES USED BY GERMAN AND INDIAN: STUDY OF CROSS-CULTURAL PRAGMATICS <i>Savira Uswatun Hasanah, Ni Wayan Sartini</i>	220
FUN LEARNING @ MCO3.0: SMALL BRICKS + BIG BRICKS <i>Irhamna Fikri Fadli Fizari, Ar-Rayyan Fikri Fadli Fizari, Fadli Fizari Abu Hassan Asari, Azlina Mat Saad, Azlina Zid</i>	221
EASY - PEASY" MATH GAME: LETS DIY @ MCO3.0 <i>Ar-Rayyan Fikri Fadli Fizari, Irhamna Fikri Fadli Fizari, Fadli Fizari Abu Hassan Asari, Azlina Mat Saad, Azlina Zid</i>	222
INNOVATION OF FLASHCARD LEARNING MEDIA BASED ON VIRTUAL REALITY IN ENLARGING LEXICAL RESOURCES OF DEAF AND HARD OF HEARING (DHH) CHILDREN <i>Genada Asaika</i>	223

WEBINAR INVESTMENT LINK PROVIDERS (WILiP)	224
<i>Nur Athirah Nor Azman, Nur Atikah Ismail, Nur Fatin Allya Abdul Halim, Nur Intan Solihah Mohd Saufian, Zuraidah Sipon</i>	
MONEY MOMENTUM	225
<i>Nur Jannah Naili Mohd Rozali, Nur Shahira Mohd Nuti, Nur Izzatur Fatihah Muhammad Tahir, Annur Akmal Mohd Hazedri, Zuraidah Sipon</i>	
inCAMPUS eWALLET (iCe)	226
<i>Muhammad Afiq Fikri Mohd Nazri, Muhammad Zafri Zambari, Muhammad Aiman Hassani Abd Nasir, Mohamad Luqman Afiq Zulkifli, Zuraidah Sipon</i>	
THE EFFECTIVENESS OF AN ACCOUNTING ON THE BLOCK (AOTB) BOARD GAMES TOWARD ACCOUNTING STUDENTS' PERFORMANCE DURING COVID-19 PANDEMIC	227
<i>Suliza Suhaimin, Nurul Hassanah Hamzah, Humairaa Hasan, Norlaila Md Din, Mohamad Azmi Nias Ahmad</i>	
A PERMATIWB MODEL IN EDUCATIONAL INSTITUTIONS	228
<i>Nor Fauziana Ibrahim, Norida Abdullah, Hasan Saleh, Afandi Yusof</i>	
EMPLOYERS' PERSPECTIVES ANALYSIS ON GRADUATES' EMPLOYABILITY SKILLS USING ASSOCIATION ANALYSIS	229
<i>Chin Hang Goh, Rohayu Mohd Salleh</i>	
AOTB GAMES AS A TEACHING TOOLS TO EASE UP WORKLOAD BURDEN DURING COVID-19	230
<i>Nurul Hassanah Hamzah, Suliza Suhaimin, Umairaa Hasan, Norlaila Md Din, Mohamad Azmi Nias Ahmad</i>	
THE IMPACT OF USING AOTB BASIC CARD GAMES AS TEACHING TOOLS ON STUDENT'S SATISFACTION DURING COVID-19	231
<i>Humairaa Hasan, Suliza Suhaimin, Nurul Hassanah Hamzah, Norlaila Md Din, Mohamad Azmi Nias Ahmad</i>	
COLLAPSIBLE GARDEN POTBAG	232
<i>Nur Illani Abdul Razak, Alwin Octavian Bidol, Ahmad Aiman Alias, Muhammad Zaim Azizi Shahidi</i>	
LEARNING AND EMBRACING CULTURE AND LANGUAGE THROUGH FILM: A CROSS CULTURAL PRAGMATICS STUDY	233
<i>Mahanani Estuningtyas</i>	
AGRO-ESSENTIAL 3-IN-1 PLANTING TOOLS	234
<i>Nur Illani Abdul Razak, Muhammad Sazri Azahri, Siti Nur Dhuha Kalit, Iszan Fakhrie Amer Roslizan</i>	
JAWI E-LEARNING SYSTEM WITH EMAIL NOTIFICATION (e-JAWI)	235
<i>Noor Afifah Kamaludin, Noor Wahida Jamil, Nur Syuhada Muhammat Pazil, Nurul 'Azwa Kamarudin</i>	
A COMPARISON OF STUDENTS' QUALITY OF LIFE AT BAN PHRU BUA SCHOOL, NAKHON SI THAMMARAT EDUCATIONAL AREA DISTRICT OFFICE 3, THAILAND	236
<i>Sakarin Jantaramanee, Supawan Promprao, Yhodpha Ratmanee</i>	

**SOCIAL SCIENCE & HUMANITIES
CATEGORY B**

THE ADMINISTRATIVE MODEL OF ETHICAL DEVELOPMENT FOR STUDENTS OF PRINCESS OF NARADHIWAS UNIVERSITY <i>Sirikanya Kanthong</i>	237
POLITICAL INTERVENTION SCANNER (PIS) <i>Nurul Azlin Azmi, Fazrul Hanim Abd Sata, Noor Hidayah Ab Aziz, Norhidayah Abdullah</i>	238
THE LIVELY ACCOUNTING <i>Norliana Omar, Amir Hakim Osman, Noor Saatila Mohd Isa, Irda Syahira Khair Anwar, Mohd Taufik Mohd Suffian</i>	239
IMPACT OF MINAPOLITAN DEVELOPMENT PROGRAM IN KUANTAN SINGINGI, RIAU PROVINCE (CASE STUDY: WARSAWA VILLAGE) <i>Puji Astuti, Apriyan Dinata, Yogiiani Aurorina, Windy Fatmala</i>	240
OPTIMIZING YOUR COST WITH COST-IT-RIGHT <i>Lily Mazlifa Mustafa, Nor Hawani Wan Abdul Rahman, Sabariah Jamaluddin, Anis Barieyah Mat Bahari, Noor Hasimah M. Yacob, Nur Syazwani Mohammad Fadzillah</i>	241
EDUCATION 4.0: TECHNOLOGY READINESS INDEX AMONG ACADEMICIANS <i>Rashidah Mokhtar, Nur Huda Jaafar, Zuriati Ismail, Mazlyda Abd Rahman, Mohd Hanafi Azman Ong</i>	242
ONLINE LEARNING ENLIGHTENING GUIDE (OLeEG) <i>Suhanom Mohd Zaki, Mohd Aidil Riduan Awang Kader, Musramaini Mustapha, Nurul Nadia Abd Aziz, Zaidatul Nadiyah Abu Yazid</i>	243
e-RECYCLING AWARENESS KIT (e-RAK): INTERACTIVE ONLINE LEARNING AID FOR KIDS <i>Suhanom Mohd Zaki, Saifudin Razali, Mohd Faizal Azrul Azwan Muhammed, Mas'udah Asmui, Musramaini Mustapha</i>	244
SUBJECT'S WEEKLY-THINGS-TO-DO ITINERARY: CHARTING STUDENTS' OPEN AND DISTANCE LEARNING (ODL) ACTIVITIES <i>Rahimah Mohamed Yunos, Syahrul Ahmar Ahmad, Siti Masnah Saringat</i>	245
BEG METODE MATAku 20/20 <i>Suraidah Daud, Norfaizah Fuad, Suliadi Firdaus Sufahani, Engku Mohd Nasri Engku Mat Nasir, Mohd Erwandi Marwan</i>	246
EMBRACING LOCKDOWN WITH LOVE <i>Syazwani Ya, Humaira Zainon, Zainon Shaari, Aslah Musafir Kelana, Fadli Fizari Abu Hassan Asari</i>	247
TEACHING ON THE GO <i>Nurul Aien Abd Aziz, Mohd Hafizan Musa, Rusnani Mohamad Khalid, Shaherah Abdul Malik, Noreen Noor Abd Aziz</i>	248

CSI-KIT NAVIGATOR	249
<i>Raja Adzrin Raja Ahmad, Noor Hidayah Ab Aziz, Norhidayah Abdullah, Noor Azrin Zainuddin, Saunah Zainon</i>	
ARAU POETRY FESTIVAL: A THERAPEUTICAL CREATIVE AGENT OF CHANGE	250
<i>Latisha Asmaak Shafie, Surina Nayan, Nor Alifah Rosaidi, Razlina Razali, Muhammad Nur Akmal Subuhi, Nazira Osman, Nor Azira Mohd Radzi, Noorazalia Izha Haron</i>	
INCORPORATING DIGITALIZATION INITIATIVES IN THE ISLAMIC BANKING INDUSTRY	251
<i>Nor 'Adha Ab Hamid, Tuan Nurhafiza Raja Abdul Aziz</i>	
MALAYSIA AS AGEING SOCIETY BY 2030: INITIATIVES ON ELDERLY ASSISTANCE	252
<i>Nor 'Adha Ab Hamid, Nur Zulfah Md Abdul Salam, Sharifah Hana Abd Rahman, Mohd Farok Mat Nor, Mohamad Hafifi Hassim, Mashitah Nabees Khan</i>	
EVA: AN ELECTRONIC EVALUATION FOR LECTURERS' TEACHING PORTFOLIO	253
<i>Tengku Intan Suzila Tengku Sharif, Ahmad Nazri Jelani, Mohd Yusri Mohamad Noor</i>	
SOCIAL ENTREPRENEURSHIP MODEL TO ENHANCE SOCIO-ECONOMIC STATUS FOR INDIGENOUS COMMUNITY VIA SOCIAL MEDIA PLATFORM	254
<i>Wan Mohd Norsyam Wan Norman, Nurul Diyana Sanuddin, Maisarah Mohd Saleh, Siti Aishah Abd Rahman</i>	
TCD (TABLE CONNECTOR DESIGN)	255
<i>Ramlan Mustapha, Nor Hapizah M. Burhan, Mohd Nasrul Hakim Roslan, Wan Azmi Wan Ahmad, Asjad Mohamad</i>	
GLOBAL EDUCATORS PROGRAM	256
<i>Nazira Osman, Nor Azira Mohd Radzi, Noorazalia Izha Haron, Fazmawati Zakaria, Fatin Najihah Ramli, Latisha Asmaak Shafie, Surina Nayan, Nor Alifah Rosaidi, Razlina Razali</i>	
MEMORY AID KIT(MAK) V.2 FOR TEACHING ACCOUNTING THEORIES	257
<i>Nor Kartini Mohd Rodzi, Norshimah Abdul Rahman, Susilawani Ayob, Salwana Selamat, Noor Azura Zainuddin</i>	
INVERTED UBIQUITOUS LEARNING MODEL	258
<i>Azrul Abdullah, Mohamad Fadhili Yahaya, Norshamshina Mat Isa, Azila Azmi, Nurwahida Fuad</i>	
SOUNDS OF FICTION: USING SONGS TO TEACH SHORT STORIES IN THE ESL CONTEXT	259
<i>Mohd Rozaidi Ismail, Roslina Abdul Aziz, Nadhratunnaim Abas, Khairunisa Nikman</i>	
FEATURES AND SPECIFICATIONS OF SENIOR RESIDENCE SAFETY: EXPLORING CARE CENTER PERSPECTIVES	260
<i>Sharifah Hana Abd Rahman, Nor 'Adha Ab Hamid, Nur Zulfah Md Abdul Salam, Mohd Farok Mat Nor, Mashitah Nabees Khan</i>	

COVID 19 E-BOOK: HOW MALAYSIA IS FACING IT	261
<i>Izleen Ibrahim, Mohamad Najib Mohamad Fadzil, Noraini Noordin, Siti Sarah Raseli, Norpah Mahat</i>	
Ei-Si – APPLICATION MODEL OF INITIAL EMOTIONAL CONSULTATION	262
<i>Nurshahira Ibrahim, Sakinatul Raadiyah Abdullah, Maziah Mahmud</i>	
CURBING TARGET PANIC: ONCE AND FOR ALL	263
<i>Mohamad Azmi Nias Ahmad, Kamarul Hisyam Kamaruzzaman, Mukhriz Mohamed, Muhammad Marbawi Sulaiman, Muhammad Nazmi Fitri Roduan</i>	
RUNNING MEET	264
<i>Huzaifah A Hamid, Nur Fairuz Wahida Ibrahim, Yang Salehah Abdullah Sani, Norlin Shuhaime, Nor Atikah Husna Ahmad Nasir</i>	
ELLENA: A MOBILE BLENDED LEARNING ROLE PLAYING GAMES APP FOR EFL/ESL READING	265
<i>Tengku Intan Suzila Tengku Sharif, Siti Wulan, Akmal M. Hum, Mohd Yusri Mohamad Noor</i>	
SMART SIMMATCH(V2): AN INTERACTIVE TOOL TO TEACH HIJAIYAH LETTERS AND TAJWEED RULES	266
<i>Norlaila Md Din, Roslina Abdul Aziz, Suzaini Harmiruslin Supian, Fatin Sabrina Abdul Sukor, Mohamad Azmi Nias Ahmad</i>	
ENJOYMATHS 2.0: FRACTIO TO DECIMO POKETTO	267
<i>Norlaila Mohd Din, Nazirah Ramli, Siti Rosiah Mohamed, Ainun Hafizah Mohd, Noor Izyan Mohamad Adnan</i>	
ONLINE IMPLEMENTATION OF CA-T LESSONS AND CHALLENGES TO BE OVERCOME IN ENGLISH CONVERSATION TEACHING	268
<i>Nasree Pitaksuksan, Kemtong Sinwongsuwat</i>	
e-ZAWAF: ONLINE ZAKAT APPLICATION AND DISTRIBUTION SYSTEM	269
<i>Azlan Abdul Aziz, Basri Abd Ghani</i>	
SELF-PSYCHOSPIRITUAL THERAPY THROUGH THE SYIFA' TO YOU (SYIFA' 2U) MOBILE APPLICATION	270
<i>Fauzi Azmi, Noraini Mohamed, Siti Zafrina Mohd Zahari, Muhammad Muzakkir Othman @ Seman, Siti Norma Aisyah Malkan @ Molkan, Nurul Hidayah Che Hassan, Rosfarhani Daud</i>	
AOTB CASHFLOW: GAUGING ITS POTENTIALS DURING COVID-19	271
<i>Norlaila Md Din, Mohamad Azmi Nias Ahmad, Junaidah Jamaluddin, Nur Syazwani Mohammad Fadzillah, Faizan Abd Jabar</i>	
SULH INNOVATION IN SETTLING THE DISPUTES	272
<i>Tuan Nurhafiza Raja Abdul Aziz, Nor 'Adha Ab Hamid</i>	
A VOICE-BASED APPLICATION SYSTEM FOR AUTISM CHILDREN TO LEARN RECITING THE AL-QURAN (VB-QURAN-AUT)	273
<i>Nurulisma Ismail, Mohammad Aliff Hatim Norazam, Suhaizam Ghazali</i>	

THE SAFE HOUSING MODEL FOR ELDERLY: A PILOT STUDY	274
<i>Nur Zulfah Md Abdul Salam, Nor 'Adha Ab Hamid, Sharifah Hana Abd Rahman, Mohd Farok Mat Nor, Mohamad Hafifi Hassim, Mashitah Nabees Khan</i>	
SOCIAL ENTERPRISE ACCOUNTING AND OPERATING INFORMATION SYSTEM (SERi): MIGRATING TO CLOUD PLATFORM DURING COVID-19	275
<i>Azizi@Hamizi Hashim, Mohamad Azmi Nias Ahmad, Mohd Zulfikri Abd Rashid, Azlan bin Md Thani, Junaidah Jamaluddin</i>	
DISPOSABLE HAND MADE FACE SHIELD	276
<i>Abdul Hapes Mohammed, Eliy Nazira Mat Nazir, Nurul Fatihah Abd Latip, Mimi Diana Ghazali, Nur Firdaus Abdul Rashid, Siti Hannariah Mansor</i>	
ISLAMIC TRADITIONAL ARCHERY-GOLF-TOP (ITAGoTop) A NEW COMBINATION LEISURE SPORT AND GAMES	277
<i>Jamalia Aurani, Nadiyah Hashim, Siti Maryam Abdul Wahab, Ahmad Fikri Mohd Kassim, Ahmad Dzulkarnain Ismail</i>	
A SMART-COMFORTABLE-SHARIAH COMPLIANT MUSLIM WOMEN TRADITIONAL ARCHERS' JERSEY-VEST	278
<i>Jamalia Aurani, Nadiyah Hashim, Siti Maryam Abdul Wahab, Ahmad Fikri Mohd Kassim, Ahmad Dzulkarnain Ismail</i>	
THE HUNGER GAMES: GAMIFICATION IN FOOD PRESERVATION TECHNOLOGY	279
<i>Nurul Asyikin Md Zaki, Noorsuhana Mohd Yusof, Siti Noor Suzila Maqsood-ul-Haque, Syafiza Abd Hashib, Ummi Kalthum Ibrahim</i>	
ICDF INTEGRATED MODEL IN DEVELOPING ISLAMIC PEERS MENTORING MODULE	280
<i>Noraini Ismail, Afiffudin Mohammed Noor, Zuraimy Ali, Nor Alifah Rosaidi, Ummi Syarah Ismail, Nadhilah Abdul Pisal</i>	
MODEL FOR SUSTAINABILITY & MANAGEMENT OF WAQF PROPERTIES IN JOHOR	281
<i>Norintan Wahab, Rahmawati Mohd Yusoff, Rosnani Mohd Salleh, Siti Mariam Atan</i>	
GAMIFICATION IN PROMOTING THE AWARENESS ON RECYCLING BEHAVIOUR AMONG KINDERGARTEN STUDENTS	282
<i>Adibah Hussin, Nor Aziah Abd Kadir, Nurfakhzan Marwan, Rosmah Nizam</i>	
BUSINESS ADMINISTRATION	
CATEGORY A	
CAMPGAIN- INNOVATIVE LEARNING	283
<i>Mohamad Amin Muqtadir Mohamad Rosli, Ezzah Syahirah Johan Marsh, Siti Amira Aisyah Azman, Jaslin Md Dahlan</i>	

**BUSINESS ADMINISTRATION
CATEGORY B**

DEVELOPMENT OF LECTURERS' ORGANIZATIONAL CITIZENSHIP BEHAVIORS MEASUREMENT FOR ONLINE LEARNING	284
<i>Shaiful Annuar Khalid, Norshimah Abdul Rahman, Shafiq Shahrudin, Athifah Najwani Shahidan, Mohd Aiman Arifin, Noraini Nasirun</i>	
ECONOMIC ANALYSIS IN THE IMPLEMENTATION OF POLYMER GEL INJECTION TO INCREASE OIL RECOVERY BASED ON GROSS SPLIT CONTRACTS	285
<i>Muhammad Ariyon, Gika Meiwanda</i>	
DGM@BA252	286
<i>Jaslin Md Dahlan</i>	
SUKUK Gr-NEXUS (SGN)	287
<i>Roslina Mohamad Shafi, Tan Yan Ling</i>	
NIAT: THE NEW NORM OF ECONOMICS TEACHING & LEARNING	288
<i>Fadli Fizari Abu Hassan Asari, Suriyani Muhamad, Azlina Zid, Norhisam Bulot, Wan Mohd Yaseer Mohd Abdoh</i>	
MIND MAP: SIMPLE YET SIGNIFICANT!	289
<i>Fadli Fizari Abu Hassan Asari, Azlina Mat Saad, Azlina Zid, Suriyani Muhamad, Syazwani Ya</i>	
A SIMPLE GUIDE TO ACCOUNTING FOR BUSINESS COMBINATION: TEACHING AND LEARNING APPROACH	290
<i>Mohamad Hafiz Rosli, Farhana Hasbolah</i>	
COMMERCIALIZING PRODUCTS THROUGH ECOTOURISM PROJECTS, Et CETERA: CpTOURS	291
<i>Zalina Ibrahim, Saiful Bahari Mohd Yusoff</i>	
SME AND MICROENTERPRISE RISK PROFILING TOOL	292
<i>Oswald Timothy Edward, Aloysius Harry Mukti</i>	

Design and Build a Water Heating System Using a Helical Type Heat Exchanger by Utilizing the Exhaust Heat of The Air Conditioner Condenser

Dedikarni^{1*}, Shandy Kurniadi¹, Trimon P Sinaga¹, Dody Yulianto¹, Eddy Elfiano¹

¹Department of Mechanical Engineering, Islamic University of Riau, Indonesia

Corresponding authors: dedikarni@eng.uir.ac.id

ABSTRACT

To take advantage of the heat energy wasted from the Air Conditioning (AC) system so that it is not wasted and does not cause global warming, a heat exchanger (water heater) is designed. An Air Conditioner Water Heater tube installed in the AC system functions as a heat exchanger to absorb heat from the refrigerant pipe out to the compressor so that the water becomes hot and stored for later use. The heat exchanger planning for heating water in the helical type air conditioning system is carried out to plan the heating material, the length of the heating pipe, the cross-sectional area, and the number of turns of the helical type heat exchanger. From the planning results obtained copper pipe heating material with a diameter of 0.00635 m, a pipe length of 8 m, and several turns of 10, with a tank capacity of 42 liters of water. From the results of the trial planning a heat exchanger (water heater) with an increase in temperature of 42 liters of water by 50°C in 60 minutes.

Keywords: *Energy, Air Conditioner, Water Heating System, Helical Pipes, Temperature*

1. INTRODUCTION

The use of air conditioning is often used in tropical areas, which are known for their hot summer, so the air conditioner is used to lower the temperature and provide thermal comfort. However, the use of air conditioning can have a harmful impact environment. One of the negative impacts of using AC is an increase in environmental temperature resulting from the exhaust heat of the air conditioner just dumped into the environment. The heat energy generated from the air conditioning system can be utilized as new energy so that it is not wasted. One of the utilizations of waste heat the resulting AC condenser is deep heating water. With utilization This means that the application of energy conservation to the AC system can be applied so that the AC is not only used as an air conditioner but also can be used as a water heater, namely the Air Conditioner Water Heater (ACWH) (Aziz et al., 2014).

ACWH is used by utilizing the condenser for exhaust heat heating water that can be used for bathing and other purposes that need warm water. This system uses a heat exchanger connected to the AC system so that in use it does not need additional energy. In this system, there are two advantages at once, namely as air conditioning and as a water heater so that it will save usage energy (Pusponegoro & Putra, 2020)

Looking at the prospects generated from this system, the author wants to use the ACWH system as a water heater can be developed in the community. This is because the costs required are very small and can reduce usage electrical energy so that it has an impact on saving energy

use and can reduce the effect of increased ambient temperature caused by exhaust heat AC condenser.

2. EXPERIMENTAL

This research was conducted at the Mechanical Engineering Laboratory, Faculty of Engineering, the design of the Riau Islamic University was carried out in September 2019. The research methodology was carried out, namely first by conducting a literature study, then conducting a survey and problem identification, then calculating the dimensions of the heat exchanger, which consisted of pipe length, pipe dimensions and a number of pipes to be used, then make a water heater, then if the appliance is functioning, the final step is to conclude from the results of the research that has been successfully carried out. In designing a heat exchanger, it requires several stages in the manufacturing process, so that a desired finished model is produced steam compression cycle with water heater.

2.1 Tools and Materials used

The tools and materials used in this study are one unit of AC Split, Flaring Tool, Tang Ampere, Tube Cutter, Pressure Gauge, Welding of Copper Pipe, Refrigerant R410A, Copper Pipe, Water Storage Tank, Perforated Elbow Iron.

2.2 Sketch Tools

This tool sketch is a form of the tool design process that will be carried out

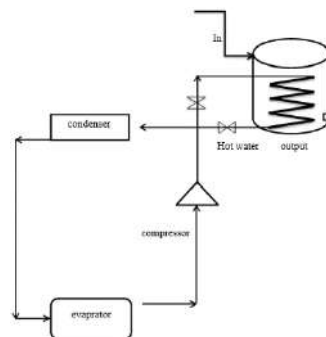


Figure 1. Schematic diagram of the experimental

3. RESULTS AND DISCUSSION

This water heater utilizes the exhaust heat from the 1 PK AC compressor has a high temperature which will experience heat transfer with a deepwater tank that has a low temperature. So that the exhaust heat from the condenser Air conditioning is not wasted and can be reused for heating water.

3.1 Calculation data and manufacture of refrigeration systems using a water heater.

1. Determine the temperature of the hot water used

For the use of water in this heat exchanger using ordinary water, which is the average temperature of the water $T_{\text{water in}} = 30^{\circ}\text{C}$ while the required temperature $T_{\text{water out}} = 50^{\circ}\text{C}$ and the value of $\Delta T = 50^{\circ}\text{C} - 30^{\circ}\text{C} = 20^{\circ}\text{C}$

2. Determination of the length of time heating water (t)

For the time to be used in planning the heat exchanger is assumed to be 60 minutes = $60 \times 60 = 3600$ second

3. Design and Calculation of Heat Exchanger.

The pipe used as a heat exchanger in the water heater from the heat output of the condenser is used as the following pipe.

- Brand: Hoda
- Inner diameter of the pipe (d_i) = 5,35 mm = 0,00535 m
- The outer diameter of the pipe (d_o) = 6,35 mm = 0,00635 m
- Pipe thickness = 0,5 mm = 0,0005 m
- Long pipe (L) = 8 m
- Helix diameter (D) = 0,25 m

4. Water capacity

$$\begin{aligned} v &= \pi r^2 \cdot t \\ &= 3,14 \cdot 15 \text{ cm} \cdot 60 \text{ cm} \\ &= 42.390 \text{ cm}^3 \\ &= 42,39 \text{ L} \end{aligned}$$

5. Heating Energy

$$\begin{aligned} Q &= m_{\text{water}} \cdot C_{\text{water}} \cdot \Delta T \\ &= 42,39 \text{ Kg} \cdot 4200 \text{ J/kg } ^\circ\text{C} \cdot 20 \\ &= 3.560.760 \text{ J} \end{aligned}$$

6. Heat transfer coefficient on the outer side of the pipe (h_o)

$$\begin{aligned} h_o &= \frac{Q}{\pi \cdot d_o \cdot l \cdot \Delta T \cdot \Delta t} \\ h_o &= \frac{3.560.760 \text{ J}}{3,14 \times 0,00635 \text{ m} \times 8 \text{ m} \times 20^\circ\text{C} \times 3600 \text{ s}} = 300,51 \text{ J/m}^2 \text{ } ^\circ\text{C s} \end{aligned}$$

7. Reynold's number calculation (Re)

$$\begin{aligned} \text{Re} &= \frac{\rho \cdot v \cdot d_i}{\mu} \\ \text{Re} &= \frac{488,9 \frac{\text{kg}}{\text{m}^3} \times 0,06 \frac{\text{m}}{\text{s}} \times 0,00535 \text{ m}}{1,6 \times 10^{-5} \frac{\text{kg}}{\text{m} \cdot \text{s}}} \end{aligned}$$

$$\text{Re} = 9808,556 \quad (\text{Turbulent Flow})$$

8. Calculation of the Nussel Number (Nu)

$$\begin{aligned} \text{Nu} &= 0,023 \times \text{Re}^{0,85} \times \text{Pr}^{0,4} \\ &= 0,023 \times 9808,556 \frac{\text{kg}}{\text{m}} \text{ } ^\circ\text{C}^{0,85} \times 2,4^{0,4} \\ &= 50,943 \end{aligned}$$

9. Heat transfer coefficient on the inside of the pipe (h_i):

$$\begin{aligned} h_i &= \frac{\text{Nu} \cdot k}{d_i} \\ h_i &= \frac{5,943 \text{ W/m}^\circ\text{C} \times 0,07 \text{ W/m}^\circ\text{C}}{0,00535 \text{ m}} \\ h_i &= 666,554 \text{ W/m}^2 \text{ } ^\circ\text{C} \end{aligned}$$

10. Number of turns (N)

$$N = \frac{L}{\pi \cdot D}$$

$$N = \frac{8 \text{ m}}{3.14 \times 0.25 \text{ m}}$$

$$N = 10 \text{ turns}$$

From the results of the above analysis, the data obtained: The length of the APK pipe is 8 m with the number of turns 10 which is inserted into a tube with a volume of 42 L with a diameter of 30 cm and a height of 60 cm. To form a straight copper pipe into a helical shape, use a wooden cylinder with a diameter of $D = 25$ cm. The heat exchanger that has been made is then installed at the bottom of the water storage tank. This tank is tubular with a diameter of 30 cm and a height of 60 cm so that it can hold 42 liters of water. Then done installation of water heater with the compressor unit.

The step that must be done is to open the compressor casing and measure the required pipe length from the compressor to the inlet side of the heating coil and from the exit side of the heating coil to the inlet of the condenser. This is done because this water heater utilizes the exhaust heat from the condenser, the heat flow from the compressor is deflected first into the tank containing water before it enters the condenser, resulting in heat transfer from the AC pipe with the water in the tank.

Before being connected to the heating coil, the pipe from the compressor to the condenser is cut using a tube cutter. Then the pipe connection from the compressor to the inlet side of the heating coil is made and the exit side of the heating coil to the condenser is done by welding.

1. The process of collecting data on testing tools

To get hot water with a capacity of 42 liters, the temperature rise in the water tank is following the table below.

Table 1. Increased Water Temperature

No	Minute	Temperature °C	Ampere
1	5	33,7	4
2	10	36,6	4.2
3	15	39,2	4.4
4	20	41,2	4.6
5	25	42,9	4.2
6	30	45,7	4,3
7	35	47,3	4,4
8	40	48,5	4,3
9	45	49,9	4,2
10	50	50,8	4,4
11	55	50,9	4
12	60	50,8	4,2
13	65	50,8	4,4
Average		45,2	4.3

According to the table above, a graphic diagram of the increase in water temperature with time is obtained as follows:

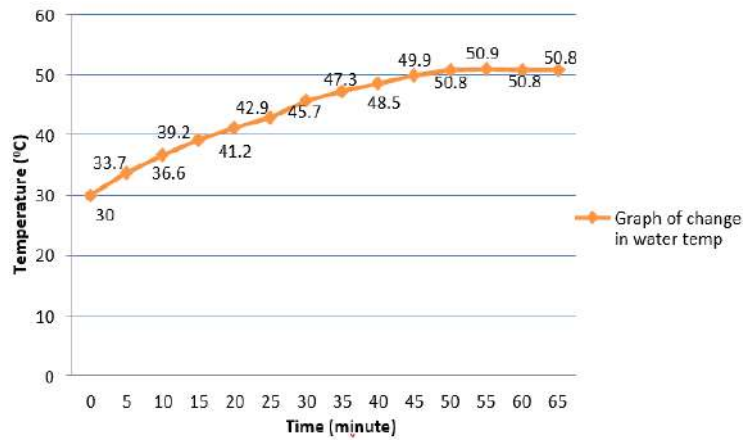


Figure 2. Graph of Increasing Water Temperature

3.2 Calculation Data of Research Results The performance of refrigeration in the water heater

Table 2. AC performance data retrieval

No	Time	Evap/ Komp (Psi)	Komp/ Cond 1 (Psi)	Cond 1/ Cond 2 (Psi)	Cond 2/ Kapiler (Psi)	capillary / Evap (Psi)
	Minute	P ₁	P ₂	P _{2'}	P ₃	P ₄
1	5	100	337	310	295	165
2	15	100	335	310	297	165
3	25	105	342	315	200	173
4	35	105	342	315	295	165
5	45	100	340	310	290	175
6	60	110	337	310	295	173
Average		103	337,83	311,17	278,67	169,33
Entalphi (kJ/kg)		120,6	123,16	123,17	47,1	33,8

1. Compressor Work (Wc)

$$\begin{aligned}
 W_c &= h_2 - h_1 \text{ (kJ/kg)} \\
 &= 123,16 - 120,16 \\
 &= 2,56 \text{ kJ/kg}
 \end{aligned}$$

2. Refrigeration Effect

$$\begin{aligned}
 Q_r &= h_1 - h_4 \\
 &= 120,6 - 33,8 \\
 &= 86,8 \text{ kJ/kg}
 \end{aligned}$$

3. Coefficient of Performance (COP)

$$\text{COP} = \frac{q_r}{w_c} = \frac{h_1 - h_4}{h_2 - h_1}$$

$$\begin{aligned}
 &= \frac{120.6 \frac{kJ}{kg} - 33.8 \frac{kJ}{kg}}{123.16 \frac{kJ}{kg} - 120.6 \frac{kJ}{kg}} \\
 &= \frac{86.8 \frac{kJ}{kg}}{2.56 \frac{kJ}{kg}} \\
 &= 33.9
 \end{aligned}$$

4. Actual Power

$$P_a = V \cdot I \cdot \cos \theta$$

$$= 220 \text{ volt} \cdot 4,4 \text{ A} \cdot 0,8$$

$$= 774,4 \text{ Watt.}$$

4. CONCLUSION

Based on research on the design and manufacture of a water heater system using a hot air conditioner condenser, the following conclusions can be drawn.

1. A helical type water heater has been designed by utilizing the 1 pk AC condenser exhaust heat to get hot water.
2. The water heater tank is made of HDPE (high-density poly Ethylene) which has a capacity of 42 L with dimensions of 60 cm tank height and 30 cm tank diameter. The designed water heater is made of copper pipe with a diameter of 6.35 mm and a length of 8 m which is formed into a helix with a diameter of 25 cm (10 turns).
3. The water temperature that can be used to heat 42 liters of water with a heating time of 60 minutes is 50 °C.

5. ACKNOWLEDGMENTS

I was a writer, would like to express my deepest gratitude to Universiti Teknologi Mara (UiTM), Cawangan Negeri Sembilan, Kuala Pilah Campus, and the Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Selangor, Malaysia for providing facilities and financial support for this research. And also, my deepest gratitude to the Institute for Research and Community Service (LPPM) of the Islamic University of Riau (UIR) for the facilities and financial support for this research.

6. AUTHOR CONTRIBUTION

Shandy Kurniadi, Trimon P Sinaga conceived of the presented idea and developed the theory and performed the computations. Dedikarni and Dody Yulianto verified the analytical methods. Eddy Elfiano encouraged Shandy Kurniadi to investigate a specific aspect and supervised the findings of this work. All authors discussed the results and contributed to the final manuscript.

7. REFERENCES

Aziz, A., Ginting, H., Hatorangan, N., & Rahman, W. (2014). *Analisis Kinerja Air Conditioning Sekaligus Sebagai Water Heater (ACWH)*. June 2014, 1–6.

<https://doi.org/10.13140/RG.2.1.2396.5840/1>

Puspongoro, F., & Putra, N. (2020). Manufacturing and performance testing of hybrid air conditioner water heater (H-ACWH). *AIP Conference Proceedings*, 2255(September).

<https://doi.org/10.1063/5.0014136>

CERTIFICATE OF AWARD

4th International Malaysia-Indonesia-Thailand
Symposium on Innovation and Creativity
sic 2021 "EMBRACING INNOVATION
AND CREATIVITY IN
INDUSTRIAL REVOLUTIONS"

This is to certify that

**MR. SHANDY KURNIADI
TRIMON S SINAGA
DR. DEDIKARNI, S.T, M.SC
EDDY ELFIANO, S.T, M.ENG
DODY YULIANTO, S.T, M.T
RAFIL ARIZONA, S.T, M.ENG**

has been awarded **SILVER**

in recognition for the innovation/invention of
**DESIGN AND BUILD A WATER HEATING SYSTEM USING A
HELICAL TYPE HEAT EXCHANGER BY UTILIZING THE
EXHAUST HEAT OF THE AIR CONDITIONER CONDENSER**



E-cert Serial No: iMITSIC2IAST46