



Cawangan Kedah  
Kampus Sungai Petani

Faculty of Administrative  
Science and Policy Studies

# i-SPIKE 2021

*Leading An Artificial Innovation In Knowledge, Education And Design*

## **i-SPIKE 2021** **INTERNATIONAL EXHIBITION & SYMPOSIUM** **E-PROCEEDINGS**

<https://ispik2021.uitm.edu.my/>

e-ISBN 978-967-2948-20-9

Copyright © 2021 is held by the owner/author(s). These papers are published in their original version without editing of the content.

The views, opinions and technical recommendations expressed by the contributors are entirely their own and do not necessarily reflect the views of the Faculty or the University.

Copy Editors : Azni Syafena Andin Salmat, Syazliyati Ibrahim, Asrol Hasan, Nor Zaini Zainal Abidin, Fatihah Norazami Abdullah, Chaleeda Som Sak, Nor Asni Syahriza Abu Hassan & Muhamad Khairul Anuar Zulkepli

Layout Editor : Asrol Hasan

Cover Design : Syahrini Shawalludin

Published by : Universiti Teknologi MARA Cawangan Kedah,  
Kampus Merbok,  
08400 Merbok,  
Kedah,  
Malaysia.

## TABLE OF CONTENTS:-

### i-SPIKE 2021 International Exhibition & Symposium E-Proceedings

NO.	TITLE	PAGE
1.	‘Viewfinder’ Mobile Learning Application for Videography and Cinematography Based on the Rules of Perspective <i>Amir Nor Azan Samar, Harim Izzati Hamdan, Iqbal Jaapar &amp; Muhammad Firdaus Amairudin</i>	1
2.	Systematic Alternative Fuzzy Logic Evaluator (SAFLE) for Student Performance Evaluation <i>Shirley Sinatra Gran, Tracy Adeline Ajol &amp; Awang Nasrizal Awang Ali</i>	8
3.	360 Employees – I <i>Dayang Hazenah Awang Abdul Hamid, Nur Dina Athia Mohd Ramley, Nur Hidayah Jusoh, Nurul Husna Abd Jalil &amp; Mohammad Firdaus Mohammad Hatta</i>	12
4.	AbMTI: Adventure Based Mental Toughness Inventory for Post Covid-19 Pandemic Era <i>Mohd Shariman Shafie, Professor Dato Dr. Md Amin Md Taff, Dr. M.Adli bin Mohd Sidi, Mohamed Azizul bin Mohamed Afandi, Dr. Omar Firdaus Mohd Said &amp; Nik Jazwiri Johannis</i>	18
5.	AbMTM: Post Covid-19 Adventure-Based Mental Toughness Training Model <i>Mohd Shariman Shafie, Professor Dato’ Dr. Md Amin Md Taff, Assoc. Professor Dr. Zuraidah Zainol &amp; Dr. Siti Musliha Mat Rasid</i>	23
6.	Pembentukan Modul Undi18@School untuk Pendidikan Kenegaraan dan Demokrasi kepada Belia 18-21 Tahun <i>Wan Rohila Ganti Wan Abdul Ghapar, Che Hamdan Che Mohd. Razali, Muhamad Fazil Ahmad &amp; Abdul Rahman Abdul Latip</i>	28
7.	A Planning of Templer Forest Park and Templer Forest Reserve through Management Plan <i>Mohammad Zharif Hakimi Mohammad Mazani, Nurul Atikah Mohd Salleh, Muhammad Hafiy Safwan Sahak, Nurul Nabila Che Ahamed, Teeny Valerian, Mohamad Fathi Radhi Ishak, Nor Hanisah Mohd Hashim &amp; Firdaus Chek Sulaiman</i>	33
8.	Administrative Model for Sekolah Agama Rakyat (SAR): Excellence Practices <i>Mohd Nasir Ayub, Nazmi @ Nazni Noordin, Mohd Zool Hilmie Mohamed Sawal &amp; Surita Hartini Mat Hassan</i>	38
9.	ADR-Now Application: Bridging Theoretical and Practical Approach in Alternative Dispute Resolution Process and Procedures <i>Dr. Shahrizal Mohd Zin, Abdul Mu’iz Abdul Razak, Prof. Madya Dr. Nur Ezan Rahmat &amp; Nik Hasbi Fathi</i>	43

10. Agricultural Career Training Program for Drop Out Students through Work Based Learning 47  
*Marinah Muhammad, Noor Janatun Naim Jemali, Nik Raihan Nik Yusoff & Rozidaini Mohd Ghazi*
11. An Eco-Friendly Concrete Blends from Palm Oil Boiler Ash 52  
*Nurrul Amilin Zainal Abidin, Zeno Michael, Mohamed Khatif Tawaf Bin Mohamed Yusof, Azmi Roslan, Siti Shahidah Binti Sharipudin, Shahrul Nizam Bin Mohammad & Ilya Izyan Binti Shahrul Azhar*
12. An Investigation of Clothing for Elderly: Emphasizing Safety, Protection and Functional Attributes 57  
*Shahrizad Fitri Mustapha, Shuhaila Nahrawi, Rizal Azni Dahaman & Norzaleha Zainun*
13. Ardu-Electrochromic Film for Home Safety And Privacy Purpose 65  
*Anas Akasyah Abd Patas, Nur Athirah Mohd Taib & Syahida Suhaimi*
14. Let's Talk about the Movies: The Movie Journal 71  
*Associate Profesor Dr Norwati Binti Hj Roslim, Associate Profesor Dr Hj, Muhammad Hakimi Tew Abdullah, Ku Nurul Atiqah Ku Ahamad, Nur Faathinah Mohammad Roshdan, Suhaila binti Sharil & Siti 'Aishatul-Humairah Muhammad Fisol*
15. Asymmetric Impact of The Oil Price Changes on Stocks Market for Selected Asean Countries 78  
*Shahiszan binti Ismail, Prof. Madya Dr. Noor Zahirah Mohd Sidek, Fauziah Mohamad Yunus, Jamilah Laidin & Nor Azira Ismail*
16. Automated System for Concrete Damage Classification Identification Using Various Classification Techniques in Machine Learning 81  
*Nur Haziqah binti Mat, Athifa Aisha binti Ahmad Zahida, Siti Nurhaliza binti Abdul Malik, Nur Athirah Syuhada binti Azmadi & Syahrul Fithry bin Senin*
17. Automatic Price Scanning System 88  
*Fahmi Nazreen Zakuan, Anis Diyana Rosli & Nurlida Ismail*
18. Al Hijjaei V1 94  
*Yuslina Mohamed, Mesbahul Hoque, Sulaiman Ismail Nurhasma & Muhamad Saad*
19. Infographic of Benevolence Practices: Public Sector's Myth or Reality 100  
*Dr Nor Zaini Zainal Abidin, Azni Syafena Andin Salamat, Syahrini. Shawalludin, Azlan Abdul Rahman & Dr Siti Norfazlina Yusoff*
20. BIO-CHEM KIT: Understanding Biogeochemical Cycles 104  
*Nurul Hidayana Mohd Noor, Shawal Sahid Hamid@Hussain, Mahazril 'Aini Yaacob & Mohd Hafiz Hazwan Hashim*



21.	Biodegradable and Recycle Husk Mailer from <i>Cocos nucifera</i> <i>Anas Firdaus bin Zakaria, Nur Atirah binti Hamzah, Siti Farahin binti Abdull Patah, Wan Zuraida Wan Mohd Zain &amp; Nur' Amira binti Hamid</i>	110
22.	Bunny's Pellet: Natural Mulberry Pellet <i>Nor Dini Rusli, Khairiyah Mat, Hasnita Che Harun, Mohd Mahmud &amp; Syed Muhammad Al-Amsyar Syed Abd. Kadir</i>	114
23.	Cails Paper Wash <i>Aisyah Nur Izzah binti Azhar, Intan Nafissa binti Mohd Jaffri, Loris Anak Noh, Caroline Anak Kiroh &amp; Silverina Anabelle Kibat</i>	120
24.	Capcut <i>Dr Sharifah Shafinaz Sh Abdullah, Nur Afini Azwa binti Roslan, Nur Alya Nabila binti Ashariman, Nur Mazmira binti Mohamad Zuki &amp; Nur Nabila binti Omar</i>	124
25.	Regenerated Kenaf Core Cellulose Hydrogels and Films Prepared via Pre-Cooled Method <i>Adam Khairul Faiz, Muhammad Khairil Hakim Ismail, Hatika Kaco &amp; Mohd Shaiful Sajab</i>	128
26.	Encapsulation of Winged Termites in Cellulose Nanofibre for the Fabrication of Cellulose Bioplastic <i>Syahidatul Nadhilah Shah Lail, Noorul Jannah Aizul Hussin, Hatika Kaco &amp; Mohd Shaiful Sajab</i>	134
27.	Chinese Character Card Game: Learners' Attitudes and Motivation <i>Ting Hie-Ling</i>	140
28.	Coffee Capsule Vending Machine <i>Mohd Sufian Ramli, Siti Sufiah Abd Wahid, Muhammad Hasif Razak &amp; Muhammad Hakimi Md Said</i>	146
29.	Corn-Based Bioplastic as Seedling Bag <i>Nur Nadia Nasir &amp; Siti Amira Othman</i>	151
30.	Coupiers: Course Pre-Registration System <i>Zeti Darleena Eri, Mohd Hanapi Abdul Latif, Mohd Atif Ramlan, Ruhana Jaafar, Sharifah Nurulhikmah Syed Yasin, Hasiah Mohamed &amp; Sarah Yusoff</i>	156
31.	Divorce Protection Takaful <i>Siti Thaqifah Ruzaidy, Siti Adibah Embong, Mohammad Firdaus Mohammad Hatta &amp; Arlinah Abd. Rashid</i>	162
32.	Entrepreneurial Website Project "Www.Businessletter4you.Com" <i>Akmal Syaifudin bin Kaharudin, Siti Zuraina binti Gafar @ Abd Ghaffar &amp; Juritah Misman</i>	168

33.	Early Flash Flood Detection and Avoidance System <i>Muhammad Aidil Aisar Mohd Yatim, Muhammad Khalis Zuhri Izahar, Rohaiza Baharudin &amp; Mohd Hussaini Abbas</i>	174
34.	Ebook: Easy Research For All <i>Sylvia Nabila Azwa Ambad</i>	180
35.	e-Info_JK Formation Committee System for the School of Civil Engineering (Pka) Universiti Teknologi MARA <i>Azlinda Saadon, Musmuliadi Kamaruding, Syahrin Neizam Mohd Dzulkifli, Mazidah Mukri, Noraida Mohd Saim, Dzulaikha Khairuddin &amp; Siti Hamidah Abdull Rahman</i>	183
36.	E-Module <i>ABRA-Maths</i> - Early Mathematics Learning via Mini Tennis <i>Rahela Abdul Rahim, Haslinda Ibrahim, Fauziah Baharom, Mohd. Rahizam Abdul Rahim &amp; Syahrul Ridhwan Morazuki</i>	189
37.	Enhanced Microwave Heat Susceptor Crucible <i>Assoc. Prof. Dr. Muhammad Azwadi Sulaiman, Fathin Asila Mohd Pabli, Syifa' Muhamad Sharifuddin, Assoc. Prof. Dr. Julie Juliewatty Mohamed &amp; Dr. Norfadhilah Ibrahim</i>	194
38.	Enhancement of Latent Fingerprint Using Dyed Eggshell Powder <i>Kavitha Rajagopal</i>	198
39.	Product Development - E-Personal Possessions Takaful (e-PPT) <i>Siti Hasnulbariah binti Ahmad Rusmili, Nor Ashikin binti Dal Nia, Dania Carmila binti Said, Mohammad Firdaus bin Mohammad Hatta &amp; Norzanah binti Mat Nor</i>	200
40.	E-Pocket Note: An Interactive Video Learning for Effective Online Teaching and Learning Process <i>Norhayati Zamri, Nor Bahiyah Omar, Norul Akma Mansor, Liyana Ab Rahman &amp; Farah Husna Mohd Fatzel</i>	205
41.	The Clauses SMM2 at Construction Site Board Game For (WBLFF) <i>Roseline anak Ikau, Zafikha Aida Bidin, Syamimi Liyana Amat Rais, Amira Shazlin Adnan &amp; Mohd Khairul Fitri othman</i>	210
42.	e-Voting: Votehere4u 2.0 <i>Adib Sarkawi, Aiza Johari, Azlina Bujang &amp; Zainon Haji Bibi</i>	215
43.	IO2TX <i>Dr Sharifah Shafinaz Sh Abdullah, Nur Afini Azwa binti Roslan, Nur Alya Nabila binti Ashariman, Nur Mazmira binti Mohamad Zuki &amp; Nur Nabila binti Omar</i>	220

44. Waste Segregation through Recycle and Composting Activities among the Community in Urban and Suburban Areas 225  
***Ts. Dr. Norhafezah binti Kasmuri & SitiNurhafizah binti Abdull Razak***
45. Ez-Crutches 2.0: An Innovation of Assistive Device for Disabled Person 231  
***Suzana binti Yusof, Sharifah Shafinaz binti Sharif Abdullah, Fatimah binti Sham & Norhafizatul Akma binti Shohor***
46. Facile-Fabricated Foamed Geopolymer Sphere for Heavy Metal Removal from Wastewater 236  
***Tan Tee How, Mo Kim Hung, Lai Sai Hin & Ling Tung-Chai***
47. Finance and Me (*FinME*) – A Digital Learning Tool 242  
***Carolyn Ann Enchas, Shafinaz Lyana Abu Talib, Fatin Adilah Razali & Norizuandi Ibrahim***
48. Fun with Mathematic and Origami: Water Lily Origami 246  
***Masnira Ramli, Wan Nurul Husna Wan Nordin, Amirah Sa'at & Nurul Fazila Lakasa***
49. Fund for Food: A Campus Food Pantry Toolkit to Help Fight Hunger on Campus 252  
***Nurul Hafizah Mohd Yasin, Nurhaiza Nordin, Nurnaddia Nordin, Nik Noorhazila Nik Mud & Siti Zamanira Mat Zaib***
50. Edible Cookie Cup: Cuppa Cookie 257  
***Raja Nur Hanisah Binti Raja Zainal Alam Shah, Nur Liyana A'tifah Binti Ahmad Jamalulail, Nur Farah Aqilah Binti Mohd Akram, Amera Nazirah Binti Mohd Yusoff & Noorshaadah Binti Omar***
51. GTNLARM21 262  
***Ts. Dr. Sharifah Shafinaz binti Sh Abdullah, Assoc. Prof. Ts. Dr. Zulkifli bin Mohamed , Aisyah Fitriah binti Asmala , Nur Fatimah binti Hanif & Nur Hanisah binti Mahadi***
52. Gulali Pandan 267  
***Amelia binti Zaidan, Ainul Hayati binti Abdull Aziz, Nurul Syamilah binti Ismail, Noristisarah Abd Shattar & Siti Noraisah Dolah***
53. Hill Paddy Plough 272  
***Jasrio Liugan, Sainah binti Melulin, Zurhizainih binti Halledy & 'Umairah Abd Khalid***
54. Historic Interior Scheme (HIS) Conservation Framework for Heritage Museum Building in Malaysia 275  
***Norashikin Abdul Karim, Siti Norlizaiha Harun, Salwa Ayob & Zulkarnain Hazim***

55.	I-Poket Perumahan: Panduan kepada Newbie <i>Mahazril 'Aini Yaacob, Nurul Hidayana Mohd Noor, Hafizah Hammad Ahmad Khan, Zuraini Yaacob &amp; Farah Amirah Fuad</i>	283
56.	Development of HVAC Virtual Laboratory (HV-Lab Version 1.0) <i>Mohd Faez bin Zainol, Ts. Shikh Ismail Fairus bin Shikh Zakaria &amp; Dr. Muhammad Zulkarnain</i>	287
57.	i-Care2u: Easy-To-Use Application Software to Enhance Knowledge and Awareness of Malaysians towards the Rights of Persons with Disabilities <i>Muhammad Fikri Othman, Nur Ezan Rahmat, Norazlina Abdul Aziz, Nora Abdul Hak &amp; Diyana Kamarudin</i>	293
58.	Immersive Learner's Usability and Experience through VMMBG during Covid-19 Pandemic: An Evidence of a Higher Educational Institution <i>Shahreena Daud, Idris Osman, Zarinah Abu Yazid, Norraeffa Md Taib &amp; Amirudin Mohd Nor</i>	297
59.	VCDDT: The Virtual Classroom Debate Tutorial Approach <i>Azlyn Ahmad Zawawi, Junaida Ismail, Irwana Nooridayu Mohd Hakimi Noorayuni Rusli &amp; Intan Syahriza Aziz</i>	304
60.	Indikator Teknik Pengajaran Bahasa Arab di UiTM Menerusi Teknologi <i>Nurul Asma Mazlan, Suhaila Zailani @ Ahmad, Zamri Arifin, Mohd Faizulamri Mohd Saad &amp; Nur Aqilah Norwahi</i>	307
61.	Inquiry-Based Reciprocal Teaching Module <i>Ting Pick Dew, Suyansah Swanto &amp; Vincent Pang</i>	311
62.	Instant Beef Stew <i>Nursyadah binti Nordin, Norhidayah bt Abdullah &amp; Muna Shakirah bt Mohamad</i>	316
63.	Integrated Solar-IoT Monitoring and Predictive Maintenance Systems for Irrigation (S-IoTP) <i>Hasyiyya Karimah Adli, Ku Azmie Ku Husin, Khairul Nizar Syazwan Wan Salihin Wong &amp; Muhammad Akmal Remli</i>	320
64.	IOT Based Monitoring System for Oyster Mushroom Farming Pondok Seri Permai Pasir Putih Kelantan <i>Muhd Azhar Bin Zainol, Sh Mohd Firdaus Bin Sh Abdul Nasir, Nor Suhada Binti Abdullah, Koay Mei Hyie, Siti Nur Amalina Binti Mohd Halidi, Hazimi Bin Ismail &amp; Lesairuamin Bin Leiah</i>	325
65.	IoT Based Water Leakage Monitoring System <i>Muhammad Azfar Shazmi Mohd Adnan &amp; Zulkifli Mohamed</i>	334
66.	i-Tabung <i>Dayang Aniisah Mardhiyyah binti Abg Borhanuddin, Mohamad Nornashriq Irfan bin Nordin, Muhammad Akram bin Nazri, Muhammad Azwar Naim</i>	340

***bin Amilan, Muhammad Fadhillah bin Mohd Zam Zam, Mohd Fazly bin Mohd Razali & Ima Ilyani binti Dato' Hj. Ibrahim***

- |     |   |     |
|-----|---|-----|
| 67. | <p>Kaedah Pengajaran CHM510: Dari Sudut Pandang Pelajar<br/> <b><i>Sheikh Ahmad Izaddin Sheikh Mohd Ghazali, Nur Nadia Dzulkifli, Nor Monica Ahmad, Jamil bin Mohamed Sapari, Ahmad Husaini Mohamed &amp; Nurul Nadthira binti Che Awang</i></b></p>  | 343 |
| 68. | <p>Ke Arah Kelestarian Kebun Komuniti dalam Usaha Menyantuni Golongan B40<br/> <b><i>Intan Syafinaz Mat Shafie, Yuslina Liza Mohd. Yusof , Nor Irvoni Mohd Ishar, Maryam Jameelah Mohd Hashim, Mohd Fairus Kholid, Muhammad Yasin Ramadhan Zahari &amp; Sharidatul Akma Abu Seman</i></b></p> | 348 |
| 69. | <p>Uniqeucare Takaful<br/> <b><i>Muhammad Sa'di Bin Mohd Saman, Nur Aimi Binti Abdul Azis, Mohammad Firdaus Bin Mohammad Hatta &amp; Azlina Binti Hanif</i></b></p>   | 353 |
| 70. | <p>#Kitajagakita: The Manifestation of Modern Jewellery Design<br/> <b><i>Mohd Faiz Jalaludin, Mohd Hakim Mohd Sharif, Adib Mohd Hasan &amp; Muhammad Shafiq Muda</i></b></p>   | 359 |
| 71. | <p>Kombu-Feed: A Nutritive &amp; Prophylactic Alternative for Fish Production<br/> <b><i>Ruhil Hayati Hamdan, Tan Li Peng, Nora Faten Afifah Mohamed, Ain Auzureen Mat Zin &amp; Ahmad Syazwan Samsuddin</i></b></p>  | 363 |
| 72. | <p>Kriging Interpolated Rainfall Data in ArcGIS for a Sustainable Flood Modelling Prediction<br/> <b><i>Fahda Nurhani Ahmad Razan, Nur Fatim Nasuha Mhd Khatif &amp; Ir. Nur Azwa Muhamad Bashar</i></b></p>  | 368 |
| 73. | <p>Kuasai Rintas: Penulisan Ringkasan Bahasa Melayu Yang Lengkap<br/> <b><i>Gladys Sebi binti Entigar, Noor Haty binti Noor Azam, Milfadzhilah binti Mohd Jamil, Roziana binti Ahmed &amp; Nur Elimtiazh bin Abidin</i></b></p>   | 373 |
| 74. | <p>Landscape Architecture Design Studio-Based Using Process-Evaluation Model in Open Distance Learning<br/> <b><i>Masbiha Mat Isa, Alamah Misni &amp; Faridatul Akma Ab Latif</i></b></p>   | 378 |
| 75. | <p>LiBCO<br/> <b><i>Noryana binti Ahmad Khusaini, Nur Hasni binti Nasrudin, Mohd Shamsul bin Daud, Noraini binti Abd Rahman, Rosida binti Ahmad Junid &amp; Siti Fairuz binti Ibrahim</i></b></p>   | 382 |
| 76. | <p>Limit of Acceptable Change and Recreation Opportunity Spectrum as a Tool in Developing a Management Plan. A Study in Templer Forest Eco Park &amp; Templer Forest Reserve</p>  | 388 |

	<b><i>Syahidah Hanani Hamdan, Nur Sabrina Sabri, Muhammad Hazim Zakaria, Khairul Asri, Syanizatul Izreen Kamal, Nor Asma Safuraa Roslan, Ely Rouzee Jamaluddin &amp; Nawfal Kamarul Bahrain</i></b>	
77.	Tweet It! EsL Writing Activity Module Using Twitter <b><i>Nurshahirah Azman &amp; Zaemah Abd Kadir</i></b>	393
78.	Malaysian Secondary Boarding School Menu Planning System <b><i>Suliadi F. Sufahani &amp; Anuar M. Yusof</i></b>	399
79.	Malaysian Studies Pocket Read <b><i>Ani Juaini Bahrin, Farhana Yaakub, Firdausi Sufian (Dr), Nurfaizah Abdullah &amp; Saiful Zizi Jalil</i></b>	405
80.	Mathematical Thinking Enhancement Program (MaTh-EP) <b><i>Nurul Akmal Md Nasir, Parmjit Singh &amp; Geethanjali Narayanan</i></b>	410
81.	Medicine Reminder With Low Battery Alert “MEDMINDER” <b><i>Syahirah Asyiqin Binti Alias, Luqman Hakim Bin Fazilah Shuhaimi, Khairin Farhana Binti Kharul Anuar, Muhammad Firdaus Bin Mangsor &amp; Suhana Sulaman</i></b>	418
82.	Meow-Meow Food Dispenser Using Internet of Things (IOT) Programme <b><i>Nor Diyana Md Sin, Saifaris Azizi Saiful Azam, Muhamad Danial Osman, Mohamad Zhafran Hussin, Norbaiti Sidik, Khairul Kamarudin Hasan</i></b>	424
83.	Mesin Penapis Turpentin Turpentine Filter Machine (TFM) <b><i>Hairulnisak binti Merman, Muhammad Salehuddin bin Zakaria, Aiman Yusri bin Mohamad Yusoff, Aimi Atikah binti Roslan &amp; Azian binti Tahir</i></b>	429
84.	Mind Your Right Booklet: Awareness on Cyber Defamation Law & Media <b><i>Suria Fadhillah Md Pauzi, Musramaini Mustapha, Azniza Ahmad Zaini, Suhanom Mohd Zaki &amp; Mohd Aidil Riduan Awang Kader</i></b>	434
85.	Modelling the Effectiveness of Using Online Food Delivery Services Apps Among Customers in Klang Valley During Covid-19 Pandemic <b><i>Prof Madya. Dr Rozita Naina Mohamed, Mohd Saifullah Bin Rusli &amp; Prof.Madya. Dr.Halimahton Borhan</i></b>	440
86.	The Innovation Process Modelling for Ethanol Gas Sensing Using Artificial Neural Network <b><i>Muhammad Afiq Wazini bin Jemani, Vicinisvarri Inderan, Syahrul Fithry bin Senin, Norain Binti Isa &amp; Lee Hooi Ling</i></b>	447
87.	The Effectiveness of i-Lab v2 as a Teaching Tool for Online Distance Learning <b><i>Nur Zaidani Wati binti Mohd Darwis, Noor Raifana binti Ab Rahim, Narita binti Noh &amp; Juwita binti Asfar</i></b>	453



88.	My Ecredit Banking Apps (MECBA) V3 <i>Wan Razazila Wan Abdullah (Dr), Enny Nurdin Sutan Maruhun (Dr), Norzarina Nordin, Sunarti Halid &amp; Ahmad Saiful Azlin Puteh Salin (Prof. Madya Dr)</i>	459
89.	The Dynamics of MILO (Multimedia Interactive Learning Online) in Role Playing: Enhancing the Learning Process in Covid-19 Pandemic <i>Woo Pak Yuan, Nina Farisha binti Isa &amp; Ezwani Azmi</i>	464
90.	The Continuance of External Review Information System Adoption In Malaysia <i>Mohd Norafizal Abd Aziz, Razulaimi Razali, Nik Rosli Abdullah &amp; Shahrul Azam Abdullah</i>	470
91.	Understanding Islamic Finance Concepts through Innovative Game: Name The Riba Transaction! <i>Azilawati Banchit, Puteri Faida Alya Zainuddin &amp; Lai Tze Wee</i>	479
92.	Natmag Cleaner (Natural Magnificent Cleaner) <i>Hani Hasriena binti Hasrin, Muhammad Firdaus bin Ahmad Nizam, Nur Amalin Batrisya binti Ujud, Deeny Robeatul Adawiyah binti Khairul Anuar &amp; Norzalina binti Jenal</i>	484
93.	New Fundamental Theory in Solving the Royalty Payment Problem <i>Wan Noor Afifah binti Wan Ahmad &amp; Suliadi Firdaus bin Sufahani</i>	489
94.	Notebookly (A Pageless Notebook) <i>Aimi Natasha binti Rujha, Amani binti Mohamad Soree Awankasim, Muhammad Faiz bin Abdul Hamid &amp; Nur Dania Syahirah binti Mohd Asri</i>	492
95.	Nutritious Digital Menu System for Malaysian Religious Primary School Children: Improving Good Memories <i>Azila M. Sudin, Suliadi F. Sufahani &amp; Mohd A.A. Abdullah</i>	495
96.	Online Games for Learning Lewis Structure <i>Wan Elina Faradilla Wan Khalid, Tuan Sarifah Aini Syed Ahmad, Nor Akmalazura Jani, Rohaiza Saat &amp; Nurazira Mohd Nor</i>	501
97.	Optimal Charging Schedule of Electric Vehicles Using Evolutionary Programming to Minimise Costs <i>Hasmaini Mohamad, Norhasniza Md Razali, Ahmad Farid Abidin, Nur Ashida Salim &amp; Zuhaila Mat Yasin</i>	506
98.	The Smart Attendance of Microsoft Team (SAMT 2021) in an Online Learning Classroom <i>Wan Normila Mohamad &amp; Zahari bin Md Rodzi</i>	511
99.	Penelitian Terhadap Kepelbagaian Fungsi Bandar Kecil Terhadap Penduduk Setempat di Gemas, Negeri Sembilan <i>Natasya Farhana Nazry, Jabil Mapjabil &amp; Farzanna Yashera Abdulla</i>	521



100. Penentuan Kaedah Mengukur Kesanggupan Untuk Membayar (WTP) Dalam Pelancongan 525  
*Nabila Farysha Dering & Jabil Mapjabil*
101. Penentuan Kecenderungan Tingkah Laku Pelancong yang Berkunjung ke Kota Kinabalu – Psikosentrik dan Alosentrik 531  
*Farzanna Yashera Abdulla , Jabil Mapjabil & Natasya Farhana Nazry*
102. Penentuan Kuasa Beli Pengunjung terhadap Perkhidmatan Pelancongan Terpilih di Bandaraya Kota Kinabalu, Sabah 535  
*Nurul Izzah Ismail & Jabil Mapjabil*
103. The Artificial Neuron Network for Photocatalytic Degradation of Acid Orange 7 Using Cerium Oxide (CeO<sub>2</sub>) 539  
*Wan Nur'ain Awanis binti Wan Sa'ari, Vicinisvarri Inderan, Syahrul Fithry bin Senin & Nur Fadzeelah Abu Kassim*
104. Perception of Digital Reading Material for Academic Purposes among UMK Undergraduates 544  
*Noor Syamimie Mohd Nawi, Lena Ramamurthy, Syakirah Shafien, Suhaida Omar & Nik Ahmad Farhan bin Nik Azim*
105. Perception of Language Awareness through Framagram: A Classroom Example 548  
*Nik Ahmad Farhan bin Azim @ Nik Azim, Lena A/P Ramamurthy, Syakirah binti Shafien, Noor Syamimie binti Mohd Nawi & Shahidatul Maslina binti Mat So'od*
106. Perkasa @ Aps : Solusi kepada Kerapuhan Keluargayang Mempunyai Anak Cerebral Palsy 552  
*Wan Rohila Ganti binti Wan Abdul Ghapar, Muhamad Fazil Ahmad, Norhashimah Yahya & Rahaya Mat Jamin*
107. Poket Peka Undang-Undang Dilettante V2:Pemberhentian Kerja 556  
*Suria Fadhillah Md Pauzi, Muhammad Asyraf Azni, Suriyati Ujang, Azniza Ahmad Zaini & Ida Rosnita Ismail*
108. Power Generation Using Thermoelectric Power Generator with Parabolic Solar Concentrator 562  
*Aneurin Nanggar anak Nyandang, Ir. Dr. Ts. Baljit Singh A/L Bhathal Singh & Dr. Muhammad Fairuz bin Remeli*
109. Prediction of Nanostructure of SnO<sub>2</sub> Properties Using Artificial Neural Networks 565  
*Khadijah binti Mohd Suhami, Vicinisvarri Inderan, Syahrul Fithry bin Senin & Lee Hooi Ling*
110. Product Development - e-Ta'awun PA Takaful+ 570  
*Mohd Faizan bin Mohd Afandi, Norazrisham bin Shamsuddin ,Muhamad Izmul Nizam bin Zubairi , Mohammad Firdaus bin Mohammad Hatta & Mohamad Nizam bin Jaafar*

111.	Promoting Malayan Emergency State by Using Gaming Platform as An Illustrative Medium <i>Mohammad Nor bin Anwar Hussin</i>	577
112.	ProTecME <i>Rosuzeita Fauzi, Syazwan Firdaus Abu Bakar, Roslinda Isa, Siti Nor Ismalina Isa, Diana Tasha Mohd Nazeri</i>	583
113.	Protein as the Building Blocks of Life <i>Rania Farzana binti Azmi, Azleen Nurkarmilya binti Azami, Nur Shafinaz binti Mohamad Salin &amp; Wan Mazlina Md Saad, PhD</i>	587
114.	Pull Up Crisp Container <i>Mohamad Firdaus bin Shaari, Kamarul Asyraf bin Shamsudin &amp; Nurul Fatimah binti Mohamad Azmi</i>	589
115.	RE Protect-i <i>Mohd Azeem bin Ahmad Zaini, Farid Akmal bin Fadzli, Mohd Saiful Izzat bin Mat Zahari, Wahida binti Ahmad &amp; Mohammad Firdaus Mohammad Hatta</i>	592
116.	ReProDB Web Application (Research Project Database) <i>Jennifah Nordin, Afida Arapa, Ibiاناflorinciliana Niane Anthony Aning &amp; Intan Syahriza Azizan</i>	598
117.	Rizbrunana: Advances in High-Fibre Biscuit Using Brown Rice and Banana Peel <i>Nurul Hafizah Mohd Yasin, Derweanna Bah Simpong, Nur Farihin binti Abd Hadi Khan &amp; Mazne Ibrahim</i>	609
118.	Ready-To-Bake (RTB) Cookie Dough <i>Muna Shakirah Bt Mohamad, Norhidayah Bt Abdullah &amp; Nursyadah Bt Nordin</i>	615
119.	RTGreenmFUND: Sejauhmanakah Keberkesanannya dalam Pengurusan Dana Ruang Terbuka Hijau Bandar <i>Nabilaa Mohamed, Thenmolli Vadeveloo, Zarina Mohd Zain &amp; Roni Ekha Putera</i>	618
120.	TCD (Table Connector Design) <i>Ramlan Mustapha, Maziah Mahmud, Surita Hartini Mat Hassan, Siti Norma Aisyah Malkan &amp; Nurul Hidayah Che Hassan</i>	622
121.	Self-Practice Ringkasan (SPRing): An Innovative Mobile Apps for Self-Practice <i>Asmahani Mahdi, Zubaidah Bohari, Abdul Hadi Abdul Talip, Nurul Lizzan Kamarudin &amp; Zainon Haji Bibi</i>	629

122. Revitalising Heritage Shophouses of Kota Bharu Kelantan 633  
***Yasmin Mohd Faudzi, Najah Md Alwi, Nor Hafizah Anuar, Juliza Mohamad & Nik Nurul Hana Hanafi***
123. Smart 3-Wheel Bike “Empower Disabled Entrepreneurs With Technology” 638  
***Nurnaddia Nordin, Nurhaiza Nordin & Nur Ilyana Amiira Nordin***
124. Takaful Sinar Ihsan Plus 642  
***Nur Adibah binti Ab Aziry, Erlyn Marlina binti A.Rahman, Nurul Izzaty binti Mohamad Ridzuan & Mohammad Firdaus Mohammad Hatta***
125. Smart Keychain 648  
***Mohd Hifadzly bin Husrin, Adeylson Ray Douni, Muhammad Azlan bin Moh Sali & Edrin Rosley***
126. Secured Multi Door Access System as A Web Application 652  
***Nor Shamshillah Kamarzaman, Norhayati Abdul Jamil, Noraliza Azizan, Jaaz Suhaiza Jaafar & Muhamad Syafiq Ahmad Nazri***
127. Standard of Care Framework for Occupier During Pandemic Covid-19 (SOCO): A Facilitation for Understanding Law Relating to Tourism Industry 657  
***Mohamad Sahizam Musa, Suria Fadhillah Md Pauzi, Shamsinar Abdul Rahman, Mohd Azim Zainal & Ida Rosnita Ismail***
128. Development Of Sound System Level Tools “SoQMeT” 664  
***Muhammad Danial bin Abu Hanafiah, Muhammad Aleef bin Mohamad Yaziz, Muhammad Aiqal bin Mohd Sazali, Adhilla binti Ainun Musir, Nurulzatushima binti Abdul Karim & Daliah binti Hasan***
129. Stackable Pinewood Pallet Storage Keeper (SPPiKe) 670  
***Nurrohana Ahmad, Hazlin Hasan, Sharifah Norhuda Syed Wahid, Mohd Aidil Riduan Awang Kader & Mastura Mohamad***
130. Sustainable Hybrid G-W Filter 676  
***Nur Fatin Nasuha Mhd Khatif, Fahda Nurhani Ahmad Razan, Ir. Nur Azwa Muhamad Bashar & Nurakmal Hamzah***
131. Takaphone Takaful 681  
***Muhammad Waizzulhakim bin Othamannor, Mohd Mazwan bin Mohd Jamil, Mohammad Firdaus bin Mohammad Hatta & Sharifah Faigah binti Syed Alwi***
132. Stay@Rural Application 686  
***Muhammad Faezzul Farhan bin Yazid, Muhammad Hakim Zulqarnain bin Ajis, Mohamad Sazlyzam bin Ledei Dawin@Salim Dawin, Mohd Ashnawi bin Ab Gani & Dr. Spencer Hedley Mogindol***

133. Sajadah Pillow 689  
*Nor Asyiqin Nadhirah binti Roslee Afendi, Sharifah Hafiza binti Abu Bakar, Nur Khaleqa Izzah binti Ikmal Hisam & Siti Hajar binti Md Shahar*
134. Pepper Casenitizer 693  
*Nurfatihah Syahirah binti Zaidi Rahimy, Syahira Nisha Nabila binti Mohamad Shahril, Muhammad Afiq Syahmi bin Rosli, Nur Wani Syamimi binti Yaman & Alvin Gatu*
135. My\_Watch - Changing the Way We Use Watches 699  
*Nur Athilla binti Alimin, Nur Hadirah Faqihah binti Zainudin, Siti Nadiah Afiqah binti Suhairi, Joseph Joshua Rumpungan Jr & Adrianna binti Aziz*
136. Myeco Application 704  
*Izz Fitri bin Hairul Sham, Nur Syahirah binti Dzulkarnain , Rosseryn Soubin Lonsiong & Siti Zuraini binti Ramley Alan*
137. Multipurpose Pushcart 709  
*Farah Adlyna Yeoh , Noor Zizy Ameleena binti Jailani , Nur Amiratul Atiqah binti Nur Azli Yaacob & Sairah Saien*
138. Multipurpose Handle Stabilizer – To Help You Handle Your Life 714  
*Nur Athilla binti Alimin, Nur Hadirah Faqihah binti Zainudin, Siti Nadiah Afiqah binti Suhairi, Joseph Joshua Rumpungan Jr & Adrianna Aziz*
139. The Travel Amenity Pod 719  
*Wan Nuramalin binti Wan Hussin, Nur Alissya binti Nazri, Muhammad Takbir bin Arifuddin & Ahmad Fareez bin Yahya*
140. Toothbrush 2-In-1 724  
*Alice Evana Anak Robert, Latijah Obaun, Staffy Stephen & Christy Bidder*
141. Torch Bottle 727  
*Muhammad Shazwan Puzi, Farzana Suaidah binti Suzaini, Nurul Aina Balqis binti Mohd Khairul Anuar & Nur Murniza binti Mohd Zaidi*
142. Tourism Application - Touch 731  
*Siti Hafizah binti Dzulkarnain, Amira Naqiyyah binti Mustaffa Ma'arof , Nursyahidah binti Hamzah, Nur Hidayah binti Mohammad Hazlan & Boyd Sun Fatt*
143. Locallah 736  
*Muhammad Faliq Aizat M.Amran, Nazmeen Fatima binti Istekhar Ahmad, Nur Izzati Nabilah binti Alias, Adriana binti Mohamad Faizal & Mohd Arsy Ardy bin Mohd Hardy*
144. Ez-Train Mobile App 741  
*Siti Aishah binti Sha'ari, Alirah Itor, Muhammad Faizzudin bin Mohd Shukor, Nur Hazeera binti Madehie & Nurafiqah binti Mohamad Musa*

145. Eventgo 747  
*Cassandra Grace anak Hamarah, Nazira Farahin binti Nazarudin, Venessa Kumang Amen anak Victor Luna & Cindy Johnny*
146. Duo-Bottle 752  
*Maybelyna Deborah Dick, Nurashikin Binti Hamzah, Jacqueline Henry & Nurafiqah Binti Mohamad Musa*
147. 4 In 1 Safety Kit 755  
*Nur Maisarah Afiqah binti Mazlan, Aina Afriena binti Afandi, Aida Najihah binti A.Lukman, Muhammad Irfan bin Mazlan & Nur Murniza binti Mohd Zaidi*
148. Augmented Reality Design: The Study of Property Development Marketing Tools 761  
*Norzaful Anuwar bin Ahmad Najamuddin*
149. SMART Hygiene Kit 765  
*Dg Kamisah Ag Budin, Jasmine Vivienne Andrew, Faiqah Mawardi, Mohammad Firdaus bin Mohamad & Dayang Haryani Diana Ag Damit*

## OPTIMAL CHARGING SCHEDULE OF ELECTRIC VEHICLES USING EVOLUTIONARY PROGRAMMING TO MINIMISE COSTS

Hasmaini Mohamad

Faculty of Electrical Engineering, UiTM Shah Alam  
hasmaini@uitm.edu.my

Norhasniza Md Razali

Faculty of Electrical Engineering, UiTM Shah Alam  
hasniza.md.razali@gmail.com

Ahmad Farid Abidin

Faculty of Electrical Engineering, UiTM Shah Alam  
ahmad924@uitm.edu.my

Nur Ashida Salim

Faculty of Electrical Engineering, UiTM Shah Alam  
nurashida606@uitm.edu.my

Zuhaila Mat Yasin

Faculty of Electrical Engineering, UiTM Shah Alam  
zuhai730@uitm.edu.my

### ABSTRACT

Electric vehicle technology presents new opportunities to the transportation sector and car manufacturers worldwide. However, this development is becoming a concern to utility operators when a large number of electric vehicles are charged simultaneously, which overloading might occur, especially during peak hours. This condition can affect the stability of the grid. Since electric vehicles are considered as an additional load to the power grid, a suitable charging coordination must be presented in order to optimize grid operation. This study implemented an electric vehicle charging schedule on an IEEE 33-bus residential network using evolutionary programming for optimization. Some constraints, such as power and voltage limits of the grid were taken into consideration to ensure the efficacy of the proposed optimal charging strategy. Simulation results showed the comparison between uncoordinated and coordinated charging schemes in terms of daily load curve and EV operating costs. Three case studies were analysed for coordinated charging based on different charging periods. Electric vehicle charging rate is varied in order to determine the minimum operational costs.

**Keywords:** charging coordination, cost minimization, electric vehicle, evolutionary programming

### INTRODUCTION

Electric vehicles (EV) can be considered as one of the evolving technologies in recent years. EVs invention is an alternative to achieve environmental conservation by reducing carbon emission. Compared to the conventional internal combustion engine (ICE) transportation [1], EVs are expected to be accepted and popular among vehicle users in the near future. High EV penetration comes with the risk of degrading the reliability and distribution performance of the power grid [2]. Simultaneous charging of EVs, especially at residential nodes, will impose a

serious impact on peak demand and increase power transmission loss [3]. Thus, it may increase the operational costs, in terms of replacing new equipment and maintenance [4]. This study aimed to coordinate EV charging using EP optimization technique. The algorithm considered 24-hour electricity price data, and varied EV users' charging rate and time in order to achieve the minimum operational cost. This method also maintained grid operation within the normal voltage and power limit, especially during peak hours. The uncoordinated and coordinated charging results of three case studies were compared and discussed.

## SYSTEM MODELING

An analysis was performed on a residential distribution system by considering a 24-hour load profile and energy market pricing. A distribution system of 415 V IEEE 33-bus, as shown in Figure 1 is used as the test network in this study. In this study, EV charging is assumed to occur at home and not at the charging station. EV users are assumed to be using their EV as their daily transport that they can use for a short distance, such as go to work, send their kids to school or go to shopping malls for groceries. After returning home from their respective activities, users can directly charge their EV overnight. A typical residential daily load curve is used to model the domestic load variations within 24 hours. This curve was based on real data captured from a distribution transformer [4]. Domestic EV chargers are assumed to be rated at 4 kW per hour. Battery capacity is important to determine reasonable charging profiles for all EVs. In this study, all EVs were assumed to have a maximum battery storage capacity of 16 kWh, with state of charge (SOC) from 0 percent to 100 percent [5]. Therefore, 4 hours would be needed for all EVs to be completely charged. Cost minimization is considered based on hourly electricity prices of the open market.

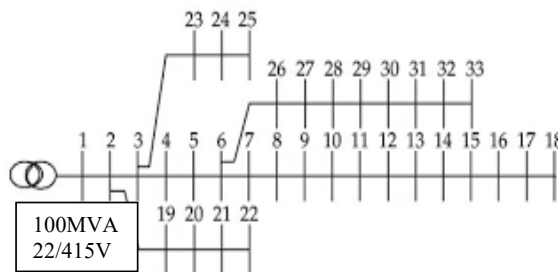


Figure 1. Distribution Network System

## METHODOLOGY

The minimum cost function is shown in Equation (1), where the cost function is the summation of charging hour price.  $P_{EV,t}$  is formulated in Equation (2), whereby EV charging load,  $P_{EV}$  is multiplied by the EV charging rate. The charging rate is optimised in the algorithm to choose when the car would need to charge at a full rate and when it would need to charge at a lower rate. Flowchart of the optimization technique based on the EP algorithm is shown in Figure 2.

$$F_{cost} = \sum_{t=1}^{t=24} [P_{EV,t} * Price_{t,i}] F_{cost} = \sum_{t=1}^{t=24} [P_{EV,t} * Price_{t,i}] F_{cost} = \sum_{t=1}^{t=24} [P_{EV,t} * Price_{t,i}]$$



(1)

$$P_{EV,t} = P_{EV} * C_{rate,t} \quad P_{EV,t} = P_{EV} * C_{rate,t} \quad (2)$$

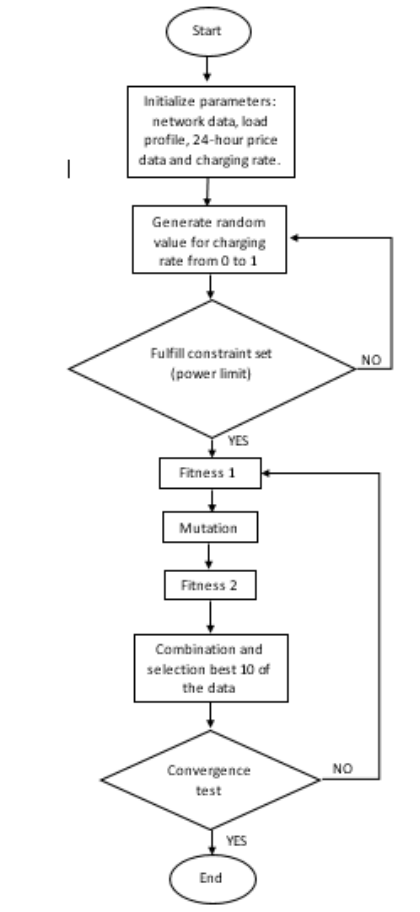


Figure 2. Optimization Process Flowchart

## RESULTS AND DISCUSSION

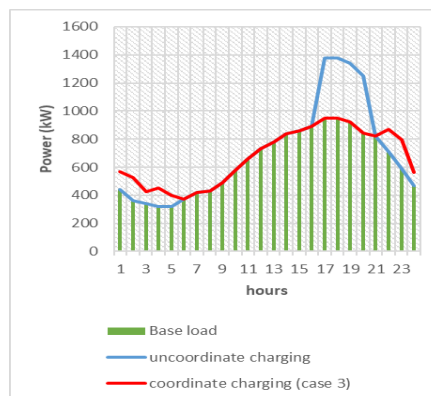
Impacts of EV charging were presented for both uncoordinated and coordinated charging schemes. In the coordinated charging scheme, the optimal charging rate of EVs to achieve minimal cost is evaluated by comparing three case studies of different EV charging periods, as shown in Table 1. The coordinated charging scheme using EP algorithm was expected to distribute EVs charging over the designated charging period, while achieving the objective of minimum operation cost. The stability and safety of the grid was ensured by following the operational constraints set in the algorithm. Result for case no. 3 is given in Figure 3 showing that the coordinated charging led the load from EVs charging to be shifted from peak hours to off-peak hours. Data of optimal charging rates and total costs are summarised in Table 2 for both uncoordinated and coordinated schemes.

**Table 1.** EV Charging Schemes and Case Studies

Case no.	Charging scheme/time
<b>Uncoordinated charging</b>	
	5:00 pm - 9:00 pm (4 hours)
<b>Coordinated charging</b>	
1	5:00 pm - 2:00 am (9 hours)
2	5:00 pm - 3:00 am (10 hours)
3	5:00 pm - 5:00 am (12 hours)

**Table 2.** Summary Results including EV Charging Hours, Energy, Charging Rate, and Total Cost

time (h)	Uncoordinated charging			Coordinated charging								
	Energy (kWh)	Cost (\$)	Rate	Case 1			Case 2			Case 3		
	Energy (kWh)	Cost (\$)	Rate	Energy (kWh)	Cost (\$)	Rate	Energy (kWh)	Cost (\$)	Rate	Energy (kWh)	Cost (\$)	Rate
1				154.034	5.083	0.7	167.234	5.519	0.3	127.634	4.212	0.3
2				127.228	3.435	0.9	140.428	3.719	0.8	166.83	4.504	0.3
3							137.027	2.741	1	84.226	1.685	0.8
4										133.625	2.272	1
5										80.825	1.374	0.4
17	325.57	27.999	1									
18	325.57	19.209	1									
19	220.5	13.451	1									
20	207.7	12.67	1									
21												
22				240.1	17.287	0.5	239.555	17.248	0.2	160.355	11.546	0.2
23				229.146	9.853	0.9	179.546	7.72	1	205.946	8.856	0.3
24				198.737	8.546	1	159.137	6.843	0.7	93.137	4.005	0.7
Total cost	73.329			44.204			43.788			38.454		



**Figure 3.** Daily Load Curve with Coordinated Charging (Case 3)

## CONCLUSION

This paper proposes the EV charging coordination for an IEEE 33-bus residential distribution system to minimise the operational costs using EP algorithm. The simulation results are presented and compared with the uncoordinated and coordinated charging schemes. The charging rates of EVs were optimised throughout the programming process. The EP method is proven to be practical and shows good convergence properties. The proposed algorithm has also successfully achieved the objective of minimising the operational costs of EV without violating network conditions. Future studies may consider larger aspects of variation in other parameters, such as battery capacity, EV penetrations, and pricing scheme.

## ACKNOWLEDGEMENTS

This work was supported by the Ministry of Higher Education and Universiti Teknologi MARA, Malaysia under FRGS research grant (Grant Code: 600-IRMI/FRGS 5/3(090/2019)).

## REFERENCES

- Cai, L.X., Pan, J., Zhao, L., & Shen, X. (2017). Networked Electric Vehicles for Green Intelligent Transportation. *IEEE Communications Standards Magazine*, 1, 77-83.
- Denholm, P., & Short, W. (2006). Evaluation of Utility System Impacts and Benefits of Optimally Dispatched Plug-In Hybrid Electric Vehicles (Revised).
- Liang, H., Liu, Y., Li, F., & Shen, Y. (2019). Dynamic Economic/Emission Dispatch Including PEVs for Peak Shaving and Valley Filling. *IEEE Transactions on Industrial Electronics*, 66, 2880-2890.
- Masoum, A.S., Deilami, S., Moses, P., & Abu-Siada, A. (2010). Impact of plug-in electrical vehicles on voltage profile and losses of residential system. *2010 20th Australasian Universities Power Engineering Conference*, 1-6.
- Zhou, R., Li, Z., Wu, C., & Chen, M. (2015). Demand Response in Smart Grids: A Randomized Auction Approach. *IEEE Journal on Selected Areas in Communications*, 33, 2540-2553.



Cawangan Kedah  
Kampus Sungai Petani

Faculty of Administrative  
Science and Policy Studies

# i-SPiKE<sup>2021</sup>

INTERNATIONAL EXHIBITION & SYMPOSIUM ON PRODUCTIVITY, INNOVATION, KNOWLEDGE & EDUCATION

*Leading An Artificial Innovation In Knowledge, Education And Design*

e ISBN 978-967-2948-20-9



9 7 8 9 6 7 2 9 4 8 2 0 9

