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VICE CHANCELLOR’S MESSAGE

Assalamualaikum W.B.T. and greetings to all,

It is my great pleasure in welcoming all of you delegates and participants to the 11th International UNIMAS STEM Engineering Conference or EnCon 2018.

The Faculty of Engineering UNIMAS has been successfully hosting this annual EnCon conference since 2007. This year, once again, under strategic partnership with Ministry of Education Malaysia, Ministry of Education, Science and Technological Research Sarawak (MESTR) and Sarawak Education Department (JPNS), another platform for professionals in the field of science, technology and engineering to build networking and collaborations is organized. This year’s theme, that is “Realizing The 4th Industrial Revolution in Engineering and Built Environment” is seen timely as solutions to enhance the knowledge in the field of science, technology, engineering and built environment through presentation and sharing of innovative ideas towards the 4th Industrial Revolution. Our distinguished keynote speakers have been invited to share their knowledge and views on various topics in this conference and I hope the two-day intellectual discourse during this event is to reveal several pertinent resolutions on this issue.

With successful introduction of International Science and Engineering Expo (i-STEEx) in EnCon2016 to showcase the latest innovation and research projects by high school students and institutions of higher learning and the industries, once again this year i-STEEx 2018 is reaching out to the researchers and innovators with the one of its objectives being to encourage youth to demonstrate their creativity and problem solving skills. This expo will focus on enhancing creativity among the youth to spark innovative interest in science and technology to showcase their innovative product designs. As we strongly advocate STEM education in support of the state’s and the country’s initiative to increase STEM students, parallel sessions of STEM workshops shall also be held for teachers from schools in Sarawak in this 2-day event. Our collaborations with industries and other Institution of Higher Learnings are also further strengthen with the signing of ten MoUs/MoAs and exchanged in this conference.

Finally, thank you to all delegates and participants for the support and it is hoped that this conference would be stimulating and would provide valuable experience to all. A big thanks to the organizing committee for their huge efforts in making this event a success.

YBhg Prof. Datuk Dr Mohamad Kadim Hj Suaidi
Vice Chancellor
Universiti Malaysia Sarawak
DEAN’S MESSAGE

Assalamualaikum W.B.T. and greetings to all

Once again, the Faculty of Engineering, UNIMAS, is proud to host the 11th INTERNATIONAL UNIMAS STEM Engineering Conference, EnCon2018.

On behalf of the EnCon2018 organizing committee, I am honored and delighted to welcome you to this prestigious conference.

This year, EnCon embarks on a very relevant theme entitled “Realizing the 4th Industrial Revolution in Technology, Engineering and Built Environment”. Topics to be delivered by both our prominent speakers and respected participants will dwell on various areas, directly or indirectly supporting the 4th Industrial Revolution which we hope shall create more opportunities to all delegates in their efforts to support IR 4.0 initiatives. Hence, our technical program is rich and varied with 3 keynote speeches, 7 plenary speeches and over 80 technical papers and of course, the success of this conference depends ultimately on strong support of the elite members of the International Steering Committee who are prominent scholars in the dedicated conference theme.

As in previous years, EnCon 2018 continues its past success via strengthened collaborations in promoting Science, Technology, Engineering and Mathematics (STEM) among youths, teachers, parents as well as the entire community. The integral part of this conference is set with the aim to ensure sufficient number of qualified STEM graduates to be readily absorbed into science, technical and engineering workforce. Our effort continues with the organization of i-STEEx 2018 or the International Science Technology and Engineering Expo which runs parallelly with the conference and already in its 3rd year of organization.

To conclude, I would like to express my deepest appreciation to the co-organizers namely Ministry of Education Malaysia, Ministry of Education, Science and Technological Research Sarawak, Tabung Ekonomi Gagasan Anak Bumiputera Sarawak (TEGAS), the Institution of Engineers Malaysia, the Royal Institution of Surveyors Malaysia and Malaysian Council of Engineering Deans. Heartiest gratitude goes to the International UNIMAS STEM Engineering Conference, EnCon2018 organizing committee, the Faculty of Engineering and our supporting partners for their initiatives and commitment in spearheading this conference. To all participants, thank you for your support and hope we will see you again in our future EnCon conferences.

Assoc. Prof Ir. Dr Siti Noor Linda Binti Hj Taib
The Organizing Committee warmly welcomes our distinguished delegates and guests to the 11th International UNIMAS STEM Engineering Conference (EnCon 2018) held on 12th-14th September 2018 in Kuching, Sarawak, Malaysia. EnCon 2018 is co-organized by the Institution of Engineers Malaysia (IEM), Sarawak Branch, and the Royal Institution of Surveyor Malaysia (RISM), Sarawak Branch. We would like to acknowledge the financial and moral support from our sponsors and supporters, namely the Chief Minister Office, Ministry of Education, Science and Technological Research, Department of Education, Sarawak, and Sarawak Foundation.

The conference has solicited and gathered technical research submissions related to all aspects of the conference themes in a broad range of mechanical, chemical, electronic, electrical, and civil engineering, as well as built environment and surveying. More than 90 papers have been submitted for presentations from five countries namely the UK, Pakistan, Czech Republic, Brunei, and Malaysia. The papers will be presented in three keynotes lectures, seven plenary talks, and 88 oral presentations. We are grateful to all those who have contributed to the success of EnCon 2018. We hope that all participants benefit scientifically from the paper presentations and find it stimulating in the process. We would like to wish you success in your technical presentations and social networking.

We are also concurrently organizing three workshops on smart building, waste management, and STEM education, and an innovative school-based science, technological and engineering exhibition and competition, iSTEEX 2018, in order to promote STEM in our schools. We have a record of 38 teams participate in the competition, and six exhibitors promoting their products and services.

Finally, we hope you have a unique, rewarding and enjoyable week at EnCon 2018 in Kuching.

Professor Ir. Dr Andrew Ragai Anak Henry Rigit
Chair, EnCon 2018
International UNIMAS STEM 11th Engineering Conference 2018 (EnCon2018) will be held from September 12 to 14, 2018 in the beautiful city of Kuching, Sarawak. With the theme ‘Realizing The 4th Industrial Revolution In Engineering And Built Environment’, the objectives of the current conference are to:

- Provide a platform for professionals in the field of science, technology, engineering and built environment to build networking for future collaborations
- Provide a critical discussion platform about new updates in the field of science, technology, engineering and built environment, especially discussion about the theme of the conference
- Enhance the knowledge in the field of science, technology, engineering and built environment through presentation and sharing of innovative ideas towards the 4th Industrial Revolution
- Foster academic-industrial relationship for the benefit and betterment of the society
INTERNATIONAL ADVISORY BOARD MEMBERS

1. Professor Mark Simmons, Head of Chemical Engineering, University of Birmingham, U.K.

2. Professor Nidal Hilal, Director CWATER, College of Engineering, Swansea University, U.K.

3. Professor Kwing-So Choi, Mechanical Engineering Dept., University of Nottingham, U.K.

4. Professor Nasir Ahmad, Head Polymer Research, National University of Sciences and Technology (NUST), Islamabad, Pakistan.

5. Professor Irshad Hussain, Lahore University of Management Sciences (LUMS), Pakistan.

6. Prof. Dr. Luqman Chuah Abdullah, Universiti Putra Malaysia (UPM).

7. Prof. Dr. Yoshimitsu Uemura, Universiti Teknologi PETRONAS (UTP).

8. Prof. Dr. Mohamed Mahmoud El-Sayed Nasef, Universiti Teknologi PETRONAS (UTP).

9. Prof. Dr. Octavio Carvajal Zarrabal, University of Veracruz, México.

10. Prof. Clement Kuek, Curtin University, Sarawak Campus.
Patron
Prof. Datuk Dr Mohamad Kadim Suaidi
Vice-Cancellor, Universiti Malaysia Sarawak

Advisors
Prof Madya Ir Dr Siti Noor Linda bt Taib
Dean, Faculty of Engineering
Dr Norhuzaimin bin Julai
Deputy Dean (Postgraduate and Research), Faculty of Engineering

Chairman
Prof. Ir Dr Andrew Ragai Henry Rigit

Co-Chairman
Prof. Madya Dr Rubiyah Baini

Secretary
Dona Rose Amer Koesmeri

Co-Secretaries
Khairul Anwar Mohamad Said
Ir Rudiyanto bin Philman Jong
Dr. Hafizah Abdul Halim Yun
Nadia Zaini
Dr Marini Sawawi
Zuraidah Ibrahim
Dayang Rohhayati Abang Ahmad
Siti Fazilah Mohammad
Hasmiza Kontet

Treasurer
Zayn Al-Abideen Gregory

Co-Treasurers
Dr Josephine Lai Chang Hui
Hamizah Kawi
Dahlia Wahab

Director of Technical Papers & Publications
Prof. Madya Dr Kharuddin Sanaullah

Co-Directors of Technical Papers & Publications
Dr Rezaur Rahman

Members of Technical Papers & Publications
Prof. Ir Dr Amir Azam Khan
Dr Alsidiqi Hasan
Dr Charles Bong Hin Joo
Dr Yonis. M.Yonis Buswig
Prof. Dr Mohammad Abdul Mannan
Dr Muhammad Kashif
Prof. Dr Paul Ratnamahilan Hoole
Ron Aldrino Chan@Ron Buking
Dr Siti Kudnie Sahari
Dr Tay Kai Meng Profesor
Dr. Musse Mohamud Ahmed
Dr Muhammad Kashif
Dr Magdalene Andrew Munot

Director of STEM Track
Noraziah binti Abdul Wahab

Co-Directors of STEM Track
Nur Amalina Shairah Abdul Samat
Norzilawatif Azwa Mohamad
Dayang Fadhilatul Aishah bt Abang Abdul Hamid
Mohammad Zulfika Hazielim b Zakaria
Airul Azhar b Jitai
Hamizah bt Kawi
Angela anak Robert Lin
Dayangku Zyzy Cermlyya binti Awang Rahmat
Nursuzila binti Daud
Othman bin Juma’at
Mohd Azree Zannurain Iyliia bin Zainudin
Indera bin Narudin
Ir. Dr Leonard Lim

Committee Members of i-STEEx 2018
Dr Noor Hisyam Noor Mohamed
Mohd Azrin Mohd Said
Dr Annisa Jamali
Dr Ade Syaheda Marzuki
Dr Shafrida Saharni
Dr Ivy Tan Ai Wei
Rose Sima Ikau

Director of Venue & Logistics
Prof. Madya Sr. Dr Afzan Ahmad Zaini

Co-Directors of Venue & Logistics
Abdul Wafi Razali
Raja Mohd Raffel bin Zulkifli
Mohammad Rhyier Juen bin Abdullah
Treman bin Bolhassan
Mohamad Zaidi Serah
Mohd Hafiz Mafadi
Mohammad Amirul Nizam
Kamri Mohamad
Raja Mohd Raffel Zulkifli
Zaharar’ Hadzli
Airul Azhar
Aswandi Rosli
Zulkifli Ahmad
Wan Mohd Hamizah
Anis Bujang
Jamli Razami
Mohamad Fauzan Hassan
Zamri Sebi
Azman Kria

Committee Member of Programme & Protocol
Prof. Madya Dr Syed Tarmizi Syed Shazali
Dr Ana Sakura Zainal Abidin
Dr Raudhah Ahmadi
Dr Annisa Jamali
Norlisa Mili
Izzati Hashim
Hishammudin Afifi Huspi
Rasli Muslimen
Mohd Iskandar Jobli
Sabariman Bakar
Mohd Fairudi Mohd Jamil
Prof. Ar. Nurakmal Abdullah @ Goh Tuo Ho
Dr Nordiana Rajaee
Sharifah Nurfarhana Syed Sahimi
Sitti Diana Tamjehi
Rosmanti Kiflie
Angela Robert Lin
Dayang Rohhayati Abang Ahmad
Rokilah Bohari Khan
Siti Fazilah Mohammad
Hasmiza Kontet
Johari Abdul Karim
Lawrence Macwell Sinin
Nasri Eli
Mohammad Ismail Hairul Abdul Latif
Mohamad Tajuddin Unus
Mahsuri Yusof
Yon Syafni Samat
Dr Dyg Norkhairunnisa Abang Zaidel
Dr Atta Idrawani Zaini
Mohd Ridhuan Mohd Sharip
Mohamad Syazwan Zafwan Mohamad Suffian
Dr Marini Sawawi
Dr Khairul Fikri Tamrin
Alia Athirah Hj Mohtadzar
Saiful Edi
Johari Abdul Karim
Nasri Eli
Harunal Rejan Ramji
Siti Hazirah Adam
Prof. Madya Dr Siti Halipah Ibrahim
Rose Sima Ikau
Mohd Ismail Hairul Abd Latif
Dr Ivy Tan Ai Wei
Mohd Hafiz Mafadi
Wiermawaty Baizura Awie
Mohammad Amirul Nizam Amit
Kamri Mohamad
Dr Lim Soh Fong
Dr Norfamila binti Che Mat
Ir Dr David Chua Sing Ngie
GENERAL INFORMATION

Registration Desk
Registration for the conference will be conducted at the Registration Desk located at level 3 foyer.

The registration desk is available during the following period:

12th September 2018, Wednesday:
0800 – 1700 (Conference + Workshops + i-STEEx + STEM Education Workshop)

13th September 2018, Thursday:
0800 – 1700 (Conference + STEM Education Workshop)

Lunch, Morning and Afternoon Tea Break
12th September 2018: Lunch will be served at Coca Restaurant at level 3 & Casablanca Restaurant at Mezzanine level
13th September 2018: Lunch will be served at Coca Restaurant at level 3 & Casablanca Restaurant at Mezzanine level

Name Badges
For identification and security reasons, delegates are requested to wear their name badges at all times during each conference sessions and at social functions.

Conference Secretariat
The conference Secretariat room is located at Board Room 2, Level 3. Please visit the Secretariat room if you have any enquiries regarding the conference.

Parallel Oral Presentation
Your presentation is limited to 12 minutes. If your presentation exceeded the time limit, you will be instructed to stop to avoid encroaching into the next speaker’s time slot and disrupting the programme schedule. There will be a 3-minutes slot scheduled at the end of your presentation for Question and Answer session.

Website

CCD/CPD/PDP Hours
12th & 13th September 2018: CPD from BQSM, CPD from IEM
*will be informed later
DAY 1 | OPENING CEREMONY
Wednesday, 12th September 2018
Sarawak Chamber 3, Riverside Majestic Hotel, Kuching

0900  -  Arrival of Delegates and Invited Guests
0920  -  Arrival of YBhg Prof Datuk Dr. Mohamad Kadim Suaidi
          Vice Chancellor of UNIMAS
0925  -  Arrival of UNIMAS Board of Directors
0930  -  Arrival of YAB Datuk Patinggi (Dr) Abang Haji Abdul Rahman Zohari Bin
          Tun Datuk Abang Haji Openg
          Chief Minister of Sarawak
          -  National Anthem – ‘Negaraku’ dan ‘Ibu Pertiwiku’
          -  Do’a Recitation
          -  Welcoming Speech by YBhg Prof Datuk Dr. Mohamad Kadim Suaidi
          -  Opening Speech by YAB Datuk Patinggi (Dr) Abang Haji Abdul Rahman
              Zohari Bin Tun Datuk Abang Haji Openg
          -  Conference Launching Ceremony
          -  MoU / MoA Exchange Session
          -  Souvenir Presentation
1100  -  End of the Opening Ceremony
        -  VVIPs and VIPs proceed to officiate i-STEEEx 2018 at Sarawak Chamber 1 and 2
## DAY 1 | TENTATIVE PROGRAMME

Wednesday, 12\textsuperscript{th} September 2018  
Riverside Majestic Hotel, Kuching

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<tr>
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<th>Activity</th>
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<tr>
<td>0730 – 0820</td>
<td>Registration and Arrival of Participants</td>
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</tbody>
</table>
| 0820 – 0900 | **Keynote Speaker 1:** Professor Dato’ Dr. Noraini Idris (STEM Keynote)  
Topic: STEM Education For 4th Industrial Revolution: A Way Forward |
| 0900 – 0930 | Arrival of Guest of Honour and VIP                                                                  |
| 0930 – 1100 | **Opening Ceremony**  
Venue: Sarawak Chamber 3                                                                           |
| 1100 - 1120 | **Tea Break (Sarawak Chamber Foyer, Level 3)**                                                  |
| Sarawak Chamber 3 | Sarawak Chamber 1 and 2                                                                 |
| 1120-1200  | **Keynote Speaker 2:** Prof. Kwing-So Choi  
| 1200 - 1240 | **Keynote Speaker 3:** Prof. Dr. Nasir M. Ahmad  
Topic: Design and Applications of Antifouling Functional Polymeric Materials for Industry and Environment |
| 1240 – 1400 | **Lunch Break (Café Majestic Level 1 & Casablanca Lounge, Mezzanine Level)**                      |
## DAY 1 | CONFERENCE WORKSHOPS

Wednesday, 12\textsuperscript{th} September 2018
Riverside Majestic Hotel, Kuching

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<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>0800-0830</td>
<td>Arrival and Registration of Participants</td>
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</table>
| 0830 – 1700 | Windsuite 2, Level 3  
Workshop 1  
Title: Identification, Notification, Labelling and Storage of Scheduled Wastes  
Speaker: Miss Siti Hazirah binti Adam |
|          | Windsuite 1, Level 3  
Workshop 2  
Title: Facility Management of Smart Building for the 21\textsuperscript{st} Century  
Speaker: Mr Abdul Rani bin Achmed Abdullah |
## DAY 1 | CONFERENCE

Wednesday, 12th September 2018
Riverside Majestic Hotel, Kuching

<table>
<thead>
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<th>STEM Track</th>
<th>i-STEEx</th>
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<tr>
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<td>Parallel Sessions</td>
<td>Sarawak Chamber 3</td>
<td>Sarawak Chamber 1 and 2</td>
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<td>Deer &amp; Lady Suite, Level 3</td>
<td>Window on Kuching 1&amp;2, Level 18</td>
<td>Window on Kuching 3&amp;4, Level 18</td>
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<tr>
<td>1400</td>
<td>Plenary Speaker 1</td>
<td>Plenary Speaker 2</td>
<td>Plenary Speaker 3</td>
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<td>Paper 03</td>
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<td>Paper 14</td>
<td>Paper 09</td>
<td>Paper 27</td>
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<td>Tea Break (Sarawak Chamber Foyer, Level 3)</td>
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<td>1550</td>
<td>Paper 17</td>
<td>Paper 13</td>
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<td>Paper 24</td>
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<td>Paper 48</td>
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<tr>
<td>1730</td>
<td>Paper 58</td>
<td>Paper 75</td>
<td>Paper 49</td>
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End of Day 1
DAY 1 | OFFICIAL DINNER
Wednesday, 12th September 2018
Asajaya Hall, Grand Margherita Hotel Kuching
*Dress code: Smart Casual

1920 - Arrival of Guests
1945 - Arrival of Vice Chancellor of UNIMAS
1950 - Arrival of Chairman of Lembaga Pengarah UNIMAS
1955 - Arrival of Minister of Ministry of Education, Science and Technological Research Sarawak (MESTR)
2000 - National Anthem ‘Negaraku’ and UNIMAS Gmilang
- Do’a Recitation
- Welcoming Remarks by Professor Ir Dr Andrew Ragai Henry Rigit
  Chairman of International UNIMAS STEM EnCon 2018
- Speech by YB Dato Sri Michael Manyin Jawong
  Minister of Ministry of Education, Science and Technological Research Sarawak (MESTR)
- MoU / MoA Exchange Session
- Best Paper Awards
2230 - Dinner Ends
## DAY 2 | CONFERENCE
Thursday, 13th September 2018
Riverside Majestic Hotel, Kuching

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<tr>
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<th>EnCon 2018</th>
<th>STEM Track</th>
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<tr>
<td></td>
<td>Parallel Sessions</td>
<td>Sarawak Chamber 3</td>
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<td>Deer &amp; Lady Suite, Level 3</td>
<td>Window on Kuching 1&amp;2, Level 18</td>
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<tr>
<td>0830</td>
<td>Plenary Speaker 4</td>
<td>Plenary Speaker 5</td>
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<td>0900</td>
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<td>Paper 64</td>
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<td>1040</td>
<td>Tea Break (Sarawak Chamber 1 &amp; 2, Level 3)</td>
<td>STEM Workshop 3</td>
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<td>Paper 65</td>
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<td>Paper 89</td>
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<td>Lunch Break (Coca Restaurant Level 3 &amp; Casablanca Lounge, Mezzanine Level)</td>
<td>STEM Workshop 4</td>
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## DAY 2  |  CONFERENCE

Thursday, 13th September 2018
Riverside Majestic Hotel, Kuching

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<tr>
<td>1400</td>
<td>Plenary Speaker 7</td>
<td>*Participants can listen to Plenary Speaker 7</td>
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## DAY 3  |  TECHNICAL VISIT

Friday, 14th September 2018
Longi Sdn Bhd, Kuching
SPEAKERS
Scan QR codes for more information

Keynote Speaker 1 (STEM Keynote)
Professor Dato’ Dr. Noraini Idris
Topic: STEM Education For 4th Industrial Revolution: A Way Forward

Keynote Speaker 2
Prof. Kwing-So Choi

Keynote Speaker 3:
Prof. Dr. Nasir M. Ahmad
Topic: Design and Applications of Antifouling Functional Polymeric Materials for Industry and Environment

Plenary Speaker 1: Assoc. Prof. Dr. Azrul Azlan bin Hamzah
Topic: Development of anti-diuretic hormone (ADH) Sensor for Smart Monitoring of Fluid Level in Artificial Kidney

Plenary Speaker 2:
Prof. Dato’ Dr. Burhanuddin bin Haji Yeop
Topic: MEMS based Chemical Sensors for Biomedical Applications

Plenary Speaker 3: Professor Ir. Dr. Abdul Aziz Bin Abdul Raman
Topic: Challenges and Opportunities for Malaysian Engineers in Coming Years
Plenary Speaker 4:
Sr Mohamad Shazali bin Sulaiman

**Topic**: Metamorphosis of QS Profession: Revolutionary Journey in Malaysia Towards Industry 4.0

Plenary Speaker 5:
Ar Wee Hii Min

**Topic**: Engineering the Built Environment

Plenary Speaker 6:
Mr. Leon Liew Chee Eng

**Topic**: Innovation and it's Impact on the Energy Sector

Plenary Speaker 7:
Mr. Abbas Ali

**Topic**: Big Data Analytics in The Facilities Management Industry

STEM Workshop 1:
Tuan Haji Syahrul Nizam bin Junaini

**Topic**: Gamification of STEM Education using Augmented Reality (AR) Board Game

STEM Workshop 2:
Dr. Rose Amnah binti Abd. Rauf

**Topic**: STEM Pedagogical Approach
STEM Workshop 3:
Pn Noraziah Abdul Wahab

Topic: TRIZ

STEM Workshop 4:
Assoc. Prof. Dr Norsiah Fauzan

Topic: Neuro Cognitive Science for STEM

Conference Workshop 1:
Miss Siti Hazirah binti Adam

Title: Identification, Notification, Labelling and Storage of Scheduled Wastes

Conference Workshop 2:
Mr Abdul Rani bin Achmed Abdullah

Title: Facility Management of Smart Building for the 21st Century
FLOOR PLAN | MEETINGS & BANQUET

Sarawak Chamber Foyer, 3rd Floor
Riverside Majestic Hotel, Kuching
FLOOR PLAN | MEETINGS & BANQUET

Window on Kuching, 18th Floor
Riverside Majestic Hotel, Kuching