NBEC
National Biomedical Engineering Conference

1ST NATIONAL BIOMEDICAL ENGINEERING CONFERENCE (NBEC 2021)

Advanced Technology for Modern Healthcare

9-10 November 2021
Virtual Conference

Program Book

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NBEC

National Biomedical Engineering Conference

NBEC 2021

National Biomedical Engineering Conference 2021

9-10th November 2021, Malaysia

ORGANIZED BY:

Engineering Service Division of Ministry of Health Malaysia (MOH)

IN COLLABORATION WITH:

Razak Faculty of Technology and Informatics (RFTI), Universiti Teknologi Malaysia (UTM)
IEEE Kuala Lumpur Subsection

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NBEC2021

WELCOME MESSAGE

Welcome Message

GUEST OF HONOR

YBHG. DATUK DR. HISHAMSHAH BIN MOHD IBRAHIM

DEPUTY DIRECTOR-GENERAL OF HEALTH (RESEARCH & TECHNICAL SUPPORT), MINISTRY OF HEALTH MALAYSIA

Dear Participants,

First and foremost, I would like to express my deepest appreciation to the Engineering Service Division, Ministry of Health (MoH) Malaysia and Universiti Teknologi Malaysia (UTM) for their dedication in organizing this virtual conference. As we know, we are living in challenging times. Although we are still battling our war against the COVID-19 pandemic, I am proud to see that such a program is well-organised reflecting that our resilience and determination is far stronger than the adversity we are facing. It is a great pleasure and honour to welcome all the participants to the 1st National Biomedical Engineering Conference 2021 (NBEC 2021).

The conference is anchored on the theme "Advanced Technology for Modern Healthcare". This conference offers a great opportunity for healthcare professionals, industry players, researchers, academicians, and policy makers to interact and exchange viewpoints and research findings on various health issues, risks and challenges during pandemic. The biggest challenge now is to ensure that our research findings are relevant, applicable, and deliverable to the researchers. MoH has been proactive in conducting research and innovation on various aspects of healthcare including biomedical engineering and healthcare engineering system. All in all, we need to re-strategize and develop a more resilient healthcare system. Towards that, it is hoped that the 1st NBEC 2021, acts as a good platform for knowledge sharing and networking in research and innovation. I am sure it will help MoH to be better equipped to handle current and future challenges as well as improving the healthcare system. I am therefore delighted to note that the organization of the NBEC 2021 is highly significant for better healthcare.

Last but not least, I wish all the participants a pleasant experience in gaining valuable knowledge and input throughout this virtual program.

Thank you and blessings to all of you.

Welcome Message

PATRON

YBRS. IR. TAURAN ZAIDI AHMAD ZAIDI
DIRECTOR OF ENGINEERING SERVICE DIVISION, MOH

Dear Participants,

I wish to extend my deepest gratitude to all the esteemed speakers and participants for attending the 1st National Biomedical Engineering Conference 2021 (NBEC 2021).

For many years, Engineering Service Division involve in a broad area of healthcare engineering welfare and core programs such as operational and maintenance under Hospital Support Service (HSS), Project Implementation, and in the Public Health. Across these core programs, the nurture of the biomedical equipment welfare is thoroughly driven by a full commitment of biomedical engineering team amongst multilevel positions through Ministry, States, and hospitals level. Biomedical Engineering is also one of several professional disciplines which contributes to safe, effective, and economical healthcare. The role and primary responsibility of a Biomedical Engineering service is to manage biomedical equipment technologies, including to ensure adherence to recognised safety and quality, standards while considering on cost and efficiency requirements.

The Fourth Industrial Revolution (IR 4.0) is already upon us. The global economy is being fundamentally transformed as we speak, by breakthroughs in technology, cutting across the physical, digital and biological worlds. I hope everyone in this conference, as a whole will come together in driving the IR4.0 towards national development, so that all Malaysians will be able to enjoy the benefits of a brighter tomorrow, through the application of technology. Also, this COVID-19 pandemic has made it evident that we need to transform and improve. This is why the theme of NBEC 2021 "Advanced Technology for Modern Healthcare", is so apt and timely. We need to explore the new technology urgently and grab the opportunities as well as to improve the current healthcare system.

I hope this NBEC 2021 will achieve its objectives, that is to enhance knowledge of all participants and strengthen the collaboration among healthcare professionals, industry players, academician, healthcare providers and students. Lastly, I hope the distinguished speakers and participants who are present here for the conference will have a productive and meaningful session.

Thank you

Welcome Message

PATRON

YBRS. PROF. DR. ASTUTY AMRIN

DEAN OF RAZAK FACULTY OF TECHNOLOGY AND INFORMATICS, UNIVERSITI TEKNOLOGI MALAYSIA

Assalamualaikum Warahmatullahi Wabarakatuh and Good day

First and foremost, on behalf of Universiti Teknologi Malaysia (UTM) I would like to extend my warmest welcome to all of you to the 1st National Biomedical Engineering Conference 2021 (NBEC2021). My heartiest congratulation to the organizing committee of NBEC2021 for the commitment and full dedication in hosting this event despite the ongoing global COVID19 pandemic. It is a great honour for UTM to be given the opportunity to co-organize this conference together with the Ministry of Health (MOH), Malaysia.

The NBEC2021 provides a platform for the participants to showcase their research and to strengthen active networking and productive collaborations between researchers, MOH, agencies under purview of MOH and other healthcare providers. We are fortunate to have a panel of distinguished local and international speakers to share their experience and knowledge throughout this conference. With the theme of "Advanced Technology for Modern Healthcare", this conference promotes engagement in rich, stimulating discussion between researchers, speakers and stakeholders.

I would also like to take the opportunity to thank our distinguished keynote speakers, presenters, and all participants of the NBEC2021. It is our hope that this conference inspires new ideas and innovation for future research and possible research collaboration amongst participants. I believe that this conference will continue to be held annually for the benefits of all the participants, sponsors and all the collaborators involved.

I wish all participants an enjoyable and valuable conference.

Thank you.

Welcome Message

GENERAL CO-CHAIR

Distinguished Guests and all Participants,

I am delighted to extend a warm welcome to all of you to the 1st National Biomedical Engineering Conference 2021 (NBEC 2021). The Engineering Service Division of the Ministry of Health (MoH) Malaysia is hosting this two-day conference in collaboration with Razak Faculty of Technology and Informatics (RFTI) Universiti Teknologi Malaysia (UTM) and IEEE Kuala Lumpur Subsection. The main goals of the 1st NBEC 2021 are to explore the frontiers of science and technology in diverse areas, to address new research, and improve the quality of biomedical engineering research and development. This conference also provides an excellent opportunity for healthcare professionals, industry players, researchers, academicians, policymakers, and students working in the field of biomedical engineering to interact and learn from one another.

IR. TS. DR. MOHD EFFENDI AMRAN
SENIOR PRINCIPAL ASSISTANT DIRECTOR,
GENERAL CO-CHAIR, NBEC 2021

For the past year, we have been living with COVID-19, which has impacted several facets of our lives, including healthcare delivery and biomedical engineering ecosystem. The severity of the disruption, on the other hand, has made us realise the need of innovation and advanced technology investment in addressing/ managing healthcare engineering problems, particularly in the biomedical engineering discipline. It is timely and appropriate to discuss our conference's theme, "Advanced Technology for Modern Healthcare". To address this theme, our wholly virtual conference will bring together eminent local and worldwide speakers, as well as presenters from a variety of biomedical disciplines.

We believe that the topics covered in the conference's submitted papers, which are divided into a few tracks, will allow the need for sophisticated technology to expand. To achieve this, the 1st NBEC 2021 is expected to serve as a valuable forum for information sharing and networking in research and innovation. I would like to extend my gratitude and appreciation on behalf of the Organising Committee to the Deputy Director-General of Health (Research & Technical Support) MoH, Director of Engineering Service Division MoH, and other health-related stakeholders for their continuous support. My warmest gratitude also goes out to the Dean of RFTI UTM and the team of co-organiser, for their dedication and help in making this conference a success. Without the passion and devotion of the main organising committee and the other working committees, the 1st NBEC 2021 would not be a success. In addition, on behalf of the Organising Committee, I would like to express my warmest welcome and well wishes to all of the attendees and sponsors for their participation in the conference. I wish you a productive and fun conference.

Thank you.

Welcome Message

GENERAL CO-CHAIR

PROF. TS. DR. NORLIZA MOHD NOOR
GENERAL CO-CHAIR, NBEC 2021

Assalamualaikum WBT.

Welcome to the 1st National Biomedical Engineering Conference or in short NBEC2021!

NBEC2021 is organised by the Engineering Services Division of Ministry of Health (MoH) Malaysia in collaboration with the Razak Faculty of Technology and Informatics (RFTI), Universiti Teknologi Malaysia (UTM), and IEEE Kuala Lumpur Subsection. In light of on-going developments resulting from the COVID-19 globally and after deliberate discussion and thoughtful consideration with our co-organizers and collaborators, we have decided to move our NBEC2021 Conference to a fully online, virtual experience using Airmeet, a virtual conference platform.

The main objective of the conference is to explore the frontiers of Science and Technology in various areas addressing innovative research, improving the quality of research and development in the field of biomedical engineering.

All submitted papers have gone through stringent peer review process, and all the accepted papers are based on the quality, originality, language and relevance. In total we have received 45 papers submission and after the review process, 35 papers were accepted and will be presented during these 2 days conference. All accepted and presented papers at the NBEC2021 are published in the conference proceedings and will be submitted to IEEEXplore.

In this NBEC2021, besides the 35 papers presented, we also have distinguished 5 keynote speakers and 8 invited speakers. Hence, NBEC2021 provides a venue and many opportunities to meet and network with academics, researchers, students and industry players from biomedical engineering fields and to share personal experiences as well as to learn from others. Furthermore, conference participants who are Professional Technologists under Malaysian Board of Technologist (MBOT) and Board of Engineering Malaysia (BEM) can claim 6 CPD hours for participating in the conference (either as presenter or as attendee).

We really hope all the participants will take advantage of knowledge sharing that is happening in this conference.

Happy Conferencing !!.

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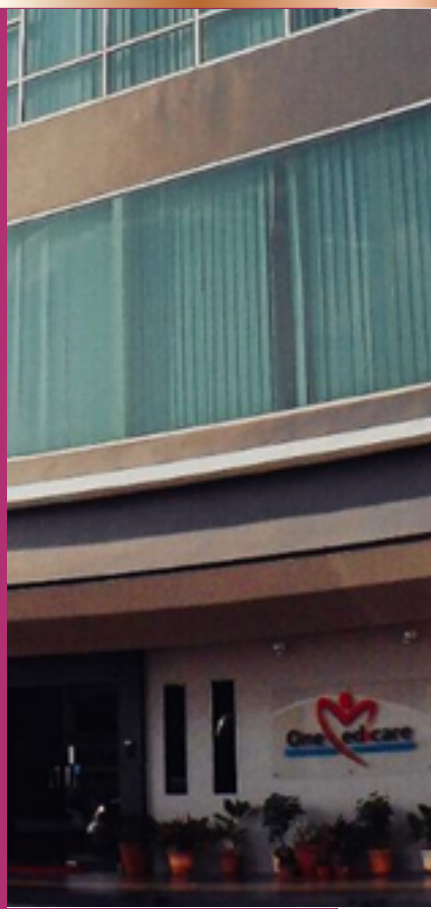

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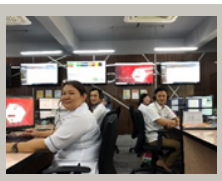

KEMENTERIAN KESIHATAN MALAYSIA
BAHAGIAN PERKHIDMATAN KEJURUTERAAN

BIOMEDICAL SECTOR
ENGINEERING SERVICE DIVISION
MINISTRY OF HEALTH MALAYSIA

" TOGETHER WE EVOLVE"

NBEC2021
SPEAKERS' PROFILE

KEYNOTE SPEAKERS

1 Ir. Dr. Syed Mustafa Kamal Syed Aman

Deputy Director, Engineering Service Division,
Ministry of Health Malaysia, Kuala Lumpur

Title: Roadmap on Biomedical Engineering Competency

Ir. DR SYED MUSTAFA KAMAL obtained a Bachelor of Science (Hons.) Degree in Electrical (Electronics) Engineering (University of Aberdeen, United Kingdom, 1986) and Master of Sciences in Biomedical Instrumentation Engineering (University of Dundee, United Kingdom, 1996) and Ph.D. degree in Biomedical physics (University of Exeter, United Kingdom, 2005). He has worked as an Electronics/ Biomedical Engineer for more than 34 years, initially at Department of Hospital Engineering, Sultanah Aminah Hospital, Johor Bahru (1988 – 1992) and at Engineering Services Department, Ministry of Health Malaysia, Kuala Lumpur (1993 – still now). He is a first in Malaysia certified as professional Engineer in the field of Biomedical from Board of Engineer Malaysia (BEM). He is a founder and first President of the Biomedical Engineering Association Malaysia (BEAM) and Medical Electronics Engineering Association of Malaysia (MEAM). He is active in developing Malaysian Standards and Guidelines. His areas of interests are in Management of Active Medical Devices, Ionizing and non-ionizing Radiation, Functional Magnetic Resonance Imaging (fMRI) and touch perceptions.

KEYNOTE SPEAKERS

2 Prof. Dr. Kahar Osman

School of Biomedical Engineering & Health Sciences, Universiti Teknologi Malaysia

Title: Biomedical modelings – What is the future?

Prof. Dr. Kahar Osman is a Professor at the Faculty of Engineering, UTM, Malaysia. He is active in the Computational Fluid Mechanics Group and IJN-UTM Cardiovascular Engineering Center. His research interests include applications of computational fluid mechanics (CFD), fluid-structure interaction (FSI) and experimental techniques in the study of mechanical and cardiovascular systems, as well as analysis, designs, and optimizations of cardiovascular devices. He has been practicing CFD for more than 25 years. He started his work in flow modelling in the area of mechanical engineering and moved to biomedical engineering field since 10 years ago. He and his team have produced their own code for CFD modelling for bio-fluid. He is also currently working on stent development for different applications. He has published more than 120 articles in peer reviewed journals and proceedings. He is currently the Chair for School of Biomedical Engineering and Health Sciences at Universiti Teknologi Malaysia. To date, he has led 15 projects as principal investigator and 26 projects as co-investigator. He has published more than 100 peer-reviewed academic journal articles in various level of publications.

KEYNOTE SPEAKERS

3 Mr. Ahmad Shariff bin Hambali

Chief Executive,
Medical Device Authority

Title: Medical Device Regulations: The Door to Commercialization

Mr Ahmad Shariff Hambali received his BSc (Physics) degree from University of Science Malaysia in 1988 and Master of Medical Physics from University of Malaya in 2003. He joined government service in 1993 as an assistant director at the Radiation Health and Safety Unit, Engineering Services Division, Ministry of Health Malaysia, with the role to regulate medical usage of ionizing radiation. Mr Ahmad Shariff was a member of the core team who pioneered and very instrumental in the development of the medical device regulatory framework in Malaysia. The regulatory framework, which was based on international standards and best practices, was subsequently gazetted as the Medical Device Act in 2012. When MDA was established in 2013, he joined the newly-established regulatory body to lead the Registration, Licensing & Enforcement Division before being appointed as the Chief Executive of MDA in 2018. Between 2005-2008, Mr Ahmad Shariff has been appointed as a member of the Asian Harmonization Working Party (AHWP) Secretariat where he has been very much involved in the efforts to harmonize the medical device regulatory framework within the Asian region. Currently, he is chairing the MDA-Industry Collaborative Committee (MICC), a forum for collaborative works between MDA and the medical device industry in Malaysia. He is also a member of the Industrial Research Advisory Committee, SIRIM.

KEYNOTE SPEAKERS

4 Prof. Ricardo Armentano

Fellow,
International Academy of Medical and Biological Engineering, IAMBE

Title: Reappraising Cardiovascular Diseases Prediction Through Innovations In Biomedical Engineering

Ricardo Armentano obtained his PhD in Physiological Sciences (1994) from the University of Buenos Aires and from Université de Paris VII Diderot in Biomechanics – Mechanics of Biological Systems (1999). The technological developments derived from his doctoral theses have led to renowned methods of cardiovascular diagnosis which are used in Latin American countries in vascular exploration centers, as well as in the European Hospital George Pompidou in Paris where he made his second Post Doc. Currently he is Distinguished Professor of Biomedical Engineering and Director of the Biological Engineering Department and Principal Investigator of UNPD/84/002 at Universidad de la República (Uruguay).

He is also Director of the PhD program on signal processing and head of the Bioengineering R&D group (GIBIO) at Universidad Tecnológica Nacional, Buenos Aires (Argentina). He is a member of IEEE EMBS Technical Committee on Cardiopulmonary Systems and Physiology-based Engineering. In 2019, Ricardo Armentano was conferred the IEEE R9 Eminent Engineer Award and he served as EMBS IEEE Distinguished Lecturer. He has served as the AdCom 2015 EMBS IEEE Latin America Officer and was the Chairperson of the 32nd International Conference EMBS/IEEE Buenos Aires 2010. He has acquired international recognition in the field of cardiovascular hemodynamics and arterial hypertension. He has taught in the fields of cardiovascular dynamics and in the broad area of engineering in medicine and biology and has extensive experience in PhD supervision and examination. He is on the editorial board of journals of cardiovascular research and is a reviewer for 15+ international scientific journals. He has 250+ publications including a book, book chapters and peer-reviewed articles. Recently, he was also appointed Fellow of the International Academy of Medical and Biological Engineering, IAMBE. Ricardo Armentano has carried out professional and administrative tasks as an educator and as a scientist not only in Argentina, but also in Uruguay and other countries in the Americas and Europe. For 10 years, he has served as a member of the board of directors, director of the research and development council of the Favaloro University, dean of the Faculty of Engineering, Exact and Natural Sciences and finally Executive Scientific Academic Director with the status of CEO of the University Dr. Rene Favaloro Foundation.

KEYNOTE SPEAKERS

5 Dr Khoh Soo Beng

Director & Partner,
PMO Innovations Sdn Bhd

Title: Digital Health 4.0 - Towards Patients Centric Innovations that matter

Dr Khoh Soo Beng has > 28 years of experience in a wide spectrum of roles in manufacturing, design engineering, IT, 6-Sigma Black-Belt, program management, and innovation in Fortune 500 MNCs based in Malaysia and abroad. He is instrumental in establishing the CREST's Connected Healthcare Cluster and co-founded Digital Health Malaysia, where medical practitioners and technologists in Australia, UK and Malaysia, collaborate and innovate advanced health and wellness solutions with IoT, Big Data, Medtech and electronics. He is also the Northern Region Innovation Forum lead and contributed to Malaysia's National IoT Strategic Roadmap spearheaded by MOSTI as a member of the working committee. He regularly does keynote speeches and guest lectures at prestigious conferences and local universities.

Dr Khoh's technical expertise include real-time embedded systems, automotive Controller Area Network (CAN) bus- morphed into the Internet of Things (IoT) today, digital dashboards, knowledge management, Lean, Six Sigma methodologies & tools (DFSS, DMAIC, Lean, VOC, KJ, Kano, QFD, CPM, DFMEAs, FMEA, FTA, TRIZ), product design & development, design thinking and innovation. During his service at Motorola, Dr Khoh piloted the Paperless Office & Digital Dashboards, manufacturing MES / SCADA back in the late 90s (today is known as Industry 4.0). He was consulted by the UK industries and helped Rockwell Automation (formerly Allen Bradley) with DeviceNet design and its Conformance Test Specification. As Innovation Champion, Dr Khoh spearheaded Motorola Penang innovation initiatives and facilitated innovation workshops to develop new innovative design concepts; and was recognised as Motorola Innovation Champion of the Year in 2013. As Inventor Mentor, he helped engineers to file novelty ideas into patents. He was inducted as a Motorola Science Advisory Board Associate, i.e. top 1.5% Motorola Global Technical Staff. Other recognitions include Motorola CTO Innovation Framework Award (2013) and Senior Engineering VP Quality Star Award (2007). He has worked with many renowned Six Sigma experts, innovation gurus, futurists, and spearheaded & institutionalised many rounds of innovation-related change management projects during his career. Dr Khoh is a change agent and experienced trainer & facilitator in Innovation, Industry 4.0, IoT and Digital Health. He is also a mentor of AI Ventures Australia. Dr Khoh holds a PhD in Electrical & Electronics Engineering and has > 50 published papers in IET, IEM, IEEE, SAE transactions, Six Sigma and professional research journals. He is member of IAOIP, IET, IEM and a senior member of IEEE.

SPECIAL SESSION INVITED SPEAKERS

AP Ir. Dr. Malarvili Balakrishnan

Universiti Teknologi Malaysia

Title: On Analyzing Capnogram as a Novel Method for Screening COVID-19: Testing strategy for post COVID-19 Vaccination

Associate Professor Ir. Dr. Malarvili BalaKrishnan received both the B. Eng and M. Eng (Biomedical Signal Processing) from Universiti Teknologi of Malaysia at Johor, Malaysia. She then obtained Doctor of Philosophy (Medical Sciences Engineering) from The University of Queensland, Queensland, Australia in 2008. Currently, she is attached to School of Biomedical and Health Sciences Engineering, Universiti Teknologi of Malaysia. Dr. Malarvili is actively involved in research related to medical monitoring devices that focuses on detection of neonatal seizure, sudden cardiac death, implantable cardiac defibrillator receiver screening tool, fetal heart rate monitoring, asthma severity monitoring and many more. One project (device) titled "Respiratory CO2 Measurement for Monitoring Severity of Asthma" is under commercialization process in local market. To date, she has published more than 100 papers where 35 of them are scopus indexed and 20 of them are indexed with Q1/Q2 impact factor. She also received 5 international awards, 12 national awards and many more appreciation certificates. She was recently selected for an 'Outstanding Woman in Health and Medical Sciences' award at the 4th Venus International Women Awards – VIWA 2019, Chennai, India.

Dr Git Kim Ann

Radiologist and Certified Imaging Informatics Professional, Selayang Hospital

Title: Biomedical Imaging in Covid-19: The Role of AI

Dr Git graduated with a Doctor of Medicine degree from Universiti Putra Malaysia in 2005, a Master of Medicine (Radiology) degree from Universiti Sains Malaysia in 2013, and following an attachment at Mayo Clinic, obtained certification as an Imaging Informatics Professional from the American Board of Imaging Informatics in 2019. Dr Git was the Society for Imaging Informatics in Medicine (SiiM)'s inaugural Global Exchange Participant and winner of the 2019 SiiM Innovation Challenge for a project aimed at automated organ classification on ultrasound. Dr Git was the Gold Medallist for the Dr Wu-Lien Teh Young Investigator's Award during the 13TH National Conference of Clinical Research 2020 for work on AI-assisted detection of Covid-19 pneumonia on chest radiographs. With interests which include medical imaging informatics and artificial intelligence, Dr Git focuses on practical applications to improve radiology workflows using an agile approach, developing open-source software which are currently being used by both local and international healthcare institutions. Primarily a clinical radiologist, Dr Git also participates in tutoring the next generation of radiologists as well as advocating for diversity and inclusiveness.

SPECIAL SESSION INVITED SPEAKERS

Dr. Nor Faiza Tohit

Public Health Medicine Specialist, International Islamic University of Malaysia

Title: Strengthening community social resilience in the combat against covid-19 through community-centred approaches

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Dr Nor Faiza Mohd. Tohit, MD, MPH, DrPH is a Public Health Medicine Specialist, currently holds the post of Asst. Professor in Department of Community Medicine, International Islamic University Malaysia (IIUM), Kuantan, Pahang. She was conferred Doctor of Public Health in 2018 from University Putra Malaysia (UPM), her Master of Public Health (MPH) in 2015 from University Putra Malaysia (UPM), and her Doctor of Medicine (MD) from Universiti Malaysia Sarawak (UNIMAS) in 2006. Prior to serving IIUM, she served as a medical officer in various government hospitals and in private medical practice. She has worked with a wide array of government and non-government agencies related to public health. During this pandemic, she has been actively involved in the vaccination process, case management and crisis management. Her focus during this pandemic is on community engagement and empowerment. In the early onset of the pandemic, she has worked tirelessly to spread awareness on Covid-19. Driven by the motto "We rise by lifting others", she is actively involved in various charity works especially towards those who are severely affected by the pandemic. She has co-authored several books, published peer-reviewed articles and written health related articles for public. Besides, she has extensive experience as a speaker in public health topics to audience of various age groups.

Ms. Dzatul Ithri Binti Amran

Engineer, Engineering Services Division
Ministry of Health Malaysia

Title: Preparing and Managing the Support Services in COVID-19 Facilities – the PKRC Bersepadu MAEPS 2.0 experience

Ms. Dzatul Ithri Amran obtained **a** B.Eng. (Hons) Electronic & Computer Engineering (UNIMAS, 2004) and M.Sc. in Biomedical Engineering (UTM, 2017) and also a Certified Healthcare Facility Manager (CHFM) (IIUM, 2019). She has worked as an Electronic/Biomedical Engineer at Ministry of Health Malaysia with 15 years' experience in Hospital Support Services (HSS) and biomedical equipment maintenance management at healthcare facilities. She is currently a Secretary General of Biomedical Engineering Association of Malaysia (BEAM). During the COVID-19 pandemic, she was actively involved in the task force on preparing and managing the support services at Low Risk COVID-19 Centres (LRCC/PKRC) and other Quarantine Stations such as PKRC MAEPS 1.0, PKRC Bersepadu MAEPS 2.0, Makeshift Treatment Centre Penjara Pokok Sena, ATM Field Hospitals, Quarantine Stations Malbatt Village and other quarantine stations in Malaysia.

INVITED SPEAKERS

Ms. Salbiah Bt Yaakop

Director of Policy, Codes and Standards Division, Medical Device Authority, Ministry of Health Malaysia

Title: Medical Device Regulatory System and Initiatives to address Covid-19 Emergency Situation.

Ms Salbiah Yaakop is currently attached with the Medical Device Authority, Ministry of Health Malaysia, as the Director of Policy, Codes and Standards Division. Here, her main functions are development of regulatory documents, policies, guidance documents, guidelines, managing international affairs and inter-agency agenda, industry assistance, events and specific projects; performing registration and licensing evaluations and verifications; and giving trainings and consultancy. She often represents MDA in other government and non-government meetings and programs and initiatives. She is currently the AHWP/GHWP TC Chair, AHWP/GHWP WG 8 Chair on Standards for Medical Devices, Convenor for ISO/TC 210/WG 7 on Good Engineering Maintenance Management, and Chairperson of various Guidance Document Development Committees in Medical Device Authority. She is also a member of various Industry Standards Committees, Technical Committees and Working Groups related to medical devices in the national standards system. Prior to her current field of work, she has almost 10 years of working experience in the automotive industry, working in the fields of mechanical, industrial and process engineering, and procurement. Ms Salbiah Yaakop graduated with a BSc in Biomedical Engineering from Marquette University, USA. In total, she has more than 28 years of working experience.

Mr. Eric Woo

Regional Director, ECRI Institute Asia Pacific

Title: Challenges of Design, Interoperability to Telemedicine

Eric Woo joined ECRI Institute in February 2015 as a Regional Director. He is responsible for the business development activities of ECRI Institute in the Asia Pacific region and operational management of the regional office. His 20 years of experience in the healthcare industries includes serving as Regional Manager, Country Manager and Product Manager of several medical devices and implant organization. He was heavily involved in many new hospital projects from planning to final commissioning of equipment, some notable project such as Prince Court Medical Centre (227 bed), Sunway Medical Centre (358 bed), Putrajaya Hospital (430 bed). New healthcare services concept was also proposed to both private and government institution in 2005; privatization of Central Sterile Supply Department (CSSD). Mr. Woo has successfully introduced Functional Endoscopic Sinus Surgery (FESS) procedure in Malaysia which has become the gold standard procedure for Sinus surgery today. He also introduced the use of advance electro surgery system for bariatric and gynaecology procedures. Mr. Woo has also been involved in designing and delivering training programs on strategic management, strategic thinking, strategic planning & implementation, leadership & innovation. He also conducted numerous cadaveric workshops for surgeons to stay educated on cutting-edge technology and surgical procedures.

INVITED SPEAKERS

Mr. Rushdi Rusmi

Regional Manager,
Löwenstein Medical SE & Co. KG

Title: Modern Mechanical Ventilation

Rushdi Rusmi from University of Hertfordshire started his carrier at Hospital Kuala Lumpur in 1997 under Radicare (M) Sdn Bhd. 12 years with Radicare, he enrolled many stages in his career as Radiation Protection Officer, Operation Manager in Selayang Hospital for 3 years managing all support services and then back to HQ in 2007 as Regional Manager within territory of Radicare hospitals for Biomedical Engineering and finally resigned on 2008 as Acting General Manager.

Pharmaniaga Berhad offer new opportunity to him as Business Development Manager to leverage their division of Non-Drug business reporting to Business Development Director. Exploring the world of medical devices to seek opportunity for Malaysian market.

Now, Lowenstein Medical expending their market to ASEAN with him as Regional Manager supporting sales, technical and clinical for ventilation and anesthesia ranges of products. Installation of Ventilators in Australia and even servicing of Anesthesia machine in Korea are now his routine. Covid19 pandemic keep him occupied with voluntary services and helping Malaysia with ICUs and Turbine Ventilator.

Mr. Mohammad Zahid Bin Zamaludin

Senior Principal Assistant Director
Engineering Service Division, Ministry Of Health

Title: MEET: The Challenges of Furnishing Our Healthcare Facility on a Large Scale

Mr Mohammad Zahid bin Zamaludin is an electronic biomedical engineer currently working in Ministry of Health. He holds 2 master's degree: MEng. in Electronic Engineering from University of Hull, United Kingdom and MEng. in Biomedical Engineering from Universiti Malaya, Kuala Lumpur. In Ministry of Health, he was involved in various project regarding medical equipment lifecycle such as planning, procuring, testing & commissioning, operation & maintenance, and disposal. Currently, he oversees the development of a national program to equip and maintain medical equipment in primary healthcare facilities under Ministry of Health.

He is also involved in Biomedical Engineering Association Malaysia (BEAM) as an active member from 2009. He represented the organization in Technical Committee on Code of Practice of Active Medical Devices and Low-Voltage Electrical Equipment/System for Healthcare Facilities (TC-10) under Department of Standards Malaysia. Through TC10, he contributed to develop and publish various Malaysia Standard such as MS 2058: Code Of Practice For Good Engineering Maintenance Management Of Active Medical Devices.

NBEC2021
CONFERENCE AGENDA

CONFERENCE PROGRAMME

9 NOVEMBER 2021

0815 – 0900	**Arrival and Registration**	
0900 – 0915	**Opening Ceremony** **Welcoming Remark General Co-Chair NBEC2021** YBrs. Ir. Ts. Dr. Mohd Effendi Amran & Prof Dr Norliza Mohd Noor *Ministry of Health Malaysia (MOH)* *Universiti Teknologi Malaysia (UTM)*	
0915 – 0930	**Welcoming Address Patron NBEC2021** YBrs. Ir. Tauran Zaidi Ahmad Zaidi & YBhg. Prof Dr Astuty Amrin *Director, Engineering Service Division, Ministry of Health Malaysia (MOH)* *Dean, Razak Faculty of Technology and Informatics, UTM*	
0930 – 0950	**Opening Speech** YBhg. Datuk Dr. Hishamshah Mohd Ibrahim *Deputy Director-General of Health (Research & Technical Support),MOH*	
0950 – 1000	**Video Montage & Photo Session**	
1000 – 1015	**Industry Highlight** Biomedical Engineering Sector, Engineering Service Division, MOH **Industry Keynote Speaker 1** Mega Radiation	
1015 – 1100	**Keynote Speaker 1** YBrs. Ir. Dr. Syed Mustafa Kamal Syed Aman *Deputy Director, Sector of Biomedical Engineering Service Division, MOH* ***Title : Roadmap on Biomedical Engineering Competency***	
1100 – 1300	**PARALLEL SESSION** **Track 1 Presentations**	**Track 2A Presentations** **Track 2B Presentations**
1300 – 1400	**Lunch**	
1400 – 1445	**Keynote Speaker 2** Prof. Dr. Kahar Osman *Chair, School of Biomedical Engineering & Health Sciences, UTM* ***Title: Biomedical Modelings – What is the Future?***	
1445 – 1530	**Keynote Speaker 3** Mr. Ahmad Shariff Hambali *CEO, Medical Device Authority* ***Title: Medical Device Regulations: The Door to Commercialization***	
1530 – 1730	**PARALLEL SESSION** **Track 3 Presentations**	**Track 4A Presentations** **Track 4B Presentations**
1730	**End of Day 1**	

***Presentation Session:** *Please refer to specific tentative for details*

CONFERENCE PROGRAMME

10 NOVEMBER 2021

0800 – 0830	**Arrival and Registration**	
0830 – 0915	**Keynote Speaker 4** YBrs. Prof. Dr. Ricardo L. Armentano *University of Buenos Aires, Universidad Tecnológica Nacional, Paris Diderot University* ***Title: Reappraising Cardiovascular Diseases Prediction through Innovations in Biomedical Engineering***	
0915 – 1000	**Keynote Speaker 5** Dr Khoh Soo Beng *Director & Partner, PMO Innovations Sdn Bhd* ***Title: Digital Health 4.0 - Towards Patients Centric Innovations that matter***	
1000 – 1030	**PARALLEL SESSION** **Special Session 1** **Invited Speaker 1** AP Ir. Dr. Malarvili Balakrishnan *Universiti Teknologi Malaysia, UTM* ***Title: On Analyzing Capnogram as a Novel Method for Screening COVID-19: Testing Strategy for Post COVID-19 Vaccination***	
1030 – 1100	**Invited Speaker 2** Dr Git Kim Ann *Selayang Hospital* ***Title: Biomedical Imaging in Covid-19: The Role of AI***	
1100 – 1130	**Invited Speaker 3** Dr Nor Faiza Tohit *Public Health Medicine Specialist, IIUM* ***Title: Strengthening Community Social Resilience in the Combat Against Covid-19 through Community-Centred Approaches***	1120 – 1300 **Track 6 Presentations**
1130 – 1200	**Invited Speaker 4** Ms. Dzatul Ithri Amran *Engineering Services Division, MOH* ***Title: Preparing and Managing the Support Services in COVID-19 Facilities – the PKRC Bersepadu MAEPS 2.0 Experience***	
1200 – 1320	**Track 5 Presentations**	
1320 – 1400	**Lunch**	

***Presentation Session:** *Please refer to specific tentative for details*

CONFERENCE PROGRAMME

10 NOVEMBER 2021	
1400 – 1430	**Industry Keynote Speaker 2** *Canon Medical Systems Sdn Bhd*
1430 – 1500	**Invited Speaker 5** Ms. Salbiah Yaakop *Director of Policy, Codes and Standards Division, Medical Device Authority, MOH* ***Title: Medical Device Regulatory System and Initiatives to address Covid-19 Emergency Situation.***
1500 – 1530	**Invited Speaker 6** Mr. Eric Woo *Regional Director, ECRI Institute Asia Pacific* ***Title: Challenges of Design, Interoperability to Telemedicine***
1530 – 1600	**Invited Speaker 7** Mr. Rushdi Rusmi *Regional Manager, Löwenstein Medical SE & Co. KG* ***Title: Modern Mechanical Ventilation***
1600 – 1630	**Invited Speaker 8** Mr. Mohammad Zahid Zamaludin *Senior Principal Assistant Director, Engineering Service Division, MOH* ***Title: MEET: The Challenges of Furnishing Our Healthcare Facility on a Large Scale***
1640	**Closing & Awards Ceremony**
1700	**End of Day 2**

NBEC2021
PRESENTATION SCHEDULE

PRESENTATION SESSIONS

9 NOVEMBER 2021

TRACK 1

Prosthetics and Orthotics Engineering

Chairperson

Ts. Dr. Siti Haida Ismail

Co-chair

Dr. Sharifah Alwiah Syed Abd Rahman

Time	Author(s)	Paper Title
11:00 - 11:20 am	**Krishani Murugiah***, Mohammad Iliya Zakaria, Hazwani Suhaimi, Wahyu Caesarendra, and Nonni Sambudi	Paper ID : 1570744603 Synthesis and Characterisation of Hydroxyapatite (HAp) from Asiatic Hard Clam (Meretrix meretrix) and Blood Cockle Clam (Anadara granosa) Using Wet Precipitation Process
11:20 - 11:40 am	Muhammad Hazli Mazlan, **Nur Ariza Hayani Mohd Nizam*,** Nur Saliha Md Salleh, Muhammad Anas Razali, Abdul Halim Abdullah, Muhammad Hilmi Abd Jalil, Hiromitsu Takano, and Nur Dalilah Diyana Nordin	Paper ID : 1570744995 Design and Analysis of interbody fusion cage materials based on finite element analysis
11:40 am - 12:00 pm	Solehuddin Bin Shuib, Iffa Mohd Arrif and Najwa Syakirah Hamizan	Paper ID : 1570754911 Finite Element Analysis (FEA) Of The Different Cement Mixture For Total Hip Replacement
12:00 - 12:20 pm	**Nur Amalina Has***, Mohd Najeb Jamaludin, Abdul Salam A Haris, Zulkifli Ahmad, Muhammad Amir As'ari, Sujana Mohd Rejab. Nurul Farha Zainuddin, and Chu Ai Reen	Paper ID : 1570755071 P300 Somatosensory Validation of Vibrotactile Haptic Feedback for Upper Limb Prosthesis
12:20 - 12:40 pm	Muhammad Hazli Mazlan, **Nur Saliha Md Salleh***, Nur Sarah Abdullah, Abdul Halim Abdullah, Muhammad Hilmi Abd Jalil, Ida Laila Ahmad. Hiromitsu Takano, and Nur Dalilah Diyana Nordin	Paper ID : 1570745080 Design and analysis of infill density effects on interbody fusion cage construct based on finite element analysis
12:40 – 1:00 pm	Solehuddin Bin Shuib, **Najwa Syakirah Hamizan** and Iffa Mohd Arrif	Paper ID : 1570754983 Development of Hip Implant: Gait Study and Finite Element Analysis

Presentation – 15 mins; Q&A – 5 mins. Titles are accurate as of printing date.
***Presenter during conference**

PRESENTATION SESSIONS

9 NOVEMBER 2021

TRACK 2A & 2B

Medical Data Analytic and Machine Learning
Biomedical Signal Processing

Chairperson
Ts. Dr. Siti Zura A. Jalil
Co-chair
Ts. Haslaile Abdullah

Time	Author(s)	Paper Title
11:00 - 11:20 am	**Nurul Fathia Mohamand Noor***, Norulhusna Ahmad and Norliza Mohd Noor	Paper ID : 1570748899 Fetal Health Classification Using Supervised Learning Approach
11:20 - 11:40 am	Tanusree De, **Ahmeduvesh Mevawala*** and Ramyasri Nemani	Paper ID : 1570747871 An Explainable AI powered Early Warning System to address Patient Readmission Risk
11:40 am - 12:00 pm	**Herold Sylvestro Sipail***, Norulhusna Ahmad and Norliza Mohd Noor	Paper ID : 1570749394 Heart Disease Prediction Using Machine Learning Techniques
12:00 - 12:20 pm	**Alexie Mushikiwabeza*** and M. b. Malarvili	Paper ID : 1570754992 Investigation on Properties of Capnogram: On Stationarity and Spectral Components of the Signal
12:20 - 12:40 pm	**Saleh Alzahrani***	Paper ID : 1570728077 Implementation of P300 based BCI Using a Consumer-grade EEG Neuroheadset
12:40 – 1:00 pm	**Zahra Taghizadeh*** and Sina Nateghi	Paper ID : 1570754437 Classification of Electromyography Signals Using Neural Networks and Features From Various Domains

Presentation – 15 mins; Q&A – 5 mins. Titles are accurate as of printing date.
***Presenter during conference**

PRESENTATION SESSIONS

9 NOVEMBER 2021

TRACK 3

Mobile Application for Healthcare and IoT of Medical Equipment

Chairperson

Dr. Sharifah Alwiah Syed Abd Rahman

Co-chair

Ts. Dr. Sahnius Usman

Time	Author(s)	Paper Title
3:30 - 3:50 pm	**Kaythry Pandurangan*,** Vijay M, and Vinu R	Paper ID: 1570745537 Automated Paralysis Patient Monitoring system
3:50 - 4:10 pm	**Afiqah Iylia Kamaruddin***, Maslin Masrom, Mohd Azmarul A Aziz, and Norliza Mohd Noor	Paper ID : 1570749644 Speech Therapy Mobile Applications for People with Aphasia: PRISMA review and features analysis
4:10 - 4:30 pm	**Mitra Mohd Addi***, and Nayli Azman	Paper ID : 1570745659 A Wearable Non-Contact Temperature Detector For Early Detection of Fever
4:30 - 4:50 pm	**Muhammad Adham Aziz***, Mohd Azmarul A Aziz, Siti Zura A. Jalil, Sharifah Alwiah Syed Abd Rahman, Haslaile Abdullah, Siti Haida Ismail, Siti Armiza Mohd Aris and Norliza Mohd Noor	Paper ID : 1570766438 Development of Speech Therapy Mobile Application for Aphasia Patien
4:50 - 5:10 pm	**Ten Yi Ting*,** Fitri Yakub, Mohd Azizi Abdul Rahman, Ahmad Haziq Shamsul Bahri, Mohamad Aiman Syamir, Muhammad Azri Azizan, Hazilah Mad Kaidi, Norliza Mohd Noor, Nurul Aini Bani, Siti Zura A.Jalil, Haslaile Abdullah and Norhayati Hussien	Paper ID : 1570764657 Development of Smart Healthcare Tracker through Internet of Things

Presentation – 15 mins; Q&A – 5 mins. Titles are accurate as of printing date.

***Presenter during conference**

PRESENTATION SESSIONS

9 NOVEMBER 2021

TRACK 4A & 4B

Biomedical Imaging and Image Processing
Biomechanics in Healthcare

Chairperson
Ts. Dr. Nelidya Md Yusoff
Co-chair
Ts. Dr. Siti Haida Ismail

Time	Author(s)	Paper Title
3:30 - 3:50 pm	**Sabiq Muhtadi***, Ahmad Chowdhury, Rezwana Razzaque and Ahmad Shafiullah	Paper ID : 1570753760 Analyzing the Texture of Nakagami Parametric Images for Classification of Breast Cancer
3:50 - 4:10 pm	**Xiao Jing Chan***, Goh Chuan Meng, Meei Tyng Chai, Sayed Ahmad Zikri Bin Sayed Aluwee, and Pei Voon Wong	Paper ID : 1570763966 An Automatic Vein Detection System Using Deep Learning for Intravenous (IV) Access Procedure
4:10 - 4:30 pm	**Akeel Al-Kazwini***, Ahmad Halilah, Aeshah Hendi, Ibrahim Al-Saeed, Abdullah Al-Azamat and Walid Al-Zyoud	Paper ID : 1570751370 Frequency Detection Of Hand Tremors Using Customized Accelerometer
4:30 - 4:50 pm	**Natrisha Francis***, Aziz Ong, Hazwani Suhaimi and Emeroylariffion Abas	Paper ID : 1570740421 A Tilting Platform as a Sub-injury Motion for Ankle Sprain Studies
4:50 - 5:10 pm	**Worakan Tongprapai***, Nichapat Rattanapan, Yingyong Torudom and Chamaiporn Sukjamsri	Paper ID : 1570764081 Development of a Ligamentous Finite Element Model of the Human Cervical Spine

Presentation – 15 mins; Q&A – 5 mins. Titles are accurate as of printing date.
***Presenter during conference**

PRESENTATION SESSIONS

10 NOVEMBER 2021

TRACK 5

Covid 19 Pandemic

Chairperson

Prof. Ts. Dr. Norliza Mohd Noor

Co-chair

Ts. Mohd Saiful Naseri

Time	Author(s)	Paper Title
12:00 - 12:20 pm	Joel Chia Ming Than, **Pun Liang Thon**, Omar Mohd Rijal, Rosminah Kassim, Ashari Yunus, Norliza Mohd Noor and Patrick Then	Paper ID : 1570755181 Preliminary Study on Patch Sizes in Vision Transformer (ViT) for COVID-19 and Diseased Lungs Classification
12:20 - 12:40 pm	**Nurul Fathia Mohamand Noor**, Herold Sylvestro Sipail, Norulhusna Ahmad and Norliza Mohd Noor	Paper ID : 1570741591 Covid-19 Severity Classification Using Supervised Learning Approach
12:40 – 1:00 pm	**Hudzaifah Hasri**, Siti Armiza Mohd Aris and Robiah Ahmad	Paper ID : 1570763280 Linear Regression and Holt's Winter Algorithm in Forecasting Daily Coronavirus Disease 2019 Cases in Malaysia: Preliminary Study

Presentation – 15 mins; Q&A – 5 mins. Titles are accurate as of printing date.
***Presenter during conference**

PRESENTATION SESSIONS

10 NOVEMBER 2021

TRACK 6

Health Informatics

Chairperson

Ts. Haslaile Abdullah

Co-chair

Ts. Dr. Siti Zura A. Jalil

Time	Author(s)	Paper Title
11:20 - 11:40 am	**Sahnius Usman***, Fatin Rusli, Norliza Mohd Noor, Siti Armiza Mohd Aris, Mohd Nabil Muhtazaruddin, Sharifah Alwiah Syed Abd Rahman and Nurul Aini Bani	Paper ID : 1570736375 Relationship between Hand Grip and Pinch Strength with Nutritional Health Status Among Indigenous People in Perak, Malaysia
11:40 am - 12:00 pm	**Nur Husna Shahimi***, Choon-Hian Goh, Maw Pin Tan, and Einly Lim	Paper ID : 1570766555 Association between Physical Performance and Autonomic Nervous System in Elderly Fallers
12:00 - 12:20 pm	**Ahmad Aizat Che Rahmat***, Siti Zura A. Jalil and Sharifah Alwiah Syed Abd Rahman	Paper ID : 1570764912 Relationship of Backpack Weight Towards Risk Factor for Scoliosis Among Primary School Children in Pahang, Malaysia
12:20 - 12:40 pm	**Siti Haida Ismail***, Haslaile Abdullah, Muhammad Faris Harun, and Norazmein Abdul Raman	Paper ID : 1570756127 Ergonomics Risk Factors and Musculoskeletal Discomfort among Offshore Support Vessel Deck and Engine Crews
12:40 – 1:00 pm	**Noor Azlyn Ab Ghafar** * and Nur Liyana Azmi	Mathematical Modeling For The Ergonomic Analysis Of Driver In Prolong Driving

Presentation – 15 mins; Q&A – 5 mins. Titles are accurate as of printing date.
***Presenter during conference**

NBEC2021

KEYNOTE & INVITED SPEAKERS' ABSTRACTS

DAY 1, 9 NOVEMBER 2021

KEYNOTE SPEAKER 1 | 1015 - 1100

Roadmap on Biomedical Engineering Competency

Ir. Dr. Syed Mustafa
Deputy Director, Sector of Biomedical Engineering Service Division, MOH

Biomedical Engineering is one of several professional disciplines which contributes to safe, effective and economical healthcare. The role and primary responsibility of a Biomedical Engineering service is to manage medical device technologies, including to ensure adherence to recognised safety and quality, standards while taking into account cost and efficiency requirements. Biomedical Engineering is a learned profession that combines expertise and responsibilities in engineering, science, technology and medicine. Since public health and welfare are paramount considerations in each of these areas, Biomedical Technical Personnel (BTP) shall uphold an appropriate level of competencies embodied in its professional practice, research, patient care and/or training. The level of competencies shall reflect the standards of professionalism and personal practice for BTP.

KEYNOTE SPEAKER 2 | 1400 - 1445

Biomedical modelings – What is the future?

Prof. Dr. Kahar Osman
Chair, School of Biomedical Engineering & Health Sciences, UTM

The application of Computational Fluid Dynamics method in biomedical engineering analysis has been the interest of many researchers since many many years ago. It started with simple two dimensional drawings of the body parts and the accuracy of the analysis was very low. The geometry then has improved to three-dimensional drawings and in recent years, patient-specific geometries have been widely used and become the standard of flow analysis. The technique of modelling has also improved greatly from steady flow to unsteady flow with Newtonian and non-Newtonian fluids have been assumed. Various turbulence models have also been adopted to increase the visualization accuracy. Recent trends have also seen integrated software being able to extract geometries from CT-Scan or MRI images to be analyzed. This technique has eliminated the needs of several software to obtain the CFD results. In the future, the biofluid modellings will be more useful to the medical practitioners in many aspects. How can we scientists and engineers help the future development?

KEYNOTE SPEAKER 3 | 1445 – 1530

Medical Device Regulations: The Door to Commercialization

En. Ahmad Shariff bin Hambali
CEO, Medical Device Authority

The ability to produce and subsequently commercialize innovative products is key to a sustainable economy. For a highly regulated product such as medical device, its compliance with safety and performance standards creates the confidence of the potential and targeted buyers and ultimately gains access to the market. MDA plays an important role in building the said confidence by implementing the medical device regulatory framework that is based on international standards and best practices. The regulatory framework provides an appropriate and robust foundation for Malaysia-made medical devices to gain wider market access, including the highly regulated ones. This topic provides an overview of the safety and performance requirements imposed by MDA as well as the steps in the journey to register a medical device that eventually opens the door to its commercialization. It also highlights efforts undertaken by MDA to assist any parties who have an interest to make a successful investment in this industry.

DAY 2, 10 NOVEMBER 2021

KEYNOTE SPEAKER 4 | 0830 - 0915

Reappraising Cardiovascular Diseases Prediction Through Innovations In Biomedical Engineering

Prof. Dr. Ricardo L. Armentano
University of Buenos Aires, Universidad Tecnológica Nacional, Paris Diderot University

Cardiovascular diseases and strokes have always been prevalent mainly in the older adult population. This panorama constitutes one of the main challenges for the healthcare sector, which mainly focuses on the prevention, early detection, and minimally invasive treatment of these diseases. Stratification of cardiovascular risk is usually carried out from risk indicators based on traditional factors such as weight, sex, height, and blood pressure together with lipid and diabetic profiles. However, it is known that the parameters that characterize the mechanical properties of the arterial wall, such as arterial pulse wave velocity and carotid intima-media thickness are non-invasively measurable through IoMT systems, play a central role in a stratification of greater specificity. In this talk we are going to show a platform for direct stratification of intermediate/high cardiovascular risk oriented to eHealth for primary care. This type of approach allows the design of a predictive support system for personalized clinical decisions, where anthropometric, hemodynamic and pulse wave velocity assessments and adding intima–media thickness supervised by AI techniques can be automated through IoMT devices and applied to the subclinical classification of cardiovascular diseases.

KEYNOTE SPEAKER 5 | 0915 - 1000

Digital Health 4.0 - Towards Patients Centric Innovations that matter

Dr Khoh Soo Beng
Director & Partner, PMO Innovations Sdn Bhd

The 4th Industrial Revolution and COVID-19 have brought about an unprecedented rate of change and disruptions to planet earth. In the new normal world of social distancing, digital is key to ensure continued delivery of health and wellness services. Thankfully, technology has played its part to blur the lines between the physical and virtual world. Today's healthcare innovations happened at the intersections between various disciplines of biosciences, engineering, IT, medical and social sciences. The affordable and reliable potpourri of technology such as IoT, Big Data, AI, software Apps, bio-sensors and wearables amongst others, have opened up endless possibilities limited only by our imaginations. An opportunity presents to flip the existing one-size-fits-all healthcare services into the patient empowered, highly personalised, hyper-connected healthcare with support from medical professionals and the community. Cross disciplines and co-creation are vital in bringing health innovations that matter to the patients.

INVITED SPEAKER 1 | 1000 - 1030

On Analyzing Capnogram as a Novel Method for Screening COVID-19: Testing strategy for post COVID-19 Vaccination

AP Ir. Dr. Malarvili Balakrishnan
Universiti Teknologi Malaysia

In December, 2019, the novel coronavirus disease (COVID-19) emerged in Wuhan city, China and rapidly spread in the remaining parts of China and in other countries around the globe. COVID-19 was declared to be caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)infection.There is no specific clinical features for this infectious disease.Therefore, current diagnosis is based on clinical symptoms, laboratory tests,real-time Reverse Transcription Polymerase Chain Reaction (RT-PCR) test, and Chest CT imaging. Although,the real-time RT-PCR test is considered as the gold standard method for the diagnosis of SARS-CoV-2 infection, this test presents some limitations which may lead to the delay in detecting the disease. Accurate, non-invasive and easy to use tools are on high demand for rapid and timely diagnosis of the disease. Since fever is a common symptom in COVID-19 patients, non-contact infrared thermometers have been used extensively to measure the body temperature rapidly and non-invasively as an early diagnostic tool. However, this approach could be misleading and may affect the effectiveness of SARS-CoV-2 detection. Therefore, we propose to use features from respired carbon dioxide(CO_2)as an early screening

tool for SARS-CoV-2 infection in addition to the thermometers. Our preliminary result proves that it has the ability of classifying different respiratory conditions namely asthma, COPD and Covid-19 based on CO2 features. Adding an amalgamation of more covid data from all category (CAT1-5) while developing this system will provide a breakthrough in understanding COVID-19. Hence, the viability of the claimed features while developing the proposed system should be verified in future work.

INVITED SPEAKER 2 | 1030 - 1100

Biomedical Imaging in Covid-19: The Role of AI

Dr Git Kim Ann
Selayang Hospital

Covid-19 infection results in a characteristic appearance on chest imaging such as radiographs and computed tomography (CT) scans. Initial excitement about the use of deep learning for diagnosis in lieu of a PCR test has been superseded by more meaningful applications such as guidance of clinical management and prognostication. This brief talk will cover the natural history of Covid-19 infection, the radio-pathological correlation on the relevant imaging modalities (radiographs and CTs), some basic informatics and deep learning related to these modalities, challenges and potential roles that AI might play at present and in the future with regards to Covid-19.

INVITED SPEAKER 3 | 1100 - 1130

Strengthening community social resilience in the combat against covid-19 through community-centred approaches

Dr Norfaiza Tohit
International Islamic University Malaysia

The pandemic has been with us for approximately 2 years, and it does not seem to end anytime soon. The government has carried out various measures in managing the pandemic. It involves multiprong-approaches that include health interventions, managing economic crisis, and psychosocial encounters. The pandemic is likely to have long-lasting consequences for everyone. It has exposed community engagement and community empowerment as important components of health emergency preparedness and response to COVID-19. Community participation approaches can be translated into action during the pandemic through empowering community members, mobilizing resources, and strengthening the ownership among the local community to ensure effective advocacy, proper networking, and dissemination of information and, subsequently, actions at the level of the community.

INVITED SPEAKER 4 | 1130 - 1200

Preparing and Managing the Support Services in COVID-19 Facilities – the PKRC Bersepadu MAEPS 2.0 experience

Ms. Dzatul Ithri Binti Amran
Engineer, Engineering Service Division, MOH

The increase in cases of COVID-19 patients in Malaysia requires the government to open several quarantine stations (QS) in additional of the capacity of existing hospitals to treat and quarantine COVID-19 patients. Pusat Kuarantin dan Rawatan COVID-19 Bersepadu MAEPS 2.0 (PKRCB MAEPS 2.0) is the largest quarantine station in Malaysia that can accommodate up to 10 000 patients at one particular time. Located at MAEPS, Serdang, it was officially operated since 9 December 2021 involving 7 halls - Hall A, B, C, D1, DG, E and F. In line with the needs of clinical services, support services are also one of the necessary services in PKRCB MAEPS 2.0. These support services include clinical waste management, provision of clean linen and laundry as well as cleaning services especially in the Red Zone area which is categorized as a highly infected area. These specialized services are implemented by experienced companies appointed by the MOH. However, several requirements and process flow need to be provided by taking into account the element of infection control to avoid cross-infection among support service staff and users. Providing and managing the needs of support services at this mega quarantine station is a challenging task. Organized planning and flexible SOPs need to be in place to ensure the delivery of support services is the best while taking measures to reduce the risk of infection to service operators. Hopefully, experience shared in this session will add value in the management of current and future quarantine station.

INDUSTRY KEYNOTE SPEAKER | 1400 - 1430

The New Era of A.I. in MRI and CT.

Mr.Andrew Ang
Canon Medical Systems Malaysia Sdn Bhd

Mr.Andrew Ang being his career with Canon Medical (formerly known as Toshiba Medical) in 2013 and held increasingly senior position such as Assistant Product Manager for CT, MR and Marketing Department. Overall, he has more than 8 years of professional experience in the field of CT and MR. Mr.Andrew has been involved in many presentation and CME talks include in the recent webinar which held in early Oct 2021. The webinar was organized for professional healthcare providers in imaging healthcare. The group of audience inclusive of radiologist, physician, medical officers, radiographers, physicists and nurses.

INVITED SPEAKER 5 | 1430 - 1500

Medical Device Regulatory System and initiatives to address Covid-19 emergency situation.

Ms. Salbiah Bt Yaakop
Director of Policy, Codes and Standards Division, Medical Device Authority, MOH

This talk explains on how medical devices are regulated in Malaysia, its alignment to international practices and efforts to ensure timely access of safe medical devices within the emergency COVID-19 situation.

INVITED SPEAKER 6 | 1500 - 1530

Challenges of Design, Interoperability to Telemedicine

Mr. Eric Woo
Regional Director, ECRI Institute Asia Pacific

Telehealth refers to a broad scope of remote healthcare services whereas telemedicine is narrower in scope and is typically associated with direct clinical services. Telemedicine leverages on the healthcare provider's interoperable system in providing consultation/services to patients without the need of physical interaction. This presentation provides a perspective of the importance in managing risk associated with the system and processes that may impact the quality and safety of care provided through telemedicine. In the pursue of great possibilities with telemedicine, the journey towards success is mounted with various challenges. This discussion can include the readiness or consistency of current system interoperability, design of the system, process improvement including liability mitigation, technical skills of relevant stakeholders involved, patient acceptance, regulatory compliance, cybersecurity prevention, etc. In summary, concerns and unknowns persist in the complicated network systems and challenging the effectiveness and efficacy of interoperability, telemedicine requiring other services of care must be carefully reviewed.

INVITED SPEAKER 7 | 1530 - 1600

Modern Mechanical Ventilation

Mr Rushdi Rusmi
Regional Manager, Lowenstein Medical SE & Co. KG

Advances in microprocessor technology have resulted in increasing sophistication of mechanical ventilators. The other side of the sword of sophistication is complexity. The array of modes and features of mechanical ventilators challenges even the most dedicated clinician to keep current update. This presentation reviews the new measurement technics, functions and modes of ventilation that have recently been introduced and are currently available. These include dual-control modes of ventilation (volume-assured pressure support, pressure augmentation, volume support, autoflow, adaptive pressure ventilation, pressure-regulated volume control, variable pressure control, and variable pressure support), AutoMode, adaptive support ventilation, and automatic tube compensation. The availability, terminology, operation, pitfalls, and literature regarding each technique are discussed.

INVITED SPEAKER 8 | 1600 - 1630

MEET: The Challenges of Furnishing Our Healthcare Facility on A Large Scale

Mr Mohammad Zahid Bin Zamaludin
Senior Principal Assistant Director, Engineering Service Division, MOH

Outfitting healthcare facilities with the right medical equipment are imperative to the success of its service delivery. Medical professionals rely on the tools available to make inform diagnostic and therapeutic decisions. Therefore, Ministry of Health always set out to provide the latest medical devices in line with Malaysia sustainable development goal towards providing good health and wellbeing in the country. In 2014, a program called Medical Equipment Enhancement Tenure (MEET) was initiated to furnish medical equipment in Ministry of Health primary healthcare facilities such as health and dental clinics. The aim of the program is to fulfil the needs for medical equipment of each facility according to its norm and provide maintenance services during the device's lifespan. The program has its own unique challenges due to the sheer number of facility and equipment involved. To ensure its being successfully implemented, careful planning has to be made and the government must be ready to pivot and implement new ways of managing equipment lifecycle.

NBEC2021

LIST OF ABSTRACTS

9 NOVEMBER 2021

TRACK 1 | 1100 - 1120

Synthesis and Characterisation of Hydroxyapatite (HAp) from Asiatic Hard Clam (Meretrix meretrix) and Blood Cockle Clam (Anadara granosa) Using Wet Precipitation Process

Krishani Murugiah, Mohammad Iliya Zakaria and Hazwani Suhaimi, Wahyu Caesarendra and Nonni Sambudi

Hydroxyapatite (HAp) is a bioceramic material having numerous applications in orthopaedic and dental applications. It can be chemically synthesised from materials that are rich in calcium carbonate (CaCO3). Asiatic Hard Clam (Meretrix meretrix) and Blood Cockle Clam (Anadara granosa) are the commercial species in Southeast Asia, resulting in the discharge of abundant waste shells, which further leads to microbial growth, odour and an unhygienic environment. Moreover, shells are the global source of CaCO3. In order to convert the waste into a valuable product, this study aims to synthesise and characterise HAp from Asiatic Hard Clam (Meretrix meretrix) and Blood Cockle Clam (Anadara granosa) via a wet precipitation process. These clamshells were characterised by X-Ray fluorescence (XRF), and the result revealed that Asiatic Hard Clam (Meretrix meretrix) contains 97.4 wt% of CaCO3 and Blood Cockle Clam (Anadara granosa) of about 98.8 wt% of CaCO3. Fourier-transform infrared spectroscopy (FTIR) confirmed the presence of -(PO4)32-, -CO32- and -OH functional groups in the synthesised HAp. The X-Ray powder diffraction (XRD) patterns of this powdered HAp showed sharper peaks which indicates better crystallinity. Moreover, the morphology of the HAp before and after sintering was characterised with the help of scanning electron microscope (SEM), which clearly showed the crystalline structure and coalescence of HAp particles. Results have revealed that HAp derived from both natural clamshells using the wet precipitation method displayed similar crystallinity, morphology and chemical characteristics of pure HAp.

TRACK 1 | 1120 - 1140

Design and Analysis of interbody fusion cage materials based on finite element analysis

Muhammad Hazli Mazlan, Nur Ariza Hayani Mohd Nizam, Nur Saliha Md Salleh and Muhammad Anas Razali, Abdul Halim Abdullah, Muhammad Hilmi Abd Jalil, Hiromitsu Takano and Nur Dalilah Diyana Nordin

This study investigates the effect of the Posterior Lumbar Interbody Fusion (PLIF) cage's material on the strength and stability of the cage. The lumbar vertebrae L2-L3 unit finite element model was developed from computed tomography (CT) scan images in 3D Slicer software. The PLIF cage model was constructed using Solidworks software. The models were assigned with polyetheretherketone (PEEK) and polylactic acid (PLA) materials. The models were implanted and analyzed in Ansys Workbench Software by applying external preload, compression load and other load conditions to mimic the spine physiological motions under static and dynamic analysis. The von Mises stress and maximum principal stress were observed and analyzed to evaluate their strength and stability. In addition, the percentage differences between the von Mises stress and yield strength of the material and between the maximum principal stress and critical strength of the material were calculated. The PEEK cage produced higher von Mises stresses than the PLA cage for the static analysis. However, the PEEK cage exhibited lower percentage differences than the PLA cage. This result indicates that the PEEK cage has the superior structural integrity to the PLA interbody cage. The results from the dynamic analysis showed that both cages exhibited extremely low von Mises stresses and similar curve patterns. These results indicate that both cages are stable and do not pose harmful health implications. Thus, PLA can be considered an alternative material for the cage because it is more cost-effective than the PEEK material, and stresses generated were far lower than the ultimate tensile strength and yield strength of the material.

TRACK 1 | 1140 - 1200

Finite Element Analysis (FEA) Of The Different Cement Mixture For Total Hip Replacement

Solehuddin Bin Shuib, Iffa Mohd Arrif and Najwa Syakirah Hamizan

Polymethyl methacrylate (PMMA) bone cement was introduced for the total hip replacement component's fixation. Cement failure in total hip replacement whether in the short-term or long-term will be harmful to the patient's health and caused osteoarthritis, hip fractures, and dislocations. The purpose was to find the suitable cement mixtures for total hip replacement consists of Young's Modulus of 2240 MPa, 312.931 MPa,

33.939 MPa and 79.609 MPa which were taken from the previous research. The PMMA cement was used with three different types of proximal cemented techniques such as 40 mm cement reduction, 80 mm cement reduction and full cement (datum). The ANSYS Workbench 2020 R2 software was used to analyze the Charnley Hip Implant with Titanium Ti-6A1-4V (Ti-41) stem model using a Young's Modulus of 100,000 MPa and a Poisson's ratio of 0.3. The analysis was based on total deformation and Von Mises stress under different types of loading conditions such as standing, walking, stair climbing and falling. The results showed that all the hip implants were considered safe because their stress does not exceed the yield strength value of the material assigned which is 880 MPa. In conclusion, the 40 mm cement reduction with Young's Modulus of 2240 MPa obtained the most improved in terms of Von Mises stress and total deformation compared with the full cement (datum) and 80 mm cement reduction with Young's Modulus of 2240 MPa, 312.931 MPa, 33.939 MPa and 79.609 MPa.

TRACK 1 | 1200 - 1220

P300 Somatosensory Validation of Vibrotactile Haptic Feedback for Upper Limb Prosthesis

Nur Amalina Has, Mohd Najeb Jamaludin and Abdul Salam A Haris, Zulkifli Ahmad, Muhammad Amir As'ari, Sujana Mohd Rejab, Nurul Farha Zainuddin and Chu Ai Reen

Haptic sensation research based on the event's related potential (ERP) has been carried out extensively in order to help amputees to be able feel and control their prosthetic hand. Clinically, somatosensory evoked potential is suggested in the pain-related evoked potential and able to control a computer using a brain to computer interface system called BCI. Somatosensory response can be evoked by tactile vibrators whether it is directly and indirect contact with skin. Somatosensory evoked potential has been reported to have lower signal to noise ratio compared to the common visual evoked potential. P300 based on somatosensory evoked potential were discovered as a benchmark that a person will generate P300 whenever decision making as simple as lift their finger take place. The aim of this paper is to identify the best location of the upper limb for tactile haptic placement and investigating whether the vibration motor haptic tactile setup reflect on the P300 somatosensory response from encephalography recordings. Results show that most of the subjects correctly guesses during upper arm position of haptic tactile feedback than the lower arm position. The vibration motor haptic tactile feedback setup was validated via experiment with mental task in order to elicit P300 somatosensory event related potential (ERP).

TRACK 1 | 1220 - 1240

Design and analysis of infill density effects on interbody fusion cage construct based on finite element analysis

Muhammad Hazli Mazlan, Nur Saliha Md Salleh and Nur Sarah Abdullah, Abdul Halim Abdullah, Muhammad Hilmi Abd Jalil, Ida Laila Ahmad, Hiromitsu Takano and Nur Dalilah Diyana Nordin

Degenerative Disc Disease is a condition of the spine when the intervertebral disc begins to collapse. This disease occurs in the human spine, especially in the lumbar spine, because the primary function of the lumbar spine is to support the weight of the body. There are many treatments for this disease, and one of the treatment methods is Posterior Lumbar Interbody Fusion (PLIF) surgery. There are few implications of the PLIF surgery, such as cage subsidence, cage failure, cage migration, and highly concentrated stress effect on the cage. The aim of the study was to develop an interbody cage that can be implanted into the spine and reduce the post-operative effects using the Finite Element Analysis (FEA) approach. In this study, various infill densities of the interbody cage were designed using Solidworks software and analyzed using Ansys software. Polylactic Acid (PLA) was assigned as a cage material. The cage was implanted between L4 and L5 to create the three dimensional (3D) model, in which the spine model was developed from extracted CT scan images using 3D Slicer software. The model was analyzed based on von Mises stress and maximum principal stress compared with the yield strength and ultimate tensile strength of the material, respectively. The 3D model was loaded with flexion, extension, axial rotation, lateral bending and compression to mimic the physiological motions of the spine. The analysis showed that the interbody cage with 50% infill density has been identified as the most appropriate design according to the acceptable range of stresses generated, fastest estimated printing time, and required the least amount of printing material.

TRACK 1 | 1240 - 1300

Development of Hip Implant: Gait Study and Finite Element Analysis

Solehuddin Bin Shuib, Najwa Syakirah Hamizan and Iffa Mohd Arrif

The hip joint gives stability to the whole human structure making it an important part of the human body that provides the ability to carry out various everyday work such as walking and running. Although hip joint replacement is commonly and successfully performed, an increased number of younger and active patients widens the range of motion of patients leading to the need for a longer lifetime of the replacement joint. This matter puts a challenge to the orthopedic surgical procedures that is needed to be overcome. This paper studies the effect of gait activity and loading acting across the joint by using Finite Element Analysis (FEA) to evaluate the total deformation and von Mises stress distribution of the hip implant. Alongside, structural analysis is conducted to evaluate a better implant design that has less stress distribution which is lesser than its yielded strength to avoid implant failure. FEA was performed using Computer- Aided Engineering (CAE) software of ANSYS by static structural analysis to study the mechanical behaviors of 3-dimensional hip implant models with the femoral design being loaded with forces ranging from 2.5 to 6.4 kN. Obtained results show von Mises stress distribution ranging from 400-1000 MPa of different gait activities, most cases are notably lower than
the yield stress value of titanium alloy, Ti-6Al-4V (860 MPa). This work revealed the critical stress concentration located on the hip implant by numerical analysis with lesser stress values than the yielded strength that offers to improve optimization of implant design and life expectancy to avoid the hip implant revision in active patients.

TRACK 2A | 1100 - 1120

Fetal Health Classification Using Supervised Learning Approach

Nurul Fathia Mohamand Noor, Norulhusna Ahmad and Norliza Mohd Noor

Fetal Health monitoring is important to reduce or minimize the mortality of both mother and child. This paper presents study on dataset of 2126 records on features extracted from cardiotocography exam with 21 attributes including baseline value accelerations, fetal movement, uterine contractions, light, severe and prolonged decelerations, abnormal short-term variability, mean value of short-term variability, percentage of time with abnormal long-term variability, mean value of long-term variability, histogram width, min, max, number of peaks, number of zeroes, mode, mean, median, variance, and tendency. This paper will be using Supervised Machine Learning to compare and classify the data set using K-NN, Linear SVM, Naïve Bayes, Decision Tree (J48), Ada Boost, Bagging and Stacking. Lastly, Bayesian Network are then developed and compared with the other classifier. By comparing all of the classifier, classifier Ada Boost with sub-model Random Forest has the highest accuracy 94.7% with k=10.

TRACK 2A | 1120 - 1140

An Explainable AI powered Early Warning System to address Patient Readmission Risk

Tanusree De, Ahmeduvesh Mevawala and Ramyasri Nemani

Hospital readmission is undesirable for all the involved parties, the patient, the hospital and the insurer. Readmission put patients at-risk for hospital acquired infections, medical errors and unfavorable outcomes. For hospitals, it leads to a gradual increase in operating expenses. For payers, readmission means additional cost. So, predicting the possibility of patient readmission is very critical and highly relevant for all the parties involved. There are powerful machine learning algorithms, like Random Forest, XGBoost, Neural Net that can be used to develop the predictive model to predict the probability of patient readmission. However, these models are all black box; they can give the prediction with high accuracy; however, they do not explain how they arrived at the prediction. Herein comes the role of Explainable AI. In this paper, we have developed a novel model-specific local explanation methodology to derive explanation at an individual patient level, considering the inner learning process of a Random-Forest model. The derived explanations from proposed methodology are human-interpretable irrespective of the complexities of the underlying Random-Forest model and the explanations provide guidance to the doctor for prescribing the necessary remedy to the patient to prevent him/her from readmission within thirty days of discharge.

TRACK 2A | 1140 - 1200

Heart Disease Prediction Using Machine Learning Techniques

Herold Sylvestro Sipail, Norulhusna Ahmad and Norliza Mohd Noor

Heart disease is the leading cause of death in the developed world. Early detection of the heart disease can prevent death, as well as other disease that is related to it such as dementia. Therefore, studies in preventing the risks of having a stroke or heart attack required. Using machine learning techniques, the aim of this study is to evaluate the accuracy of supervised learning techniques in predicting heart disease based on the dataset obtained from University of California Irvine data repository. The result from this study shows that Naïve Bayes and Bayesian Network has better estimated accuracy in Weka for the data set, while both Bayesian Network and J48 may gives useful insight with Weka generated visualization.

TRACK 2B | 1200 - 1220

Investigation on Stationarity and Spectral Components of Capnogram

Alexie Mushikiwabeza and M. B. Malarvili

Capnography provides a graphical representation of the CO2 concentration in the exhaled gases. There are different methods that are used to extract time domain features of capnogram. However, those methods are manual and only suitable for normal and asthmatic capnograms. Frequency domain method is mostly used to analyze physiological signals, by assuming that those signals are stationary. Note that numerous physiological phenomena are characterized by dynamical properties. Identifying the nature of the signal is a preliminary stage which can enable to select suitable signal processing method. In this study, stationarity of capnogram signal was tested by analyzing statistical characteristics of the time series of the carbon dioxide samples recorded from normal subjects, and patients with complaint of asthma, chronic obstructive pulmonary disease, and pulmonary edema. Analysis of the spectral components of capnogram was performed using Fourier transform. The results show that there is a slight change in the statistical properties of the time series. Suggesting that capnogram can be considered as a quasi-stationary signal. Besides, analysis of capnogram based on the number of main lobes and side lobes can help to examine how changes in the spectral properties of capnogram relates to the respiratory status of the person, which can subsequentially help to discriminate normal from abnormal capnograms, and thus classify different respiratory diseases. This study may provide the key insight while identifying the proper signal processing method to analyze capnogram waveform.

TRACK 2B | 1220 - 1240

Implementation of P300 based BCI Using a Consumer-grade EEG Neuroheadset

Saleh I Alzahrani

The P300 signal is an electroencephalography (EEG) positive deflection observed 300 ms to 600 ms after an infrequent, but expected, stimulus is presented to a subject. The aim of this study was to investigate the capability of Emotiv EPOC+ headset to capture and record the P300 wave. Moreover, the effects of using different matrix sizes, flash duration, and colors were studied. Subjects attended to one cell of either 6x6 or 3x3 matrix while the rows and columns flashed randomly at different duration (100 ms or 175 ms). The EEG signals were sent wirelessly to OpenViBE software, which is used to run the P300 speller. The results provide evidence of capability of the Emotiv EPOC+ headset to detect the P300 signals from two channels, O1 and O2. In addition, when the matrix size increases, the P300 amplitude increases. The results also show that longer flash duration resulted in larger P300 amplitude. Also, the effect of using colored matrix was clear on the O2 channel. Furthermore, results show that subjects reached accuracy above 70% after three to four training sessions. The results confirmed the capability of the Emotiv EPOC+ headset for detecting P300 signals. In addition, matrix size, flash duration, and colors can affect the P300 speller performance. Such an affordable and portable headset could be utilized to control P300-based BCI or other BCI systems especially for the out-of-the-lab applications.

TRACK 2B | 1240 - 1300

Classification of Electromyography Signals Using Neural Networks and Features From Various Domains

Zahra Taghizadeh and Sina Nateghi

Real-time control of prosthetic hands has attracted huge attention from researchers in recent years. Real-time analysis of Electromyography (EMG) signals has several challenges. The most important one is to achieve an acceptable classification accuracy by observing a limited length of the EMG signal. In this paper, we address these challenges i.e., we enhance the classification accuracy and reduce the required observation signal's length. These goals are achieved by employing extracted features from time, frequency, and time-frequency domains and introducing a new neural network architecture to combine these features. The experimental results illustrate that combining features from different domains and the proposed architecture improve the accuracy of real-time classification of EMG signals in comparison to existing state-of-the-art methods.

TRACK 3 | 1530 - 1550

Automated Paralysis Patient Monitoring system

Kaythry Pandurangan, Vijay M and Vinu R

Paralytic people in most cases are not able to convey their needs as they are neither able to speak properly nor do they convey through sign language due to loss in motor control by their brain. In such a situation, our proposed system helps the disabled person in displaying a message over the LCD by simple motion of their hand. The proposed system works by reading the various tilt directions of the hand. The transmitter is attached to a glove which is worn by patient. User just needs to tilt the device in different directions to convey different messages. An accelerometer is used to measure the statistics of motion. It then passes on this data to the microcontroller which processes the data and displays the particular message as per the input obtained. It sounds a buzzer along with the message as soon as it receives motion signal from the accelerometer. The data is then transmitted online to IOT Adafruit server and the message is displayed online. With the help of this system, the patients affected by paralysis can convey their important needs to others.

TRACK 3 | 1550 - 1610

Speech Therapy Mobile Applications for People with Aphasia: PRISMA review and features analysis

Afiqah Iylia Kamaruddin, Maslin Masrom, Mohd Azmarul A Aziz and Norliza Mohd Noor

Mobile applications have become substantial and practical for speech therapy services for people with aphasia (PWA) in this advancing technology era. Cultural and linguistic features consideration play a vital role in mobile applications utilization in speech therapy sessions. PWA in the Malaysian population mostly uses the Malay language as their lingua franca. The objective of this study is to 1) review mobile apps available for aphasia and 2) identify instructional features (speech therapy components) and functional features (non-linguistic components and technology components) of speech therapy mobile applications for the PWA population in Malaysia. Preliminary search and selection process using Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) has identified 1797 apps with 161 apps eligible to be included for reviewing. This study enables documentation and review of the aphasia speech therapy apps compatible with iOS and Android mobile phones. It shall also identify the features and recommendations for the incorporation of users' needs and perspective in mobile apps development for PWA, particularly in the Malaysian population. This study will help with the review of the speech therapy apps features and propose the framework for future development of speech therapy apps for PWA in the Malay language.

TRACK 3 | 1610 - 1630

A Wearable Non-Contact Temperature Detector For Early Detection of Fever

Mitra Mohd Addi and Nayli Azman

The world is currently facing a pandemic attack of Coronovirus disease (COVID-19), which is an infectious disease causing mild to moderate respiratory illness. One of the most common and early symptoms of COVID-19 is fever which is the reaction to a disease-specific stimulus causing the increase of the human body temperature. To slow down the transmission of the COVID-19 virus, the public is required have their body temperature measured when entering any premises. The current common method of monitoring the human body temperature uses the application of non-contact infrared thermometer (NCIT) and is only limited for stationary conditions within short distances and mostly suitable for indoor premises. The available technology to detect human body temperature for longer distances uses the thermal camera which is costly and large. Thus, it is challenging to detect anyone with high body temperature is non-stationary conditions, at longer distances, especially outdoor. The project proposes an innovation to the current practice, for a wearable non-contact temperature detector device which is portable. The wearable non-contact temperature detector embeds a thermal sensor and a microcontroller to a normal hat. It is able to detect objects with higher temperature (>37.5℃) within 1 meter radius of 60° angle view in stationary and non-stationary conditions. The wearable device communicates via Bluetooth to a mobile device to display the detected temperature and notifies the user via alert message and alarm for high temperature detection. Display of the object's thermal image is also available with a resolution of 8 × 8 pixel. The wearable non-contact temperature detector is able to achieve 99% accuracy of temperature measurement for detection distance of up to 70 cm for indoor and within 20 cm for outdoor when tested with normal temperature subject and high temperature object and compared with the actual temperature detected via a commercial NCIT device.

TRACK 3 | 1630 - 1650

Development of Speech Therapy Mobile Application for Aphasia Patients

Muhammad Adham Aziz, Mohd Azmarul A Aziz, Siti Zura A. Jalil, Sharifah Alwiah Syed Abd Rahman, Haslaile Abdullah, Siti Haida Ismail, Siti Armiza Mohd Aris and Norliza Mohd Noor

Aphasia is a difficulty in communication due to the loss of linguistic abilities caused by brain injuries. People with aphasia can recover their lost abilities through training with language therapy where it trains the ability to read, write, comprehends, and produce speech. With the booming advance in technology, telerehabilitation with the use of IoT opens up possibilities for improvement for providing a better life for people with aphasia. Smartphones being mobile and pocket sized can provide a big improvement for people with aphasia. Mobile applications can be designed and developed based on people's needs including healthcare. This study will focus on mobile application development for Malay-speaking people with aphasia. Stroke cases in Malaysia have been up to 14396 cases between the year 2012 to 2019 and a median of 34% of post stroke patients obtained aphasia. In this study, speech therapy mobile apps with a monitoring system will be developed. The mobile app is designed and developed using the Flutter Software development kit as the tool for mobile apps development and IoT as a connection between devices. The monitoring system will be tested to collect the data from users that completed the task and can be accessed by the patient's caregiver and the patient's Speech-Language Therapist.

TRACK 3 | 1650 - 1710

Development of Smart Healthcare Tracker through Internet of Things(IoT)

Ten Yi Ting, Fitri Yakub, Mohd Azizi Abdul Rahman, Ahmad Haziq Shamsul Bahri, Mohamad Aiman Syamir, Muhammad Azri Azizan, Hazilah Mad Kaidi, Norliza Mohd Noor, Nurul Aini Bani, Siti Zura A.Jalil, Haslaile Abdullah and Norhayati Hussien

According to the World Health Organization, there are approximately 17.9 million people in the world who will die under the cause of Cardiovascular diseases (CVDs) in 2019. Heart and Brain are both related to Cardiovascular diseases. Even if the patients do not pass away due to the disease, the post-effect of this illness burdens the patients and their family. Also, the outbreak of COVID-19 makes the patients take a risk of undergoing rehabilitation in the hospital. Thus, a smart healthcare solution which is a Smart Healthcare Tracker through Internet of Things is designed. The system consists of EMG sensor, accelerometer, gyroscope, and heart rate/pulse oximeter connected to ESP 32 with an interface of NodeMCU to study the patients' health condition for upper and lower limb by sending the data to the caregivers or physicians. The project aimed to obtain consistent and accurate reading for each of the features for upper limbs' strength

analysis, lower limbs' strength analysis and sleeping disturbance analysis. The BLYNK app is also applied to the project design as a platform to display the analysis result to the caregivers/physicians on the gadgets at anytime and anywhere. The prototype has been constructed and the data collection is built successfully. The prototype is trusted to obtain accurate and consistent results and is able to provide a sustainable way for the rehabilitation to indicate the health condition and the recovery stage of the patients.

TRACK 4A | 1530 - 1550

Analyzing the Texture of Nakagami Parametric Images for Classification of Breast Cancer

Sabiq Muhtadi, Ahmad Chowdhury, Rezwana Razzaque and Ahmad Shafiullah

In this paper we analyze the capability of texture features extracted from Nakagami parametric images for the classification of breast cancer. Nakagami parametric maps were generated from ultrasound envelope images using a sliding window of length 0.75mm and 0.0385mm increment (95% overlap). Next, Gray Level Co-occurrence Matrix (GLCM) techniques were applied to the parametric maps in order to extract texture features. These texture features were utilized for the classification of breast lesions. An Area under the Receiver Operating Characteristics curve (AUC) of 0.90 and a sensitivity of 88.5% was obtained, suggesting that texture features derived from Nakagami parametric images have the potential to play an important role in the early diagnosis of breast cancer.

TRACK 4A | 1550 - 1610

An Automatic Vein Detection System Using Deep Learning for Intravenous (IV) Access Procedure

Xiao Jing Chan, Goh Chuan Meng, Meei Tyng Chai, Sayed Ahmad Zikri Bin Sayed Aluwee and Pei Voon Wong

Intravenous (IV) access is a common and yet important daily clinical procedure that delivers fluids or medication into a patient's vein. However, IV insertion is very challenging where clinicians are suffering in locating the subcutaneous vein due to patients' physiological factors such as hairy forearm and thick dermis fat, and also medical staff's level of fatigue. As a result, the patients are suffering from multiple IV insertions and the problem has not yet been resolved till-date. Thus, researchers have proposed an autonomous machine for IV access, but such equipment is lack of an artificial intelligence (AI) algorithm in detecting the vein accurately. Therefore, this project proposes an automatic vein detection algorithm using deep learning for Intravenous (IV) access purposes. U-Net, a fully connected network (FCN) architecture is employed in this project due to its capability in detecting the Near-Infrared (NIR) Subcutaneous vein. In our experiment, data augmentation is applied to increase the dataset size and reduce the bias from overfitting. The original U-Net architecture is optimized by replacing up-sampling with transpose convolution as well as the additional implementation of batch normalization. Lastly, the proposed algorithm has achieved an accuracy and specificity of 0.9909 and 0.9970, respectively. This result indicates that the proposed algorithm can be applied into the venipuncture machine to locate the Subcutaneous vein for Intravenous (IV) procedures.

TRACK 4B | 1610 - 1630

Frequency Detection Of Hand Tremors Using Customized Accelerometer

Akeel Al-Kazwini, Ahmad Halilah, Aeshah Hendi, Ibrahim Al-Saeed, Abdullah Al-Azamat and Walid Al-Zyoud

Tremor can be defined as involuntary, rhythmic muscle contraction involving movements of one or more body parts, e.g. hands, arms, head, face, voice, trunk, and legs. This work aims to measure the frequency of hand tremors using a customized, reasonably accurate method to monitor the severity of tremors and reach a point where building hand tremors stabilizing system is possible to allow patients to overcome this problem. The data in this work was collected using an accelerometer attached to the patient's index finger as it is involved in important daily life activities such as writing. The signal was obtained using a microcontroller and an Arduino Mega and has been processed using MATLAB software from Math Works, combined with an open-source Arduino Software, an Integrated Development Environment (IDE). The proposed method was applied to 30 patients with hand tremors from various diseases compared with a normal person as a source for a normal signal. The maximum frequency of hand tremors was around 7 Hz, which is in agreement with previous studies. We conclude that this technique can handle and measure very low tremor frequencies, which can be utilized in the future for building a tremor stabilizing device.

TRACK 4B | 1630 - 1650

A Tilting Platform as a Sub-injury Motion for Ankle Sprain Studies

Natrisha Francis, Aziz Ong, Hazwani Suhaimi and Emeroylariffion Abas

Ankle sprains are amongst the most prevalent musculoskeletal system injuries, impacting athletes of all ages and all sporting activities, with most ankle sprains resulting from stress during inversion, plantar flexion, or supination of the foot. One method of simulating ankle sprain motion is through sub-injury trials using a platform that can force the foot to invert, simulating an ankle sprain motion repeatedly on human participants without causing actual injury. This study aims to design and fabricate a tilting platform that uses a DC motor to enable such research to be performed. The tilting platform, which is capable of inverting the foot to the desired angle of inversion to simulate ankle sprain motion, has been constructed, and a total of 20 sets of data have been collected from four participants to ensure that the platform is able to simulate ankle sprain motion. The design, material, structure, and mechanism of the tilting platform was made to ensure the participants' safety and not cause real injury to the participants. Comparison of sub-injury trial using the platform and kinematic data from OpenSim has shown that the tilting platform is capable of simulating real-life ankle sprain motion for data analysis, which paves the way forward for further studies on ankle sprain.

TRACK 4B | 1650 - 1710

Development of a Ligamentous Finite Element Model of the Human Cervical Spine

Worakan Tongprapai, Nichapat Rattanapan, Yingyong Torudom and Chamaiporn Sukjamsri

The cervical spine finite element model is helpful for biomechanical analysis of cervical spine motion. Previous studies have developed cervical spine finite element model models with a variety of ligamentous groups. This study aimed to reduce the complexity of finite element model construction while optimizing the simulation accuracy of the cervical spine analysis. In this study, four cases of the cervical spine models were constructed based on computed tomography images. Each case contained different groups of ligaments ranging between six and seventeen groups. Finite element models in all cases were analyzed and compared to previous experimental data, focusing on the range of motion of the cervical spinal column in flexion and extension movements subjected to static loading. The results suggested that the model with a minimum of seven ligamentous groups was consistent with previous cadaveric studies. This finding can be used as a guideline to develop an appropriate finite element model and can further be used for biomechanical analyses.

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TRACK 5 | 1200 - 1220

Preliminary Study on Patch Sizes in Vision Transformers (ViT) for COVID-19 and Diseased Lungs Classification

Joel Chia Ming Than and Pun Liang Thon, Omar Mohd Rijal, Rosminah Kassim and Ashari Yunus, Norliza Mohd Noor, Patrick Then

COVID-19 and lung diseases have been the major focus of research currently due to the pandemic's reach and effect. Deep Learning (DL) is playing a large role today in various fields from disease classification to drug response identification. The conventional DL method used for images is the Convolutional Neural Network (CNN). A potential method that will replace the usage of CNNs is Transformer specifically Vision Transformers (ViT). This study is a preliminary exploration to determine the performance of using ViT on diseased lungs, COVID-19 infected lungs, and normal lungs. This study was performed on two datasets. The first dataset was a publicly accessible dataset from Iran that has a large cohort of patients. The second dataset was a Malaysian dataset. These images were utilized to verify the usage of ViT and its effectiveness. Images were segregated into several sized patches (16x16, 32x32, 64x64, 128x128, 256x256) pixels. To determine the performance of ViT method, performance metrics of accuracy, sensitivity, specificity, negative predictive value (NPV), positive predictive value (PPV) and F1-score. From the results of this study, ViT is a promising method with a peak accuracy of 95.36%.

TRACK 5 | 1220 - 1240

Covid-19 Severity Classification Using Supervised Learning Approach

Nurul Fathia Mohamand Noor, Herold Sylvestro Sipail, Norulhusna Ahmad and Norliza Mohd Noor

This paper presented work on supervised machine learning techniques using K-NN, Linear SVM, Naïve Bayes, Decision Tree (J48), Ada Boost, Bagging and Stacking for the purpose to classify the severity group of covid-19 symptoms. The data was obtained from Kaggle dataset, which was obtained through a survey collected from the participant with varying gender and age that had visited 10 or more countries including China, France, Germany Iran, Italy, Republic of Korean, Spain, UAE, other European Countries (Other-EUR) and Others. The survey is Covid-19 symptom based on guidelines given by the World Health Organization (WHO) and the Ministry of Health and Family Welfare, India which then classified into 4 different levels of severity, Mild, Moderate, Severe, and None. The results from the seven classifiers used in this study showed very low classification results.

TRACK 5 | 1240 - 1300

Linear Regression and Holt's Winter Algorithm in Forecasting Daily Coronavirus Disease 2019 Cases in Malaysia: Preliminary Study

Hudzaifah Hasri, Siti Armiza Mohd Aris and Robiah Ahmad

Coronavirus disease 2019 is a fatal viral disease presently sweeping the globe. COVID-19 is a novel coronavirus that produces an infectious illness. Thus, COVID-19 detection in the general population may be helpful. The involvement of machine learning in combating COVID-19 had rapidly increased because of its efficiency to scale up, faster processing capacity, and more dependable than humans in some healthcare activities. This paper will focus on two machine learning algorithms which are Linear Regression (LR) and Holt's Winter. The COVID-19 dataset was taken from the Ministry of Health for Malaysia's website. Daily confirmed cases were recorded from 24th of January 2020 to 31st July 2021 and stored in Microsoft Excel. Waikato Environment for Knowledge Analysis (WEKA) software was utilized to perform the prediction of daily cases in the next 14-days and the quality of forecasting models is evaluated by two performance metrics, MAD and MAPE. The best model is selected by the lowest value of performance metrics. The comparison shows that the forecasting result of Holt's Winter is more accurate than the LR model. The developed prediction model can help public health officials make better decisions and manage resources to decrease COVID-19 pandemic morbidity and mortality. Therefore, preparation and control procedures can be established.

TRACK 6 | 1120 - 1140

Association of Hand Grip and Pinch Strength Reading with Nutritional Health Status Among Orang Asli in Perak, Malaysia

Sahnius Usman, Fatin Rusli, Norliza Mohd Noor, Siti Armiza Mohd Aris, Mohd Nabil Muhtazaruddin, Sharifah Alwiah Syed Abd Rahman and Nurul Aini Bani

Malaysian indigenous people, locally known as Orang Asli, live in remote forest areas for centuries and rely heavily on agriculture for their daily subsistence. The association of nutritional status with hand grip and pinch strength readings among adults in Orang Asli community is investigated in this preliminary study. The nutritional status of the participants, as well as their hand grip and pinch strength, are assessed using a cross-sectional design. Patients who are malnourished or at risk of malnutrition are identified using a validated nutritional risk screening, also known as the Malnutritional Universal Screening Tool (MUST). An independent t-test compares the means of the hand grip and pinch strength readings with MUST risk group. A p-value of 0.05 or less is considered statistically significant. It is evident that there is a similar of hand grip and pinch strength reading between medium and high risk group of MUST score.

TRACK 6 | 1140 - 1200

Association between Physical Performance and Autonomic Nervous System in Elderly Fallers

Nur Husna Shahimi, Choon-Hian Goh, Maw Pin Tan, Einly Lim

Falls among older adults have become a global concern. Autonomic nervous system (ANS) function, which is implicated, can be noninvasively evaluated with heart rate variability (HRV) and blood pressure variability (BPV). The present study evaluated relationship between physical activity, physical performance and autonomic function in 92 older individuals. Continuous non-invasive cardiovascular autonomic reflexes were monitored over 5 minutes supine rest and 3 minutes standing upright. Our findings suggest that elderly fallers had poorer autonomic function, lower hand-grip strength ($p<0.001$), poorer walking ability (TUG: $p=0.004$), greater dependence in instrumental activities of daily living (Lawton IADL: $p<0.001$) and lower physical activity level (PASE: $p<0.001$). Overall, Lawton IADL, PASE and Time-up and Go were significantly associated with autonomic function indices (LF-nu, HF-nu, LF/HF) and could be served as pre-screening tools to identify patients with autonomic dysfunction. Identification of specific autonomic function risk factors can be useful in the early prevention and diagnosis of recurrent falls and cardiovascular risk.

TRACK 6 | 1200 - 1220

Relationship of Backpack Weight Towards Risk Factor for Scoliosis Among Primary School Children in Pahang, Malaysia

Ahmad Aizat Che Rahmat, Siti Zura A. Jalil and Sharifah Alwiah Syed Abd Rahman

The purpose of this study is to determine the relationship of backpack weight and risk factor for scoliosis in primary school children. The risk factors are identified by age, gender, body mass index and the weight of the backpack. A total of 260 children aged from 7 to 12 years old participated in this study. The test was performed by measuring the angle of trunk rotation (ATR) on Adam Forward Bending Test (AFBT) using a scoliometer. ATR readings at 5° and above is deemed to be positive. The findings showed that a significant correlation was found on risk factor of age ($r = 0.538$), gender ($r = 0.580$), and backpack weight ($r = 0.552$) which indicates that age, gender and backpack weight may contribute to risk factor of scoliosis.

TRACK 6 | 1220 - 1240

Ergonomics Risk Factors and Musculoskeletal Discomfort among Offshore Support Vessel Deck and Engine Crews

Siti Haida Ismail and Haslaile Abdullah, Muhammad Faris Harun and Norazmein Abdul Raman

One of the industries that make a huge return in Malaysia's economy is the oil and gas industry, but it is also one of the highest risk industries. This study was conducted to assess the daily risk associated with the ergonomics hazards often encountered by general workers and engineers on board and its contribution to the health of the employees. The study specified food and provision loading activities on the deck area. Data was collected and analyzed using the Rapid Entire Body Assessment (REBA) standard method and Recommended Weight Limit (RWL) calculations by the National Institute of Occupational Safety and Health

(NIOSH) Malaysia. The risk obtained were compared by using the Cornell Musculoskeletal Discomfort Questionnaire (CMDQ). The result shows that the most affected body area was the crew's upper body part. These were due to the crews' distance at least 30 meters with loads from lorry to galley. A recommendation was made to mitigate the risk.

TRACK 6 **1240 - 1300**

Mathematical Modeling for The Ergonomic Analysis Of Driver In Prolong Driving

Ab Ghafar Noor Azlyn, Nur Liyana Azmi

Prolong driving could cause spine muscle fatigue and lead to drowsiness and microsleep. In addition, the ergonomics of the driver car seat including seat inclination angle and whole-body vibration produced by the car will also contribute to spine muscle fatigue. Objective: The objective of this research is to develop and validate the mathematical model of erector spinae muscle activity with respect to different seat inclination angles (10 degrees and 20 degrees) and whole-body vibration of the driver during driving. Method: A healthy male volunteer underwent two driving trials with different seat inclination angle (10° and 20°) for 66.4km driving. An electromyography (EMG) sensor was placed over erector spinae. The car vibration was collected using MPU6050. The Mathematical model with the car vibration as the input and the EMG data as the output for both inclination angle was developed and validated using System Identification (SID) technique. Result and Conclusion: The validation of the developed mathematical models with 10° and 20° seat inclination angles have the fit to estimation data of 85.48% and 85.03%, respectively. This research could the guideline for the car manufacturer to improve the performance of the car while maintaining driver's comfort.

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