

KEYNOTE SPEAKER:

Mr Ts Nurul Haszeli Ahmad
General Manager
SIRIM Berhad



PUSHING THE LIMITS: EXPLORING THE POTENTIAL OF GENERATIVE AI IN DENTAL RESEARCH

Abstract: Generative AI is a rapidly evolving technology that holds immense potential for the dental industry. It has the power to revolutionize dental care by making it more efficient and effective. Dental research can play a crucial role in ensuring that AI is used safely and ethically in the industry. Researchers have already used generative AI to design realistic dental crowns with high accuracy, which can mimic both the look and function of natural teeth. This smart manufacturing technology could be the stepping stone for driving Industry 4.0 in dentistry, which is vital to meet the challenges of an ageing society and lack of dental personnel. Clinical trials for using generative AI for dental crowns are underway, and researchers are working to expand the applicability of the tool to other dental prostheses. However, it is crucial to approach AI cautiously and consider its potential impact on patients and the dental profession. The economic potential of generative AI is immense, and it could add millions of dollars in value to the global economy. In summary, generative AI has the potential to transform the dental industry and improve dental care, but it must be used safely and ethically. Dental research can play a crucial role in ensuring that AI is used effectively and efficiently in the industry.

Biography: Haszeli is a highly accomplished professional with a master's degree in information technology and quantitative sciences from MARA University of Technology (UiTM). With over 20 years of experience, he has held key roles as a project manager, solution architect, and team leader in diverse industries. His expertise spans software security, program analysis, system development, cryptography, AI, ML, DL, and IoT. Currently serving as the General Manager at Group Digital, SIRIM Berhad, he excels in driving technical implementations and collaborating with stakeholders. With a proven track record of success across academia, logistics, government, and telecommunications, he actively engages in various discussions, conferences, and talks, sharing his knowledge and insights.

PLENARY SPEAKER:

Profesor Dr Wan Himratul Aznita Wan Harun
Department of Oral & Craniofacial Sciences,
Faculty of Dentistry, Universiti Malaya



DIMORPHISM: THE VIRULENCE ATTRIBUTE IN *C. albicans*

Abstract: *Candida albicans* is an opportunistic fungus colonising the oral cavity as commensals. The dimorphism of *C. albicans* involves morphological switch between its ovoid budding yeast to the filamentous hyphae and is regulated in response to a range of environmental conditions that are encountered in distinct host niches. The ability to exhibit these morphological forms is important for virulence and when the immune system is compromised, it may become pathogenic and capable of causing disease. The hyphal form plays an important role in virulence and has distinct functions during the different stages of disease development. Many unique transcription factors were found to contribute to the hyphal morphogenesis transcriptional regulatory network that determines which phenotypic state will be expressed. Therefore, targeted inhibition of yeast-to-hyphae transition will possibly help in controlling diseases caused by *C. albicans*.

Biography: Professor Dr Wan Himratul Aznita Wan Harun is a passionate oral microbiologist. Since year 2000, she has served as an academic staff at the Department of Oral & Craniofacial Sciences and is currently the Deputy Dean of Value Creation and Enterprise, Faculty of Dentistry, Universiti Malaya. She is a member of the Malaysian Section International Association for Dental Research (MalSec-IADR), Malaysian Society for Microbiologist (MSM) and Malaysian Society for Oral Microbiologist and Oral Immunologist (MySOMOI). Her research interest includes microbial virulence, oral biofilms, polymicrobial interactions, microbiomes, and medicinal plant extracts. She was awarded the Hitachi Fellowship Award in 2009 and flew to Japan to conduct research on the virulence of oral microorganisms. She publishes articles actively in ISI and Scopus journals and has experienced in supervising many PhD and Masters research for both local and international students including undergraduate elective projects. Throughout her service, she has secured various grants, including Fundamental Research Grants Scheme (FRGS), Ministry of Higher Education-High Impact Research Grants (MOHE-HIR), etc.

SYMPOSIUM I:

**Associate Professor Dr. Nangham Mohammed
Abdullah Al-Jaf**
Faculty of Dentistry, Universiti UiTM



DEEP LEARNING IN DENTISTRY: CHALLENGES AND OPPORTUNITIES

Abstract: Deep learning is a subset of artificial intelligence that has emerged as a groundbreaking technology with immense potential in the field of dentistry that could result in a transformative effect on various aspects of oral healthcare. Deep learning algorithms have the potential to revolutionize dental diagnostics, treatment planning, and patient care. It can enhance clinical decision-making and improve treatment outcomes. Additionally, deep learning can assist in predicting patient prognosis, treatment success rates, and potential complications, allowing dentists to tailor treatment plans and provide more accurate prognostic information to patients. While deep learning in dentistry holds tremendous promise, it is crucial to address challenges such as data privacy, algorithm transparency, and the ethical use of AI. Robust data governance and collaboration between dental professionals and AI experts are essential to ensure the responsible and effective integration of deep learning in clinical practice.

Biography: Dr. Nangham is an associate professor in orthodontics at the Faculty of Dentistry, Universiti Teknologi MARA (UiTM). Her doctoral degree is in Artificial intelligence applications in orthodontics. Her research interests are, analytical prediction and modeling using deep learning. She has won multiple research and innovation awards for using artificial intelligence algorithms for diagnosis and treatment planning in orthodontics.

SYMPOSIUM II:

Associate Professor Dr. Nazimi Abdul Jabar
Department of Oral and Maxillofacial Surgery
Faculty of Dentistry,
Universiti Kebangsaan Malaysia



COMPUTER-ASSISTED ORBITAL SURGERY: STRETCHING BEYOND OUR COMFORT ZONES.

Abstract: Orbital blowout fracture is one of the most prevailing maxillofacial injuries and challenging to manage. Inadequate diagnosis and lack in its surgical plan may inevitably lead to complications. The development of computer-assisted method in dentistry has long been recognized as important surgical tools or adjunct including in the management of severe maxillofacial and orbital trauma. This lecture will seek to explore what is currently known in the practice - to begin with image acquisition, pre-selection and image data processing to various novel surgical protocols, customisations and innovations that are constantly being developed. Various advanced surgical tools and role of dedicated software will also be highlighted. Importance of some of the regulatory aspects in Malaysia and on how surgeon-biomedical engineer role can be further enhanced will also be highlighted. Many roles of computer assisted method will also be discussed from the advantage and disadvantage aspects to both surgeons and patients.

Biography: Dr. Nazimi is currently an Associate Professor and consultant oral and maxillofacial surgeon at UKM with a special interest in orbital traumatology and computer-assisted maxillofacial surgery. He was elected to serve as the 10th President of Malaysian Association of Oral and Maxillofacial Surgeons. Dr. Nazimi graduated from the University of Malaya in the year 2000 and completed his postgraduate training at University College London. He has been with UKM for the past 23 years and made numerous contributions, especially in pioneering the use of cutting-edge maxillofacial surgical technology such as VSP, navigation-assisted orbital fracture reconstruction, and the use of personalized implant and solutions in complex surgical cases. He constantly publishes scientific articles in both local and international journals and currently exploring the potential of VR, MR, and AI for orbital reconstructive procedures.

SYMPOSIUM II:

Dr Johari Yap

Craniofacial Imaging Laboratory,
School of Dental Sciences,
Universiti Sains Malaysia



ADVANCING DENTAL RESEARCH USING OPEN-SOURCE SOFTWARE AND ARTIFICIAL INTELLIGENCE

Abstract: Artificial intelligence (AI) and machine learning (ML) are widely applied in many disciplines including medicine and dentistry. AI refers to the broader concept of creating intelligent machines or systems that can simulate human intelligence, such as problem solving and decision making. On the other hand, ML is a subset of AI that focuses on the development of algorithms and models that allow machines to learn from huge datasets. In diagnosis and treatment planning, AI algorithms can analyse dental images to aid in the diagnosis of various dental conditions. ML algorithms can learn from large datasets of labelled images to accurately detect and classify dental caries, periodontal disease, and other oral pathologies. AI and ML can help automate the diagnostic process of analysing dental images by segmenting different structures such as teeth, roots, and bone. This can assist in various tasks, including measuring tooth movement in orthodontics, assessing the quality of dental restorations, and aiding in implant placement planning. Open-source software is developed by a non-profit community or research organisation. It is free to use, distribute, and modify. Among the advantages of open-source software are the flexibility to modify features to fit the needs of the research and the ability to run experiments at a lower cost. Other researchers from other health institutions can easily reproduce similar research as the open-source software is free. This free-to-use software can hugely lower the cost of our healthcare system, seeing that we will be utilising more of these AI technologies in the near future.

Biography: Dr Johari Yap is a senior lecturer teaching Oral and Maxillofacial Radiology at School of Dental Sciences, Universiti Sains Malaysia (USM). His expertise is in craniofacial imaging and visualisation, 3D reconstruction and analysis of craniofacial deformity, 3D image processing of oral and craniofacial structures, application of open-source software for 3D reconstruction, CAD/CAM, and rapid prototyping of maxillofacial prosthesis. He has great interest in applying artificial intelligence and machine learning in dental research. Johari obtained his Bachelor of Software & Information Technology (with Honours) from Lincoln University, New Zealand; Graduate Diploma in Information & Communication Technology (Distinction) from Christchurch Polytechnic Institute of Technology, New Zealand; Master of Science in Dentistry (Oral Biology) from Universiti Sains Malaysia; and a PhD in Craniofacial

Prosthesis from Universiti Sains Malaysia. His research greatly impacted patients' management and has benefited patients with cranio-maxillofacial defects and improved their quality of life.