Media Release

Singapore's IMAGINE AI: Largest Global Gathering to Shape the Future of Healthcare with AI Innovations

Singapore, 5 December 2024 –IMAGINE AI is the largest calendar event in Singapore that brings together the brightest minds in healthcare and artificial intelligence to explore the transformative potential of AI in healthcare. Hosted at the Marina Bay Sands Expo & Convention Centre, this biennial event features a diverse array of experts, practitioners, and innovators from across the globe and aims to inspire and engage more than 600 delegates and participants in the exploration of AI's capabilities in healthcare, fostering innovation and collaboration in the field.

IMAGINE AI is a collaborative effort[1] organized by the three healthcare clusters, three medical schools, and Saw Swee Hock School of Public Health, and featuring more than 60 international and local speakers. The Guest-of-Honour is Mr Lew Chuen Hong, Chief

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[1] Singapore's leading healthcare and academic institutions are featured, including the National University of Singapore (NUS), National University Health System (NUHS), SingHealth, National Healthcare Group (NHG), the Lee Kong Chian School of Medicine (LKC Medicine) at Nanyang Technological University, Singapore (NTU Singapore) and Duke-NUS Medical School, as well as Saw Swee Hock School of Public Health.

Executive of Infocomm Media Development Authority (IMDA). For more information on this event, go to : https://sg-ai.org/

<u>Key News Points</u>

2. The IMAGINE AI opening day event saw the introduction of a nurse companion robot, the NUHS **MiSSi Robot**. It is a cloud-based robot, connected via a dedicated 5G network to a secured healthcare cloud to enable a range of AI functions. For example, it features an empathetic personality based on trained GPT models in the cloud. The MiSSi Robot is designed to support healthcare staff by taking over repetitive tasks. It autonomously assists nurses with tasks such as like vital sign monitoring, averting falls in the ward, last mile delivery and patient interaction, enhancing the efficiency of ward activities. It features swappable 'smart' compartments and a robot arm for versatile roles in consumable logistics and delivery in healthcare settings. MiSSi is also capable of conversing with patients, providing a personalised care to patients with empathy and humour. Head, Academic Informatics Office, NUHS, Adjunct Professor Ngiam Kee Yuan added, "We are at the final prototype stage of MiSSi robot and piloting at NUH ward with a plan to scale it to more settings."

3. This biennial event also saw the announcement of the establishment of a **new centre for AI in Public Health by the Saw Swee Hock School of Public Health**. This centre slated to be launched early next year, aims to create AI solutions specifically designed to address public health challenges, in collaboration with the World Health Organization and regional health ministries. **In close collaboration with the World Health Organization (WHO) and Ministries of Health across the region, the centre is committed to deploying these innovative AI solutions to drive positive impact and advance health equity for the populations of Southeast Asia. The centre's mission also includes empowering local health officials and developing a regional talent pool to drive positive impact and advance health equity in Southeast Asia, through education and training. As the centre focused on public health, there will be a lot more focus on preventive health, behaviour nudging and education of population, so that the population will be better informed, develop a healthier lifestyle, participate in screening for early detection of diseases and more effective treatments.**
Assistant Professor Feng Mengling said, "Our centre will also focus on developing predictive AI models to identify high-risk sub-populations for chronic diseases or other health conditions. This will enable timely preventive measures or early treatments to improve outcomes. Moreover, we will develop AI-powered surveillance systems for the early detection of potential outbreaks of infectious diseases, allowing us to proactively prepare for and mitigate pandemics rather than merely reacting to them. Our centre will collaborate with regulators to establish robust laws and guidelines, ensuring that AI solutions are developed and deployed responsibly and ethically. By doing so, we strive to create a future where everyone has an equitable opportunity to achieve better health outcomes."

4. The first two days of IMAGINE AI 2024 feature a diverse array of sessions, including keynote talks, panel discussions, and industrial panels. Notable speakers include **Dr. Andrew Ng, Founder of DeepLearning.AI**, Founder & CEO of Landing AI, General Partner at AI Fund, Chairman and Co-Founder of Coursera and an Adjunct Professor at Stanford University's

Computer Science Department, who will discuss the future of AI in healthcare. This would be followed by Prof. Leo Celi, from the Massachusetts Institute of Technology (MIT) who will address the challenges of AI bias. Dr. Junaid Bajwa, Senior Partner at Flagship Pioneeringwho will share insights on the. The programme also includes sessions on AI for diagnostics, clinical implementation, and public health, providing a comprehensive overview of AI's potential in healthcare. The last two days of IMAGINE AI on the 7 and 8th December features a two-day Datathon, where contestants will participate in a rapid data science problem solving on large healthcare datasets to compete for a prize of $10,000.

5. NTU Senior Vice-President (Health and Life Sciences) and LKCMedicine Dean Distinguished University Professor Joseph Sung said: "The Lee Kong Chian School of Medicine (LKCMedicine) is proud to be one of the organisers of IMAGINE AI, bringing together leading voices from Singapore and beyond to explore the promise and challenges surrounding AI in medicine and healthcare, and to spark collaborations. It is important for a medical school like LKCMedicine to be part of these discussions so that we can better prepare our future doctors and teach responsible AI use in clinical practice."

6. In a noteworthy announcement at the latest edition of IMAGINE AI, Duke-NUS Medical School unveiled the Duke-NUS AI + Medical Sciences Initiative (DAISI). Led by Associate Professor Liu Nan from Duke-NUS's Centre for Quantitative Medicine, the initiative brings AI and data science experts and clinicians together to innovate novel AI-based solutions to real-world clinical problems. Comprising globally renowned biomedical and healthcare researchers, the DAISI team spearheads research on cellular data science, immunology, quantum computing and even AI governance and ethics. The initiative is not only invested in developing groundbreaking methodologies but is also committed to turning its findings into practical interventions that are beneficial to healthcare professionals and patients.

Key speakers and key points

a) Assistant Professor Feng Mengling from NUS shares his project of having an AI assistant for faster triage in emergency services and collaborative AI for treatment recommendations, aimed at improving healthcare efficiency and outcomes. It is an AI Assistant for faster and better triage for 995. He will also touch on the transformative potential and uses of AI in healthcare, from improving diagnostic accuracy to enhancing patient management and treatment processes.

b) Dr. Lucinda Tan, Senior Consultant from NHG's National Skin Centre (NSC), in collaboration with EyRIS and the Agency for Science, Technology and Research (A*STAR) Institute for Infocomm Research (I2R), has incorporated Artificial Intelligence (AI) into mobile applications to assist in the screening and early detection of skin cancers. SkAI is an integrated system, with SkAI Lite designed for patients and public use to capture images of skin lesions with their mobile phone cameras. Its inbuilt algorithm can analyse and classify the risk of the skin lesion being cancerous. SkAI Pro is designed for clinicians, used in tandem with an attachable dermoscope to capture dermoscopic images of lesions for clinical assessment. SkAI Lite and SkAI Pro

is a seamless system that facilitates comprehensive skin cancer detection and monitoring, allowing for timely intervention.

c) Dr Shum Cheuk Fan, Senior Consultant Urologist, Department of Surgery from NHG's Woodlands Health (WH), in collaboration with NDR Medical Technology, is developing a Robotic- and AI-Assisted Fluoroscopic-Guided Renal Access System called ANT-X to assist clinicians in precise instrument alignment for minimally invasive percutaneous procedures. Percutaneous Nephrolithotripsy (PCNL), the current standard of care for Nephrolithiasis, is the most effective procedure to remove large kidney stones and requires accurate placement of the needle. ANT-X's AI software allows full automation of its system calibration and the needle alignment with a single fluoroscopic image, allowing clinicians to focus solely on controlling the depth of needle insertion. It has been tested in over 80 cases of PCNL and has demonstrated increased first puncture success rates to 100%, greater puncture accuracy, and reduced procedural time. ANT-X is a Health Sciences Authority (HSA)-approved Class B medical device, and the project team has been awarded with the National Health Innovation Centre Singapore (NHIC) Innovation-to-Adopt grant to support its evaluation of clinical performance and adoptability for PCNL procedures in Singapore public health institutions.

d) Assoc Prof Hairil Rizal Abdullah, Senior Consultant Anaesthesiologist and Clinician Scientist from SGH talks about a clinically oriented Generative AI Large Language Model called PEACH, which assists doctors in clinical decision making to ensure a more comprehensive, evidence-based, uniform and efficient optimisation plan for patients.

Notable AI showcase

1) **Survey on Gastroenterologists' Trust and Acceptance of AI**: An international study led by LKCMedicine surveyed 165 gastroenterologists and gastrointestinal surgeons in the Asia Pacific region and found that gastroenterologists generally trust AI tools for diagnosing digestive diseases.

   Published in the scientific journal *JMIR AI*, findings from the study highlighted that more experienced doctors showed more confidence and discernment about addressing AI risks, in comparison to younger doctors.

2) **Increasing the accuracy and reliability of large-scale study of proteins:** High-throughput technologies for measuring genes, proteins, and metabolites are vital for advancing our understanding of biological systems and discovering novel biomarkers and drug targets. However, the data generated from these technologies in proteomics—the large-scale study of proteins—is complex, high-dimensional, and requires extensive processing.

   A study led by LKCMedicine tested over 34,000 workflow combinations on reliable datasets, uncovering consistent patterns among the top-performing workflows and demonstrated their predictability. Using this information, the team developed machine learning models capable of accurately predicting optimal workflows and

introduced a novel method called "ensemble inference," which integrates results from the best workflows to enhance coverage and resolve inconsistencies.

The study, which is published in *Nature Communications*, is the first to highlight AI's role in optimising data processing workflows, and underscores that AI not only enhances data quality assurance but also plays a critical role in ensuring the generation of high-quality models by starting with high-quality data.

3) **CHAMP Program**: This initiative promotes chronic disease management through an automated chatbot that calculates the patient's risks and provides personalised nudges to patients. The program is integrated with patient's electronic health record and supports patients, clinicians and care coordinators to provide population scale community-based care for chronic diseases. Developed by NUHS, CHAMP uses whatsapp nudges to support patient self-management in chronic disease and to encourage healthier lifestyles. It enables patients to effortlessly submit vital signs readings like blood pressure, sugar readings and other information via the whatsapp-based chatbot and is seamlessly integrated into the patient's medical record for continuity of care.

More about the **CHAMP Chatbot**

Dr Wayne Han Lee, Assistant Group Chief Technology Office of NUHS, CHAMP program lead and family physician at the National University Polyclinics shared some benefits of the whatsapp-based chatbot:

CHAMP can remind patients to input their blood pressure throughout the week. Dr Lee said, "Currently, patients would write their blood pressure readings on a piece of paper, and I've got to spend time trying to make sense of it. But with this chatbot, the patient's data is recorded in our system, and it shows me immediately what their maximum, minimum, and average blood pressure trend during the week. So, I can spend more time talking with our patients to find out more about them, rather than staring at a computer screen keying in and looking for information."

This chatbot serves a dual purpose in that it not only offers clinicians a more efficient way of processing information, but also provides patients with an easier way of recording their medical information.

With more than 9,000 NUHS patients currently enrolled on the CHAMP program, Dr Lee hopes to extend CHAMP to over 150,000 patients with one or more chronic diseases. While this chatbot has currently been rolled out within NUHS, Dr Lee shared, "We want to extend this automation service to all patients, GPs and doctors across the country".

4) Novel ethics assessment tools for AI applications in healthcare: the development of the Transparent Reporting of Ethics for Generative AI (TREGAI) checklist and CARE-AI consensus research are two key achievements of Duke-NUS' DAISI initiative. A pioneering tool that standardises ethics assessments for implementing GenAI in healthcare settings, the TREGAI checklist helps to mitigate ethical concerns identified

during the researchers' scoping review of existing discourse on GenAI use. The CARE-AI consensus, an ethics assessment tool that is currently being developed by DAISI, will ensure that AI prediction models are implemented in a fair, trustworthy and ethical manner to improve patient care. Considering various factors, including disease conditions and geo-economic contexts, it will guide healthcare professionals across the different stages of making medical decisions involving AI.

5) **RUSSELL-GPT** is a secured clinical large language model tool platform for healthcare that features multiple large language model tools for healthcare use. It is designed and customised for a wide variety of clinical tasks that supports clinicians in reduce their administrative workloads. For example, it is routinely used to generate medical summaries, draft referrals, improve medical coding and documenting communication. One of its component tools is a medical voice-to-document program called **Medivoice**. It is widely used by nurses in NUHS to document daily clinical activities in clinical settings. It is also used to document communications with patients and caregivers which are a time consuming, but essential part of clinical care. In a study of NUHS clinicians who use this tool for the summarisation task vs those who didn't showed a 40% increase in efficiency in generating the same summary. Dr Andrew Makmur, Group Chief Technology Officer, and Dr Clara Ngoh, Assistant Group Chief Technology Officer, shared that RUSSELL-GPT is now the default generative AI tool used by over 2000 staff in NUHS and continues to grow in its capability and adoption.

6) For non-clinical and back-of-house users, the homegrown **Bot-NUHS, an AI-powered assistant, is redesigning healthcare operations to drive productivity and efficiency**. The bot is designed to enhance both patient-facing and back-of-house operations within NUHS. It leverages advanced AI technologies to provide quick and precise responses, improving patient experience and operational efficiency. The bot's capabilities include sentiment analysis, procurement guidance, and clinical practice information retrieval, making it a comprehensive tool for healthcare operations.

<u>More about Bot-NUHS</u>

It can measure and utilize the following specific data points:
a) Procurement Data: It provides guidance and quick responses to procurement-related inquiries, such as SRF material codes.
b) Clinical Practice Information: The bot assists polyclinic doctors by retrieving clinical practice guide information more quickly and accurately, thereby enhancing productivity.
c) Patient Feedback: It analyzes patient feedback using natural language processing to uncover key themes and insights, which helps improve patient services.
d) Job Applicant Data: The bot screens high volumes of job applicants, effectively parsing resumes to surface qualified candidates, thus reducing time-to-hire.
e) Corporate Policy Queries: It provides quick answers to corporate policy questions, reducing the workload for policy teams.

f) Employee Feedback: The bot analyzes employee feedback using sentiment analysis and theme extraction to provide data-driven insights for addressing concerns.

Application of Bot-NUHS

A team of Supportive and Palliative Care nurses from Alexandra Hospital uses AI to communicate complex medical information to patients from diverse cultural backgrounds. These nurses who work with discharged patients at home and in the community, offer tele-support services to caregivers. Now with the implementation of the homegrown Bot-NUHS AI system, nurses can now translate lengthy, complicated discussions like Advanced Care Planning into different languages such as Mandarin. The Bot-NUHS AI further simplifies these conversations into layman terms for easier comprehension by patients. It also enables the care team to quickly generate a condolence message for a bereaved family member. It is also utilized to swiftly provide tailored education and advice to caregivers as needed. This saves nurses' time from having to manually type out these communications, thereby enhancing workflow efficiency.

7) SingHealth's A/Prof Zhong Liang is leading the APOLLO project, AI in Cardiovascular Care, which aims to develop a national AI platform for Computed Tomography Coronary Angiography, significantly improving diagnostic speed and accuracy. APOLLO aims to develop a national platform driven by artificial intelligence for Computed Tomography Coronary Angiography, to cater to clinical, research, and industrial applications for Coronary Artery Disease. It will serve as a one-stop solution spanning from diagnosis and clinical management to prognosis. Additionally, it will aid in predicting how patients response to therapy in the pharmaceutical sector. APOLLO is a collaborative effort involving the three largest national heart centres among the public healthcare clusters, as well as A*STAR and universities. Since its initial introduction in 2022, APOLLO has achieved significant milestones, having successfully recruited 5000 patients for its projects. Notably, it has been demonstrated that the AI-powered CT image reader (version 1.0) is 20 times faster and just as accurate as clinician readers. Project APOLLO will soon be testbeded in three healthcare clusters (i.e. SingHealth, NUHS and NHG).

8) SingHealth implements Note Buddy to transform clinical documentation and enhance the quality of doctor-patient interactions. All healthcare professionals across SingHealth institutions will progressively be onboarded to Note Buddy which aims to significantly reduce administrative burden by transcribing and summarising clinical notes in real-time during physician-patient conversations. This allows clinicians to dedicate time during each consultation to interacting with patients and their caregivers to better understand and address their health concerns and questions.

More about Note Buddy

Note Buddy's key feature is its ability to automatically detect, transcribe and summarise conversations in multiple languages (English, Mandarin, Malay and Tamil) between the clinician and patient during clinic consultations into accurate clinical notes using customised prompts that structure how the clinical note is summarised. Speaker diarisation allows Note

Buddy to differentiate multiple speakers and identify their role based on the context (e.g. Doctor, Patient, Caregiver). Developed by SingHealth's Division of Digital Strategy, Note Buddy is launched on Tandem, a Secure Generative Pre-trained Transformer (GPT) platform developed by Synapxe, Singapore's HealthTech agency.

Currently, healthcare professionals document clinical notes during consultations with patients. Note Buddy heralds a paradigm shift in the way clinical documentation is done. Before the consultation, clinicians can select a customised prompt in Note Buddy to tailor the format of the notes to their specialty.

For instance, an endocrinologist can use Note Buddy to document patient-reported insights, diabetes and thyroid assessments, as well as cardiometabolic management plans during consultations, ensuring that these key pieces of information are captured. Note Buddy extracts and summarises the relevant information shared during the doctor-patient conversation into clinical notes in real time. Clinicians can review the notes immediately after each consultation to ensure that the necessary information has been accurately documented. This process enhances the timeliness, completeness and accuracy of each clinical documentation.

Note Buddy also has capabilities beyond clinical consultations including text summarisation. Clinically, it assists in summarising clinical notes into various structured documents such as discharge summaries and medical reports. On the administrative front, Note Buddy can handle administrative tasks like drafting meeting minutes. This expansion of its capabilites streamlines both clinical and administrative workflows, reducing the documentation burden on healthcare professionals and administrators.

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