SGH and NTU Singapore to develop customized medical devices and implants using 3D printing

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Singapore General Hospital (SGH) patients are expected to benefit from healthcare innovations, such as customized medical devices and implants, under a collaboration with Nanyang Technological University, Singapore (NTU Singapore) to set up a Joint Research & Development Laboratory in additive manufacturing (AM), also known as 3D printing.

These innovations are currently still in development, and when implemented, would represent a significant leap towards pioneering healthcare solutions that could redefine patient treatment.

The collaboration leverages the combined expertise and resources of SGH's 3D Printing Centre and NTU's Singapore Centre for 3D Printing (SC3DP) to study and develop related technologies for clinical applications in a point-of-care setup.

Professor Kenneth Kwek, Chief Executive Officer of Singapore General Hospital, said: "For more than 200 years, SGH has been a beacon of hope for all patients, consistently staying at the forefront of medicine. As a leading Academic Medical Centre with the privilege of being ranked among the world's best, our razor-sharp focus is on providing the best care and experience for our patients. This is a responsibility we take seriously, particularly as many who entrust us with their care have extremely complex health conditions.

We deeply value collaboration with like-minded partners and we are so grateful to find a key partner who shares our values and who brings with them deep expertise. Together, the possibilities that we can bring to our patients are limitless. We can advance care to enable better outcomes and a better experience for all patients and future users of healthcare."

> *Through the combined medical expertise from SGH and the extensive knowledge of additive manufacturing and advanced materials of NTU's faculty, our collaboration aims to forge innovative solutions in the development of personalised prosthetic and orthotic devices, and explore new pathways for regenerative medicine. This collaboration also greatly benefits the next generation of clinicians, academics and engineers, through its upcoming shared educational programmes, shared resources, and joint initiatives. NTU and SGH are committed to nurturing new talent that possesses the skills and knowledge needed to navigate the ever-evolving medical landscape."*
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> *Professor Lam Khin Yong, Vice President (Industry) of NTU Singapore*

The collaboration, which aims to provide solutions that could redefine patient treatment, reflects NTU's commitment to responding to the needs and challenges of healthy living and ageing, which is one of four humanity's grand challenges that the University seeks to address through its NTU 2025 strategic plan.

The Joint R&D Lab in additive manufacturing will focus on the following four areas:

1. Prosthetic & Orthotic Devices

This research area involves developing capabilities in the modelling and use of additive manufacturing methodologies for Prosthetic & Orthotic (P&O) devices, including Ankle Foot Orthosis, Wrist Hand Orthosis, and Below Knee Amputation Sockets.

Key objectives include defining design guidelines and requirements to 3D print the devices, which will involve engineering analysis, material selection, and functional testing. Additionally, the project will study and determine the most optimal materials and manufacturing techniques utilising various additive manufacturing technologies.

2. Bioprinting for Regenerative Medicine

This research focus aims to develop capabilities to 3D print living tissues, or bioprinting, specifically for regenerative medicine. This involves exploring the clinical applications of bioprinting and working towards translating existing research in this field into practical clinical use. A part of this effort will be to assess the feasibility and infrastructure requirements necessary to set up bioprinting capabilities at the point-of-care.

Additionally, the project will focus on conducting research into new areas of bioprinting that hold high clinical significance, such as human organ printing, to further enhance its potential impact in regenerative medicine.

3. 3D Printed Implants at Point-of-Care

Developing capabilities for 3D printing medical implants directly at the point-of-care is the third area of research focus. This will involve exploring the potential of technologies like PEEK, a type of plastic known as Polyetheretherketone, and metal 3D printing to create implants for specific medical procedures such as surgical repair of a bone defect in the skull and reconstruction of the bones surrounding the eyeball.

Similarly, the feasibility and infrastructure requirements for setting up implant printing capabilities will be thoroughly studied to ensure efficient and effective implementation.

4. Additive Manufacturing Technology Landscaping for Healthcare Applications

Reviewing and enhancing the additive manufacturing technology landscape specific to healthcare 3D printing involves identifying and developing potential applications with clinical significance, such as food printing and flexible electronics for medical monitoring devices.

The focus is on cultivating capabilities and methods to translate these innovative applications into practical healthcare use cases, aiming to integrate advanced 3D printing technology into diverse medical needs.

Source:

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