# A Motorized Omni-Directional Hospital Bed for Easy Maneuverability

National University of Singapore

Moving wheeled hospital beds from one place to another is a laborious and time-consuming task. This is made more cumbersome by complicated hospital layouts that often feature narrow corridors, tight elevators, and crowded rooms. It takes a minimum of two staff to transport a bed – one at the back to push the bed, and one in the front to provide direction. A shortage of hospital staff is one of the common causes of delay in transporting patients lying in hospital beds between locations, which could occur in time critical situations.

To solve this problem the National University of Singapore (NUS) and HOPE Technik have embarked upon a research collaboration to create motorized, easily-maneuverable hospital beds – known as the SESTO. This will allow hospital beds to move in omni-directions and be operated by only one hospital staff, thereby increasing productivity.

This powered, omni-directional mobility wheel design can be easily clipped on to hospital beds, encouraging easy market adoption as hospitals can use their existing fleet of beds. The movement and direction of the hospital bed is controlled by a staff controlling a panel at the back of the bed. A safety feature ensures that the SESTO will stop all movement, should the staff's hand leave the panel.

This NUS-industry partnership leverages on an invention created by Dr Yu Haoyong, from the Department of Biomedical Engineering and the Engineering Design and Innovation Centre (EDIC) at the NUS Faculty of Engineering. Mr Melvin Loh and Ms Rachel Hong, Directors of the Medical Engineering Research & Commercialization Initiative (MERCI) of the Department of Surgery at the NUS Yong Loo Lin School of

Medicine, are leading the test-bedding of the prototype under a collaborative effort with the National University Hospital (NUH). This project is the first of several that MERCI is undertaking to use technology to improve productivity in hospitals.

“The SESTO can move in any direction instantly and easily, without any complicated maneuvering, making it ideal for the busy hospital environment. I am happy to see my research work being brought to fruition via an inter-faculty collaboration between the NUS Faculty of Engineering and the NUS Yong Loo Lin School of Medicine. The project idea was seeded by Professor Lee Chuen Neng, Chairman of MERCI during an inter-faculty networking session. I am also delighted that my long-time industry collaborators, HOPE Technik, will co-develop and drive the commercialisation of this product. Moving forward, EDIC would like to continue developing the technology, as we see potential for it to be applied to a wide range of applications, for example, personal mobility aids for the aged in eldercare facilities,” said Dr Yu Haoyong, who is leading this research project at NUS.

He also is the principal investigator at the Advanced Robotics Centre and Singapore Institute of Neurotechnology (SINAPSE). Engineers from HOPE Technik will collaborate with Dr Yu, to translate his wheel design from a lab prototype into a commercially-viable product. The development leveraged on HOPE Technik’s ability to translate the concept into a sophisticated system in a short time frame.

The pilot test at NUH began in September 2013 and initial feedback from hospital staff has been positive. HOPE Technik will be showcasing this product at MEDICA Trade Fair 2013 to be held at Dusseldorf, Germany on 20 to 22 November 2013.

“This research collaboration allows HOPE Technik, which is a high performance engineering company, to enter into the dynamic medical technology sector. We have incorporated feedback from NUH hospital staff to improve the design of the SESTO and plan to commercialise this product by early 2014. For example, we integrated a flip down platform for staff to stand on, eliminating the need for them to walk with the bed. As there is no other existing product in the market with similar capabilities of being both self-powered and omni-directional, we expect the SESTO will generate significant international interest,” said Mr Manolo Sta Cruz, Engineer, HOPE Technik.

MERCI and the NUS Industry Liaison Office had also worked together to bring Dr Yu’s technological innovation closer to market. Said Ms Irene Cheong, Director, NUS Industry Liaison Office, a division of NUS Enterprise, “The healthcare sector can benefit greatly from more efficient logistics solutions, as this will allow hospital staff to be deployed to more productive work that could ultimately save lives. In addition to being applied in developing the SESTO, we believe that this omni-directional mobility wheel design can benefit additional sectors. NUS hopes to partner with industry players to help improve the maneuverability of wheeled equipment, for example factory machines or small electrical vehicles.”

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