

SEMINAR ANNOUNCEMENT

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

Faculty of Engineering

Website: <https://www.eng.nus.edu.sg/ece/>

Area: Microelectronic Technologies & Devices

Host: Assoc Prof. Vincent C. Lee

TOPIC	:	Artificial Intelligence-Enabled Caregiving Walking Stick Powered by Ultra-Low-Frequency Human Motion
SPEAKER	:	Mr. Xinge Guo Graduate Student, ECE Dept, NUS
DATE	:	Thursday, 29 July 2021
TIME	:	10.30AM to 11.00AM
WEBINAR	:	Join Zoom Meeting https://nus-sg.zoom.us/j/89601594325?pwd=KzZkNzZga2V6RVJMQ1REd2F5ZE1yQT09 Meeting ID: 896 0159 4325 Passcode: 251392

ABSTRACT

The increasing population of the elderly and motion-impaired people brings a huge challenge to our social system. However, the walking stick as their essential tool has rarely been investigated into their potential capabilities beyond the basic physical support, like the activity monitoring, tracing, and accident alert. Here, we report a walking stick powered by ultra-low frequency human motion and equipped with deep learning-enabled advanced sensing features to provide a promising healthcare monitoring platform for motion-impaired users. A linear-to-rotary structure is designed to achieve highly efficient energy harvesting from the linear motion of a walking stick with ultra-low frequency. Besides, two kinds of self-powered triboelectric sensors are proposed and integrated to extract the motion features of the walking stick. Augmented sensing functionalities with high accuracies have been enabled by deep-learning-based data analysis, including identity recognition, disability evaluation, and motion status distinguish. Furthermore, a self-sustainable Internet of Things (IoT) system with Global Positioning System (GPS) tracing and environmental temperature and humidity amenity sensing functions is obtained. Combined with the aforementioned functionalities, this walking stick is demonstrated in various usage scenarios as a caregiver for real-time well-being status and activity monitoring. Promisingly, the caregiving walking stick shows a great potential of being an intelligent aid for motion-impaired users to help them live a life with adequate autonomy and safety.

BIOGRAPHY

Xinge Guo received his Bachelor of Engineering degree in microelectronics engineering from Southern University of Science and Technology, China, in 2019. He is currently pursuing his Ph.D at the Department of Electrical and Computer Engineering of National University of Singapore under NUS Research Scholarship. His research interests include Energy Harvesting and Self-powered Sensor Technologies for IoT Applications.

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