

SEMINAR ANNOUNCEMENT

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
COLLEGE OF DESIGN AND ENGINEERING

Website: <https://cde.nus.edu.sg/ece>

Area: Communications & Networks (CN)

Host: Asst Prof Wu Changsheng

TOPIC	:	Neuromotor Hierarchy Network: A Physiologically Grounded Encoder for Generalizable sEMG Decoding
SPEAKER	:	Mr Wang He Graduate Student, ECE Dept, NUS
DATE	:	Friday, 17 July 2026
TIME	:	4:00PM-5:00PM
VENUE	:	Join Zoom Meeting https://nus-sg.zoom.us/j/88028075281?pwd=gvy1QDJp4aHYN3r1bFunSIKhjveg4h.1 Meeting ID: 880 2807 5281 Passcode: 069689

ABSTRACT

Surface electromyography (sEMG) provides a non-invasive window into the neural commands that drive hand movement and supports applications in prosthetics, rehabilitation, and wearable human-computer interaction. However, many existing sEMG decoders treat the signal as a generic time series and do not explicitly represent the physiological mechanisms that generate it.

This seminar presents a physiology-guided neural architecture for generalizable sEMG decoding based on an Analysis-by-Synthesis framework. The model follows the neuromotor hierarchy from muscle synergies and motor-unit recruitment to muscle-fibre activation and surface signal formation. Its analysis pathway performs structured temporal and spatial processing to extract synergy-level representations, while its synthesis pathway introduces physiological constraints on recruitment and activation dynamics.

The shared encoder is evaluated on two complementary tasks: continuous hand-pose estimation and discrete keystroke recognition from wrist sEMG. Experiments on the emg2pose and emg2qwerty benchmarks demonstrate strong cross-user decoding performance with reduced model size and computational cost.

BIOGRAPHY

Mr Wang He is a PhD student in the Department of Electrical and Computer Engineering at the National University of Singapore, under the joint supervision of Asst. Prof. Wu Changsheng and Prof. Mehul Motani. His research focuses on physiology-informed machine learning, surface electromyography decoding, and efficient neural interfaces.

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