IEEE ICMA 2025 Conference Workshop II

Workshop on OT high-density electromyography and its application technology

Tuesday, August 5, 2025
11:00 - 12:00
International Conference Room
Beijing Empark Grand Hotel, Beijing, China

Application of OT high-density electromyography in intelligent robot technology

Venue: International Conference Room
Beijing Empark Grand Hotel, Beijing

Date and Time: 11:00 - 12:00, August 5, 2025

Organizers:

Ruihong'an (Guangdong) Scientific Equipment Co., Ltd. currently acts as an agent for Italian OT Bioelettronicar high-density electromyography. OT's high-density electromyography, wireless surface electromyography, dynamic high-density electromyography acquisition and analysis equipment has published over 1000 papers in more than 200 academic journals, including top international scientific journals such as Nature and Science, fully demonstrating its outstanding performance and wide recognition in the field of bioelectric signal research.

About the workshop:

The work shop Mainly exploring the application of high-density electromyography acquisition equipment in intelligent automation. We will conduct in-depth research on motion intention perception and on-demand assistance technology based on multimodal signals (such as high-density electromyography), which has important application value in fields such as rehabilitation medicine, intelligent prosthetics, and exoskeleton robots. The growing prevalence of physical disabilities has driven the demand for advanced prosthetic devices. Grip force estimation plays a crucial role in controlling prosthetic hands during various activities of daily living for amputees. Recent advances in sEMG-based grip force estimation have demonstrated their potential to improve prosthetic hand control.

List of Speakers and Schedule

Time	Topics	Speaker List
11:00-11:30	Motion intention perception and on-demand assistance based on multimodal signals such as electromyography 基于肌电等多模态信号的运动意图感知与按需辅助	Dr. Zou Yongxiang Dr. Zou Yongxiang, Assistant Researcher of State Key Laboratory of Automation, Institute of Automation, Chinese Academy of Sciences. His main research interests are human-computer interaction control and rehabilitation evaluation in the field of medical robots, with a focus on the integration of biomechanical electrical signals. He has been selected as a national funded postdoctoral researcher program, a general postdoctoral fund, and a cutting-edge project of the Beijing Natural Science Foundation. He participated in two key research and development projects funded by the Ministry of Science and Technology.
11:30-12:00	Cross arm posture and adversarial learning grip strength estimation based on high-density electromyography 基于高密度肌电的跨手臂姿势与对抗学习握力估计	Dr. Liao Xiaolan Dr. Liao Xiaolan is from the Tianjin Key Laboratory of Intelligent Robotics at the School of Artificial Intelligence, Nankai University. Her main research areas include human-computer interaction of biological, mechanical, and electrical signals, intelligent diagnosis and treatment, and rehabilitation assistance technology. Participated in one national key research and development project.

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Workshop II on OT high-density electromyography and its application technology

Workshop II Talk 1

Motion intention perception and on-demand assistance based on multimodal signals such as electromyography

Dr. Zou Yongxiang

Assistant Researcher, State Key Laboratory of Automation, Institute of Automation,

Chinese Academy of Sciences, China

Abstract:

Motion intention perception and on-demand assistance technologies hold significant application value in fields such as rehabilitation medicine, intelligent prosthetics, and exoskeleton robotics. These technologies can notably improve the mobility of individuals with functional impairments or enhance the motor performance of healthy individuals. Surface electromyography (sEMG), as a core biological signal source for decoding motion intention, directly reflects neuromuscular activity. To overcome limitations such as noise interference and incomplete representation of single-mode sEMG signals in complex dynamic scenarios, the integration of multimodal information and deep learning-based robust intention recognition methods has become a research hotspot. Based on accurately perceived user intentions, adaptive impedance control strategies can be employed to dynamically adjust the assistive torque of exoskeletons/prosthetics, thereby ensuring the further realization of "human-in-the-loop" personalized on-demand assistance.

Dr. Zou Yongxiang, Assistant Researcher of State Key Laboratory of Automation, Institute of Automation, Chinese Academy of Sciences. His main research interests are human-computer interaction control and rehabilitation evaluation in the field of medical robots, with a focus on the integration of biomechanical electrical signals. He has been selected as a national funded postdoctoral researcher program, a general postdoctoral fund, and a cutting-edge project of the Beijing Natural Science Foundation. He participated in two key research and development projects funded by the Ministry of Science and Technology.

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Workshop II Talk 2

Cross arm posture and adversarial learning grip strength estimation based on high-density electromyography

Dr. Liao Xiaolan

Tianjin Key Laboratory of Intelligent Robotics, School of Artificial Intelligence,

Nankai University, China

Abstract:

Robotic manipulation of deformable materials like fabric is challenging due to their tendency to wrinkle and deform. To maintain a flat state, fabric requires either controlled tension or full support. We address this challenge with a novel robotic end-effector that grasps fabric by rolling it. The end-effector features a roller with integrated suction, which first secures the fabric's edge and then smoothly rolls it up, preventing wrinkles. We integrated these end-effectors into a dual-arm robotic system with force sensors, enabling bimanual handling with active tension control to keep the fabric taut. Performance was evaluated through pick-and-place experiments on stacked fabric pieces. The results demonstrate that our system achieves precise and reliable fabric manipulation, showing significant potential for automating tasks in industries like apparel manufacturing.

Dr. Liao Xiaolan is from the Tianjin Key Laboratory of Intelligent Robotics at the School of Artificial Intelligence, Nankai University. Her main research areas include human-computer interaction of biological, mechanical, and electrical signals, intelligent diagnosis and treatment, and rehabilitation assistance technology. Participated in one national key research and development project.