Special Session
Brain-controlled robotics

Description/Scope

Brain-Computer Interfaces / Brain-Machine Interfaces (BCIs/BMIs) are revolutionizing the way we perceive human-machine interaction, by empowering individuals with disabilities to communicate and interact with their environment, enhancing neurorehabilitation therapies and restoring lost functionalities. But BCIs/BMIs offer more than assistive capabilities; they serve as a gateway to augment human potential in various domains. As technology advances and our understanding of the brain deepens, the potential of BCIs/BMIs becomes increasingly promising for applications in medicine, education, communication, augmentation, gaming, sports, neuromarketing and industry. This special session is focused on the use of non-invasive BCIs/BMIs to control and interact with robotic devices, in areas such as assistive robotics, rehabilitation robotics, exoskeletons, robotic arm control, prosthetics control, and interaction with aerial and industrial robots, addressing aspects related to human-robot collaboration, innovative therapies, effective use in real-world settings, usability, machine learning, and new application trends.

Topics (but are not limited to)

- Human-Robot Interaction using BCIs/BMIs
- Assistive Robotics controlled by BCIs/BMIs
- Neurorehabilitation Robotics with BCI/BMI integration
- Brain-Controlled wheelchairs
- Prosthetics and Exoskeletons controlled by BCIs/BMIs
- Augmented Reality and Virtual Reality interfaces using BCIs/BMIs
- Robotics for Teleoperation and Remote Control via BCIs/BMIs such as drone control
- Brain-Controlled Robotic Systems for Industrial Applications
- Collaborative robots (cobots) based on BCIs/BMIs to improve safety and human-robot interaction
- Measuring user's mental workload during robotic operation/manipulation
- Interaction with humanoids using BCIs/BMIs
- BCIs/BMIs for Motor Learning and Skill Acquisition in Robotics
- Robots learning from human observation using passive BCI
- Robotics for Neuroscience Research using BCIs/BMIs
- Ethics and Privacy in BCI/BMI-controlled Robotics

Organizers

Gabriel Pires, Instituto Politécnico de Tomar / Instituto de Sistemas e Robótica (ISR-UC)
Ana Lopes, Instituto Politécnico de Tomar / ISR-UC
Urbano J. Nunes, Universidade de Coimbra / ISR-UC