Surface Electromyography as a Control Input for Human-System Interaction

Leia Sterling
Charles Stark Draper Professor of Aeronautics and Astronautics
Massachusetts Institute of Technology

Tasks that require mobility and interaction with the environment create challenges for controlling human-robot systems, especially if the system is tightly coupled to the human as in the case of exosystems (i.e., exoskeletons or exosuits). Surface electromyography (sEMG), which provides information on underlying muscle activation, has previously been shown to be usable as a control input. However, non-expert sensor placement, complex tasks, and human interaction with the environment all create challenges for current sEMG paradigms. In this talk, we will discuss the use of data from non-specific placement of sEMG sensors on the forearm as a control input to robotic systems. We will consider (1) informing an upper extremity exosystem for aiding grasping and (2) informing gesture control for telerobotics. First, a study will be presented that examined anticipatory signals that exist in the sEMG measures prior to grasp and release when interaction with an object was present. Next, a study will be presented that examines how incorporating insights from human motor control within a gesture control framework can enable control of complex telerobotic systems and tasks.