

# Sensorimotor games: human/machine collaborative learning and control

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**Abstract:** Human interaction with the physical world is increasingly mediated by automation -- planes assist pilots, cars assist drivers, and robots assist surgeons. Such semi-autonomous machines will eventually pervade our world, doing dull and dirty work, assisting the elderly and disabled, and interfacing directly with our bodies and brains. To ensure safety and performance, machines should adapt to their human partners. Since humans continually adapt control strategies to suit their circumstances, intelligent machines must take this co-adaptation explicitly into account.

We model the strategic interaction between human and machine decision-making agents using game theory. In applications like teleoperated robots, assistive devices, or brain/machine interfaces, such games are played through one or more sensory-and-motor pathways. This talk presents results from studying these sensorimotor games, including empirical models for human-in-the-loop control through different interfaces (muscle vs manual) with different hands (dominant vs non-dominant), and theoretical predictions for steady-state (i.e. equilibrium) and transient (i.e. learning) behaviors of humans interacting with intelligent machines.

**Bio:** Sam Burden earned his BS with Honors in Electrical Engineering from the University of Washington in Seattle in 2008. He earned his PhD in Electrical Engineering and Computer Sciences from the University of California in Berkeley in 2014, where he subsequently spent one year as a Postdoctoral Scholar. In 2015, he returned to UW EE (now ECE) as an Assistant Professor; in 2016, he received a Young Investigator Program award from the Army Research Office (ARO-YIP). Sam is broadly interested in discovering and formalizing principles of sensorimotor control. Specifically, he focuses on applications in dynamic and dexterous robotics, neuromechanical motor control, and human-cyber-physical systems. In his spare time, he teaches robotics to students of all ages in classrooms and campus events.