Bionics and Prosthetics
Session co-chairs: Justin Sanchez, DARPA, and Shoko Miyagawa, Keio University

Research to utilize brain signals to restore motor and sensory functionality to severely impaired individuals has proven the capability to extend the brain's capacity, and potentially improve human performance. Enhanced human-machine teaming also has the potential to go beyond the individual, improving the quality of life for society at large. Furthermore, combining bionics and neurotechnology with other academic fields such as cybernetics, robotics engineering, psychology, and sociology will result in additional transformative scientific and technological discoveries. Today's speakers will share with you the underlying technologies that facilitate real-time interaction of humans and machines. In addition, they will share their thoughts on how combining bionics, neurotechnology, and other research areas could shape how people live and work in the future.

The session will begin with a presentation by Junichi Ushiba (Keio University) who will talk about the science behind brain-machine interfaces. The next presenter, Robert Gaunt (University of Pittsburgh) will describe his work to facilitate direct brain control of a remote prosthetic arm. Noritaka Kawashima (National Rehabilitation Center for Persons with Disabilities) will discuss research to better understand the phantom limb phenomenon and a novel strategy for minimizing phantom limb pain through use of a newly-developed prosthesis. The final speaker, Daniel Rizzuto (Nia Therapeutics) will describe his work using neuromodulation to facilitate memory formation.