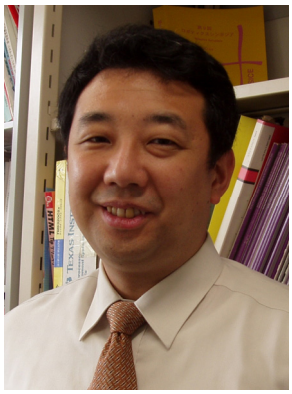
Plenary Talk 11

Mobiligence: Emergence of Adaptive Motor Function through Interaction among the Body, Brain and Environment



Hajime Asama, University of Tokyo, Japan

Abstract

Adaptiveness is one of the target functions of research on autonomous robotic systems. However, the adaptiveness realized in the robotic research so far is quite limited and specific to sample problems and systems configurations. On the other hand, all the animals from primitive ones to insects or mammals have commonly the adaptiveness to behave in an unexpected environment. Such adaptive behaviors are the intelligent sensory-motor functions, and most essential and indispensable ones for animals to survive.

It must be effective to consult biological systems to find the general design principle to realize the adaptiveness in artificial systems as well as robotic systems. However, the secret of the mechanism to realize the adaptiveness in animals is not yet thoroughly revealed even in biology as well as brain science and neurophysiology. Such an adaptive function is considered to emerge from the interaction of the body, brain, and environment, which is caused by a subject to act or move. We call the intelligence for generating adaptive motor function *mobiligence*.

The *Mobiligence* project started from 2005, which was accepted as a five-year program of Scientific Research on Priority Areas of Grant-in-Aid Scientific Research from the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT). The present project is designed to investigate the mechanisms of mobiligence by collaborative research in biology and engineering from systematic and synthetic (constructive) approach. In this talk, the abstract of the project is introduced in contrast to adaptive behaviors achieved in the robotic research so far.

Short-Bio

Hajime Asama was born on Jan. 18, 1959. He received MS and DS degrees in Engineering from the University of Tokyo, in 1984 and 1989, respectively. He worked at RIKEN (The Institute of Physical and Chemical Research, Japan) from 1986 to 2002, and became the professor of RACE (Research into Artifacts, Center for Engineering), the University of Tokyo in 2002. He received JSME Robotics and Mechatronics Division Best Paper Award in 1995, JSME Robotics and Mechatronics Division Academic Achievement Award in 2000, Best Paper Award of Fanuc FA Robot Foundation in 2006, etc. He played an editorship of "Distributed Autonomous Robotics Systems", its second and fifth volume which were published from Springer-Verlag, Tokyo in 1994, 1996 and 2002 respectively. He was the IFAC TC chair on Intelligent Autonomous Vehicles from 2002 to 2005. He is a fellow of JSME since 2004, an AdCom member of IEEE Robotics and Automation Society since 2007, and a member of IEEE, JSME, RSJ, SICE, etc. He is the director of the Mobiligence project in the MEXT Grant-in-Aid for Scientific Research on Priority Areas from 2005. His main interests are distributed autonomous robotic systems, cooperation of multiple autonomous mobile robots, emergent robotic systems, ubiquitous systems, service engineering, and Mobiligence, namely emergence of adaptive motor function through the body, brain and environment.