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Keynote title: Multi-scale Robotic System

Bio

Toshio Fukuda received Dr. Eng. from the University of Tokyo, Tokyo, Japan, in 1977. Currently, He is Professor Emeritus Nagoya University, Professor Waseda University. His major is bio-robotics, especially Micro and Nano Robotics.

Dr. Fukuda is IEEE President and CEO (2020), the IEEE Director of Division X, Systems and Control (2017-2018), IEEE Region 10 Director (2013-2014) and served President of IEEE Robotics and Automation Society (1998-1999), Director of the IEEE Division X, Systems and Control (2001-2002), Co-founding Editor-in-Chief of IEEE / ASME Transactions on Mechatronics (2000-2002) and Editor-in-Chief of ROBOMECH Journal, Springer (2013-). He was Founding President of IEEE Nanotechnology Council (2002-2003, 2005). He was elected as a member of Science Council of Japan (2008-2013). IEEE Robotics and Automation Pioneer Award (2004), IEEE Robotics and Automation Technical Field Award (2010), Chunichi Culture Award(2019).

IEEE Fellow (1995), SICE Fellow (1995), JSME Fellow (2001), RSJ Fellow (2004), Honorary Doctor of Aalto University School of Science and Technology (2010), Member of the Japan Academy of Engineering(2013), Medal of Honor on Purple Ribbon (2015), The Order of the Sacred Treasure, Gold Rays with Neck Ribbon (2022).

Multi-scale Robotic System

Abstract:

Multi-scale robotic system is a concept of the intelligent robotic system which can self-re-configure its robotic system structure with the capability of the self-organization and evolution. The robotic system is based on robotic cell units, which are assembled and re-configured to make a functional robot, then a group of robots and a large robotics system, so that the system can flexibly create the swarm intelligence and collective intelligence with many cell robots. It is similar to the biological system in our nature. It is necessary for the system to have control and communication with feedback by any means at any level. Even the hybrid robotic system is also proposed.

In this presentation, the example of the Multi-scale robotic system is shown from the micro-nano-robot system to form the distributed autonomous robotic system. Based on the Multi-scale robotic system, the Moonshot program is currently going under the concept of Co-evolution and Self-Organization of the intelligent robotic systems.