

Bio-Syncretic Robotics for Natural Intelligence Achievement

Lianqing Liu, Professor

State Key Laboratory of Robotics,
Shenyang Institute of Automation, Chinese Academy of Science, China.

Abstract

Robotics is now undergoing a deep revolution not only in its design principles but also in its constitutive elements, which are changing from pure electromechanical systems into the combination with bio-living system. This carrier transformation provides new opportunities for the development of both robot and artificial intelligence. Billion years evolution tells us that bio-living system is the best intelligence carrier. However, the mainstream of AI research is carried out on silicon-based non-living systems under the assistance of big-data and supercomputing. One of the shortcomings are the energy-cost efficiency and the lack of abilities of learning, development and association. In this talk, the concept of biosyncretic robotics will be introduced to solve this problem. The word “Biosyncretic” here is not a simple imitation or simulation of biological structures, functions or working principles for electromechanical systems in the sense of biomimetics, but a deep syncretism of life systems and electromechanical systems at the molecular and cellular scale. The functions of sensing and actuation are demonstrated in this biosyncretic way, which shows the super advantages of the intrinsic properties and functions of bio-living system with billion years evolution can be represented directly. Last but not least, we investigated and proved the possibility of realizing natural intelligence based on the biosyncretic platform.

About the speaker



Lianqing Liu received his Ph.D. degree in Pattern Recognition and Intelligent System from university of Chinese Academy of Sciences, China in 2008, and B.S. degree in Industry Automation from Zhengzhou University, China in 2002. He started his career in 2006 at Shenyang Institute of Automation, Chinese Academy of Sciences, and holds the position of Assistant Professor (2006-2008), Associate Professor (2009-2010) and Professor (2011 to now) respectively.

Currently his research interests include Biosyncretic systems, Micro/Nanorobotics, Intelligent control. He has published over 100 peer reviewed international journal papers and led more than 20 funded research projects as Principal Investigator. He was awarded the Early Career Award by the IEEE Robotics and Automation Society in 2011, Outstanding Young Scientist of Chinese Academy of Sciences in 2014, Rising Star Award of 3M-Nano Society in 2015, Talent Young Scholar Funds of NSFC in 2015, National Program for support of Top-Notch Young Professionals in 2015, Distinguished Young Scholar Funds of NSFC in 2019. He is the winner of Best Student/Conference paper Award for ROBIO, IEEE-NANOMED and IEEE-3M-NANO, and delivered plenary/Keynote talks at IROS,

IEEE-NANO, IEEE-NANOMED, IEEE-NEMS, ICIUS, MARSS and so on. He has served as guest editor for Sensors, TIMC, Journal of autonomous robotics, Journal of Healthcare Engineering, associate editor of Mechatronics, IET Cyber-Systems and Robotics. He has been elected as the vice president of IEEE Robotics and Automation Society for the term of 2018-2019, served as a member of long range planning committee of RAS.