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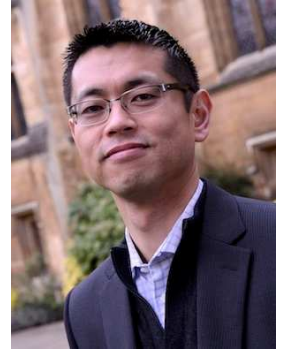
Robotics Lecture

Soft Robot Revolution:
Turning Soft Materials into Intelligent Machines

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Fumiya Iida
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JSPS Invitational Fellows (for research in Japan)

Date: 16:20 – 17:20, May 8 (Wednesday)
Room: Seminar Room #2 (East Wing 4F)

Abstract: The research of soft robotics has been exploring, since its incarnation, the power of physical adaptation in autonomous robots. The capability of shape conformability to environment, for example, can facilitate control of grasping and climbing, on the one hand, and soft sensors can transform rich information extracted from complex physical stimuli, on the other. While these explorations are important and fundamental on its own right, there has been a new trend of investigation on the notions of plastic physical adaptation, in which robots can modify their own bodies in a more persistent form. Previously there were demonstrations, for example, of robots that can change the shapes and sizes of manipulator's end-effectors, self-reconfigurable modular robots, and growing tree-trunk like structures. For opening a door to this new field of autonomous adaptive robots, we have been exploring a set of technologies to autonomously design and construct complex soft robots, such as multi-material 3D printing, electrically conductive elastomers, and model-free design automation processes. With the recent rapid progress of these technologies, we are now able to tackle a highly challenging problem of autonomous design optimisation inspired from biological systems. In this talk, I would like to introduce some of our recent soft robotics projects in our laboratory and to discuss the challenges and perspectives of this research area.

Short biography: Fumiya Iida is a reader at Department of Engineering, University of Cambridge. He received his bachelor and master degrees in mechanical engineering at Tokyo University of Science (Japan, 1999), and Dr. sc. nat. in Informatics at University of Zurich (2006). In 2004 and 2005, he was also engaged in biomechanics research of human locomotion at Locomotion Laboratory, University of Jena (Germany). From 2006 to 2009, he worked as a postdoctoral associate at the Computer Science and Artificial Intelligence Laboratory, Massachusetts Institute of Technology in USA. In 2006, he awarded the Fellowship for Prospective Researchers from the Swiss National Science Foundation, and in 2009, the Swiss National Science Foundation Professorship for an assistant professorship at ETH Zurich from 2009 to 2015. He was a recipient of the IROS2016 Fukuda Young Professional Award, and Royal Society Translation Award in 2017. His research interest includes biologically inspired robotics, embodied artificial intelligence, and biomechanics, where he was involved in a number of research projects related to dynamic legged locomotion, dextrous and adaptive manipulation, human-machine interactions, and evolutionary robotics.

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