

International Symposium on Robotic and Human Cognition and Brain Development

Date: February 28th, 2017.

Language: English.

Venue: Lecture Hall 31, Engineering Building 3, Hongo Campus, The University of Tokyo.
7-3-1 Hongo, Bunkyo-ku, Tokyo, Japan.

Sponsored by: MEXT KAKENHI "Constructive Developmental Science" No. 24119001

Co-sponsored by: Next Generation AI Research Center & GCL Program,
The University of Tokyo

Registration: No fee. Just email to: symp170228@isi.imi.i.u-tokyo.ac.jp (see bottom)

Program

14:00-14:10 Opening – Yasuo Kuniyoshi

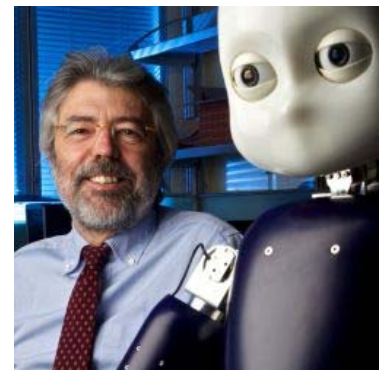
14:10-15:00 Invited Plenary Talk: Humanizing Robots

Giulio Sandini, Director of Research at the Italian Institute of Technology / Professor of BioEngineering at the University of Genoa, Italy.

Abstract: In the recent years robot technology has advanced dramatically producing machines able to move like a human and, at the same time, being faster, stronger and more resilient than humans are. The variety of humanoid robots being built and, to some extent, commercialized has increased enormously since the first humanoid robot announced by Honda 30 years ago. Since then the complexity and the performance of these robots has been steadily increasing and nowadays we can claim that more and more sensing and motion abilities of robots are approaching those of humans. Moreover, the computational power of today's computers and the possibility to process gargantuan amount of data, has created the impression

that the science fiction world described by Asimov where humans and robots co-exist and collaborate is not very far away. Is this true? Is there some major missing ingredient we have to develop? What is the role of robotics research in this endeavour? Does it still make sense to think to robotics as an engineering activity waiting for the technological solutions required to fulfil Asimov's dream, or should robotics get involved head-on in actively seeking the knowledge which is still missing?

During the talk I will argue that robots interacting with humans in everyday situations, even if motorically and sensorially very skilled and extremely clever in action execution are still very much primitive in their ability to understand actions executed by others and that this is the major obstacle for the advancement of social robotics. I will argue that the reason why this is happening is rooted in our limited knowledge about ourselves and the way we interact socially. I will also argue that robotics can serve a very crucial role in advancing this knowledge by joining forces with the communities studying the cognitive aspects of social interaction and by co-designing robots able to establish a mutual communication channel with the human partner to discover and fulfil a shared goal (the distinctive mark of human social interaction).



15:00-15:40 Invited Talk: Deep Neural Models for Object Manipulation and Communication of Robots

Tetsuya Ogata, Professor of Intermedia Art and Science, School of Fundamental Science and Engineering, Waseda University, Japan.

Abstract: In this talk, I will present two topics of our research on deep learning models which enable a humanoid robot to manipulate the various objects and translate the sentences to motions. By retrieving temporal sequences over the learnt different modalities, the robot can generate the object manipulation behaviors from the corresponding image sequences, and vice versa. The other is a recurrent neural model for a linguistic process of the robot using the sequence to sequence method. The model achieves immediate and repeatable response to linguistic directions.



15:40-16:00 Break



16:00-16:40 Talk: Simulating Fetal Sensory-Motor Experiences and Embodied Neural Learning

Yasuo Kuniyoshi, Professor of Mechano-Informatics, School of Information Science and Technology, and Director of Next Generation AI Research Center, The University of Tokyo, Japan.

Abstract: Development is a continuous causal process involving complex interaction between genes, body, nervous system and environment. Although the whole process may be too complicated, fetal interaction and development can be relatively more tractable to model. From a dynamical systems point of view, the beginning part of the temporal development trajectory provides an important information about the underlying principles governing the developmental dynamics. We constructed a computer simulation model of a human fetus. It consists of a musculo-skeletal body, uterus, and basic nervous system. It exhibits spontaneous motor development and sensory-motor map organization comparable to human data. Also, by changing the model parameters, we can simulate "atypical" development. Our series of experiments shows that sensory-motor experiences in the fetal period can be crucial to the formation of body representations, which are significantly affected under "preterm birth" conditions, providing new insights about the developmental origins of social cognition and autism spectrum disorders.



16:40-17:20 Invited Talk: Towards Functional Differentiation: theory, robot brain, and human development

Minoru Asada, Professor of Adaptive Machine Systems, Graduate School of Engineering, Osaka University, Japan.

Abstract: Functional differentiation of the brain is the most fundamental issue for living agents to generate physical and mental activities. However, the mechanism how different functions can be realized is still one of the big mysteries. We attempt to approach to this issue from three different but closely related perspectives. They are mathematical formulation, function assignment in robot brain, and human development. The principle of the functional differentiation is based on the information theory, and simulation of functional differentiation with physical body and neural architecture is implemented. fMRI studies show the developmental functional differentiation from school kids to adults. In this talk, I will introduce these attempts and discuss how they can be linked together.



17:20-17:30 Closing.

Registration:

No fee is charged. Please email to symp170228@isi.imi.i.u-tokyo.ac.jp the following information prior to your attendance. (Just for statistics.) In case the number of attendance exceeds the capacity of the hall, the registration will be closed.

Subject: Registration

Name:

Title&Affiliation:

Nationality:
