

Symbiotic Interaction and Harmonious Collaboration for Wisdom Computing (SymCollab 2018)

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ABSTRACT

This half-day workshop introduces the state-of-the-art technologies on HCI for symbiotic society. They come from team-oriented research programs (CREST); “Symbiotic Interaction” and “Harmonious Collaboration” between human and computers, organized by the Japan Science and Technology Agency (JST).

Author Keywords

Symbiotic Interaction; Augmented Human; Ambient Intelligence; Human-Robot Interaction; Human Agent Interaction; Ethical, Legal, Social and Economic Issues.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI); Miscellaneous

WORKSHOP TOPIC AND GOAL

The cyber-physical world is advancing rapidly based on the technologies of artificial intelligence, robotics and IoT. The symbiotic society requires to design novel interactions between humans and computers in order to maximize the benefit to humans, considering ethical, legal, social and economic (ELSE) issues. They include augmented humans, connected things, ambient intelligence (i.e., a smart intelligence environment), internet of wisdoms, etc. At the same time, however, as ICT reaches deeper and deeper into society, the volume of information emanating from the Internet, mobile devices, sensors, robots, IoT, and other sources continues to rise, leading to problems in terms of the inability to effectively apply knowledge gained from these sources and creating new problems regarding matters such as ethical, legal, social and economic (ELSE) issues.

This workshop, therefore, focuses on advanced interaction, called “symbiotic interaction,” and its intelligent systems with “harmonious collaboration” between human and computers for the symbiotic society. The Japan Science and Technology Agency (JST) has started a new research program to create and develop the core technologies that realize the symbiotic interaction based on understanding and designing interactions in a symbiotic society; “Symbiotic Interaction: Creation and development of core technologies interfacing human and information environments” in 2017 as an

5.5 year project of the CREST, team-oriented research program [1]. It has also promoted the sister CREST program on “Intelligent Systems creating co-experience knowledge and wisdom with human-machine harmonious collaboration” that started in 2014 by the leadership of the Research Supervisor, Norihiro Hagita [2].

This workshop will introduce several research projects in these two CREST programs. It is also open for the presentations of the following topics that may be the candidates of future research proposals.

- Human Augmentation:
advanced multi-modal communication, advanced collaborative work, community formation
- Ambient Intelligence:
interaction with intelligent agents, robots, etc.,
interaction design for intelligent systems; self-driving cars and smart homes, networked life-logging environments
- Fundamental interaction theory and modeling:
modeling of augmented-human interactions, system design principles based on relations between humans and ambient intelligences
- Co-experience knowledge and wisdom with harmonious human-machine collaboration, services with human-robot interaction and collaboration, wearable sensors, and the development of an open platform using the state-of-the-art technologies

OUTLINE OF THE WORKSHOP

The workshop program will start from overview of two CREST programs: “*Harmonious collaboration*” by professor Norihiro Hagita and “*Symbiotic Interaction*” between human and computers, professor Kenji Mase, respectively. Professor Daniel Gatica-Perez from Idiap research institute, Switzerland will give a keynote talk about multimodal interaction and then position and full paper sessions. We have two full papers and six position papers. The accepted papers covered the broad range of areas targeted by the CREST programs. In the area of *Human Augmentation*, Koike et al. proposed a skill acquisition mechanism and developed *Skill Transfer* systems. Fang et al. proposed an *Interactive Selfie* application in which crowdsourcing-based learning is utilized to define good head postures. In the topic of *Ambient*

Intelligence, Nakazawa introduced a project that aims to understand and support the tender care skill *Humanitude*, and Watanabe et al. proposed a concept: “*Implicit Ambient Surface Information*” (*IASI*), which was applied to measuring athlete’s physiological states and body movements. There are two papers concerning the topic of Fundamental interaction theory and modeling. Tsuda et al. introduced a project focusing on the principle of *Emerging Interactions* that produces functional differentiation via interaction with complex environment. Tomiyama et al. proposed a model for *Discourse Segmentation* for group discussions using deep learning. For co-experience knowledge and wisdom, Satake and Kanda reported a situation where robot activity is interrupted by children and claimed the necessity of *Moral Interaction* in human-robot interaction. A paper by Suzuki described the overview of *Social Imaging* technologies and its application to empower people with social impairments.

ORGANIZERS

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- Norihiro Hagita: Norihiro Hagita received the B.E., M.E., and Ph.D. degrees in electrical engineering from Keio University in 1976, 1978, and 1986. In 1978, he joined Nippon Telegraph and Telephone Public Corporation (Now NTT). He is currently Board Director of ATR and ATR Fellow, director of the Intelligent Robotics and Communication Laboratories. He is also a visiting professor of Nara Institute of Science and Technology, Osaka University and Keio University. His major interests are cloud networked robotics, human-robot interaction, ambient intelligence, pattern recognition and learning. <http://www.irc.atr.jp/hagita/hagita.html>
- Yukiko Nakano: Yukiko Nakano is a professor in the Department of Computer and Information Science at Seikei University, Japan, and leading the Intelligent User Interface Laboratory (IUI lab). She received her M.S. in Media Arts and Sciences from Massachusetts Institute of Technology, USA, and Ph.D. in Information Science and

Technology from the University of Tokyo, Japan. With the goal of allowing more natural human-computer interaction, she has addressed issues on modelling conversations by analyzing human verbal and nonverbal communicative behaviors, and developing Multimodal Conversational Interfaces (MCIs) based on the empirical models. http://www.ci.seikei.ac.jp/nakano/index_e.html

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