Task Force on Intelligent Cyber-Physical Systems

Motivation

Current available networked embedded systems, Internet-of-Things systems and networks of wearable devices generally rely on sophisticated sensors to gather data from an environment, communicate to exchange information and build services/applications on the top of acquired sensor data. However, if one should investigate the availability and usability of acquired data to build an application or a service, it would immediately appear that data are not rarely inaccurate due to calibration problems, inefficiencies in the compensation mechanisms, presence of soft and hard faults affecting the readout system or changes in the environment in which the devices/embedded systems are operating. These inaccuracies in the acquired data streams might heavily affect the envisaged application/service leading to a (possibly relevant) degradation of the performance and Quality-of-Service.

To address this critical issue, in the recent years, the research focused on Intelligent Cyber-Physical Systems (ICPSs) that are cyber-physical systems endowed with intelligent abilities. The main characteristic of such new generation of distributed embedded systems is the ability to interact with the environment in which operate and adapt to new working conditions through distributed intelligent mechanisms operating at the unit (single device), at the cluster (groups of devices) and the network level (the network of devices). Such ICPSs rely on machine learning and computational intelligent solutions for analyzing and interpreting the data acquired from the environment and activate proper reaction/control mechanisms to guarantee the QoS of the envisaged application.

For the aforementioned reasons, the TF on "Intelligent Cyber-Physical Systems" perfectly fits the scope of the SWTC by studying CI techniques meant to operate in distributed (embedded) devices characterized by constrains on memory, computation, energy and communication bandwidth and are designed to deal with all the uncertainties related to the interaction (gathering data/actions) with a real environment through sensors/actuators. The TF is meant to operate vertically on the main four aspects of the SMTC (i.e., Smart Objects and Interactions, Smart Systems and Services, Smart Environments and Applications, Smart Things related to Personalization and Social Aspects) by studying the use of intelligent mechanisms on all the level of a CPS (from the object-layer to the system-layer up to the application layer).

Goals

- Promote scientific activities (Special Sessions, Workshops, Tutorials, etc.) on intelligent/smart cyber-physical systems, intelligent objects, intelligent embedded systems, intelligent sensors
- Launch competitions/hackathons/contests for CIS students/researches/research groups on Intelligent Cyber-Physical Systems

- Strengthen the relationship between CIS and Industry in the field of Intelligent Embedded/Cyber-Physical Systems
- Discuss about possible standards in the field by also creating liaisons with existing actions (e.g., IEEE P2413 - Standard for an Architectural Framework for the Internet of Things- IoT)

Scope

- Intelligent Embedded/Cyber-Physical Systems
- Intelligent Internet-of-Things
- Smart Sensors
- Smart Devices
- Smart Monitoring Applications

Task Force Chair

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He Li received the B.S., M.S. degrees in Computer Science and Engineering from Huazhong University of Science and Technology in 2007 and 2009, respectively, and Ph.D. degree in Computer Science and Engineering from The University of Aizu in 2015. He is currently an Assistant Professor with Department of Information and Electronic Engineering, Muroran Institute of Technology, Japan. In 2018, he is selected as a Ministry of Education, Culture, Sports, Science and Technology (MEXT) Excellent Young Researcher. His research interests include cloud computing and software defined networking. He has received the best paper award from IEEE VTC2016-Fall. Dr. Li serves as an Associate Editor for Human-centric Computing and Information Sciences (HCIS), as well as a Guest Associate Editor for IEICE Transactions on Information and Systems. He is the recipient of IEEE TCSC Outstanding Ph.D. Dissertation Award 2016. In 2019, he recieved the Award for Excellence (Early Career Researcher) from IEEE TCSC.

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Mr. Abu Sufian received his B.Sc. (Hons) in Mathematics from the University of Kalyani, India in 2007 and Master of Computer Applications (MCA) from the Kalyani Govt Engineering College under the West Bengal University of Technology, India in 2010. Currently he is an assistant professor of the department of computer science, University of Gour Banga. He has submitted his Ph.D. thesis in computer science in the Visva-Bharati University, Santiniketan, India. He has published more than 20 research papers in several reputed journals and conferences both international and national including publishers namely Elsevier, Springer, IEEE, Taylor & Francis etc. His research areas including Mobile Computing, Edge Computing, Deep Learning, Computer Vision. He is member of IEEE and IEEE CIS, and also life member of Computer Society of India and other national and international societies.