

Cloud-Assisted Cyber-Physical Systems for the Implementation of Industry 4.0

Jiafu Wan¹ · Min Xia²

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Guest Editorial: In recent years, modern industry has been struggling against personalized consumption demands which feature multiple types, small batches, and random orders. The promising solution relies on Cloud-assisted Cyber-Physical Systems (CCPS) that addresses the integration of virtual information systems with physical devices. When combining the big data, cloud computing, internet of things, and even artificial intelligence with industrial automation, we may achieve a flexible, efficient, and transparent industry system. Since German government released the Industry 4.0 initiative, three kinds of integration with the support of cloud technologies have been widely discussed, i.e., 1) horizontal integration through value networks; 2) vertical integration and networked industrial systems; and 3) end-to-end digital integration of engineering across the entire value chain. However, many difficulties exist in integration, e.g., virtualized resource management, high-bandwidth real-time industrial wireless networks, industrial big data analytics, dynamical reconfiguration mechanics, and unified network standards. Therefore, industrial and academic researchers should cooperate to promote the progress of smart industrial technologies and applications. This special issue features six selected papers with high quality related to CCPS for the implementation of industry 4.0.

✉ Jiafu Wan
jiafuwan_76@163.com

Min Xia
xia.ubc@gmail.com

¹ School of Mechanical & Automotive Engineering, South China University of Technology, Guangzhou 510640, China

² University of British Columbia, 2329 West Mall, Vancouver, BC V6T 1Z4, Canada

This special issue kicks off with an article on smart home system, namely “Smart Home 2.0: Innovative Smart Home System Powered by Botanical IoT and Emotion Detection,” co-authored by M. Chen, et al. The authors propose an innovative smart home solution, in which users interconnect with home appliances and greeneries harmoniously, to achieve the organic integration between users and greeneries.

The second article “A Lightweight Intelligent Manufacturing System Based on Cloud Computing for Plate Production” by Q. Liu et al. proposes a flexible Lightweight Plate Intelligent Manufacturing System (LPIMS) based on cloud computing and assembly manufacturing process for industry 4.0. The framework structure and functions is described, a real-time manufacturing information model of the LPIMS to meet the needs of large-scale information processing requirements is given, and a key concept for the system, i.e. the optimal state is defined in this paper.

In the article “TempoRec: Temporal-Topic Based Recommender for Social Network Services”, Y. Zhang et al. propose a hybrid recommendation algorithm based on social relations and time-sequenced topics, which has been evaluated through datasets from Sina Weibo that the improved hybrid recommendation algorithm achieves better mean average precision (MAP) than other related approaches.

The fourth article “Exploiting Energy Efficient Emotion-Aware Mobile Computing”, co-authored by Y. Peng, et al., proposes a framework of energy efficient emotion-aware mobile computing system to consider the energy saving from both local user part and remote data centers part, and provide energy saving while keeping quality of service.

The fifth paper “Underwater Optical Image Processing: A Comprehensive Review” by H. Lu, et al., introduces a comprehensive review of recent trends of underwater optical

image processing technologies, including underwater image restoration, underwater image enhancement, underwater image quality assessment.

In the sixth paper “Cloud-Assisted Mobile Crowd Sensing for Traffic Congestion Control”, H. Yan, et al. propose a cloud-assisted MCS architecture for urban transportation system. The authors make the case for cloud-assisted MCS traffic congestion control by sensing data obtained continuously from a large set of smartphones carried by drivers. In this case, a Mechanism of more Contributions and more Feedback Services (MCFS) to recruit, engage, and retain the participants is considered.

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Jiafu Wan has been a Professor in School of Mechanical & Automotive Engineering at South China University of Technology (SCUT) since Sep 2015. His research interests include Cyber-Physical Systems, Industry 4.0, Smart Factory, Industrial Big Data, Industrial Robot and Internet of Vehicles. He has directed 12 research projects, including the National Natural Science Foundation of China, the High-level Talent Project of Guangdong Province, and the Natural Science Foundation of Guangdong Province. Thus far, he has published more than 110 scientific papers, including 60+ SCI-indexed papers, 20+ IEEE Trans./Journal papers, 8 ESI Highly Cited Papers and 3 ESI Hot Papers. His research results have been published in several famous journals, such as IEEE Transactions on

Industrial Informatics, IEEE Communications Surveys and Tutorials, IEEE Communications Magazine, IEEE Transactions on Intelligent Transportation Systems, IEEE Network, IEEE Wireless Communications, IEEE Systems Journal, IEEE Sensors Journal, and ACM Transactions on Embedded Computing Systems. According to Google Scholar, his published work has been cited more than 2700 times (H-index = 26). His SCI other citations (sum of times cited without self-citations) reached 630 times according to Web of Science Core Collection. He is an Associate Editor for IEEE Access (SCI), and he is a Managing Editor for IJAACS and IJART. He is a Leading Guest Editor for several SCI-indexed journals, such as IEEE Systems Journal, IEEE Access, Elsevier Computer Networks, Mobile Networks & Applications, Computers and Electrical Engineering, and Microprocessors and Microsystems. He is General Chair for 2016 International Conference on Industrial IoT Technologies and Applications (IndustrialIoT 2016) and 7th EAI International Conference on Cloud Computing (CloudComp 2016). He is a senior member of both CMES and CCF, and a member of IEEE. The homepage of Dr. Jiafu Wan can be visited at <http://www.cps-lab.cn/>.

Min Xia is currently a Ph.D. candidate in the Department of Mechanical Engineering at the University of British Columbia. He received his B.S. degree in Industrial Engineering from Southeast University in 2009, and M.S. degree in Precision Machinery and Instrumentations from University of Science and Technology of China in 2012. He has participated in many research projects, including The Natural Sciences and Engineering Research Council of Canada, the Canadian Foundation of Innovation, Mitacs, National Natural Science Foundation of China, etc. He won the best paper award of the 9th International Conference on Computer Science & Education. His research interests include machine condition monitoring, deep neural network, wireless sensor network and sensor fusion. He is a member of IEEE.