



INTRODUCTION TO THE SPECIAL ISSUE ON COMMUNICATION, COMPUTING, AND NETWORKING IN CYBER-PHYSICAL SYSTEMS

The new paradigms and tremendous advances in computing, communications and control have provided and supported wide range of applications in all domains of live, in particular, bridging the physical components and the cyber space leading to the Cyber Physical Systems (CPS). The notion of CPS is to use recent computing, communication, and control methods to design and operate intelligent and autonomous systems that can provide using cutting edge technologies. This require the use of computing resources for sensing, processing, analysis, predicting, understanding of data, and then communication resources for interaction, intervene, and interface management, and finally provide control for systems so that they can inter-operate, evolve, and run in a stable evidence-based environment. CPS has extraordinary significance for the future of several industrial domains and hence, it is expected that the complexity in CPS will continue to increase due to the integration of cyber components with physical and industrial systems.

The special issue publish six papers. Some of them are extended from papers presented at IEEE IPCCC 2016 workshop. The first paper provides a review of cyber space and security, cyber security capability maturity models and presents security metrics framework. The work presented has several application in CPS, in particular security domain. The second paper presents a solution called "AutoReplica" for automatic and scalable data replication management in distributed computation and storage infrastructure of cyber- physical systems using SSD-HDD storage. The method presented in the paper open potential applications for CPS with distributed storage requirements. The next paper investigates the middleware challenges for CPS, based on the different types of CPS applications being developed and their specific challenges. The paper also presents developing methods for middleware platforms for CPS and shows that middleware development is relevant for several CPS applications. The fourth paper presents a design and implementation of an industrial compliant SCADA test bed using formal analysis. The method is used to differentiate attack vector by identifying influential nodes using formal concept analysis of semantics and security of Modbus/TCP protocol. The paper shows that formal methods have several potential applications in the domain of CPS. The fifth paper presents technologies, algorithms, and techniques used in smart Radio Frequency Identification systems based inventory systems. The paper differentiates the applications and capabilities of several RFID based technologies in inventory systems. Finally, the last paper present a scalable network architecture called MooreCube. The architecture allow each multi-port server directly connected to other servers via bidirectional links, without using any switch. Furthermore MooreCube is a recursively defined architecture that uses Moore graph as Building Block and uses the hierarchical structure to meet high scalability. The paper provides scalable solution with several CPS potential applications.

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