Call for Papers (Deadline Extended)
Special Issue on Cyber-Physical Systems and Services for IEEE Transactions on Services Computing

The cyber-physical space integrates a vast variety of static and mobile resources, including computing/medical/engineering devices, swarms of robots, remote-controlled vehicles, critical infrastructures, sensor/actuator networks, control and decision software, static data and just-in-time information from sensors, knowledge, data analytics and fusion software, event-driven supply chains, and humans, and offers a great potential of achieving tasks that are far beyond the capabilities of existing systems. Individual users, organizations, and various communities can transform the vast space of cyber-physical resources into capabilities that no single entity can achieve alone. However, these capabilities do not come easily. Intelligence is needed for just-in-time composition of resources into capabilities. For example, how to discover and manage the vast and dynamic resources, how to describe the capabilities of the resources, how to achieve intelligent coordination among the cyber-physical entities, how to manage the information flow, how to predict the collective capabilities of the composed resources - that may consist of physical subsystems, intelligent software, vast amounts of data and knowledge, and humans, etc. are pressing issues to be investigated. Dependability and security in such cyber-physical systems can be extremely complex, while also being absolutely essential. Human resources constitute a class of physical entities in the cyber-physical world and influence the operation of cyber entities. As such integrating humans into the loop to achieve effective and dependable operation has long been a challenge. Capturing the effect of the human operator in modeling and predicting the operation of cyber-physical systems and services is equally challenging.

Many problems remain unresolved; however, existing technologies in service-oriented systems may be leveraged to provide partial solutions. Services can be positioned as a higher-level abstraction for the cyber-physical systems to mediate the interactions among devices, software, information, humans, and applications. Rapidly developing service-related technologies, such as service discovery, service composition, service adaptation, dynamic service reconfiguration, etc., can be applied with relative ease to integration tasks in cyber-physical applications. Furthermore, grids of data and services and information sharing technologies are research directions that can be leveraged to help manage and process information flow in the cyber physical space. Intelligent agents and coordination technologies can also be integrated and leveraged to attain smart collaborations. However, existing service paradigms, grid infrastructures, and intelligent collaboration techniques are not up to the challenge, and new models and techniques that extend existing paradigms need to be investigated to maximize the utilization of the vast amount of resources and capabilities in the cyber-physical world.

This special issue will present novel research results on cyber-physical systems and services (CPSS), including advances in modeling and related technologies, intelligence-assisted discovery, composition, collaboration, and adaptation of cyber-physical services, dependability and security for cyber-physical systems and services, as well as the identification of new research challenges and directions that can facilitate the formation of a truly intelligent and dependable cyber-physical world. Topics of interest include, but are not limited to:

- Models and methodologies for building and integrating smart CPSS, such as new SOA models and paradigms for CPSS and intelligence for CPSS management and adaptation;
- Semantic solutions to facilitate CPSS specification, discovery, and composition;
- Methods for intelligent and real-time collaboration among CPSS entities;
- Theories and practices for rapid development and prototyping of CPSS systems;
- Smart infrastructure to support the integration of autonomic and self-healing CPSS applications;
- Infrastructures to support dependable, secure, and safe CPSS operations;
• Testing, verification, and validation of integrated CPSS;
• Assessment and prediction of the trustworthiness of CPSS;
• Assessment and prediction of the dependability and security of CPSS;
• Simulating and emulating environments for CPSS;
• Context awareness and dynamic adaptation of CPSS;
• Design of large-scale CPSS;
• Design and implementation of energy-efficient CPSS;
• CPSS in the cloud;
• Human behavior analysis in CPSS and cyber-physical society;
• Business and societal applications of CPSS.

Important Dates

Feb 15, 2015: Deadline for paper submission
May 15, 2015: decision announcement
June 15, 2015: revised submissions due
September 15, 2015: Camera-ready version due

Submission Guidelines

Papers that have not been previously published or considered for publication elsewhere are welcome. Authors should submit their papers through the TSC online system (https://mc.manuscriptcentral.com/tsc-cs) and select “SI on Smart Cyber Physical Systems and Services”. Author guidelines are available at the journal website (http://www.computer.org/tsc).

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