

Research Topics in Semantic Sensor Networks

Preface to the Proceedings of the 3rd International Semantic Sensor Network Workshop 2010

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Welcome to the third international workshop: *Semantic Sensor Networks 2010*, held in conjunction with the 9th International Semantic Web Conference, Shanghai, China, 7–11 November 2010.

Semantic technologies are often proposed as important components of complex, cross-jurisdictional, heterogeneous, dynamic information systems. The needs and opportunities arising from the rapidly growing capabilities of networked sensing devices are a challenging case.

It is estimated that today there are 4 billion mobile devices that can act as sensors, including active and passive RFID tags. This is complemented by an even larger number of fixed sensors recording observations of a wide variety of modalities. Geographically distributed sensor nodes are capable of forming ad hoc networking topologies, with nodes expected to be dynamically inserted and removed from a network. The sensors are increasingly being connected with Web infrastructure, and the Sensor Web Enablement (SWE) standard developed by the Open Geospatial Consortium is being widely adopted in industry, government and academia alike. While such frameworks provide some interoperability, semantics is increasingly seen as a key enabler for integration of sensor data and broader Web information systems. Analytical and reasoning capabilities afforded by semantic web standards and technologies are considered important for developing advanced applications that go from capturing observations to recognition of events and ultimately developing comprehensive situation awareness. Defence, transportation, global enterprise, natural resource management and climate change industries are leading the rapid emergence of applications in commercial, civic, and scientific operations that involve sensors, web, services and semantics.

The goal of the Semantic Sensor Networks workshop is to develop an understanding of the ways semantic web technologies, including ontologies, agent architectures and semantic web services, can contribute to the growth, application and deployment of large-scale sensor networks and their applications. The workshop provides an inter-disciplinary forum to explore and promote these concepts.

The workshop sought paper submissions on topics including:

- Semantic support for Sensor Web Enablement

- Spatio-temporal reasoning in sensor networks
- Semantic integration in large-scale heterogeneous sensor networks
- Sensors and observations for symbol grounding
- Reasoning with incomplete or uncertain information in sensor networks
- Semantic web services architectures for sensor networks
- Semantic middleware for active and passive sensor networks
- Semantic algorithms for data fusion and situation awareness
- Experience in sensor network applications of semantic technologies
- Rule-based sensor systems
- Ontologies for sensor and RFID networks
- Semantic policy management in shared networks
- Semantic feedback and control
- Semantic discovery of sensors, sensor data and services
- Emergent semantics and ambient intelligence in sensor systems
- Semantic approaches to status monitoring and configuration of sensor systems
- Scalability, security, trust and privacy in semantic sensor networks
- Semantic reasoning for network topology management
- Semantic web in sensor data mashups
- Semantic sensor context management and data provenance
- Citizen sensors, participatory sensing and social sensing

The First International Semantic Sensor Network Workshop was held with ISWC in 2006, four years ago. Since that time there has been a considerable growth in interest in the use of modern semantic technologies to address long-standing issues that seem to inhibit the widespread deployment and application of sensor technologies. In particular, the Open Geospatial Consortium has begun to consider the contribution of semantic technologies to the SWE standards. In 2009, a new activity of the W3C, the Semantic Sensor Networks incubator group (SSN-XG) was established to address the development of both semantic annotation for SWE services and an ontology to describe sensor networks and to provide terms for the annotation. This activity has only just formally completed, but a strong community of interest has been established and a follow-on activity is being planned.

We were excited by the quality and diversity of the 12 submissions we received for the workshop. The papers were each carefully reviewed by 3 members of our international program committee. We decided to accept nearly all the papers, despite the range in maturity and technical contribution of the works, as all the papers contribute novel ideas to this rapidly developing field. We hope that this decision both promotes development of the field and creates a vibrant and robust workshop on the day. We have 5 full papers and 6 short papers in the proceedings.

We hope that you enjoy the workshop, and learn from the papers here. We appreciate your feedback on the workshop this year and hope that you can find a way to contribute to the workshop in 2011.

Workshop website: <http://research.ict.csiro.au/conferences/ssn/ssn10>

Program Committee

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