1st International Workshop on the Semantic Sensor Web (SemSensWeb 2009)

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Preface

Millions of sensors are currently been deployed in sensor networks around the globe and are actively collecting an enormous amount of data. Together with legacy data sources, specialized software modules (e.g., modules performing mathematical modeling and simulation) and current Web 2.0 technologies such as mashups, deployed sensor networks give us the opportunity to develop unique applications in a variety of sectors (environment, agriculture, health, transportation, surveillance, public security etc.). The terms Sensor Internet, Sensor Web and Sensor Grid have recently been used to refer to the combination of sensor networks and other technologies (Web, service-oriented, Grid and database) with the view of addressing this opportunity.

Previous Sensor Internet, Sensor Web and Sensor Grid proposals make very little use of semantics (e.g., they do not use semantic annotations, metadata, ontologies etc.) and, in fact, whenever these proposals do refer to semantic concepts, they do so in an unprincipled and non-systematic way. On the contrary, the use of explicit semantics for Web and Grid resources as pioneered by many Semantic Web and Semantic Grid projects enables us to overcome the heterogeneity of data and resources, and to improve tasks like data sharing, service discovery and composition etc.

The 1st International Workshop on the Semantic Sensor Web (SemSensWeb 2009) took place in Heraklion, Crete on June 1st, 2009 in the context of the European Semantic Web Conference 2009. The goal of the workshop was to explore whether the core ideas and technologies of the Semantic Web can also be applied to sensor networks to allow the development of an open information space which we call the Semantic Sensor Web. SemSensWeb 2009 addressed, among others, the following research questions that are fundamental for the realization of the Semantic Sensor Web:

- What extensions are needed to established Semantic Web data models and languages (e.g., RDF, SPARQL, OWL etc.) so that we can deal with sensor data and meta-data? How do we model the temporal, spatial and thematic dimensions that arise in sensor networks?

- What are appropriate ontologies for describing sensors, their processes and products? What are appropriate languages and tools for semantic annotation of sensors? How can we leverage existing standards developed by the Sensor Web Enablement Working Group of the Open Geospatial Consortium such as SensorML (`http://www.opengeospatial.org/standards/sensorml`) or the W3C Geospatial Incubator Group (`http://www.w3.org/2005/Incubator/geo/`)?

- What are appropriate principles and architectures for the semantics-based integration of sensor networks? What kind of middleware is appropriate for supporting the proposed architectures?
- What are appropriate techniques and tools for semantics-based data management over heterogeneous data streams coming from autonomously deployed sensor networks? Can we apply semantic data integration techniques as we know it from database and Semantic Web research? How do these techniques interact with existing ways of processing (continuous) queries over sensor networks e.g., in-network data processing?
- How do we develop open, scalable and fault-tolerant resource discovery mechanisms for the Semantic Sensor Web? Is there a role for successful technologies such as P2P networks and publish/subscribe systems here?
- Is it possible to combine existing techniques for developing mashups with semantic technologies and sensor networks to allow the flexible and rapid development of decision support systems for target application sectors? What are appropriate high-level APIs that ease the rapid development of such mashups? Can we build on already deployed tools such as SensorMap?
- What are interesting applications of Semantic Sensor Web in target sectors such as environment, agriculture, health, transportation, surveillance, public security etc.?

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Organization

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