Internet of Things, models and applications

Ph.D. Course, 7.5 hp

The Internet of Things models and applications course is a reading course at the Ph.D. level. The course will run from January 28, 2013 to April 1, 2013.

Course responsible
Professor Theo Kanter

Course Administration
Dr. Rahim Rahmani

Prerequisite of the course
Only PhD students can participate in the course.

Aim of the course
The aim of the course is to provide an overview of the main trends and challenges in Internet of Things, models and applications. In particular, the course will emphasize the implications of Internet of Things applications and services. Moreover the course will allow students to discuss their papers in light of some of the most important research developments in Internet of Things and models and application. The course will give both practical and general knowledge about the Internet of Things, models and applications. After the course the student should have some knowledge of these architectures, models and applications, and understand the basic principles behind them. The student should be able to read and have a good understanding of 90% of the current literature on par with conference papers in this area. In addition, the student should also be aware of the standardization process, new products and services in the area. The student will be able to write an article (paper) suitable for submission to Ubicomp, Pervasive and other conferences and journals in the field. The course will prepare also the student to write a licentiate and PhD thesis.

Learning Objectives
The course provides insight into the Internet of Things information organization, modeling entities and relationships, methods of data storage, and methods for detection and search, in particular shared user and sensor information. The knowledge is then used to provide detailed insights into how this can be used to create context-based applications. The insights deepened understanding of how applications and components shall cooperate with other knowledge infrastructures (eg, Web).
**Syllabus**

1. **Introduction**: Internet of Things. Integration of embedded computers, WSNs and everyday Things; RFID/GRIFS, EPC, WSNs/Mobile, etc.
2. **Security and Privacy**: Definitions, notions, relations, needs, threats, requirements; Privacy Enhancing Technologies (PET), etc.
3. **Decentralized and Interoperable Internet of Things**: RESTful and Web-oriented approaches, Object-Information Distribution Architecture, Object Naming Service (ONS), Service Oriented Architecture, Network of Information, etc.
4. **Composition models for the Web of Things and resources on the Web**: Discovery, search, Web mashups and other.
5. **Semantic technologies** (e.g. ontologies, microformats, context, etc.) for describing and discovering things
6. **Interaction models and paradigms between human and things** (mobile interfaces, etc).
7. **Concrete applications and use-cases of Web-enabled Things**: Energy management & smart homes, Ambient Assisted Living, Intelligent Transport, etc.

**Teaching methods**

Teaching consists of lectures, reading of literature and writing. The number of hours studied is estimated at approximately 200 hours including approximately 40 hours (20%) lectures. Approximately 160 hours (80%) of the time is study without a teacher that the student must devote to reading of literature and assignments. When changing resource availability, the distribution changes. An assigned paper (article) requires approximately 50 hours of work for each student. The length of the final report should be minimum 10 pages (about 5,000 words) for each student. The report may be in the form of a collection of articles, with each paper suitable for submission to a conference or journal contributions from each member of the group must be clear especially when the report is a collection of documents, the role and contribution of each member of the group must be explained in the general introduction to the articles. The report should clearly describe: 1) what you have done, 2) who did what, on the implementation and measurements you should describe the methods and tools, together with the test or implementation results, and your analysis.

**Examination**

The course requires the submission of a paper that applies Internet of Things concepts to empirical problems in a variety of domains. The length of the paper should be 10-12 pages. Papers must be written in English and submitted to the course responsible till April 1, 2013.

**Course literature**

Internet of Things - Global Technological and Societal Trends - Smart Environments and Spaces to Green ICT; Ed. Ovidiu Vermesan,SINTEF, NO & Peter Friess, EU, BE; The River Publishers Series in Communications; ISBN: 978-87-92329-67-7


**Incoming Competency and Prerequisites**

- Distributed systems
- Java programming
- Programming of application for mobile devices

**Enrolment in the course**

To apply for the course please contact Fatima Ferreira (santala@dsv.su.se) before January 21, 2013.