Université d'Ottawa
Faculté de génie

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University of Ottawa
Faculty of Engineering

School of Electrical Engineering
and Computer Science

Syllabus CSI 5140 G00

Ubiquitous Sensing for Smart Cities

Fall 2019

Instructor:

Dr. Burak Kantarci, P.Eng., SMIEEE
Office: CBY-A516
www.site.uOttawa.ca/~bkantarc
E-mail: burak.kantarci@uOttawa.ca
Office Hours: TBD

Teaching Assistants:
TBD

Course Schedule:

LEC (4 Sep 2019- 3 Dec 2019) Mon 7pm-9:50pm TBD

Class attendance is mandatory. As per academic regulations, students who do not attend 80% of the class will not be allowed to write the final examinations.

All components of the course must be fulfilled; otherwise students may receive an INC as a final mark (equivalent to an F).

Calendar Style Description:

Sensor and actuator networks. Dedicated and non-dedicated sensing. Vehicular sensing and smart transportation. Software Defined Things. Sensing as a service. IoT-data analytics ecosystems. AI-based security solutions. Auction and game theory concepts in ubiquitous sensing.

Description

This course is an introduction to ubiquitous sensing systems for intelligently coordinated and efficient cities and spaces. Three primary foci will be on smart cities sensing, reliable sensory data acquisition, and security and privacy in smart city sensing systems. Topics will include: a thorough presentation of sensor and actuator networks for smart cities, software-defined Internet of Things, vehicular sensing, social sensing, detailed investigation of opportunistic and participatory sensing solutions, sensing as a service, and security and privacy assurance in smart city services by using artificial intelligence methods. An emphasis will be given on the design and analysis of multi-purposed, non-dedicated and large-scale sensing systems along with the trustworthiness, reliability, security and efficiency requirements of smart city services.

Prerequisite:

No official prerequisites are required. However, students are expected to have sufficient knowledge in Data Communications and Networking to succeed in this course.

Academic Integrity is expected from all students participating in this course and academic fraud will not be tolerated. All students should be familiar with the University of Ottawa Academic Integrity WEB site at http://web5.uottawa.ca/mcs-smc/academicintegrity/home.php

Course Objectives

By the end of the course, students:

- how to meet networking challenges related to ubiquitous sensing in smart cities
- how to achieve large scale and ubiquitous sensing in smart cities
- how to design AI-based security and privacy solutions for ubiquitous sensing systems smart services
- how to design cloud-inspired sensing as a service model for smart city services
- an introduction to auction and game theoretic approaches in the acquisition of sensory data

Week-by-week Description:

- Week-1: Introduction and Overview of Key Enabling Technologies for Smart Cities
- Week-2: Software Defined Things and Networks in Smart Cities
- Week-3: Service Discovery Protocols for Smart Cities
- Week-4: Design methods for Sensor Networks for Smart Grids/Microgrids
- Week-5: Vehicle as a service and vehicular clouds
- Week-6: Sensing as a Service (S^2aaS)
- Week-7: Data trustworthiness, reliability and veracity in S^2aaS
- Week-8: Big sensory data acquisition: Auction models
- Week-9: Big sensory data acquisition: Game theoretic models
- Week-10: IoT-Data analytics ecosystems
- Week-11: AI-based Security & Privacy in smart city services
- Week-12: Project Presentations

Text

- *M. Obaidat and P. Nicopoliditis, "Smart Cities and Homes," Morgan Kaufmann, 2016, 1st ed, ISBN 9780128034545*
- *McClellan, Stan, Jimenez, Jesus, Koutitas, George; "Smart Cities : Applications, Technologies, Standards, and Driving Factors" Springer, ISBN 978-3-319-59381-4*
- *C. Stimmel, "Building Smart Cities: Analytics, ICT, and Design Thinking," CRC-Press, August 2015, ISBN: 9781498702768*

Term Project: The project will have three phases: 1) Proposal and presentation of the state of the art (in writing), 2) Implementation and presentation of project outcomes, 3) Final report. You may work in groups of two; however if you work in a group of two; your individual performance will be evaluated in all phases. In all reports, both members have to clearly indicate the contributions of each team member, and the reports have to be signed by both project members

Quizzes: 4 quizzes will be given; each will contribute to 20% of your final grade. **No make up quizzes will be given. No exceptions will be made for missed quizzes.**

Midterm: Midterm is a closed book, in-class exam. Target date is either one week before or after the study break.

Note: Rules and regulations will be posted on the course web site, as well as how to deal with late copies.

Grading

Term project- Phase I (Proposal + Presentation of the state of the art)	5%
Quizzes	5% x 4 = 20%
Midterm Examination	20%
Term project- Phase II (Implementation + Presentation)	25%
Final Exam	30%