Welcome to SENG 480B / CSC 485B / CSC 586B Self-Adaptive and Self-Managing Systems

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http://courses.seng.uvic.ca/courses/2013/summer/seng/480b
http://courses.seng.uvic.ca/courses/2013/summer/csc/485b
http://courses.seng.uvic.ca/courses/2013/summer/csc/586b

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Two Quiz Questions

- Are you sitting next to the same person you did on Wed?
- Did you look up any term or resource related to this course since Wed?
- This course involves a lot of reading!

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Self-Adaptive Systems (SAS)

- A SAS can alter its behaviour at runtime (on the fly) in response to its perception of
  - its environment
  - its own state

  by adapting itself
- SAS abilities
  - Assess its own behaviour
  - Observe its context or environment
  - Adapt without shut down

- Oreizy, et al.: An Architecture-Based Approach to Self-Adaptive Software, *IEEE Intelligent Systems*, pp. 54-62 (1999)
- MacManus: Why Software is More Important Than Sensors in the Internet of Things, ReadWriteWeb (2010)

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Course Web Sites

- Course outline
  - Undergraduate students
    - http://courses.seng.engr.uvic.ca/courses/2010/spring/seng/480b
    - http://courses.seng.uvic.ca/courses/2013/summer/seng/480b
  - Graduate students
    - http://courses.seng.uvic.ca/courses/2013/summer/csc/586b
- Course websites
  - http://www.rigiresearch.com/courses/sas
  - Syllabus
  - Lecture slides (pdf)
  - Assignments
  - Materials for reading assignments
  - Everything else you need to know about the course

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Optional Textbooks Great Resources

- Northrop, et al.: Ultra-Large-Scale Systems. The Software Challenge of the Future. Software Engineering Institute, Carnegie Mellon University, 134 pages ISBN 0-9786956-0-7 (2006)
  http://www.sei.cmu.edu/uls
- Hellerstein, Diao, Parekh, Tilbury: Feedback Control of Computing Systems. John Wiley & Sons (2004)
- Kephart, Chess: The Vision of Autonomic Computing. IEEE Computer 36(1):41-50 (2003)
- IBM Corp.: An Architectural Blueprint for Autonomic Computing, Fourth Edition (2006)
  http://people.cs.kuleuven.be/~danny.weyns/csds/IBM06.pdf

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Optional Textbooks Great Resources

- de Lemos, Giese, Müller, Shaw (Eds.): Software Engineering for Self-Adaptive Systems II, LNCS 7475, Springer (2013)
  http://link.springer.com/book/10.1007/978-3-642-35813-5/page/1#
- H.C. Cheng, R. de Lemos, P. Inverardi, J. Magee (Eds.): Software Engineering for Self-Adaptive Systems, LNCS 5525, Springer (2009)
  http://www.springer.com/computer/swe/book/978-3-642-02160-2
- More resources on course website

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Assignments

- Reading assignment
  - ULS Book Section 1-3 on-line at
  - http://www.sei.cmu.edu/uls/the_report.html
- Assignment 1
  - A1 will be posted by Monday

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Deadlines

- Assignment 1
  - Thu, May 30 due
- Assignment 2
  - Thu, Jun 20 due
- Assignment 3
  - Thu, Jul 11 due
- Assignment 4
  - Thu, Jul 25 due
- Breaks
  - Reading Jun 4-11
  - Reading July 2
- Midterm
  - Fri, Jun 28
  - In class, closed books, closed notes
- Final
  - Aug 2013 to be scheduled by university
  - 3 hours, closed books, closed notes

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Course Requirements

- Undergraduate students
  - Assignments 48%
  - Midterm 12%
  - Final 30%
  - Class participation 10%
- Graduate students
  - Assignments 36%
  - Position paper 6%
  - Presentation 6%
  - Midterm 12%
  - Final 30%
  - Class participation 10%
- All materials discussed in class are required for the midterm and final examinations
- Passing the final exam is not required to pass the course, but of course highly recommended

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Questions?

- Organization of the course?
- Evaluation scheme?

- Study course web site carefully
- Visit course web site regularly
  - Web site and materials will change almost daily
- Other questions?!?

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Keep in mind …

- **Ask questions at any time ☺ !! ☺**
- **Let's make this a truly interactive course!!!**
- **Take full advantage of this opportunity to work on your communication skills ☺ !! ☺**

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Situational Awareness (SA)

- SA is the perception of environmental and personal context with respect to time and space
- Comprehension of its meaning and its projection into the future
- Critical to decision-making in complex, dynamic situations

- Applications
  - Mars Curiosity
  - Aviation—UAV, drones
  - Military command and control
  - Emergency services
- Applications
  - Driving a car
  - Crossing a street
  - Playing basketball
  - Shopping

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India

Mindboggling Situation Awareness

Vietnam

Humans are amazingly adaptive

Stream of Context

How are we going to help this person?

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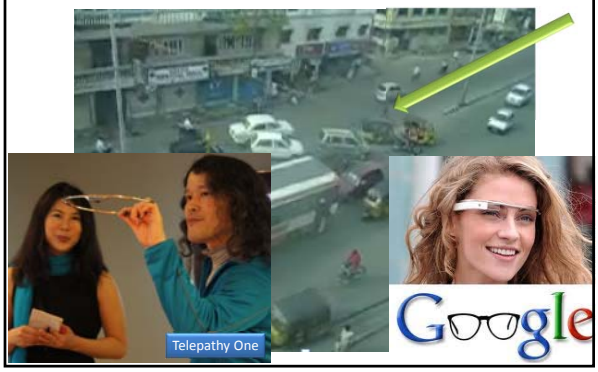
Instrument and Capture the Stream of Context



Context is Big Data

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Intuitively we know how critical and valuable context is. But context is complicated.

"Context is the new battleground between Android, iOS, Windows, Symbian and Apple, Google, IBM, Microsoft, Nokia, Samsung."

The Age of Context

Simple can be harder than complex. You have to work hard to get your thinking clean to make it simple.

Steve Jobs, BusinessWeek, 1998

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Instrument and Capture the Stream of Context

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Killer Application

The Experiment—Volunteers

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Context is Big Data

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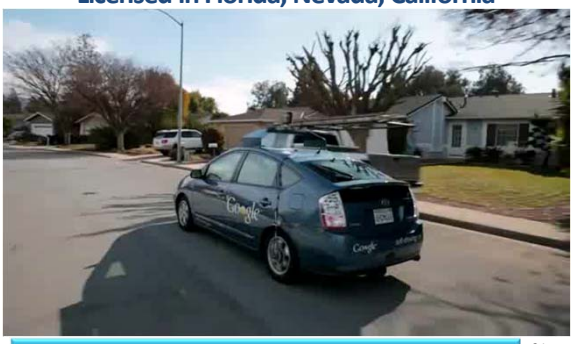
Google Driverless Car

Licensed in Florida, Nevada, California



http://www.youtube.com/watch?v=cdgQpa1pUUE

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Second Class Participation Assignment

- The execution environment for future software systems will not necessarily be known a priori at design time and, hence, the application environment of such a system cannot be statically anticipated.
- Such systems necessarily will have to reconcile the static view with the dynamic view by breaking the traditional division among development phases by moving some activities from design time to run time.

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Second Class Participation Assignment

- The resulting systems push design decisions towards runtime and exhibit capabilities to reason about the systems' own state and environments.
- Discuss this problem and its issues in groups of 3-4 students and try to figure out what it all means
- Pick one person to present the findings to the class

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