Dependable and Secure Autonomous Systems

EECE 571P

Univ of British Columbia (UBC)

Who am I ?

- Associate Professor of Electrical and Computer Engineering (ECE) – joined UBC in 2010
  - PhD from UIUC, Post-doc with MS Research
  - Research in fault-tolerant and secure computing
  - Recent research direction: IoT security/reliability

- First time I'm teaching this course (EECE571P)
  - Taught grad course on IoT Reliability and Security (571K)
  - Taught grad course in fault-tolerance (EECE 513) and program analysis (EECE571P)
  - Teach undergrad courses on software design/web/OS etc.

Who are you ?

- Your name, department, advisor (if applicable)
- What interests you ? What do you want to do after you finish your current degree ?
- What made you choose this class (or did you) ? What do you want out of the course ?

What is this course about ?

- Autonomous systems' Security and Reliability principles and foundations
- Practical Applications of the concepts learned to real-world autonomous systems
- Completion of an independent research or substantial development project in this area

Why take this course ?

- Autonomous systems are a hot-topic in both academia and industry, and security/reliability is critical

- You will learn the cutting-edge principles and techniques for security and reliability
  - Applications beyond autonomous systems

- Ability to complete a substantial research project in your area of interest related to autonomous systems

Why NOT take this course ?

- We will be doing a lot of paper reading
  - 4 papers/week for which you'll have to submit reviews ahead of time (by Wednesday at noon)
  - No extensions or late reviews (one slip day)
- We will NOT learn about specific autonomous platforms
  - You can use them in your project however
- Substantial time commitment for the project

Pre-requisites

- No previous background in reliability or security nor in autonomous systems is needed
  - We'll cover the basic concepts in the class

- The following courses or equivalent
  - At least one systems programming course, in C++/Java (e.g., Operating systems, compiler design)
  - At least one theory of computation/discrete math/algorithms course (or mathematical maturity)
  - Ability to learn new concepts/ideas quickly

Evaluation

- Paper Reviews (4 papers every week): 20%
- Discussion Leading (1-2 papers): 10%
- Class Participation: 10% (on Piazza)
- Project: 60% (5% abstract + 15% mid-term report + 15% presentation + 25% final report)

Project

- **Major component of course grade (60%)**
- **To be done in teams of 1 or 2 (3 people allowed in a team if warranted – discuss with me first)**
- **You are encouraged to integrate it with your own research, but doing so is not necessary**
  - But cannot be the same thing you do for research
  - Talk to your advisor first to ensure this is OK
  - Advanced development-oriented projects are fine, but they should not simply reproduce existing systems or research papers

Project: Milestones

- In a week or two from today (by Sept. 20th)
  - Decide who you want to work with for the project
  - Send me a private note on Piazza with this info
- By September 30th: 2-page proposal (5%)
- By November 5th: mid-term report (15%)
- By early December (TBD): Presentation (15%)
- By mid December (TBD) -> final report (25%)
  - Must be in the form of a conference paper (10 pages)
  - Can integrate material from other reports
  - Submission of code and other artifacts encouraged

Paper Readings

- **We will read papers on different topics**
  - Each of you needs to submit a 1-2 page review of the papers by noon the day before discussion
  - All reviews will be open to everyone after then
  - Discussion leader summarizes each paper (20 mins), and the points raised by the class along with his/her own points for leading the discussion.
  - **You are allowed to miss one class of reviews penalty-free (both reviews of the same class)**

Discussion Leading

- You will lead the discussion of 1-2 papers (TBD based on final enrollment in the course)
- Two goals
  - Present the paper at a high level and answer any questions about it
  - Summarize the main points in the reviews and lead the discussion of the paper in class
- You will be evaluated by your peers based on a five point form – this will determine your grade

Class Participation

- Attendance will not be taken, but you're expected to show up in each class and participate actively (inform me in advance if you can't come to class on a particular day)

- Participation is not simply attending the class. You need to ask questions and participate in discussions, both in class and on Piazza. Quality of participation is important !

Adminstrivia

- **Join Piazza.com and register for this class**
  - No email will be sent, No canvas either
  - All announcements, assignments, lectures will be uploaded on Piazza
  - Participation on Piazza counts for class participation – both asking and answering questions
- **Complete survey on Piazza (by Sep 14)**
  - Allows me to tailor the course to your interests

Final thoughts

- The goal is to have fun while we learn !
  - I certainly hope you have fun in this course …
  - I hope to have fun learning from you too …

- I am always open to suggestions and critical comments on any aspect. **Such critical comments will not impact your grade in any way.** On the other hand, good suggestions may even earn you some extra credit/cookies