

Assignment: Wireless Networking Project

18-452/750 Wireless Networking, Spring 2018

The course project is an important part of the course, both with respect to learning objectives and grades (25% of the final grade). Projects will be executed by a team of two (preferred) or three students. Teams are expected to define their own projects, but there is a focus topic on information centric wireless networks described at the end of the handout.

A nice discussion on how to write a good project proposal is [John Wilkes' write up on project startup documents](#). While it targets larger projects, many of the points are useful for (interesting) course projects as well. Some features that I expect to see in a course project proposal:

- It is a good learning experience, which typically means that you gain more depth in one particular aspect of wireless networking.
- There must be a concrete deliverable, e.g., reading X papers is not an acceptable project. Examples of deliverables include:
 - A new system design for communication, localization, etc.
 - A measurement study of how a specific wireless technology works under various conditions. This information is useful for optimization.
 - A comparison of competing wireless solutions under different wireless conditions or usage scenarios.
- It involves some notion of a designing, building, and measuring a system:
 - The balance can be very different, e.g., if the focus is on measuring, but you need to design and build the measurement infrastructure
- There is a strong preference for projects that involve real wireless signals being abused by propagation through the ether.
 - Working with wireless abstractions is a lot less interesting.
 - Simulation may be a reasonable alternative in some cases.
- An ideal project proposal should have both a conservative goal that can be achieved with high probability, and one or more stretch goals that are more ambitious and exciting but be unrealistic.
- You should consider any risks associated with the project such as availability of hardware or software.

Deliverables

The project has the following deliverables:

- A short e-mail listing team members, and 2-3 possible project topics, rank orders. Any additional early information (e.g., plan to use personal laptops, inspired by paper X, ...) will help the instructor provide early feedback.
- A project proposal of 2-3 pages. The more detail you provide, the more feedback you can expect. The project should include (see above document):

- A problem statement why the project is interesting or important.
- A description of what you plan to do.
- What are the (concrete) expected results of the project and what experiments do you plan to run to evaluate them.
- What are the concrete deliverables.
- A set of milestones at 10-14 day intervals.
- Project requirements (e.g., hardware, ..) and risks.
- Checkpoints as specified in the project schedule. Details on format will be provided closer to the deadlines
- A presentation to the class at the end of the semester.
- An extended set of slides describing the project based on feedback after the presentation. This extended slide set effectively is an information project report that provides a detailed overview not only of what you did, but also what you learned.
- Meetings with course instructor to discuss your project proposal and checkpoint.

Milestones

	Milestone	Comment
March 2	Team and topic	E-mail to instructor
March 9	Project proposal	Canvas
March 19-20	Meetings on Proposal	
March 30	Check point 1	Canvas
Week of April 2	Meetings on checkpoint	
April 13	Check point 2	Canvas
Week of April 23	In class presentation	
Last day of class	Extended set of slides	Canvas

Topics for projects

The topic can be anything related to wireless networking as defined by:

- Topics covered in the lectures.
- Topics listed in the survey handout (not just those presented in class).

Past topics have been all over the map:

- Measurement studies
- Localization
- Vehicular networks
- Sensor networks

- Optimizing Wifi access point selection

Focus project area

One project area of particular interest is to use “information-centric” networking techniques to optimize information retrieval in sensor-rich wireless networks:

- Information centric networking is an active area of research in networking. The focus so far has been information in the Internet by providing support in the network layer (layer 3), for example in the form of addresses for information (or content) instead of hosts. Examples include:

- CCN/NDN: [Networking Named Content, ACM CoNEXT, 2009](#)
- XIA: [XIA: Architecting a More Trustworthy and Evolvable Internet, ACM CCR July 2014](#)

Note the above papers contain a lot of details that are not relevant in our context. The key point is that you have destination addresses for content/information rather than hosts.

- In the above work, the format for content addresses has been optimized for Internet applications, e.g., the web. Here we will focus on applications using sensor information, which often use publish-subscribe systems to retrieve content. An example of a system that uses a pub-sub system for information retrieval is:
 - [Irisnet: An Architecture for a Worldwide Sensor Web, IEEE Pervasive Computing, 2003](#).

Again, the paper has an Internet focus. The most relevant aspect is the query format used, which is a good starting point for an address format.

We have some initial infrastructure that can be used as a starting point for projects in this area. Possible topics can look at routing, optimizing packet forwarding, support for complex queries, and using in-network caching to improve performance.

After Monday’s lecture (Feb 26), I will have a short recitation session providing some more background on this project area.