

## Project 2: Hands-on Wireless Networking

### 18-452/750 Wireless Networking, Spring 2022

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 have to define their own project (more on this later).

A good 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. Some features that I expect to see in a course project proposal:

- It is a good learning experience that will give you 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 your project is a measurement study, 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 simplified wireless models 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 may not be unrealistic.
- You should consider any risks associated with the project such as access to the necessary hardware or software, unexpected challenges, etc.

### Deliverables

The project has the following deliverables:

- A short e-mail listing team members, and 2-3 possible project topics, rank ordered. 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 proposal should include:
  - A problem statement why the project is interesting and what you hope to learn.

- A description of what you plan to do.
- What are the concrete deliverables: such as an artifact, (concrete) expected project results, and experiments do you plan to run to evaluate them.
- 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 short presentation at the end of the semester
- A final project report:
  - The report should describe the goals, design and implementation of your system/network, and measurements characterizing its capabilities.
  - You should add short (~1 paragraph) describing what you learned.
  - The final report can use material from your checkpoints.
  - The length of the report depends on the formatting and number of graphs, but 10-12 pages is common.
- Meetings with course instructor to discuss your project proposal and checkpoint.

### Milestones (approximate)

	Milestone	Comment (cc your partner!)
Feb 14	Team and tentative topics	E-mail to instructor
Feb 28	Project proposal	E-mail to instructor
Mar 2-4	Meetings on Proposal	
Mar 30	Checkpoint 1	E-mail to instructor
Apr 1-4	Meetings on checkpoint	
Apr 15	Checkpoint 2	E-mail to instructor
Apr 25	Short project presentations	
Last day of class	Final report	E-mail to instructor

### 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. Please check the slides of the 2/3/2022 recitation.

I have a small supply for Raspberry Pis and WiFi hardware that can be used for projects.

Additional hardware needs should be discussed with the instructor.