

## COURSE PROJECT

### *Preliminary Description*

This document is intended to give general suggestions for the course project. Students have the freedom to submit any reasonable proposal. Students are encouraged to select projects that they find interesting and that they are qualified to undertake. The following is a list of suggested project types:

1. An actual implementation and performance analysis using the TelosB sensors. This would involve a real Wireless Sensor Network (WSN) and include performance measurement and possibly implementing a Power Aware MAC protocol.
2. A simulation study of a WSN that runs using Contiki. This simulation project would use the publically available Cooja simulator.
3. An empirical network performance study where the students use existing tools to measure and evaluate some aspect of network performance on a LAN or on the Internet. **Given the emphasis of the course, I strongly encourage a measurement project that involves wireless LANs or WSNs.**
4. To utilize an available simulation tool to do an extensive analysis of some aspect of computer networks. The **ns-2 simulator** has been used extensively by the WPI CC Research group. The newer **ns-3 simulator** can be used to simulate either cellular networks (e.g. 4G LTE) or a MANET. Recent CS grad students have also used the OMNET++ simulator to study WLANs.
5. A mathematical treatment of a specific problem in computer networks. This could be a continuation of an algorithm or an analysis of a network performance problem discussed in the literature. For this type of project to be acceptable the final report must demonstrate that the students have a very thorough understanding of a specific research problem and have not simply extracted the results from a paper. This type of project could be done in the context of encryption or network security.
6. To build and exercise a computer program which simulates some aspect of computer networks. Prior knowledge of simulation techniques is required for this type of project. Building a special simulator only makes sense when no currently available simulators are adequate to characterize the network of interest.
7. An in-depth research paper/term paper on some aspect of computer networks **not** covered in detail in this course. This is the least technical choice in that no programming or building of hardware is required. The paper could be of a survey nature with an extensive literature search or it can be an in-depth probe into a specific issue in computer networks.

Other types of network project proposals may be submitted but all proposals must be approved.

## Project Due Dates

### Proposal

**Due: September 25, 2013**

Each project group should meet with me to discuss potential project ideas in the first three weeks of the course. Each group must submit electronically a project proposal. The proposal includes: an explanation of the project including: expected outcomes, a description of the work to be carried out, resources needed to do the project, and a discussion of the value of the project relative to the research focus areas and to the objectives of this course.

The proposal is either accepted or returned for revision, but it is not a graded assignment.

### Progress Report or Design Report

**Due: November 12, 2013**

This report should clearly state the current status of your project. If the project involves building something (e.g. software, hardware or conducting experimental data collection), the progress report becomes a *complete design report*. If the project involves algorithm analysis or an in-depth investigation of some aspect of computer networks, this report must include a clear discussion of the problem, include the current state of your analysis or investigation. The progress report must include a **completed bibliography** (properly formatted). The target size for this typed report is between 10 and 20 pages (not counting pages with figures or diagrams).

This report will receive a letter grade based on all the standard criteria of a professional technical report (i.e., technical organization, grammar, writing style, typos/misspellings and content will **ALL** be considered). pseudo-code is **unacceptable** in a design report. Professional technical prose is expected.

Note: This report can easily be the basis for the final report. The key is to demonstrate that a sufficient amount of work has been done at this point.

### Project Presentation

**Due: December 10, 2013**

Each team will give a PowerPoint presentation of their project. More details on the expected time length for these presentations will be provided once we know the final class size.

### Final Project and Report

**Due: December 20, 2013 at 4 p.m.**

The final report should be a well-presented technical report discussing your project. If your project is primarily a programming effort, you should explain how the program works, give specific sample runs and analyze the results using appropriate graphs and tables. You must turn in a hard copy of your program which must conform to standard commenting expectations. **The analysis of results is the most important component of the final report.**

The final report may include parts of your progress report. The written report should be 15 to 30 pages in length. You **must** turn in your graded progress report with your final report. If the group feels a live demo would help explain the project, then a live demo should be scheduled on or before December 20<sup>th</sup>.