Term Project Information

The course project is a project related to any aspect of wireless sensor networks. The project can be defined as an implementation of a technique on available hardware platforms in the WSN Lab, or a simulation and analysis project with an objective to define and evaluate system design for a specific WSN application. Defining a project that includes original research is highly encouraged. Since the largest portion of the course grade will be based on the project, the amount of time to spend on a project is expected to be substantial. It is therefore strongly advised that you start on defining and working on your project early on in order to have a relatively balanced project workload throughout the quarter.

Teams of two students can be formed for taking on projects that have a sufficient scope for collaboration of two people. However, the work needs to have a clear delineation between the collaborators for grading purposes.

A project proposal needs to be submitted, which should include a description of the project, its objectives, a plan of approach, a short explanation about the importance of the work (citing existing literature), and in case of a collaborative project, a description of how the work would be divided between the collaborators. Both the project proposal and the final project report must have separate sections written by each of the collaborators describing their contributions.

Project ideas need to be approved in advance of writing the proposal. Please come see me during office hours prior to the deadline for discussing your project idea. The grading basis for the project includes credit for the proposal, the presentation, and the final report.

The credit for the project component of the course grade is a total of 45%, which is split to 10% for the proposal, 5% for the status report, 15% for the presentation, and 15% for the final report.

Deadlines and Details:

- Project proposals are due on Sunday 01/23 midnight. The proposal will be graded according to the level of detail and clarity in describing a reasonably manageable amount of work in your proposed project. A list of objectives and deliverables needs to be included, which will be used as check points for evaluating the final project report. Proper planning of the scope of the project is indeed a part of the learning experience, and you should try to keep the goals stated in the proposal at a reasonably manageable level so you can deliver the proposed results. The proposal should be about 2 pages long, and must be sent as an Email attachment to the instructor by the stated deadline. Do not forget to include a title space with the name(s) and Email address(es) of the project contributor(s).

- In order to provide feedback on the progress of the projects, a project status report must be submitted to the instructor by Sunday 02/20 midnight. The report must include: a clear statement of the problem, detailed descriptions of the technical approach, system model, work completed and preliminary results, a description of the work items to be completed, and a list of references. A typical status report is about 2-3 pages long. The project status report must be sent to the instructor as an Email attachment.
• The last two Thu sessions of the course (03/03 and 03/10) will include project presentations by students. For experimental projects, a demonstration would be expected that shows how the developed method or system works. For projects oriented towards simulation and analytical work, a presentation summarizing the work and results would be expected. Clarity and motivating aspects of both categories of presentations are important parts of the overall evaluation. The order of presentations will be scheduled by the instructor after the project status report deadline.

• The final project report is due on Sunday 03/13 midnight. A typical report would be around 10 pages long. The report must be submitted to the instructor as an Email attachment. Do not forget to include the name(s) and Email address(es) of the project owner(s) in the title space of the report. The report must include a section on motivating the project with references to published works, stating the differences or novelties in your approach and providing a summary of your results and observations. In other sections of the report, provide details about the model of the problem, your approach to the solution or comparison between the results of different approaches as applicable, detailed description of any simulations, system models and architectures, and algorithms that have been used in the project to arrive at the results, analyzing the observations, and suggestions for extensions or future work. Pay particular attention to the literature search aspect of the work, both at the time of defining the project in order to put your project in perspective relative to existing interest in the idea, and at the time of writing the final report to provide the reader with a clear understanding of how your results are motivated and related to other works.

Some Suggested Topics for Project Ideas:

• Applications of distributed low-resolution image sensors
  o System design issues, energy requirements, local processing, collaboration between nodes, networking
  o Traffic flow monitoring, achievable performance limits given resource limitations, detection and tracking, image analysis and statistical aspects
  o Node localization techniques using visual information
  o Neighbor discovery enhanced by visual information
  o Network intelligence methods and algorithms based on visual information from landmarks, beacon agents, or moving targets
  o Visual reconstruction of events based on views from distributed image sensors
  o Statistical methods for building up knowledge from observations in time and space
• Routing in wireless sensor networks
  o Various methods of geographical routing
  o Data aggregation while routing, routing methods based on optimal data aggregation
• Feasibility study – energy, duty cycle, bandwidth, rate, compression, processing load – for a particular application
• Issues with space-time sampling by randomly distributed ad-hoc networks with or without global data exchange
• Deployment of an application on real wireless motes
  o Interfacing issues, programming and testing code, networking, clustering, data sharing and collaborative processing
  o Performance analysis of a technique deployed on motes, energy consumption, tradeoffs between energy and latency, local and collaborative processing, communication schedules, duty cycles
• Location-aware or context-aware applications
• Distributed control applications