CS 284: Project Ideas

Simulation-based projects
If you choose to do a simulation project, you must create a new protocol or mechanism for doing something. You cannot simply evaluate existing protocols or do something that has already been done. Look through QualNet to see all the models that are available to you. Think about using different error models, application protocols, transport layers, physical layers, mobility models, etc.

- QoS in wireless networks
  Enhance any routing or mac layer protocol to provide quality of service metrics to VoIP or Video traffic.

- Wireless TCP
  Develop a new method for improving the performance of TCP over wireless links, either for infrastructured or ad hoc networks.

- Participation guarantees/incentives for ad hoc networks
  Develop a method by which nodes can be forced or encouraged to participate in an ad hoc network.

- Path selection criteria
  Develop, implement and evaluate different path selection criteria for on-demand routing protocols to determine under what network conditions each one gives the best performance.

- MAC protocols
  Develop a new MAC protocol for mesh networks that outperforms 802.11.

- Security
  Augment an existing ad hoc routing or multicast protocol so that it is secure against specified attacks from intruders.

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- Delay Tolerant Networks
  Develop a solution for packet delivery in a delay tolerant network and compare the performance to previous solutions.

- Sensor Networks
  Develop a localization solution for sensor networks. Use sQualnet to model sensor networks.

- Addressing
  Develop a method for address autoconfiguration in ad hoc networks, so that each node is able to obtain a unique IP address.

- Load Balancing
  Develop a load balancing solution for wireless LANs.

- Satellite Networks
  Customize any of the above ideas for satellite networks.

- Cellular Networks
  Customize any of the above ideas for cellular networks.
Implementation-based Projects

If you choose an implementation-based project, you can either create some new software for iPAQs or laptops (your own laptops), or you can characterize existing software. Part of the challenge of the latter option will be in getting the software to run on the iPAQ. You can also use our IETF data sets, or other existing data sets, to study the performance of deployed wireless networks.

- **Streaming Video**
  Develop a mechanism for supporting streaming video for video conferences to small handheld devices. Investigate the capabilities and limitations of the handheld device. You may also consider what happens when traffic congestion increases at the access point.

- **Media Server**
  Develop a media server that determines the resources of the end device, and then adapts the media stream appropriately such that the end device can process it.

- **Uni-directional Links**
  Determine the frequency of occurrence of uni-directional links. This will include a comprehensive study of different metrics that result in the occurrence of these links.

- **Application Development**
  Develop an application that utilizes the iPAQs. The application must be sensitive to the constraints and resources of the iPAQ.

- **Billing**
  Develop a mechanism for charging users of an 802.11 network. Design choices include what to charge the user for - time, traffic load, congestion of the network, etc.

- **Power Consumption**
  Characterize the power consumption of the different components of the iPAQ - screen, radio, CPU usage, etc. Examine different techniques for reducing energy consumption and investigate the performance benefit of each technique.

- **Data Analysis**
  Analyze existing data sets from deployed wireless networks to develop models of traffic, user behavior, mobility, etc. Check http://moment.cs.ucsb.edu/conan for our IETF data sets, or http://crawdad.cs.dartmouth.edu/data.php or http://nile.usc.edu/MobiLib/ for data sets from the mobility community. Develop a simulation model that captures the statistical trends.