Environmental Sensor Networking and the Internet of Things

This course has been taught since the fall of 2015. The client proposals developed within the class have raised over **$25,000** from real clients. Students have gone on to implement the networks under the guidance of Dr. Andrew Rettig. Development of the class was funded by KEEN (Engineering Unleashed).

Detailed Description of Course

Background

Rapid advances and decreasing costs in sensor technology, wireless communication, data processing speed, and data storage capacity have enabled widespread deployment of automated environmental sensing systems. Basic environmental processes can be monitored continuously in habitats ranging from very remote to urban, providing information in unprecedented temporal and spatial resolution. Although research questions that may be answered based on these data are very diverse, the design process, establishment and maintenance of most environmental sensor systems, and resulting data handling have many commonalities. Realizing that sensor networks are becoming ubiquitous in ecological research creates the need for a new set of technological skills, approaches and applications.

Expected Students

Environmental Sensor Networking and the Internet of Things (ESN & IoT) is a new course development. The class is a multi-discipline undergraduate and graduate course targeting students from the earth sciences, computer science, engineering and business.

Hands-on experience

The class is on Tues/TH with both lecture and lab components. The complexities involved in sensor networking are best learned through hands-on experiences. Students work directly with sensors (such as a temperature sensor) connecting them to embedded devices. The embedded devices are programmed to capture the data and transmit the data to a server for storage and publication. The students use these experiences to compliment the lecture components of the course. These experiences enable the students to complete a sensor networking final project, a real client proposal for solving sensor networking needs. (Open Source software is used by the students for the labs)

Resources

The Internet of Things is the most hyped technology on the planet according to Gartners Hype Cycle. The popularity of the topic provides opportunities for guest speakers.   The course often incorporates an IT guest speakers on server virtualization, a M2M (Machine to Machine) guest speaker, a proprietary sensor company guest speaker, and a computer scientist.

Structure

The class is taught in a team environment with the students consistently working together to learn and teach each other the material as well as complete the lab component. In sensor networking development, team work is an essential skill. The complexity of a sensor network creates the need for team member specialization on specific aspects of the network. A typical installation will have members dedicated towards sensors, embedded devices, servers, visualization and data analysis.

Entrepreneurial Minded Learning

Lastly, I want to emphasize the importance of EML within sensor networking. With the team approach essential within sensor networking implementations, every engineer must be able to relate their developments to the customer. Only with EML and a diverse team will a sensor networking team succeed with an applicable and innovative network.