

Project Proposal:

This project proposes to build parking garage monitor using a multi-hop routing protocol using a heterogeneous mix of sensors to track parking spot availability among other metrics. While there exist solutions to monitor parking lot utilization, they are not as versatile and are potentially cost prohibitive. Our goal is to develop an extensible system that is able to provide the same information using a variety of input sensors on an open platform. By using an open platform, our system enables us to monitor other metrics such as headlight, heat, or magnetic field detection with greater ease than existing systems. Also, unlike most existing solutions, our system will not require expensive installation and maintenance of the hardware.

To achieve this, our project will use the Collection Tree Protocol (CTP) as a multi-hop routing method. This enables a single system to monitor a large area without the need to install costly wiring or a requirement of line-of-sight communication. To have a variety of detection methods, we intend to use the expansion connector of the TelosB/Tmote Sky sensor motes. By doing this we are able to swap in and out detection methods with ease. For example, if we used a magnetometer to detect the presence of a car and the sensor failed it would be easy to swap out the sensor for a new one or an alternative sensing mechanism. On the collection end, we intend to aggregate all the data into an easy to read/interpret interface. This is important because we need to present vehicle operators with a quick intuitive knowledge of where they should go for the quickest parking spot to reduce physical congestion. By monitoring the duration of parking space use, it would also be possible for a parking attendant to be notified when a person has remained in their space for too long.

This project will require at least 4 TelosB/Tmote Sky sensor (1 for the base station and 3 for detection and building an non-trivial routing topology). We would also like a MicaZ with the MTS310CA (magnetometer) sensor board, to test vehicle detection with a magnetometer. Alternatively, if there is a way to interface a magnetometer with the TelosB/Tmote Sky motes we would use that in place of the MicaZ method.

The breakdown of major components is: building the sensing devices/hardware, writing and testing the TinyOS software to handle sensing and sending of data, and creating a front end to present the information as needed. If we discover any of these components is easier than others, it is easy to combine forces to develop new/better methods for any of them. There will also be a brief focus on finding what alternatives exist and how our system compares to them, which we will all participate in.

- Matthew:
- Patrick:
- Michael:
- All: