Harris 1: Intruder Detection System

Overview
The problem that Harris presented us with was to develop a portable, low power, wireless intruder detection system. The system had to detect intruders in a standard size room and transmit the data via Zigbee wireless technology to a nearby secure location to be displayed on a user-friendly interface. It was an optional requirement to have a remote disarming and notification system.

Objectives
The objective of our intruder detection system is to reliably and efficiently detect intruders in a room and transmit the data to a remote, secure location to be displayed on an intuitive user interface that sends a text to the user upon intrusion. The user interface saves and displays all useful information gathered from the sensors and can be remotely disarmed by an Android cell phone application.

Approach
- The team first schedule a site visit with Harris to further clarify the customer needs
- The most important needs involved the system being low power, narrowing our ideas
- Three concepts were developed and our current one was chosen after analysis
- In depth research was done to see the strengths and weaknesses of current intruder detections systems on the market
- The team ordered parts as early as possible to test the two most viable concepts
- The sensors node design was first modelled in Google SketchUp before fabrication
- Prototypes of the sensor nodes were built to interface with the control panel and Android application
- The prototype was tested under all reasonable use cases to verify the design
- The results were then analyzed to ensure that the customer needs were properly met

Outcomes
- The intruder detection system successfully met all of the customer needs including detection and transmission range and data display
- The sensor nodes determine number of intruders and distance from sensor node
- The control panel displays the timestamp, date and sensor data
- The user is automatically notified of intrusion via text
- The system can be armed/disarmed from the control panel through a secure login and disarmed from the Android application
- A sleep mode lengthens the battery life of the sensor nodes significantly