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CPRE 546

Final Project

**Goal:**

We wish to be able to tell the speed of wavelengths through a material by finding out what material is between 2 motes. We have 4 material which is can be: Ceramic, wood , Foam or Metal

**Design:**

#### Temperature inside testing chamber : 76 Degrees Fahrenheit

**Files Description:**

**Sender.c –**  The File responsible that loops through power levels and blindly sends radio transitions , does not receive in any manner

**Receiver.c –**  receives radio transitions and figures out what power level it is receiving on, after the power is found it calls functions in lookup.h to figure out what the material is

**Lookup.h -**  The file where all of the data we collected in the collection phase is stored, also has the function to figure out what values the current received transitions most closely matches

**Set Up/Collection/Testing :**

This project is a continuation of programming project #2. We have created three different programs ( along with other files) to achieve our goal: The first one makes the mote loop through the power levels and send messages out, the second receives the messages and process the data, and the last is the data processing function which goes through our lookup table and display what material It is going through at the current moment along with the likelihood of the other material.

We started out testing by placing 2 motes a foot apart in the Testequity faraday cage located in cover. Then we placed a material between the 2 motes and made sure it fit snuggly into the center to ensure that all the radio transition had to go through the material. We then looped through all of the power levels and collected the RSSI values for each material. Once all of the data is collected from the receiver we would put the averaged RSSI values into our lookup table.

In Testing to find the material the receiver node first reicieves the broadcast from the sender motes, then it figures out the tx level, which is used to query the RSSI values. Once the closest material of stored rssi is found to the received RSSI we can determine the likely of material. The program then will display the likelihood of the current material is.

**Observations:**

**When Foam is entered:**

3: It thinks nothing is inside

5: It thinks nothing is inside

11: It thinks wood/nothing is inside

23: It thinks nothing is inside

30: It thinks nothing is inside

**When Metal is entered:**

3: It thinks nothing is inside

5: It thinks wood is inside

11: It thinks wood/foam/nothing is inside

23: It thinks nothing is inside

30: It thinks nothing is inside

**When nothing is entered:**

3: It thinks wood is inside

5: It thinks nothing is inside

11: It thinks nothing is inside

23: It thinks foam/nothing is inside

30: It thinks wood is inside

**When Wood is entered:**

3: It thinks metal is inside

5: It thinks metal is inside

11: It thinks metal is inside

23: It thinks metal is inside

30: It thinks metal is inside

**When Ceramic is entered:**

3: It thinks nothing is inside

5: It thinks wood/nothing is inside

11: It thinks nothing/foam is inside

23: It thinks foam is inside

30: It thinks foam is inside

**Results:**

It seems that we couldn’t determine that material inside the camber. This could be for a multiple of reasons, most likely do to the fact that the motes are inconsistent in tests and that the RSSI values were to close together to determine differences.

If we were redo this experiment we would try to increase the differences between the RSSI value through the material along with trying to do thicker materials and spreading the motes out in to a large distance set. It might be that the motes are too close together that the reading are too close.

We also noticed that when we had the metal inside the cage we would get really weird results, this may be because the electrical current in the cage would cause induction onto the metal sheet causing it to produce its own current and thus making results become weird.