Deliverable 4: Test Plan

Back Breakers
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In our system we have three total subsystems; the RFID Reader subsystem, the Sound subsystem, and the Microcontroller subsystem. Each of these are on their own board, and this was done for two main reasons: one reason was that it made testing easier, and the second reason was that it would allow us to have the systems in separated locations around the backpack as opposed to all together in one unit. Each of the pieces of hardware will have headers so that we can connect the power unit and interface with the main microcontroller subsystem when required during our testing. This allows us to test and develop for each one of the subsystems independently, and once we can get each one to work, we can begin to put them together and test each integration until all three of the systems are working together.

The first system that we want to work with is the RFID subsystem that contains the RFID reader because we foresee this system as the biggest challenge for us when putting everything together, considering it requires us to engineer an RFID antenna. We are going to use an online calculator to find out how many turns we will need to get the inductance of 1.337 mH, that the data sheet describes for the reader, with the diameter, length, and wire gauge that we are using. Once we have completed the initial construction of the antenna, we will wire up the antenna to the ID-3LA and upload the code to the microcontroller to retrieve tag information from the RFID reader so that we can begin to see if we get information back. We can use a Serial.println() function to print the information that is sent back from the RFID reader to verify that it is sending what we want it to and sending in the format that we can work with. Once we can get the ID's from the RFID subsystem, we know that the RFID subsystem is working the way that we want it to. For testing purposes, since we will be using the Launchpad, we can use some of the LEDs built-in to it for testing purposes, such as seeing whether we are sending a signal or if we are doing a certain process in the code. The next step for this subsystem is tuning. The first antenna is not intended to and will most likely not be optimal, as far as range is concerned, requiring us to change the number of turns as well as the diameter to tune the antenna to better fit our needs of staying within the backpack while still getting all of the tags that are meant to be tracked. Other independent projects have taken this approach as well, using an oscilloscope and a magnet to tune the antenna, removing turns in the coil as needed. The diameter of the antenna will need to be determined by trial and error in order to get the optimal size that will give us the range that we desire.

The second subsystem, the speaker sound subsystem, will then be tested after we have our RFID subsystem working, returning the ID's of the tags that we have preset to track. We can test this system with just the microcontroller since it has no direct connection to the RFID subsystem. We will develop a program specifically to create two tones to be played on the speaker so that the user can be able to distinguish whether they have the contents that they wanted to track or whether an item is missing from the list of tracked items. Once we have connected the speaker subsystem to the microcontroller and can interface with it, we will begin to fine tune these two distinct sounds.

The last phase of the testing that we want to conduct is putting the three subsystems together, creating the code that will align with the state diagram that we provided in our first deliverable. We will test the complete system with multiple cases, such as if the tags are just outside of the backpack, when a tag is missing, when an unidentified or unknown tag is inside of the pack, when all tags are in the backpack, etc., to test all of the use cases that we foresee with this product.