**8 Memo**

To: Professor Pisano

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Team: NoiseHub Team 8

Date: 04/11/2022

Subject: Final Test Report

1. **Equipment and Setup**

**Hardware:**

* Raspberry Pi 4B
* Thermistor
* Garmin LIDAR-Lite v4 x2
* Raspberry Pi Case
* Adafruit USB Microphone
* 12W USB C Power Adapter (RPI)
* Laptop (Pi SSH)
* Mobile Device (App observation)

**Software:**

* Python Scripts:
  + Lidar, mic, thermistor data sourcing and transmission
* Amazon Web Services (Backend)
  + AWS Cognito
  + AWS DynamoDB
  + AWS Amplify
  + AWS AppSync
  + AWS TimeStream
* React Native Mobile Application

**2.0 Test Setup**

Both Raspberry Pis will be turned on and connected to BU’s network. Next, the team will ensure the Lidar and thermistor are properly wired. Then, the team will SSH into both Pi’s to display real-time data and observe changes in room conditions. A member of the team will also log into AWS to view the DynamoDB tables and Timestream as data is transmitted. Finally, a member of the team will launch the mobile app in an iOS simulator.

**3.0 Test Procedure**

1. Open mobile application to view current room conditions
2. Demonstrate Lidar trip point system
   1. Two members will walk in and out multiple times
   2. The specific number being reported can be viewed through AWS Timestream and the Pi console out while SSH’ed
3. Trip the Lidar multiple times in each direction to show mobile app reported occupancy changing
4. Submit user check in to demonstrate the reported room occupancy changing on mobile app
   1. View correction variable updating in DynamoDB/console
   2. Send a “high” user feedback and verify that the graph data for headcount moves up
   3. Send a “low” user feedback and verify that the graph data for headcount moves down
   4. If max headcount changes due to feedback, verify that the change is reflected in the graph
5. Speak louder and quieter near the microphone to show mobile app reported volume changing
6. Hold the thermistor in one members hand to show mobile app reported temperature changing
7. Show data of last 24 hours in DynamoDB

**Lidar Results (75% Accuracy Acceptable)**

| Data set # | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Mobile App Display |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Expected Headcount | 0 | -1 | 0 | -1 | 0 | -2 | -3 | 0 | Accurately Updating |
| Received Headcount | 0 | -1 | 0 | -1 | 0 | -2 | –3 | 0 | Accurately Updating |

Volume Testing

| Test | High Volume | Medium Volume | Low Volume | Mobile App Display |
| --- | --- | --- | --- | --- |
| Results | 2 | 1 | 0 | Accurately Updating |

0 = Low

1 = Medium

2 = High

Temperature Testing

| Test | Increased Temperature | Lowered Temperature | Mobile App Display |
| --- | --- | --- | --- |
| Results | 75 | 70 | Accurately Updating |

User Feedback Testing

| Test | Reported Low Headcount | Reported High Headcount |
| --- | --- | --- |
| Mobile App updates on relaunch | Accurately decreased graph data and updated max headcount label | Accurately increased graph data and updated max headcount label |

**3.0 Conclusions**

Our tests from our final testing confirmed that all of our sensor systems are working at a high accuracy level. All entrances and exits during the test were labeled by the lidar tripwire correctly, even when encountered with a variety of walking speeds or rapid entrances. The audio sensors worked perfectly as well as it was able to shift to a loud noise level as we began talking loudly near the device and then quieted down. Additionally, the temperature, like always, was able to read temperatures and adjust as we held the sensor and warmed it up. All of this data was successfully populated on the mobile application, in both graphical and text form. Lastly, to test user feedback, as we submitted input that the room was busier or more idle than reported, the graphs updated to reflect this new value and a new max value was recalculated if that had indeed changed due to the feedback. Our next steps will now be to transition the system to the ECE day testing facility and scale up audio/temperature sensors for a larger venue.