Progress Report: 14 Nov 14

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Introduction

Home Air Monitor (HAM) by *Clean Space* is an addition to existing products which aim to improve the overall living conditions of users such as air purifiers and filtration systems. This device allow users to take control of pollutant levels in their living space by monitoring air intake areas and thus, prevent pollutants from entering their home in the first place. HAM differs from existing products in its flexibility and customization through the interactive mobile application, which allow users to monitor less frequented areas. It will observe several aspects of air quality including the pollutant and dust particle count, humidity, temperature, and carbon monoxide levels, and then provide alerts to the user on their mobile device when any of these areas do not meet the ideal standards. HAM will be a compact and cost efficient system that permits users to take a proactive approach to improving their indoor health.

Schedule

From initial planning meetings, *Clean Space* established the following deadlines to mark significant development stages. As of right now, the project follows the set schedule.

Development Stage 1:
24 Oct 14: Dust sensor is able to communicate with mobile application
17 Nov 14: Calibrate data from particle sensor, and work on mobile application functionality to display sensor data.

Development Stage 2:
22 Nov 14: Add carbon monoxide sensor to circuit, data can be displayed on app.
30 Nov 14: Add humidity and temperature sensor to circuit, data can be displayed.

Development Stage 3:
02 Dec 14: Complete project, and begin demo preparation.

Financials

In the beginning of the semester *Clean Space* received a total funding of $250 through the Engineering Student Society. While it was possible to apply for the Wighton fund at the end of the semester for outstanding purchases, it was desirable to keep our budget under $250 to meet our specifications of developing a cost effective system. The following table

outlines the cost breakdown of materials that have been purchased, and estimated costs of components that still need to be purchased.

Table 1.1: Cost breakdown of purchased items:

Quantity	Component	Cost
2	Sharp GP2Y1010AU0F (Optical Dust Sensor)	**$21.56**
1	Arduino Yun (Built in Wifi capabilities)	**$78.45**
1	Clear Enclosure for Arduino	**$32.83**
1	Carbon Monoxide Sensor (MQ-7)	**$8.22**
1	Humidity and Temp sensor (RHT-03)	**$11.29**
1	Test Rig : Plastic box to simulate room	**$7.20**
1	PCB Copper board 3x5 inches	**$5**
1	Chemicals for PCB	**$5**

From the tables above, our approximate total spending including the items that still need to be purchased is $169.55, with $80.45 remaining for demonstration preparation, and in the event any components fail before the presentation.

Progress

At the present time, the current state of our project is on schedule and about 70% complete. At the beginning of the project a lot of time was spent researching air quality and components to be able to build our desired system. The progress breakdown for the different aspects of the system is as follows.

Hardware Progress:

Currently all circuitry has been designed to incorporate all three sensors, but only the particle sensor has been implemented and is functional. The Arduino Yun and particle sensor are powered by an external battery pack, and testing for calibration is underway. The test rig to simulate a living space has been designed, and materials have been purchased for construction. The next step in the hardware aspect is to incorporate the two new sensors, as well as create the Printed Circuit Board.

Software Progress:

On the software side, the algorithm to calculate thresholds with regards to an enclosing area exists and has been integrated. The mobile application structure has been designed and implemented. The functionality is in place for saving sensor data to an external storage,

and the refresh button has the ability to poll for new data from the dust sensor. Currently the sensor and mobile application has the ability to communicate, with real sensor data being displayed on the app. The next step for software would be to display the data in more aesthetic ways such as in tables or graphs.

Remediation

To add to the complexity of the project, two new sensors were introduced early November. Due to the addition of a carbon monoxide sensor (MQ-7) and humidity and temperature sensor (DHT-03), shifting of the schedule was required. The decision was made to take some time out of the demonstration prep, and incorporate the two sensors instead. We will mitigate lost time by scheduling work effectively and allow parallel parts to be completed concurrently. We will also use our previous experience with connecting sensors to the mobile application, and firmly enforce the new time schedule developed. To prevent further schedule slippage, two team members will work on one task at a time, and each sprint must end with a product that is ready to be demonstrable in the event the next addition does not function as expected.

Conclusion

Clean Space is dedicated to providing homeowners with an affordable way of keeping their living space as healthy as possible. With our design of the Home Air Monitor, we focus on creating the most portable, convenient, and flexible system possible to allow the average homeowner the freedom to decide what areas to observe. By connecting alerts to a mobile device, users have the ability to monitor their air quality freely, and minimize the time and cost of maintaining a home.

As outlined in this report, our project is coming along, with research still occurring throughout the entire project. We experienced slight time schedule slippage due to the addition of two new sensors, but have a plan in place and will put in extra work to complete our project in time. Initial development has been complete, with the testing ongoing for the first sensor, and the incorporation of the other two sensors well on its way.