Home Air Monitor

By Clean Space Inc.

Team Introduction

Elaine Chiang

Chief Executive Officer

Joanne Leong

Chief Financial Officer

Peterson Poon

Chief Operations Officer

CLEAN SPACE

Presentation Outline

1. Introductions
2. Project Overview
3. Hardware
4. Software
5. Project Logistics
6. Future
7. Conclusion

Project Introduction

Observed Problems:

- —Poor air quality of indoor space
- Majority of our time is spent indoors
- Some solutions available on market can be costly

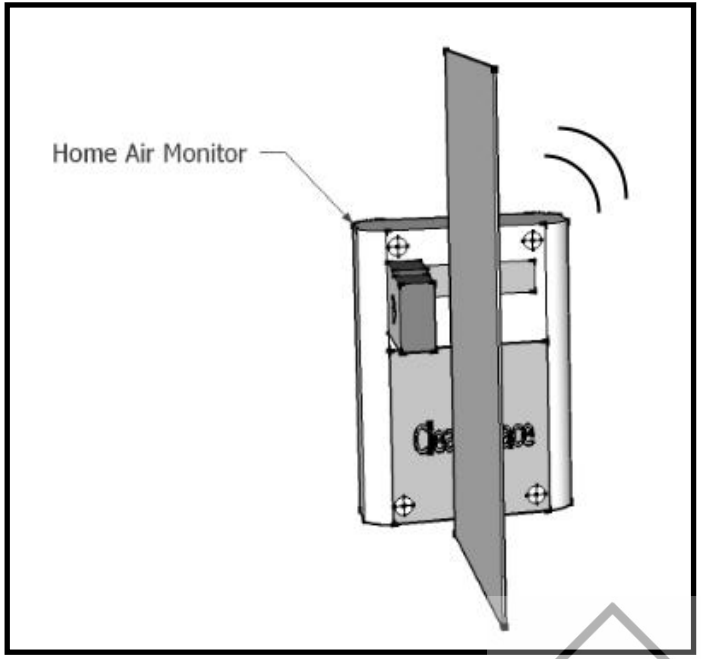
http://www.top-air-purifier-reviews.org/air-purifier-water-filter.html

CLEAN SPACE

Project Introduction

Proposed Solution:

- —Home Air Monitor (H.A. M) to observe and alert
- An aid to existing devices to improve air quality
- User control



CLEAN SPACE

Justification of Sensors

- Why monitor particles?
- Why monitor humidity and temperature?
- Why monitor carbon monoxide?

CLEAN SPACE

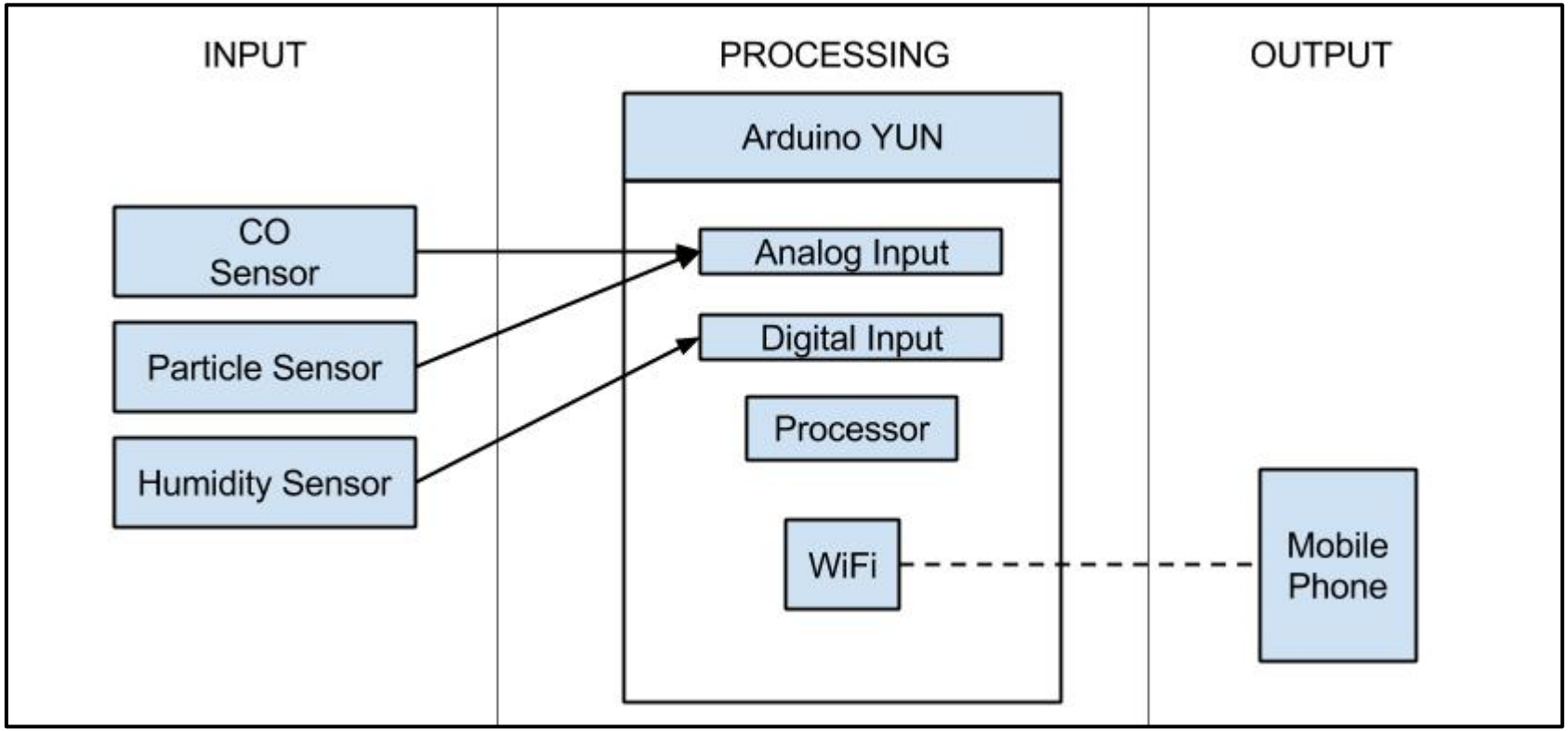
Justification of Phone App

- Mobile phones are often with a user
- Allows customization
- Live data
- Experience

http://www.bsminfo.com/doc/grocery-and-convenience-store-it-news-for-vars-january-0004

CLEAN SPACE

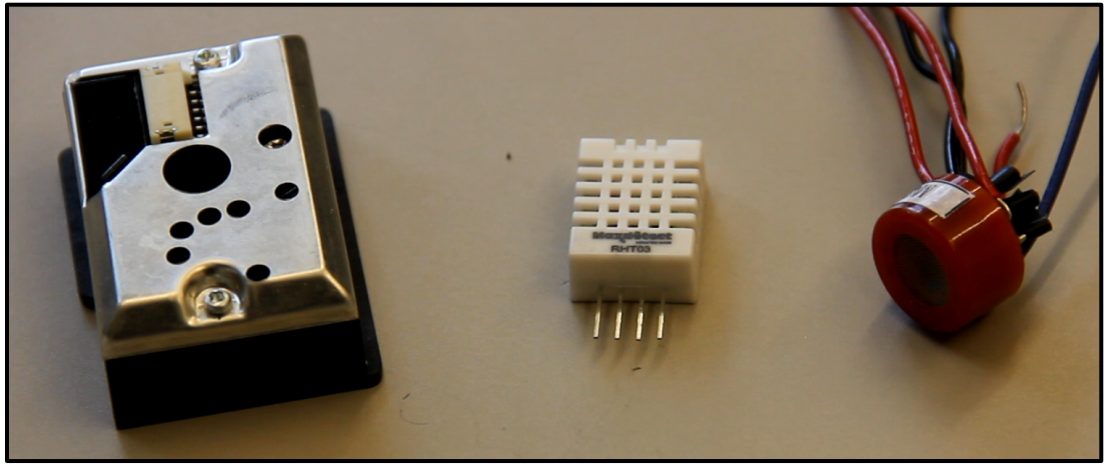
System Overview



Components of Project

Hardware

- Arduino Yun
- MQ 7 Carbon Monoxide Sensor
- Sharp Optical Dust Sensor
- RHT-03 Humidity and Temperature Sensor

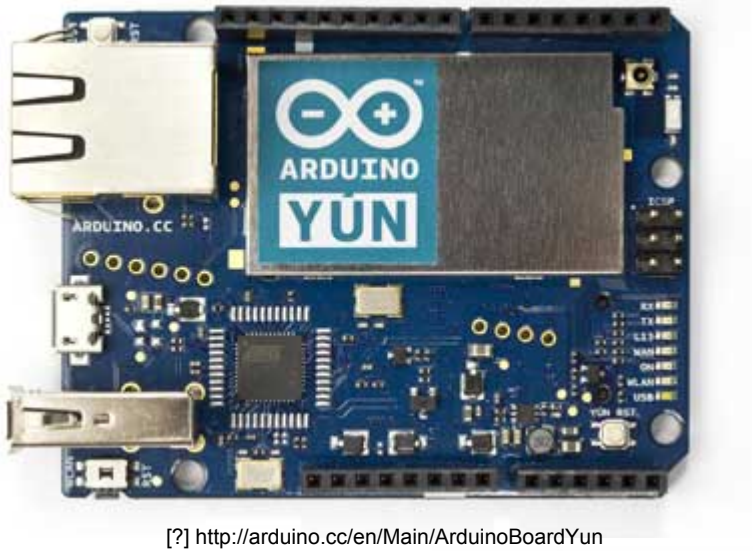


CLEAN SPACE

Hardware

Microcontroller (Arduino Yun)

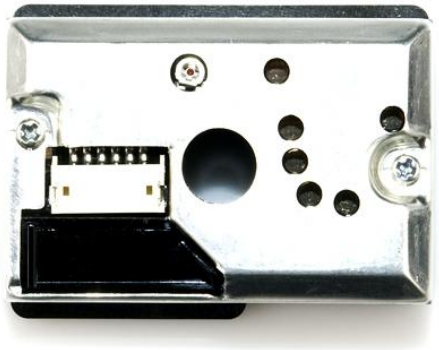
- Easy to learn and use
- Wifi capabilities
- Multiple i/o pins
  - 12 analog and 20 digital
- Open source



[?] http://arduino.cc/en/Main/ArduinoBoardYun

CLEAN SPACE

Sharp Optical Dust Sensor



https://www.sparkfun.com/products/9689

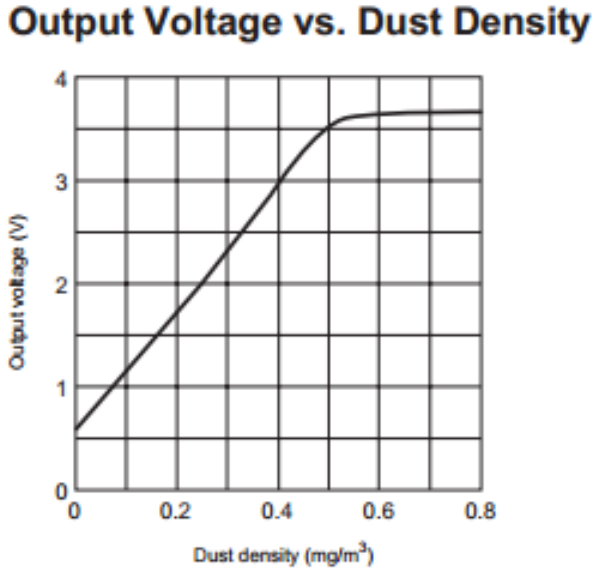
Sharp GP2Y1010AU0F

- Low cost compared to similar products
  - Dylos DC1100 ~ $200
- Analog signal returned maps voltage to measure dust density

CLEAN SPACE

Calculation in Optical Dust Sensor

1. Data read from analog pin is converted to output voltage
2. Output voltage is mapped to dust density based on specifications
3. Dust density returned in mg/m^3



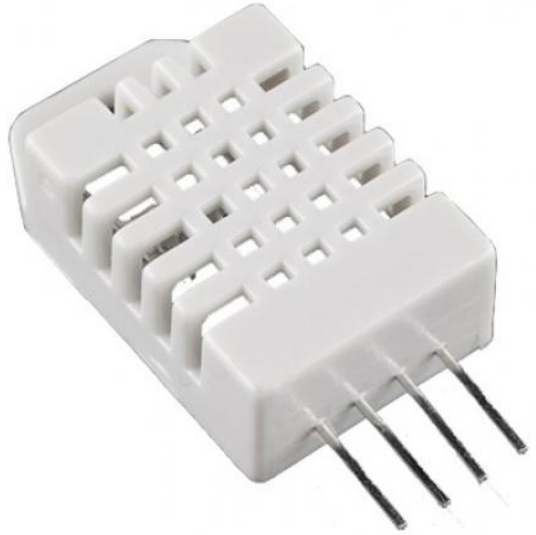
https://www.sparkfun.com/datasheets/Sensors/gp2y1010au_e.pdf

CLEAN SPACE

Humidity Temperature Sensor

RHT03 Sensor

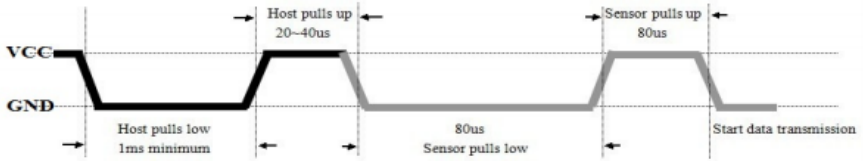
- Also known as DHT22
- Well supported libraries
- Low cost and high accuracy
  - humidity 2-5%
  - temperature +/- 0.5 degrees celsius



http://www.hobbytronics.co.uk/rht03-humidity-temp-sensor

CLEAN SPACE

Calculations in RHT03 Sensor



MCU has received 40 bits data from RHT03 as

0000 0010 1000 1100	0000 0001 0101 1111	1110 1110
16 bits RH data	16 bits T data	check sum

http://dlnmh9ip6v2uc.cloudfront.net/datasheets/Sensors/Weather/RHT03.pdf

- Arduino initiates request
- 40 bit data output
  - 16 bits to humidity
  - 16 bits to temperature

CLEAN SPACE

Carbon Monoxide Sensor

https://www.sparkfun.com/products/9403

MQ7 CO Sensor

- 20 - 2000 ppm
- Simple and small

CLEAN SPACE

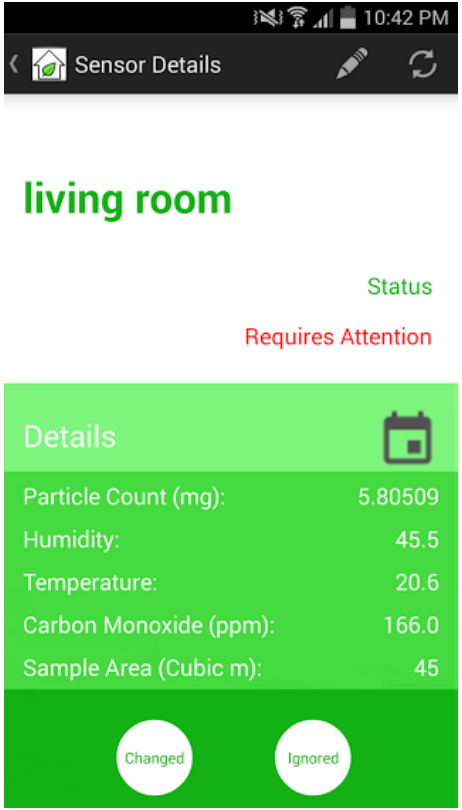
Components of Project - Cont'd

Software

- Eclipse and Android Developer Tools
- Arduino IDE
- Repository: Github

CLEAN SPACE

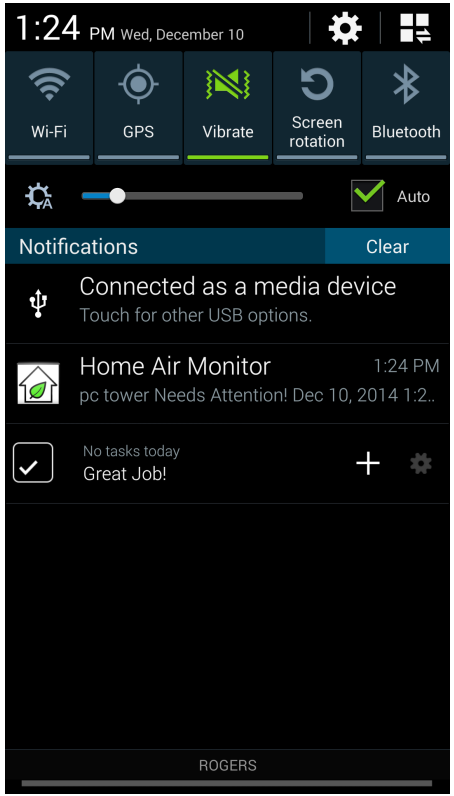
Mobile Application

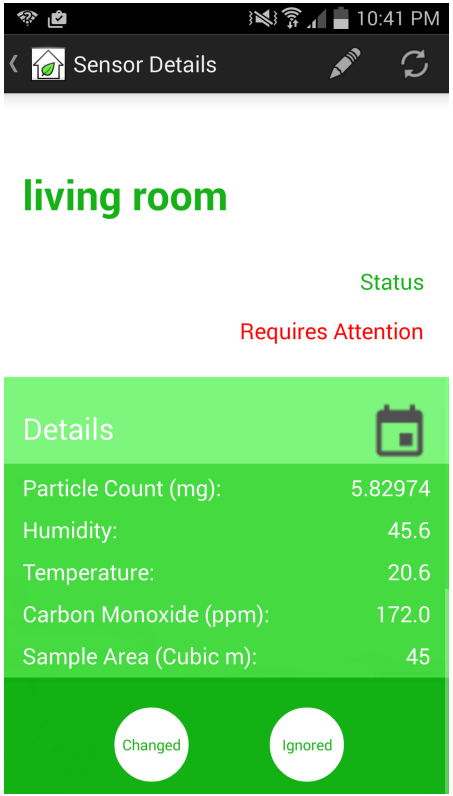


- Steps to designing a mobile application
- Things we learned from app development

CLEAN SPACE

Application Functionality

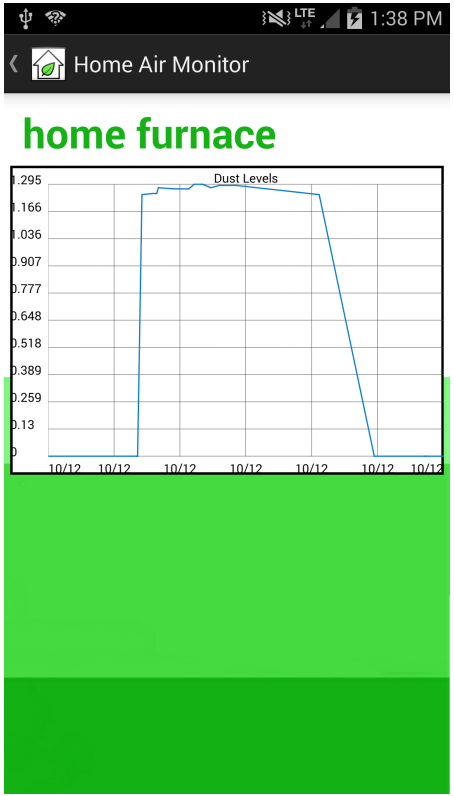




CLEAN SPACE

Graph

- Used GraphView
- Open Source library specifically for use in Android applications
- Documentation and examples were available

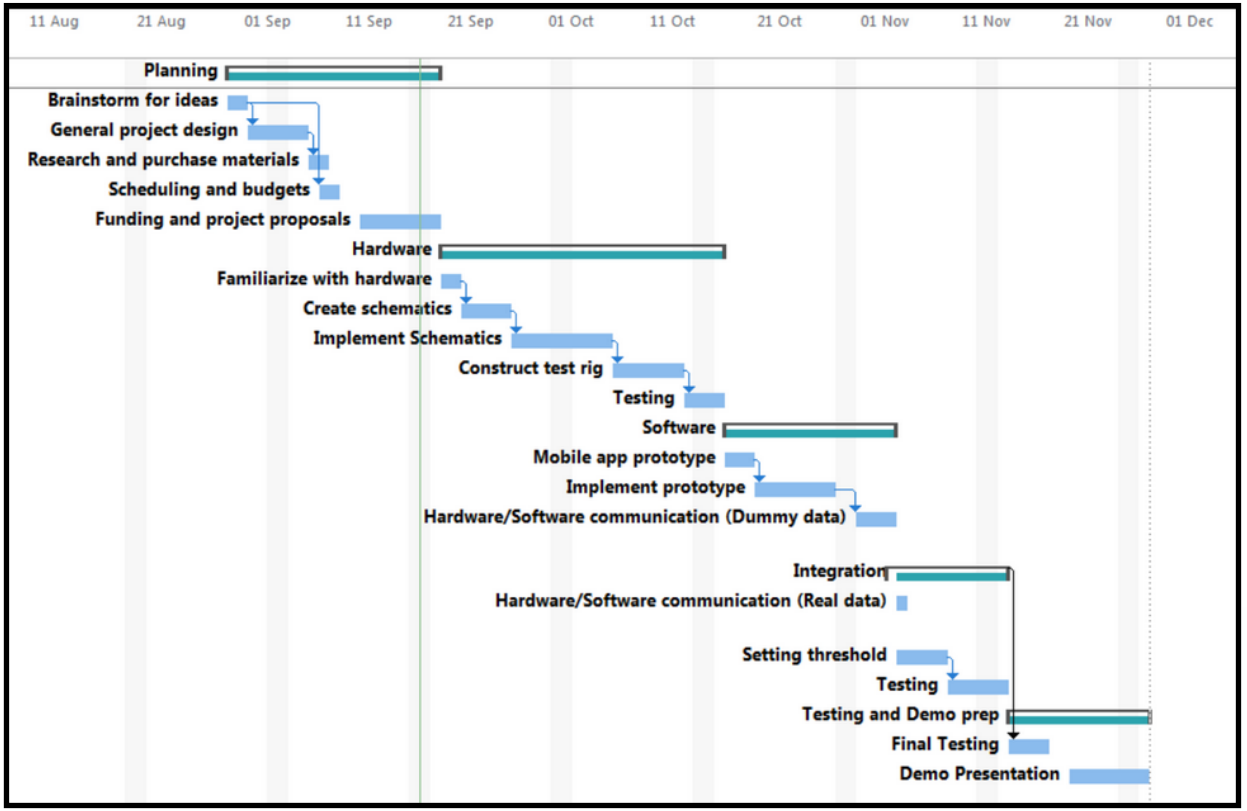


CLEAN SPACE

Project Funding

Quantity	Component	Total Cost
2	Sharp GP2Y1010AU0F (Optical Dust Sensor)	$21.56
1	Arduino Yun	$78.45
1	MQ 7 Carbon Monoxide Sensor	$11.70
1	RHT 03 Humidity/Temperature Sensor	$14.77
	PCB Materials	$33.46
	Case and other demo materials	$46.99

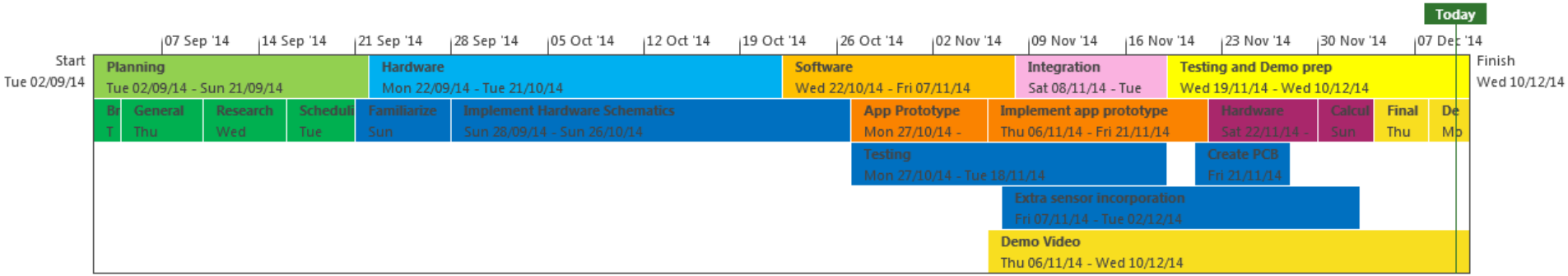
Project Schedule



CLEAN SPACE

Project Timeline

Proposed Timeline (Lighter)



Actual Timeline (Darker)

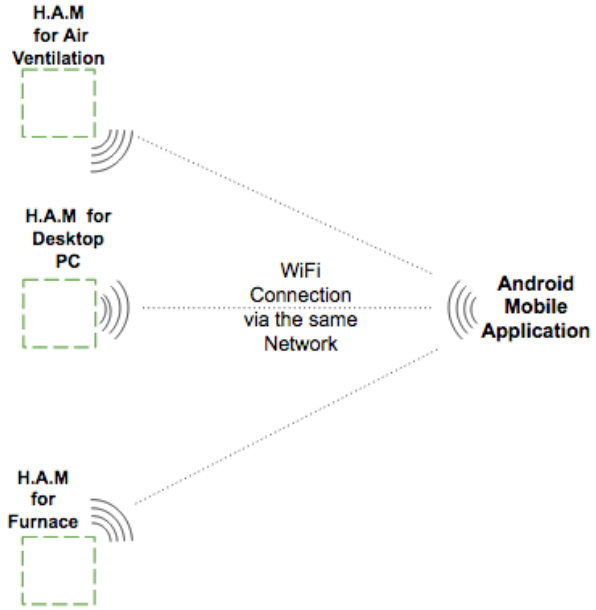
CLEAN SPACE

Work Distribution

High-Level Task	Elaine	Joanne	Peterson
Documentation Writing	XX	X	X
Documentation Planning	XX	X	X
Documentation Editing	X	XX	X
Mechanical Design	X	XX	XX
Mechanical Work	X	XX	X
Circuit Design	X	X	X
PCB Creation (Printing, soldering, testing)	XX	X	X
Sensor Research	X	X	XX
Arduino To Use Sensors	X	XX	XX
Mobile Application Design (Includes prototype)	XX	X	X
Mobile Application Implementation	XX	XX	X
Testing	X	X	XX
Administrative tasks	X	X	X
Purchasing parts, Budgeting	X	X	X

CLEAN SPACE

General Usage



1. Set up H.A.M
2. Connect H.A.M to phone
3. Load mobile application
4. Check live data for sensors
    a. Receive warnings
    b. View historical data

CLEAN SPACE

Project Future

https://www.mindflash.com/wp-content/uploads/2013/08/Improve1.jpg

- Server implementation
- Further mobile application features

CLEAN SPACE

Acknowledgements

Cleanspace Logo Design by Jacqueline Lee

Video editing by Alvin Man

DHT library by Adafruit

GraphView Library by Jonas Gehring

Fluid UI

CLEAN SPACE

Video

Questions

http://en.hdyo.org/assets/ask-question-2-fb180173e13f21ad6ae73ba29b08cd02.jpg

CLEAN SPACE