



CO₂ Software Design Review



James Beasley, Sam Beals, Andrew Greene, Joseph Kelroy

Sponsors: Dr. Andrew Richardson and Dr. Mariah Carbone

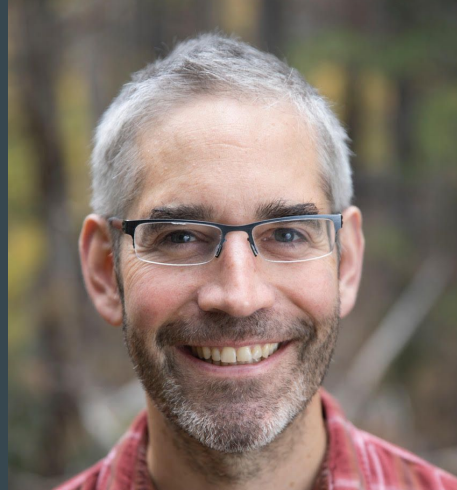
Mentor: Ana Steinmacher

Introduction

- Climate change
- Accurate data collection
- Importance of forest in carbon cycle
- Measuring respiration in organisms
- CO₂ is a major greenhouse gas

Sponsors

- Dr. Andrew Richardson
- Dr. Mariah Carbone
- Ecologist
- Study balance of carbon uptake and release in trees and microorganisms

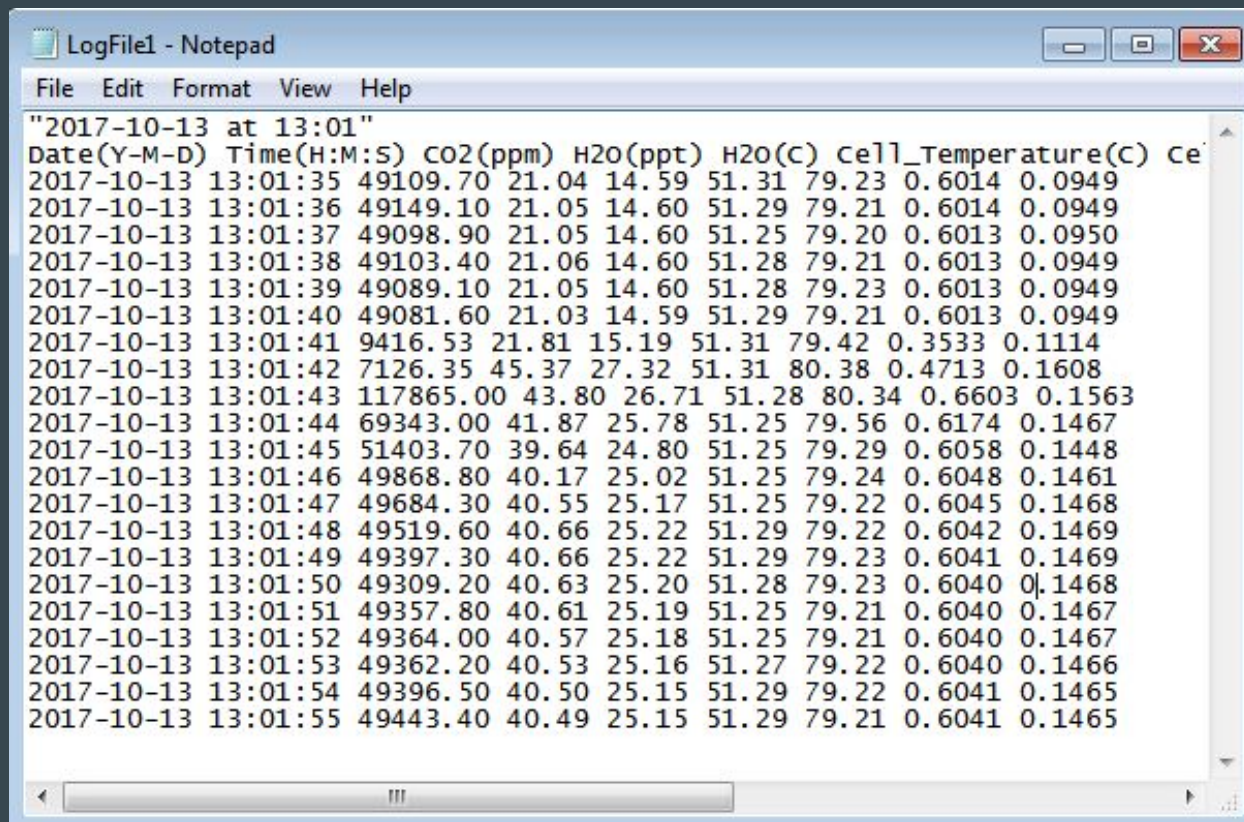


Problem Statement

- Ecology research at NAU
- Taking CO₂ readings from trees
- Current solution
 - Outdated Windows Software
 - Slow
 - Cumbersome
 - Data is difficult to read



Data Output

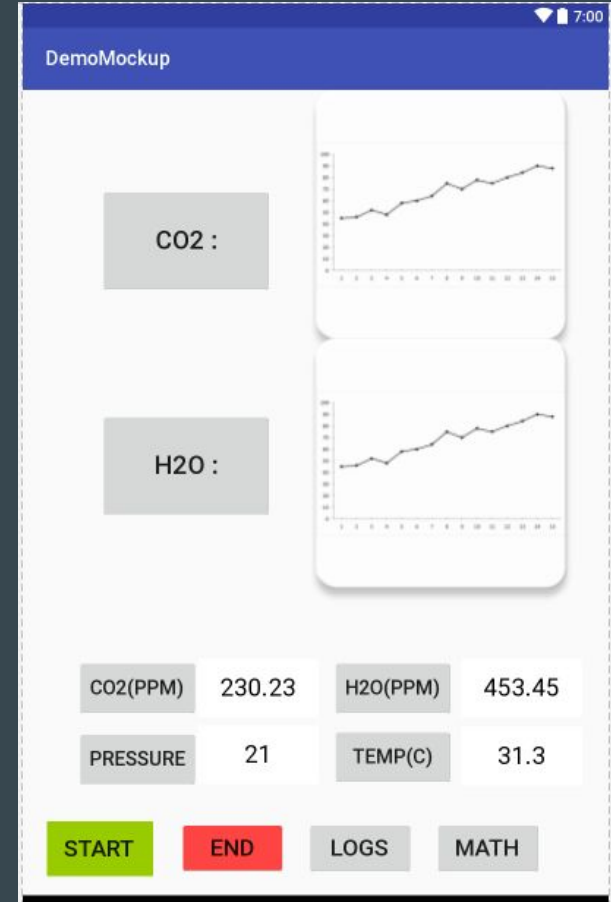


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LogFile1 - Notepad
File Edit Format View Help
"2017-10-13 at 13:01"
Date(Y-M-D) Time(H:M:S) CO2(ppm) H2O(ppt) H2O(C) Cell_Temperature(C) ce
2017-10-13 13:01:35 49109.70 21.04 14.59 51.31 79.23 0.6014 0.0949
2017-10-13 13:01:36 49149.10 21.05 14.60 51.29 79.21 0.6014 0.0949
2017-10-13 13:01:37 49098.90 21.05 14.60 51.25 79.20 0.6013 0.0950
2017-10-13 13:01:38 49103.40 21.06 14.60 51.28 79.21 0.6013 0.0949
2017-10-13 13:01:39 49089.10 21.05 14.60 51.28 79.23 0.6013 0.0949
2017-10-13 13:01:40 49081.60 21.03 14.59 51.29 79.21 0.6013 0.0949
2017-10-13 13:01:41 9416.53 21.81 15.19 51.31 79.42 0.3533 0.1114
2017-10-13 13:01:42 7126.35 45.37 27.32 51.31 80.38 0.4713 0.1608
2017-10-13 13:01:43 117865.00 43.80 26.71 51.28 80.34 0.6603 0.1563
2017-10-13 13:01:44 69343.00 41.87 25.78 51.25 79.56 0.6174 0.1467
2017-10-13 13:01:45 51403.70 39.64 24.80 51.25 79.29 0.6058 0.1448
2017-10-13 13:01:46 49868.80 40.17 25.02 51.25 79.24 0.6048 0.1461
2017-10-13 13:01:47 49684.30 40.55 25.17 51.25 79.22 0.6045 0.1468
2017-10-13 13:01:48 49519.60 40.66 25.22 51.29 79.22 0.6042 0.1469
2017-10-13 13:01:49 49397.30 40.66 25.22 51.29 79.23 0.6041 0.1469
2017-10-13 13:01:50 49309.20 40.63 25.20 51.28 79.23 0.6040 0.1468
2017-10-13 13:01:51 49357.80 40.61 25.19 51.25 79.21 0.6040 0.1467
2017-10-13 13:01:52 49364.00 40.57 25.18 51.25 79.21 0.6040 0.1467
2017-10-13 13:01:53 49362.20 40.53 25.16 51.27 79.22 0.6040 0.1466
2017-10-13 13:01:54 49396.50 40.50 25.15 51.29 79.22 0.6041 0.1465
2017-10-13 13:01:55 49443.40 40.49 25.15 51.29 79.21 0.6041 0.1465
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Functional Requirements

Our Solution will be an Android Tablet Application :

- Logging Individual Subsets of Data
 - Gas Analyzer provides live data output
 - User begins and ends logging of data stream
- Metadata
- Adjustable Data Display
 - User can toggle which values are shown
- Statistical Computation



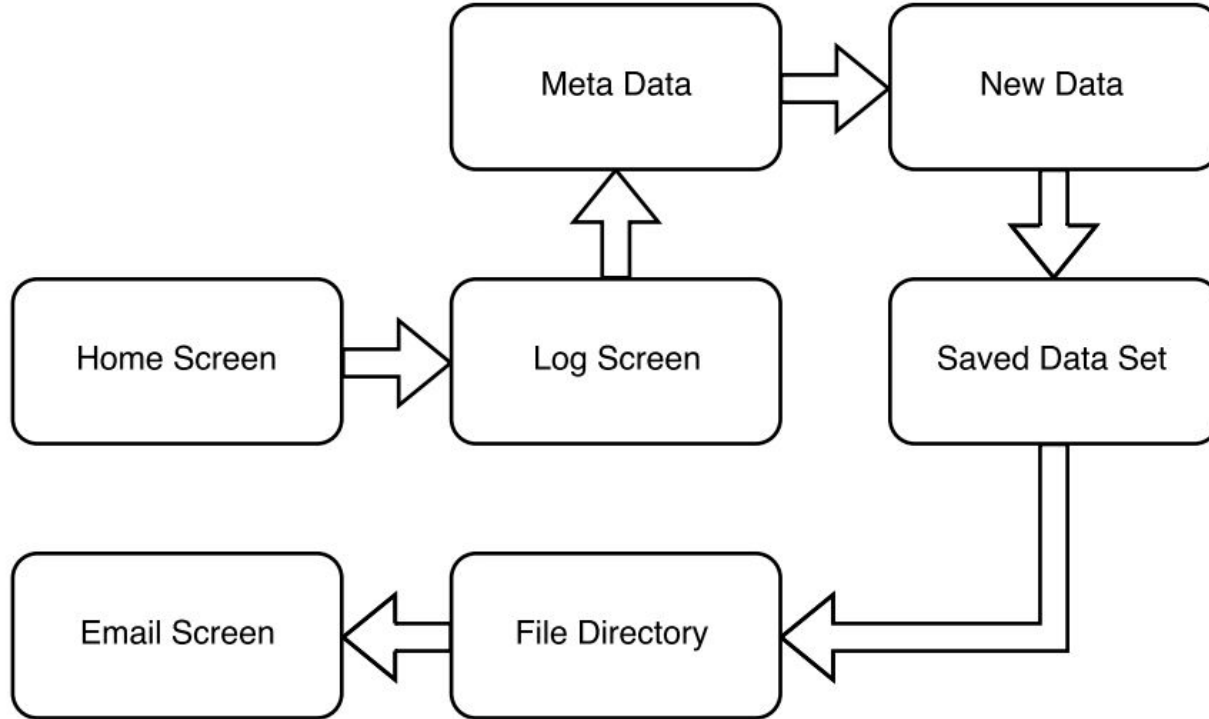
Non-Functional Requirements

- Mobile
 - Run on 7" Android Tablet
- LI-840A gas analyzer
 - Serial port connection
- Real time data reporting
 - Android GraphView Library
- Transfer readings out of app
 - Basic Email Implementation

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Date(Y-M-D) Time(H:M:S) CO2(ppm) H2O(ppt) H2O(C) Cell_Temperature(C) Ce
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Application Flow



LI-840A Gas Analyzer

- Sponsor's current hardware
- Numerical output
 - CO₂
 - H₂O
 - Pressure
- Serial to USB connection



Android Tablet

- 7" Android Tablet
- Screen real estate
- Low cost
- Simple development



Data Transferring With Email

- Ubiquitous
- Not dependent on other software
- Simple integration with Android
- Choice of email client



Distributable

- Free and open-source
- Well documented
- Apache Open-Source 2.0 License

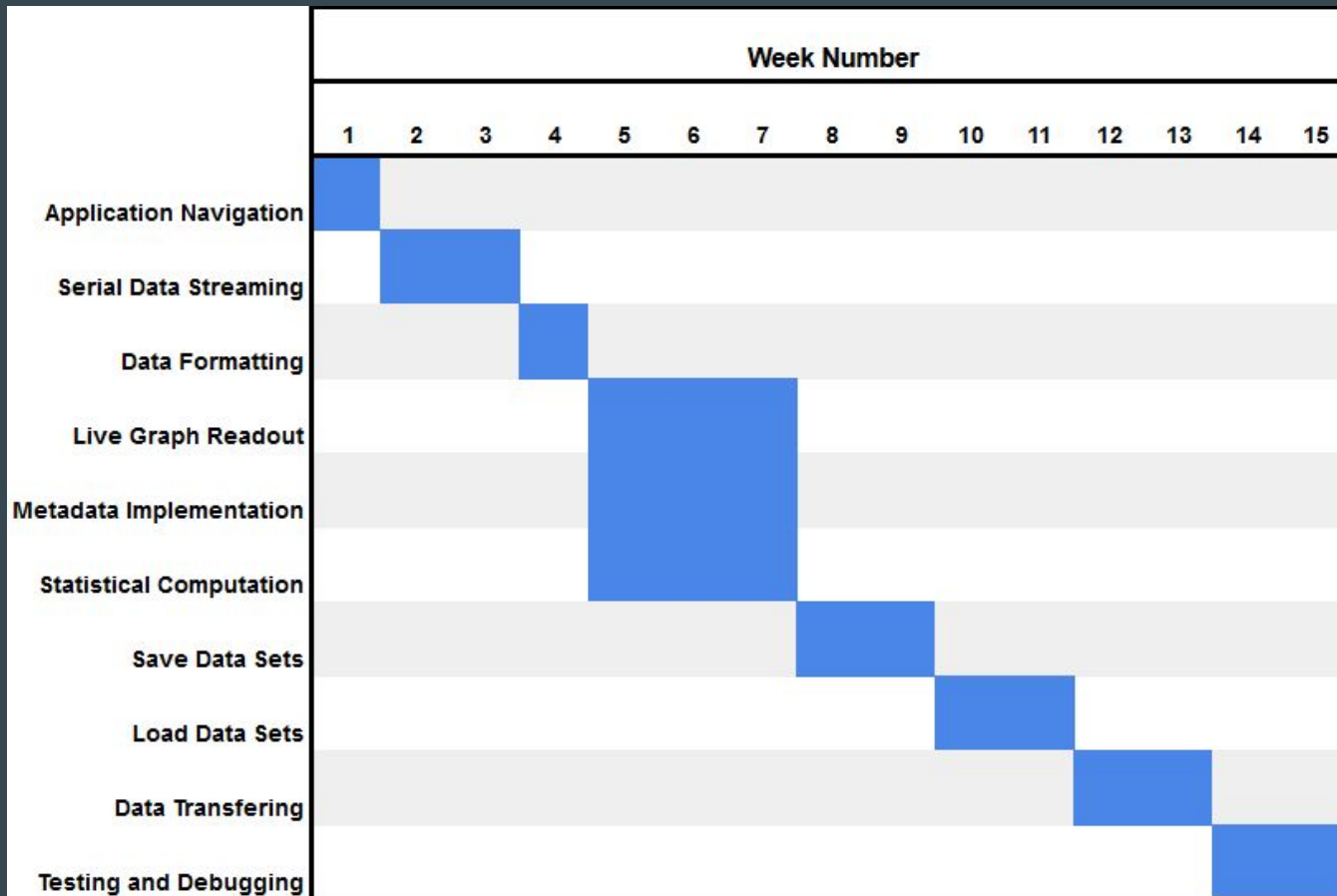
GitHub



Potential Risks

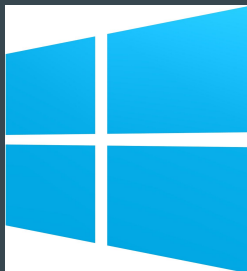
- Unable to create real-time display of the data stream
- Poor user interface
- Issues with hardware working properly

Schedule

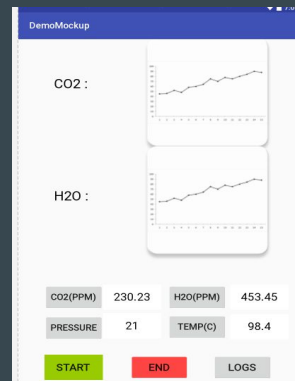


Conclusion

- Android tablet application
 - Used for ecological research
 - Replacing the old system
 - Windows laptop
 - Bulky
 - Slow
- New, more feature rich system
 - Live data reporting
 - Statistical computation
 - Portable Android device



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Questions?



Contact Information

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