WaterMainia

Cumulative Design Review

Senior Design Project

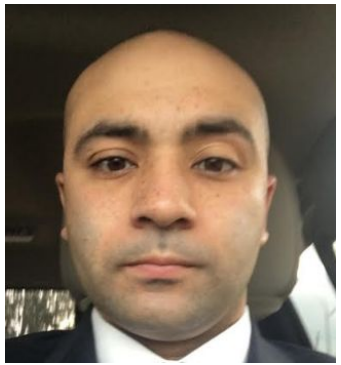
March 9th, 2017

WaterMainia

Greg Boudreau

Team Manager

Michael Moran



Jon McAvoy

Professor Hollot

Advisor

Project Description - Watermainia

Water Conservation

Water Pipe Damage

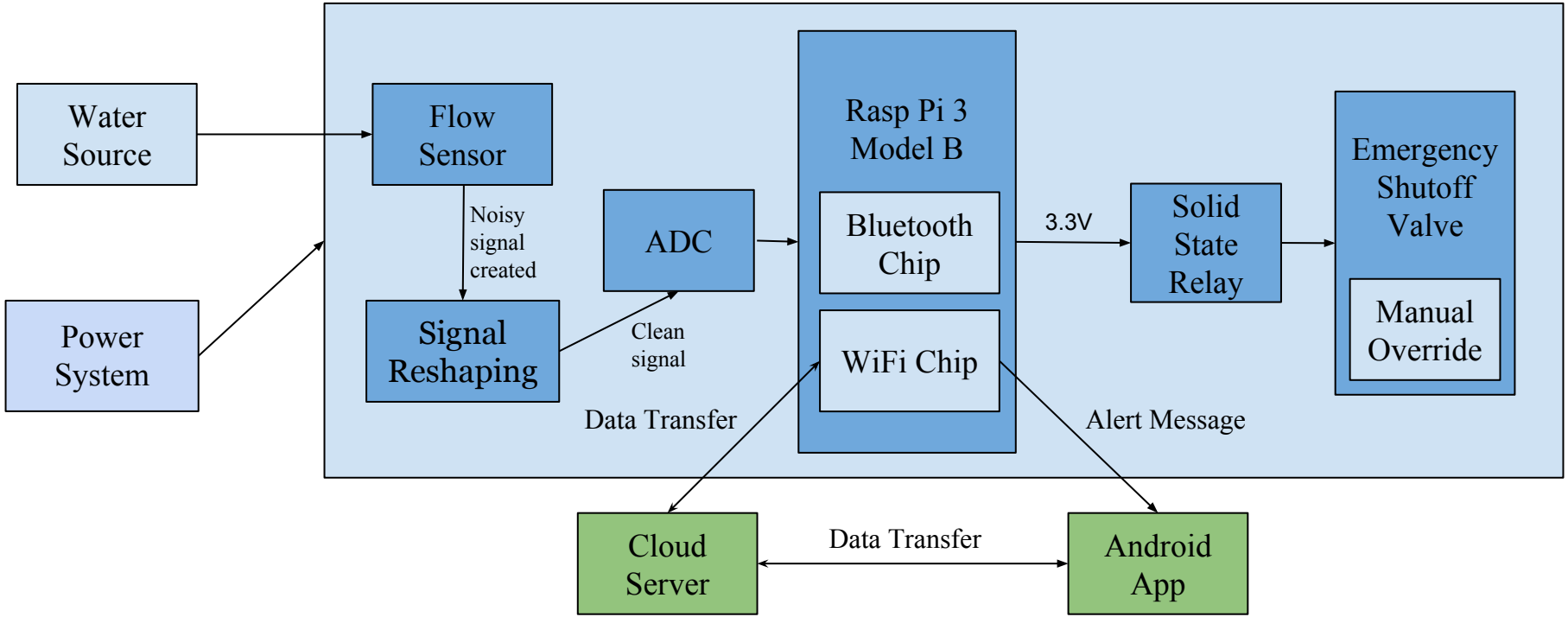
Requirements Analysis: Specifications

1. Must be implemented using 3/4” pipe
2. Water flow data is metered and recorded
3. Store data for previous two years
4. Display water consumption data in tables, line charts and pie charts
5. Close water main & notify owner within one minute from pipe burst
6. Alerts owner of any sized leaks
7. Power < 50W
8. Cost <$500 budget

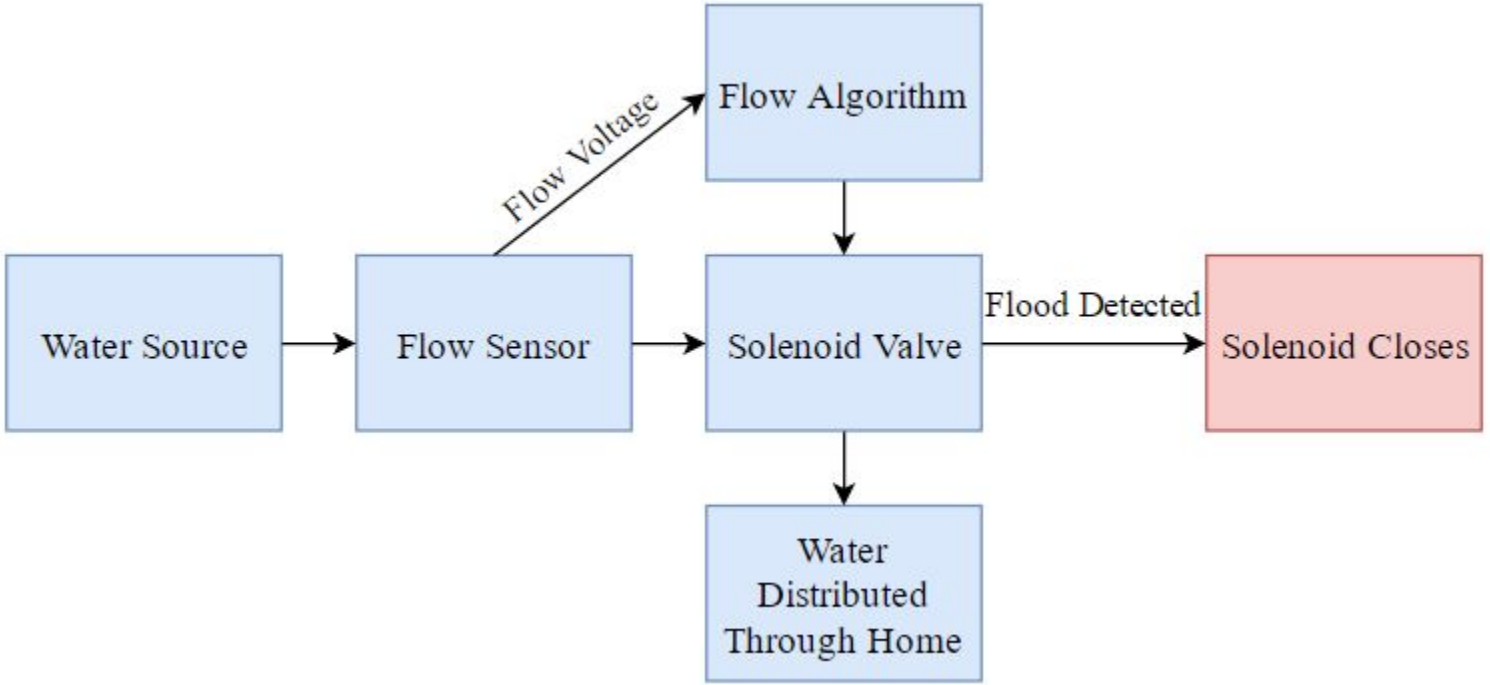
CDR Deliverables

- Fully Parametrized Flow Data
- Data Analysis
- Integrated and Compacted Design

System Structure - Block Diagram



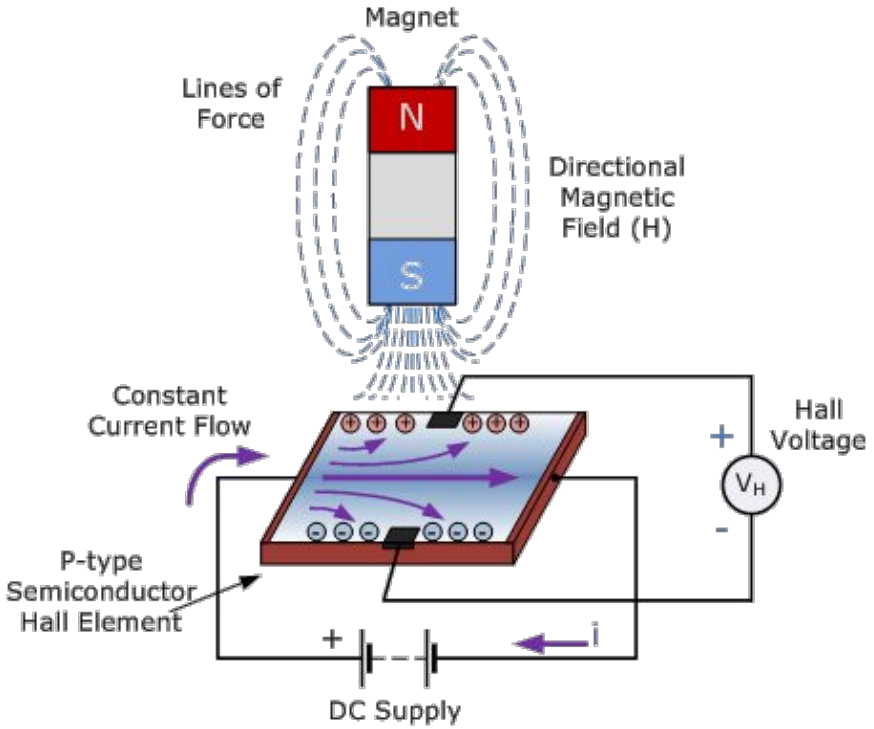
Water Flow Detection



Electric Interference

- Our usage of a sump pump in the test system created an unforeseen consequence - electric interference
- We measured extremely large amounts of unexpected voltage off the electrodes
- Our signal from the coil was completely buried under this noise

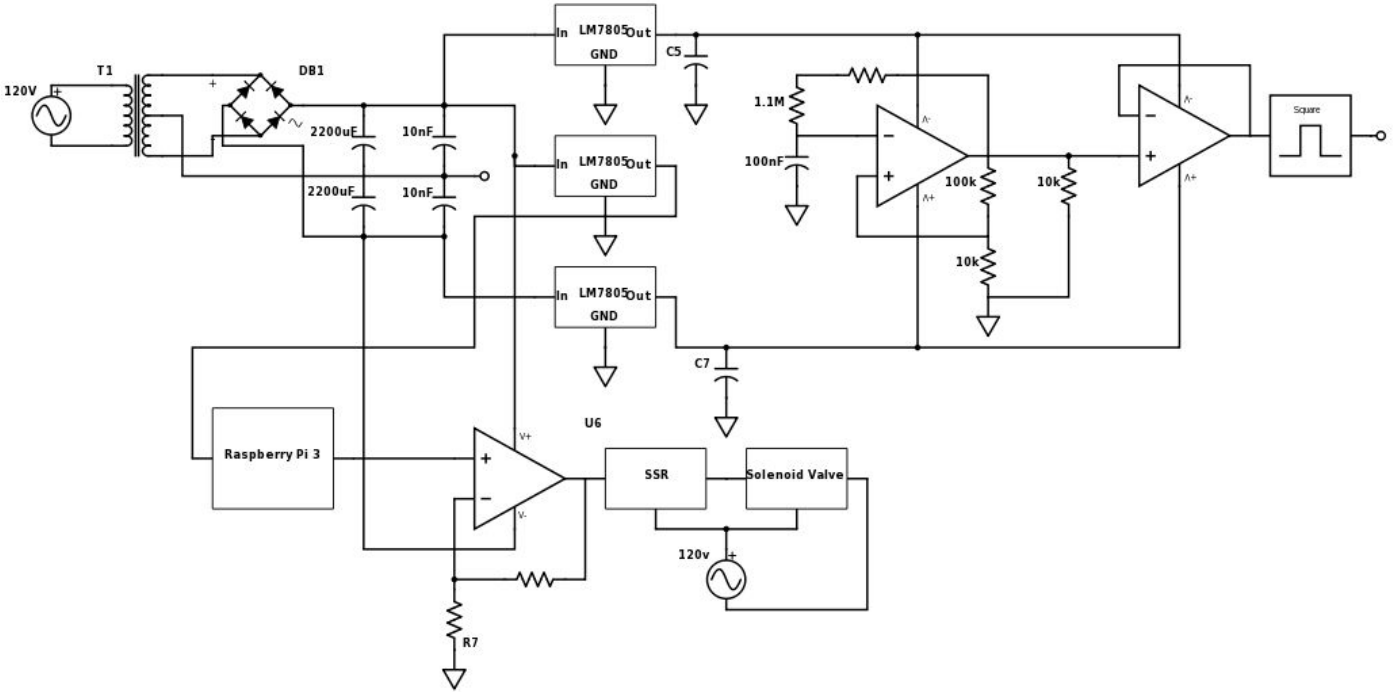
Hall Effect Sensor



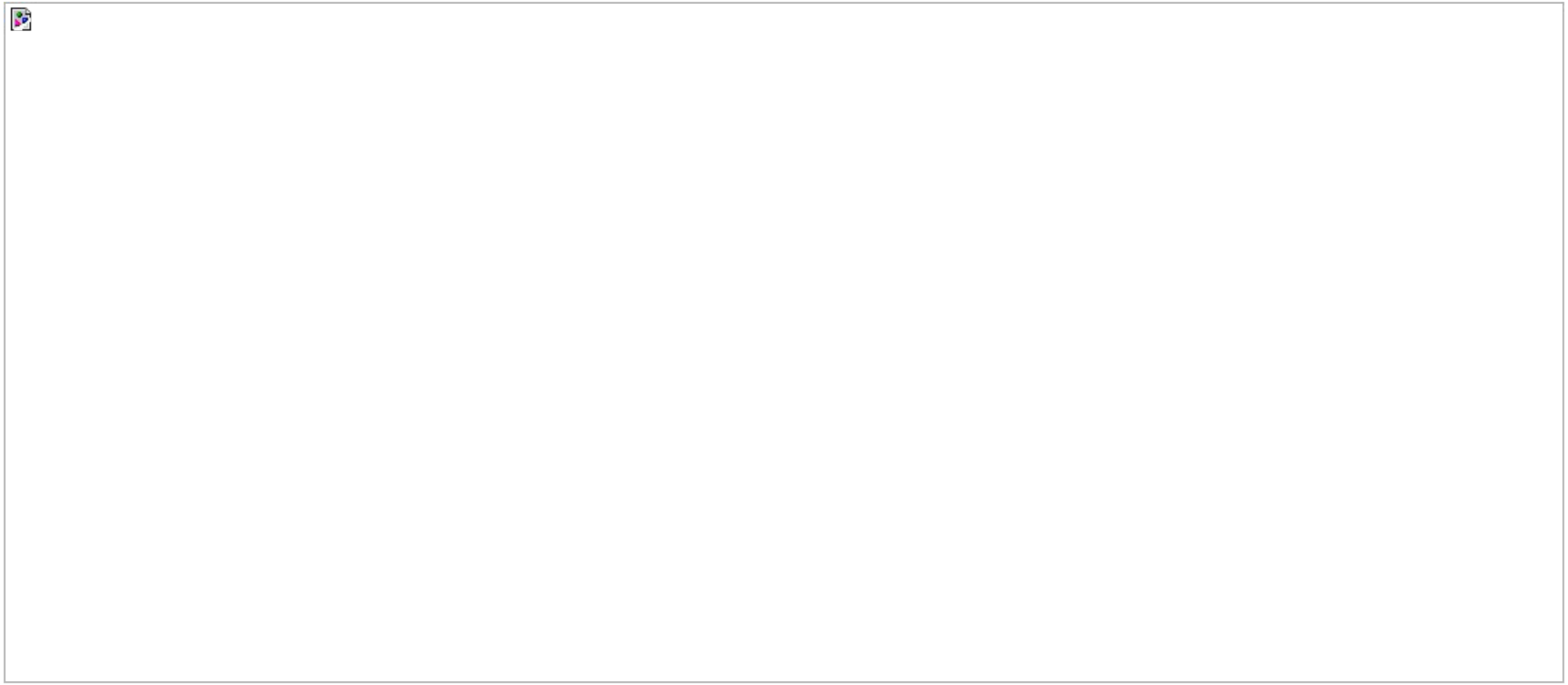
- Mechanical Flow Meter with a semiconductor attached to one fin of a turbine. On every revolution a square pulse is generated when the semiconductor passes the magnet.

Electromagnetic Sensor

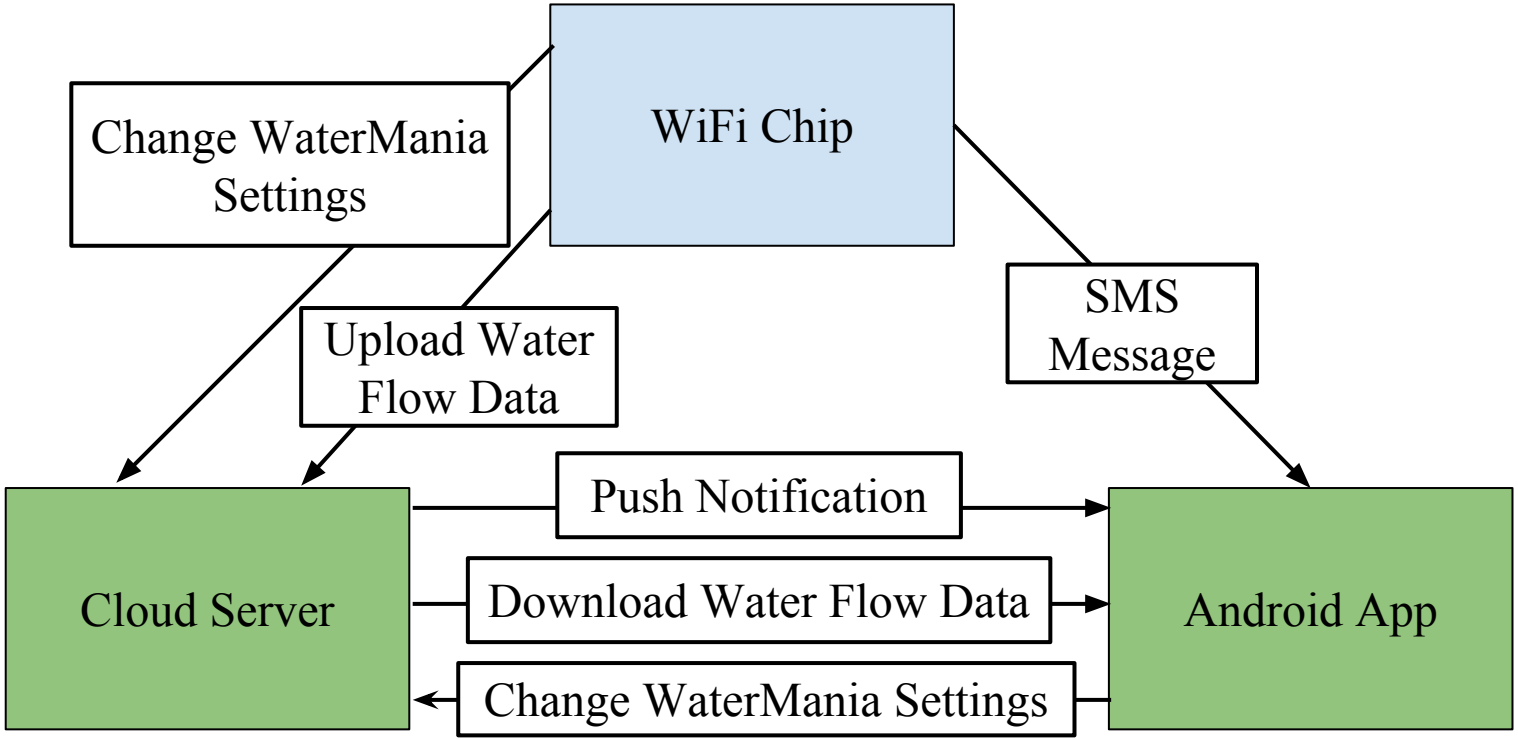
Power System



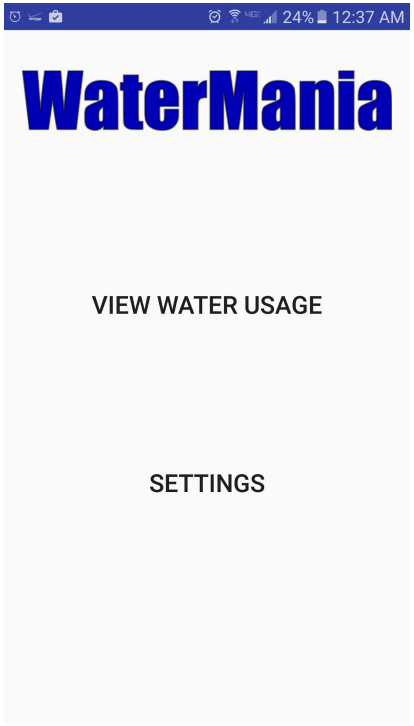
Software



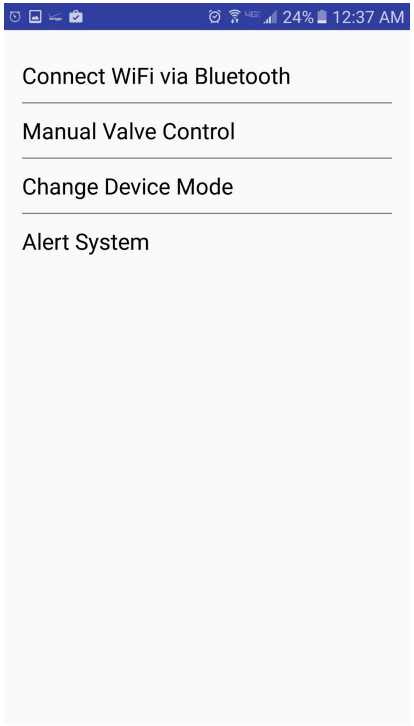
Data Transfer

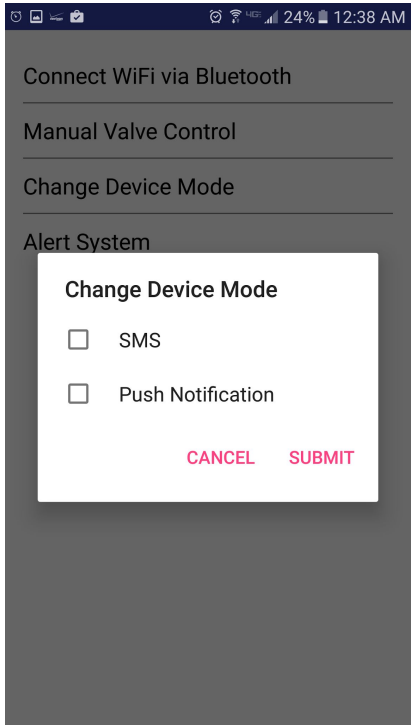


Android App


24% 12:37 AM
WaterMania
VIEW WATER USAGE
SETTINGS


24% 12:37 AM
Enter Start Date
Enter Start Time
Nov 04 2015 11 36
Dec 05 2016 12 : 37 AM
Jan 06 2017 1 38 PM
Enter End Date
Enter Start Time
Nov 04 2015 11 36
Dec 05 2016 12 : 37 AM
Jan 06 2017 1 38 PM
CANCEL
SUBMIT

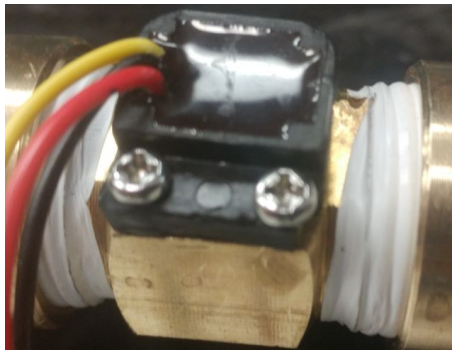

24% 12:37 AM
Connect WiFi via Bluetooth
Manual Valve Control
Change Device Mode
Alert System

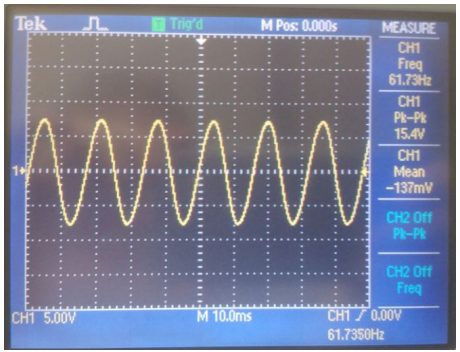

24% 12:38 AM
Connect WiFi via Bluetooth
Manual Valve Control
Change Device Mode
Alert System
Change Device Mode
SMS
Push Notification
CANCEL
SUBMIT

Project Outlook

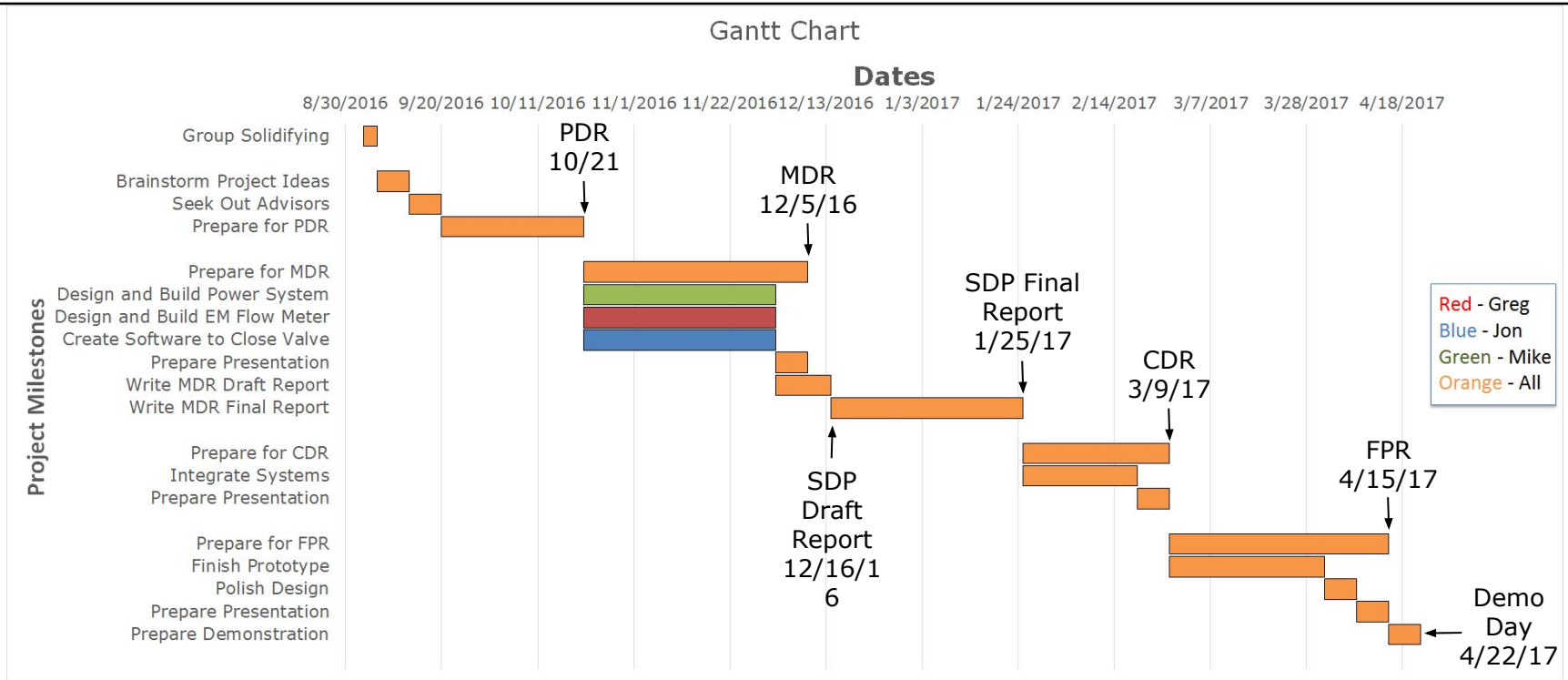
- 3D Printed (and Shielded) Enclosure
- Reduce noise from outside sources
- All analog circuitry moved to PCB
- More accurate water flow data
- Most robust data

Challenges




Tek
Trig'd
M Pos: 0.000s
MEASURE
CH1
Freq
61.73Hz
CH1
Pk-Pk
15.4V
CH1
Mean
-137mV
CH2 Off
Pk-Pk
CH2 Off
Freq
CH1 5.00V
M 10.0ms
CH1 ∕ 0.00V
61.7350Hz

Gantt Chart


Gantt Chart
Dates
8/30/2016 9/20/2016 10/11/2016 11/1/2016 11/22/2016 12/13/2016 1/3/2017 1/24/2017 2/14/2017 3/7/2017 3/28/2017 4/18/2017
Project Milestones
Group Solidifying
Brainstorm Project Ideas
Seek Out Advisors
Prepare for PDR
Prepare for MDR
Design and Build Power System
Design and Build EM Flow Meter
Create Software to Close Valve
Prepare Presentation
Write MDR Draft Report
Write MDR Final Report
Prepare for CDR
Integrate Systems
Prepare Presentation
Prepare for FPR
Finish Prototype
Polish Design
Prepare Presentation
Prepare Demonstration
PDR 10/21
MDR 12/5/16
SDP Draft Report 12/16/16
SDP Final Report 1/25/17
CDR 3/9/17
FPR 4/15/17
Demo Day 4/22/17
Red - Greg
Blue - Jon
Green - Mike
Orange - All

Watermainia - Demo

Prototype Demo

Thank You

Questions