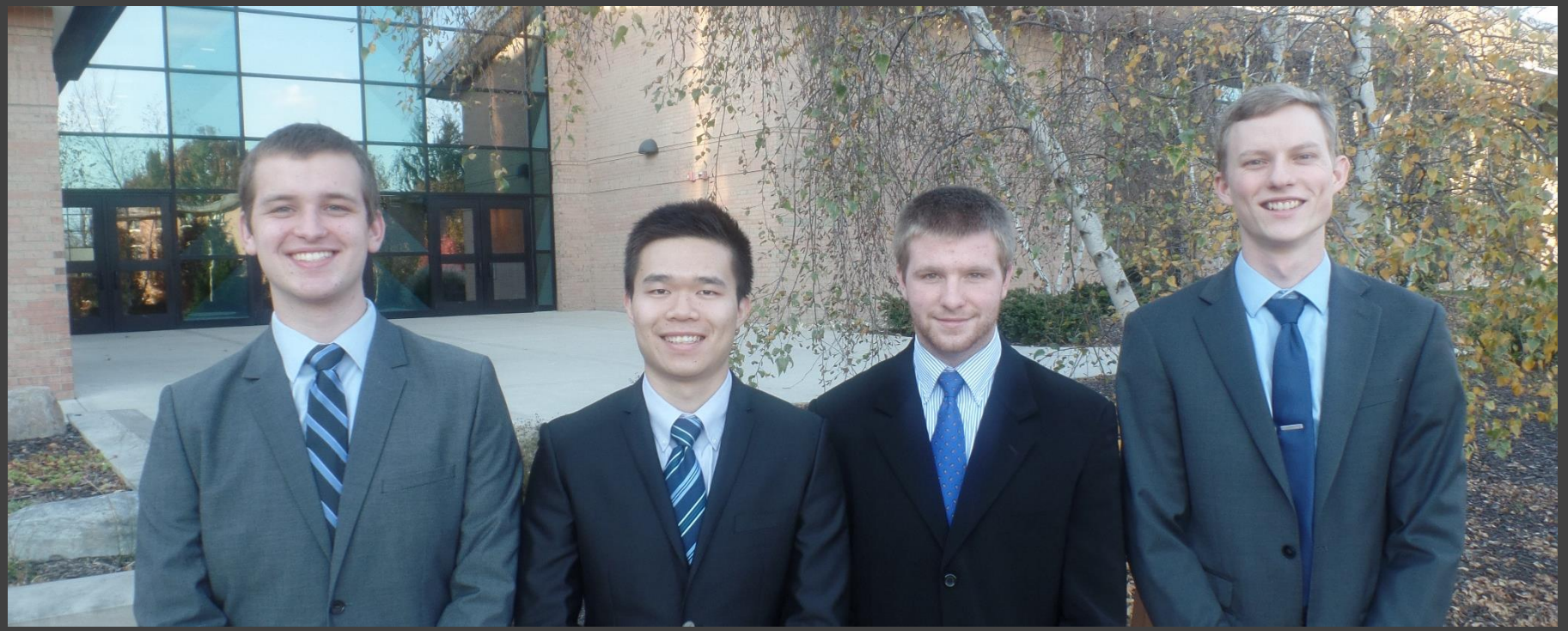
Garde*Net*

TEAM 16

JOHN CONNELL, ANTHONY JIN, CHARLES KINGSTON, AND KEVIN KREDIT

The Team



John Connell | Anthony Jin | Charles Kingston | Kevin Kredit

Overview

- The Project
- Design Decisions
- Project Highlights
- Reflections

The Project

The Problem

- Watering is a labor intensive venture
- Community gardens often have difficulties to get consistent volunteer help

Our Solution

- Automate the watering process via
  - 3G cellular network
  - Internet-of-Things (IoT)

Target Market

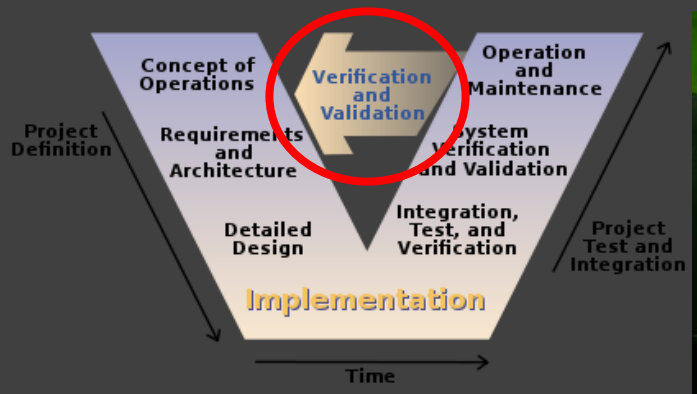
- Urban farms to community and home gardens
- Our main client is Caledonia Community Garden

Caledonia Community Garden

https://lintvwotv.files.wordpress.com/2014/06/maranda-caledonia-community-garden.jpg?w=650

Design Norms

- Integrity
- Trust
- Humility
- Stewardship



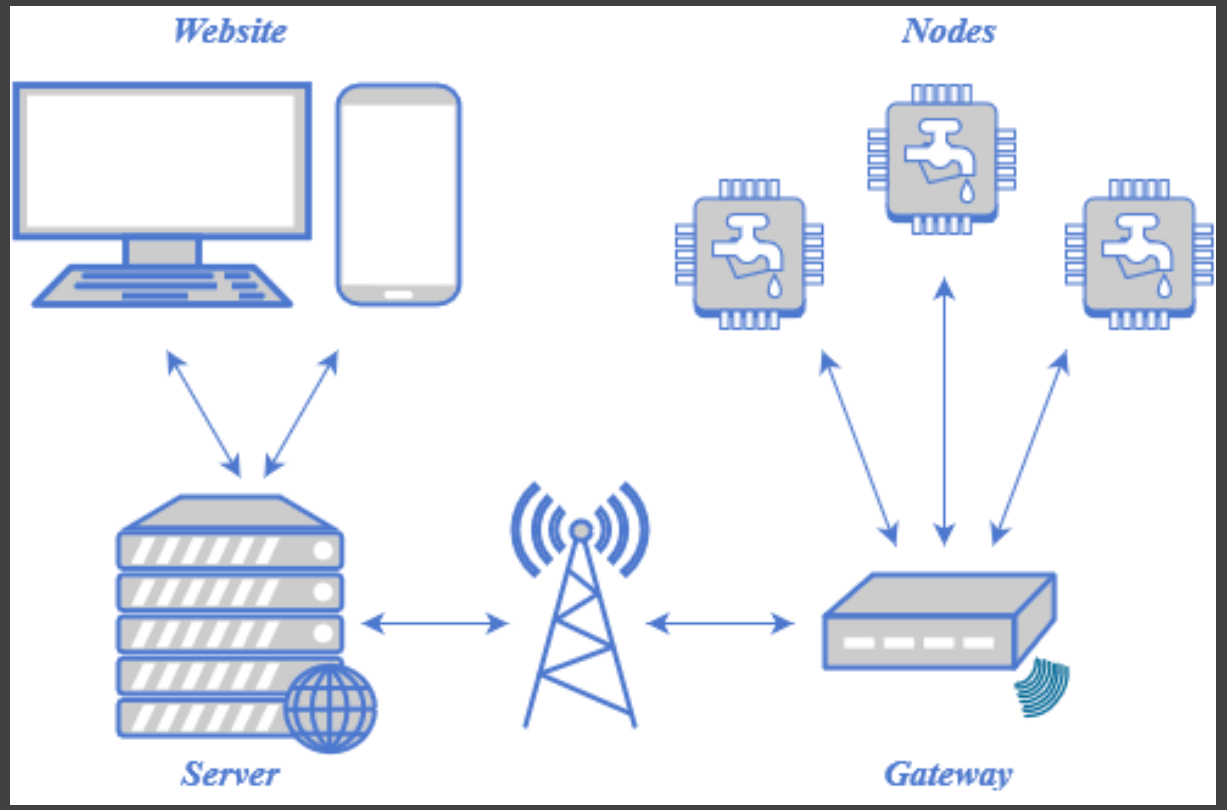
https://upload.wikimedia.org/wikipedia/commons/thumb/e/e8/Systems_Engineering_Process_II.svg/420px-Systems_Engineering_Process_II.svg.png

http://www.profitguide.com/wp-content/uploads/2014/03/outside_handshake_deal.jpg

http://audiodimensions.net/wp-content/uploads/2011/10/Control-4-lady-with-touch-screen.jpg

http://g4.img-dpreview.com/384DA42DD7B54A149394C67164F2AD16.jpg

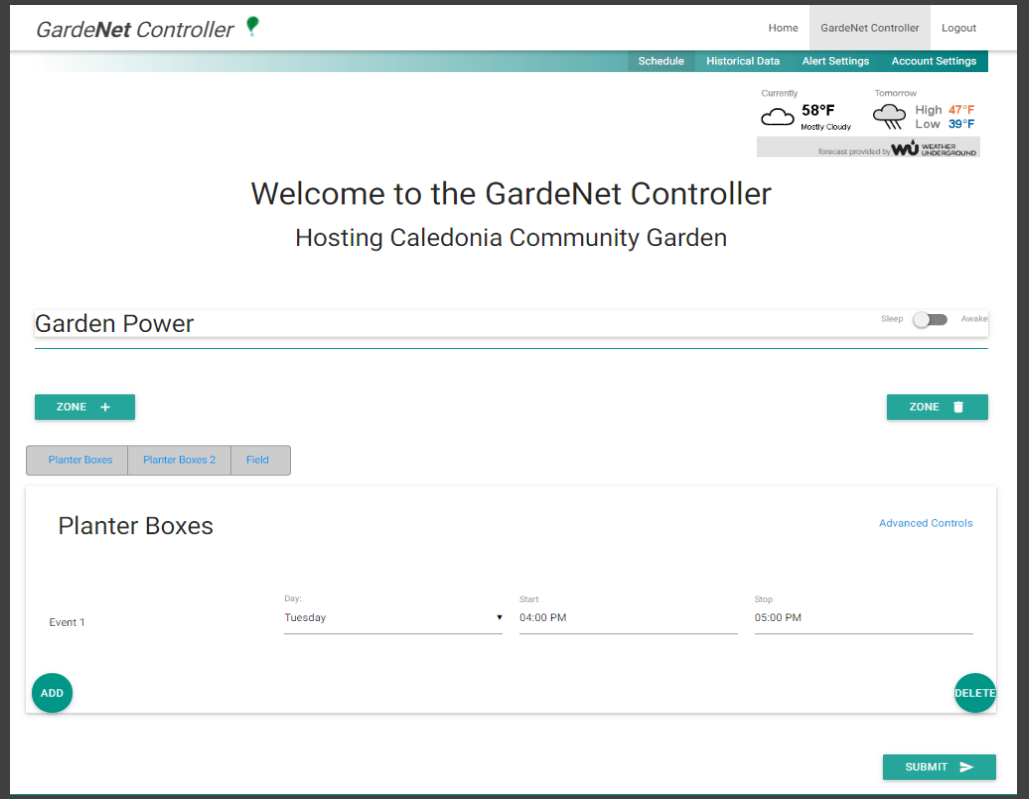
Our Design



Simplified GardeNet System Architecture

Website

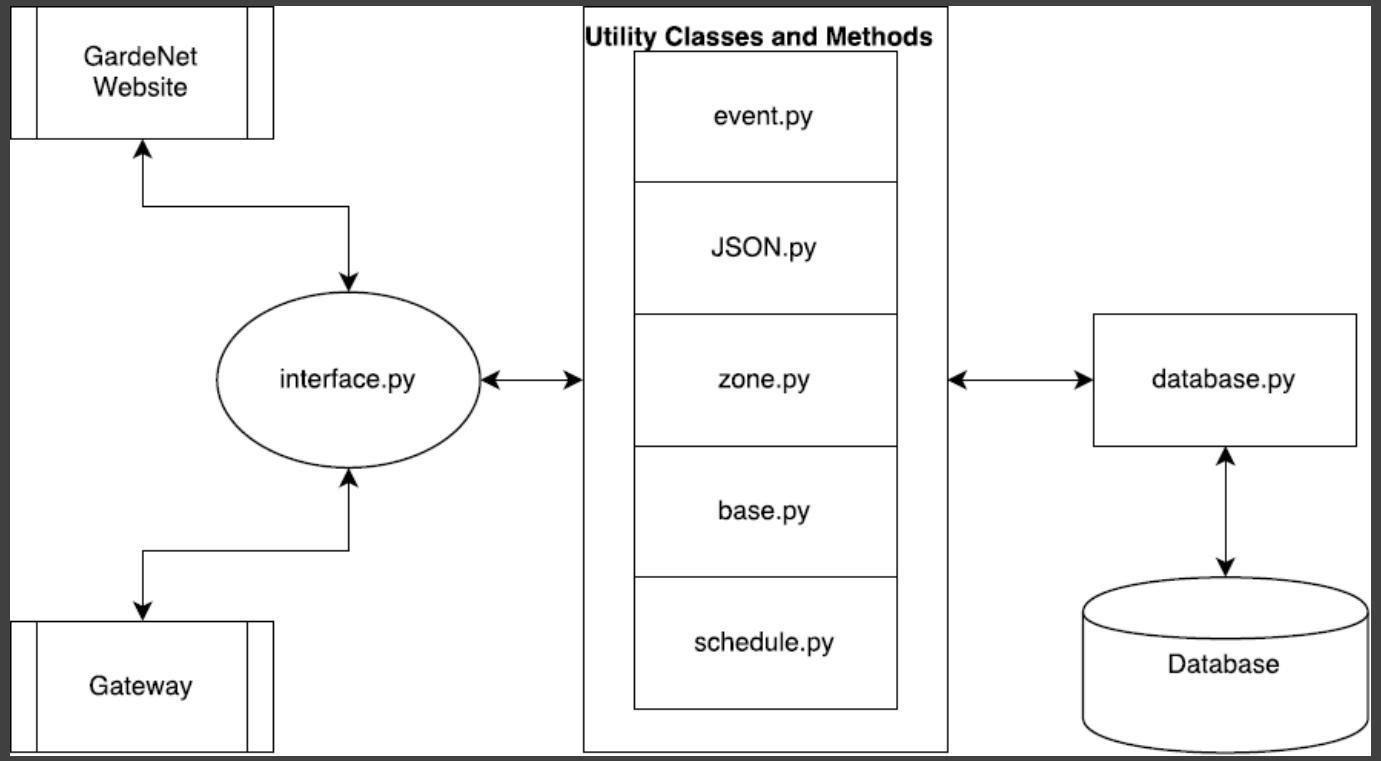
- Platform: Apache web server on Raspberry Pi
- Features
  - Dynamic scheduling
  - Set weather sensitivity per zone
  - "Public" and password protected "Admin" views
  - View historical data
  - Modify alert and account settings



GardeNet Website

Server

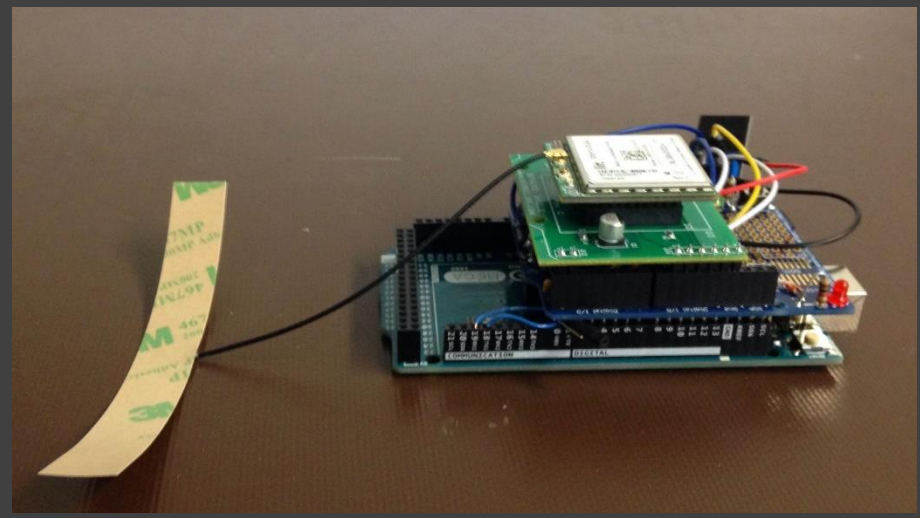
- Platform: Python server on Raspberry Pi
- Communication: Internet sockets
- Controls
  - Communication between the website and the gateway
  - Historical data
- Monitors
  - Weather
  - Garden status, sends alerts



GardeNet Server Architecture

Gateway

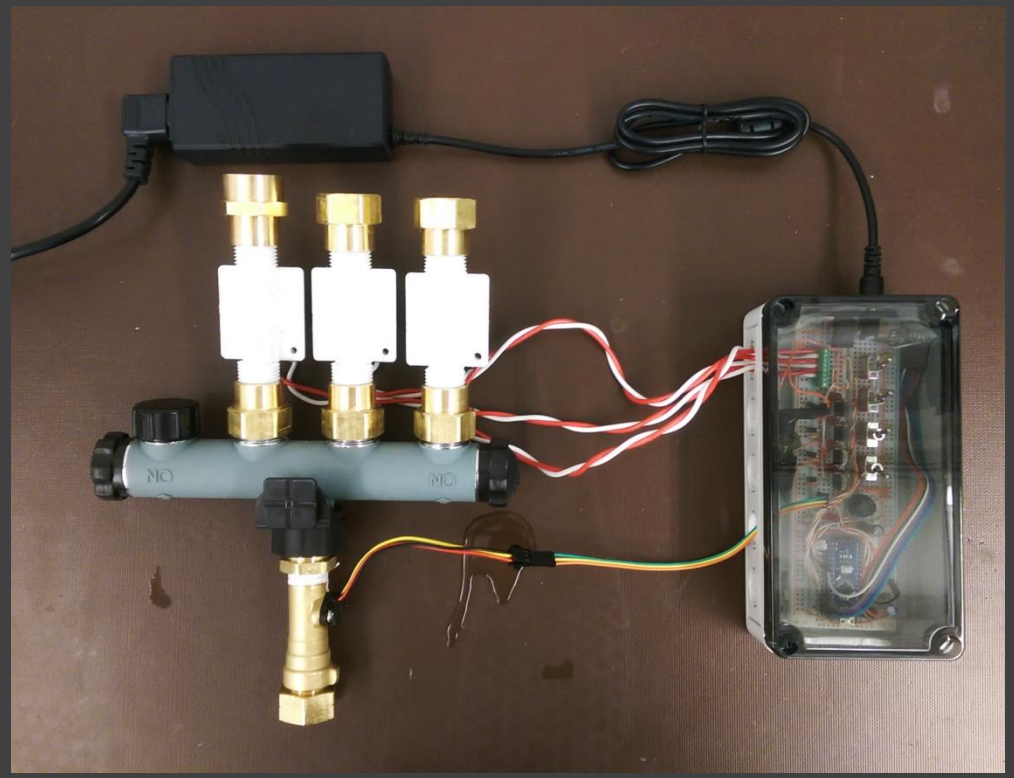
- Platform: Arduino Leonardo / MEGA 2560
- Communication
  - 3G Modem
  - RF24 radio
- Controls
  - Nodes
  - Alerts
- Monitors
  - System feedback data



The Gateway

Node

- Platform: Arduino Nano
- Communication: RF24 radio
- Controls
  - 4 valves
  - 1 flow rate meter
- Monitors
  - Input voltage level
  - Flow states
  - Communication link
- Modular
  - Up to 16 nodes
  - All programmed with same code



The Node

Final Solution

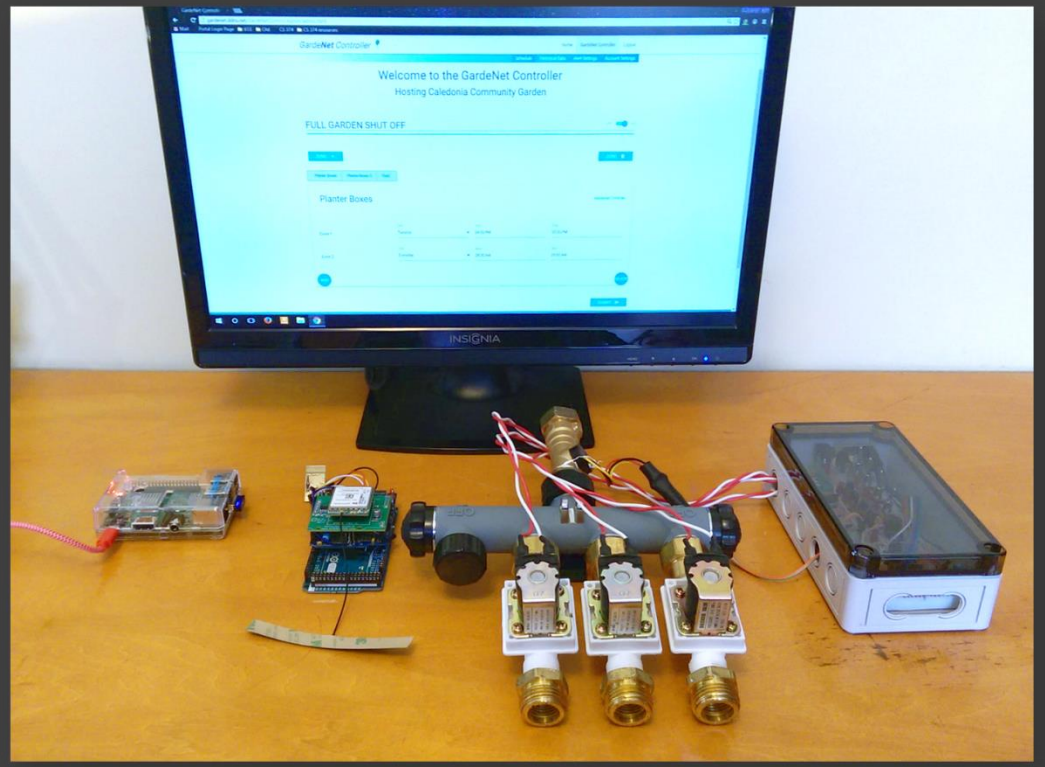
Project Highlights

Challenges

- 7 programming languages
- Exosite vs. GardeNet server
- Reliability
- Budget and time constraints

Opportunities

- Advice from experts
- Learning curve



The Complete System

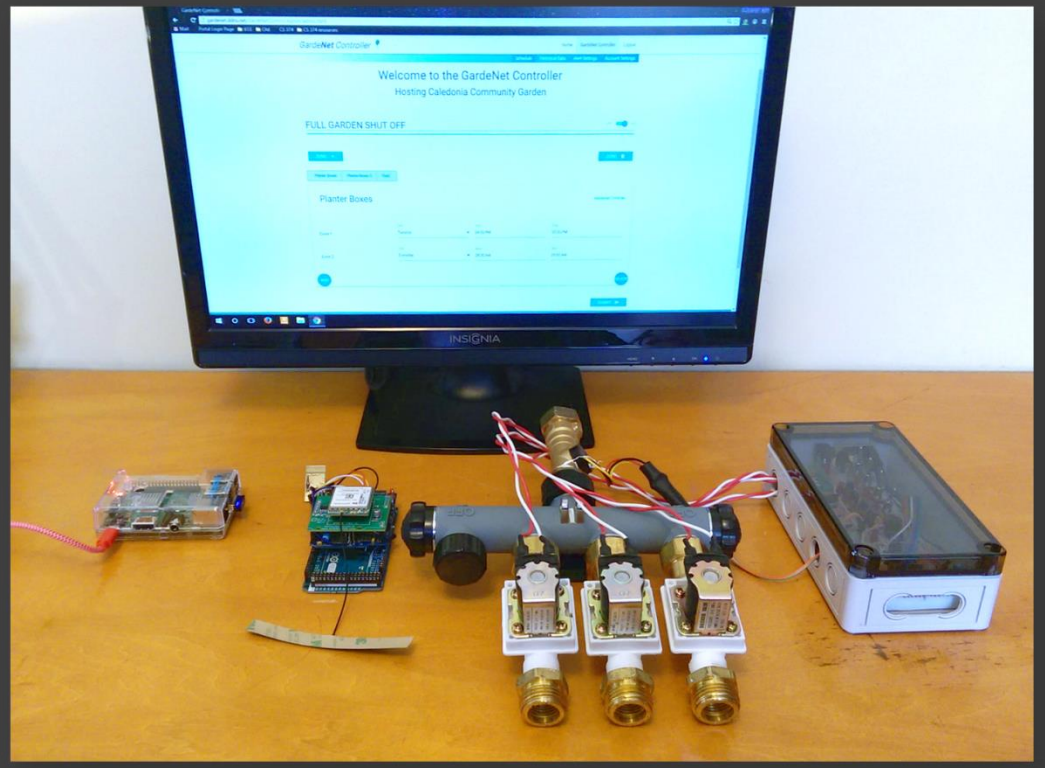
Assessment

What We Learned

- ❑ Systems design
- ❑ Web development
- ❑ Networking

Future Work

- ❑ Better onsite control
- ❑ Onsite weather monitoring
- ❑ Control lights, outlets
- ❑ Dedicated mobile app
- ❑ Support multiple customers



The Complete System

Thanks

Engineering Advisors

- Professor Mark Michmerhuizen
- Mentor Kurt Dykema
- Consultant Eric Walstra

Networking Advisors

- Professor Victor Norman
- Lab Administrator Chris Wieringa

Garden Managers

- David Benjamin of CCG
- Kyle Van Eerden of EDF

Questions