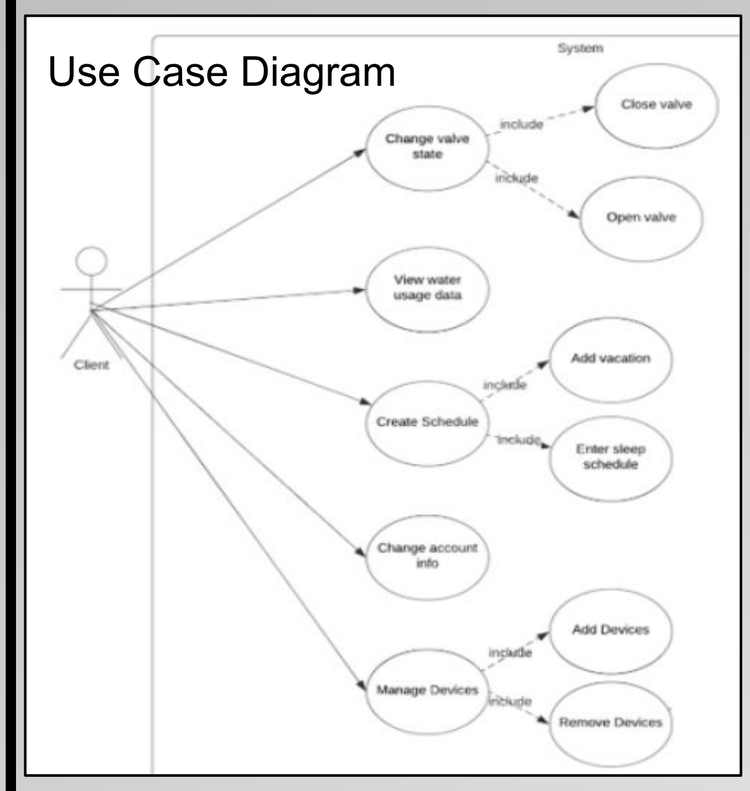
Smart Water Leak Shut-Off Valve

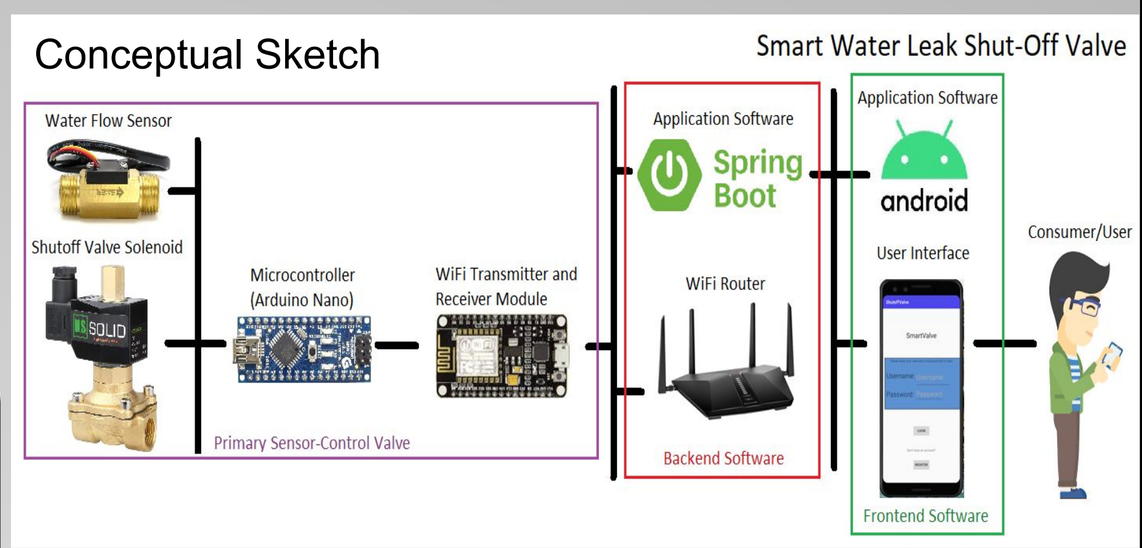
Overview:



Problem Statement: Many property owners experience water damage from unknown leaks

Goal: To create an affordable and user-friendly way to monitor water usage and prevent water damage

Solution: A device that users can control through an app to shut off water and view water usage history



The Team: sdmay21-11

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-Grace Wilkins (Electrical Engineering)
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Requirements

Functional:

- Hardware is easily integratable into a piping system
- Hardware monitors and sends water flow data to app
- Users can view their water usage history
- Users can remotely turn the valve on/off and monitor their water flow in real time
- The shutoff valve can automatically open and close according to a schedule entered by the user

Non-Functional:

- Hardware costs less than $250
- Measure water flow within 5% accuracy of actual flow rate

Constraints:

- Operate at common household voltage
- WiFi network is required

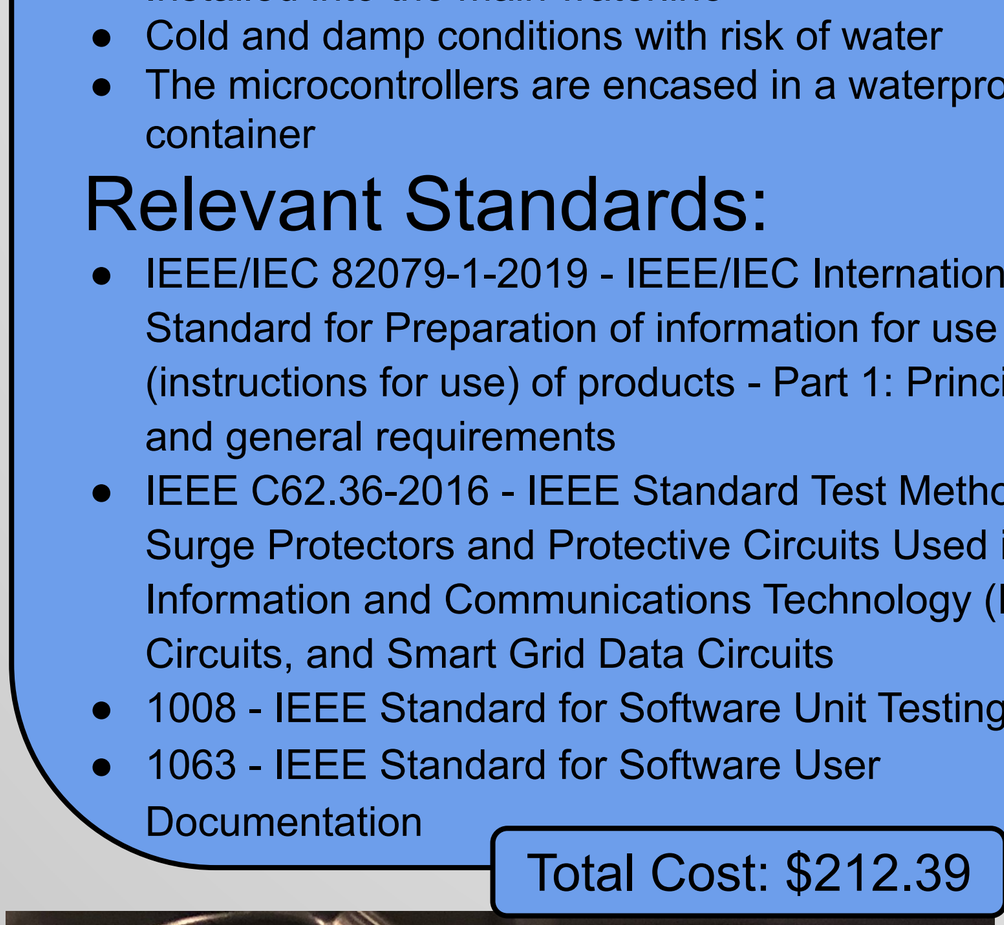
Operating Environment:

- Installed into the main waterline
- Cold and damp conditions with risk of water
- The microcontrollers are encased in a waterproof container

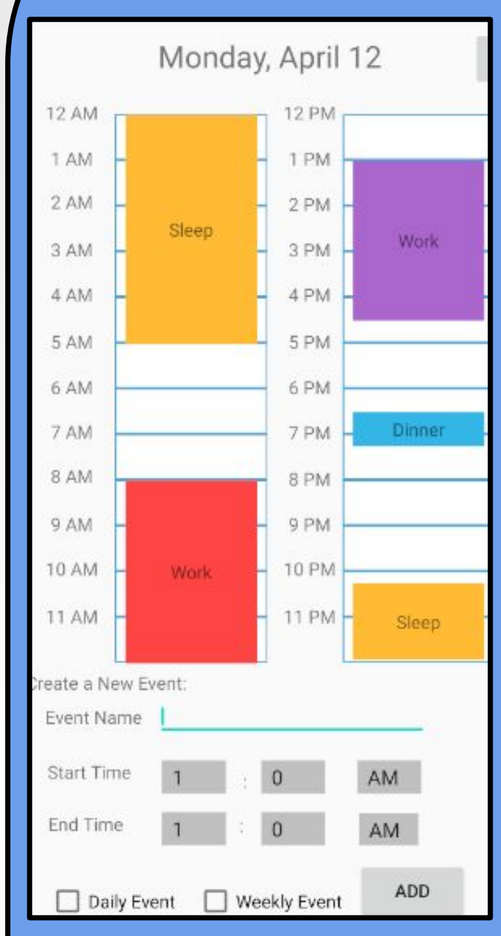
Relevant Standards:

- IEEE/IEC 82079-1-2019 - IEEE/IEC International Standard for Preparation of information for use (instructions for use) of products - Part 1: Principles and general requirements
- IEEE C62.36-2016 - IEEE Standard Test Methods for Surge Protectors and Protective Circuits Used in Information and Communications Technology (ICT) Circuits, and Smart Grid Data Circuits
- 1008 - IEEE Standard for Software Unit Testing
- 1063 - IEEE Standard for Software User Documentation

Total Cost: $212.39

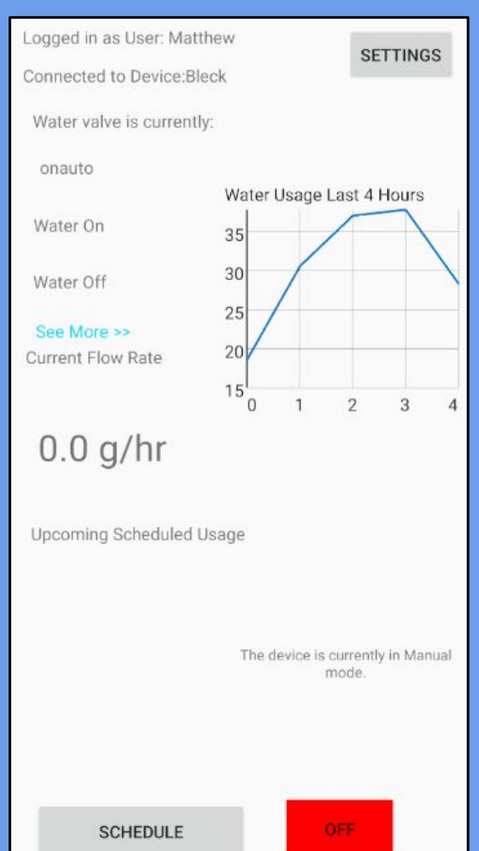


Features



A page to create a schedule for the device to follow when in automatic mode or WiFi connection is lost

A page where users can view recent water usage, the current flow rate, and manually turn the valve on and off

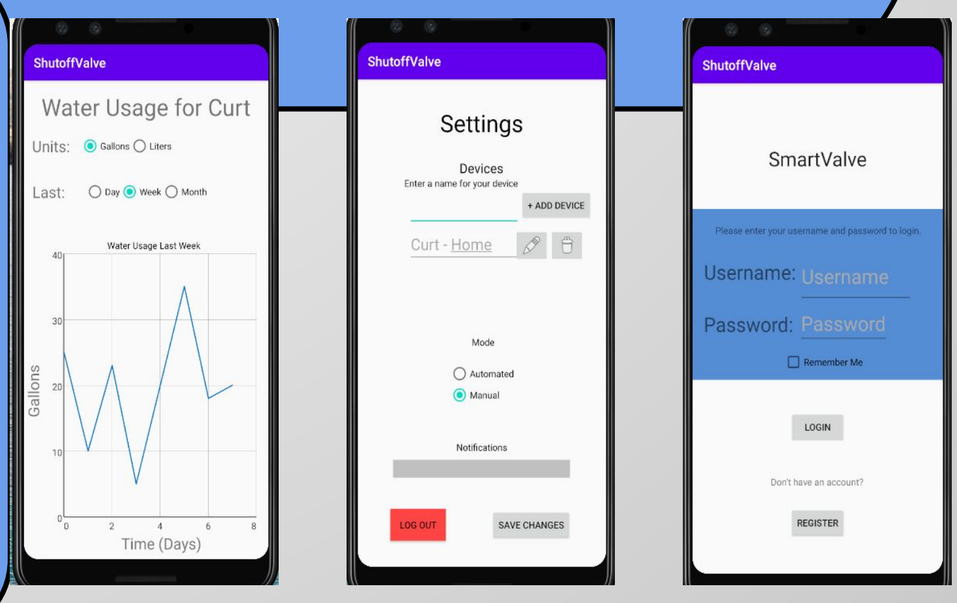


Features also include:

- Graph to view previous day/week/month water usage
- Switch to manually turn off the water valve
- Battery for when power is lost
- Text alerts when battery needs to be recharged

Security

- HTTPS for encrypted connections
- Switch to manually turn off the water valve
- Rechargeable battery for loss of power



Testing

- JUnit and Mockito testing
- Volume testing to ensure readings are accurate, within 5% error
- User experience testing

Circuit Design