Smart Water Leak Shut Off Valve

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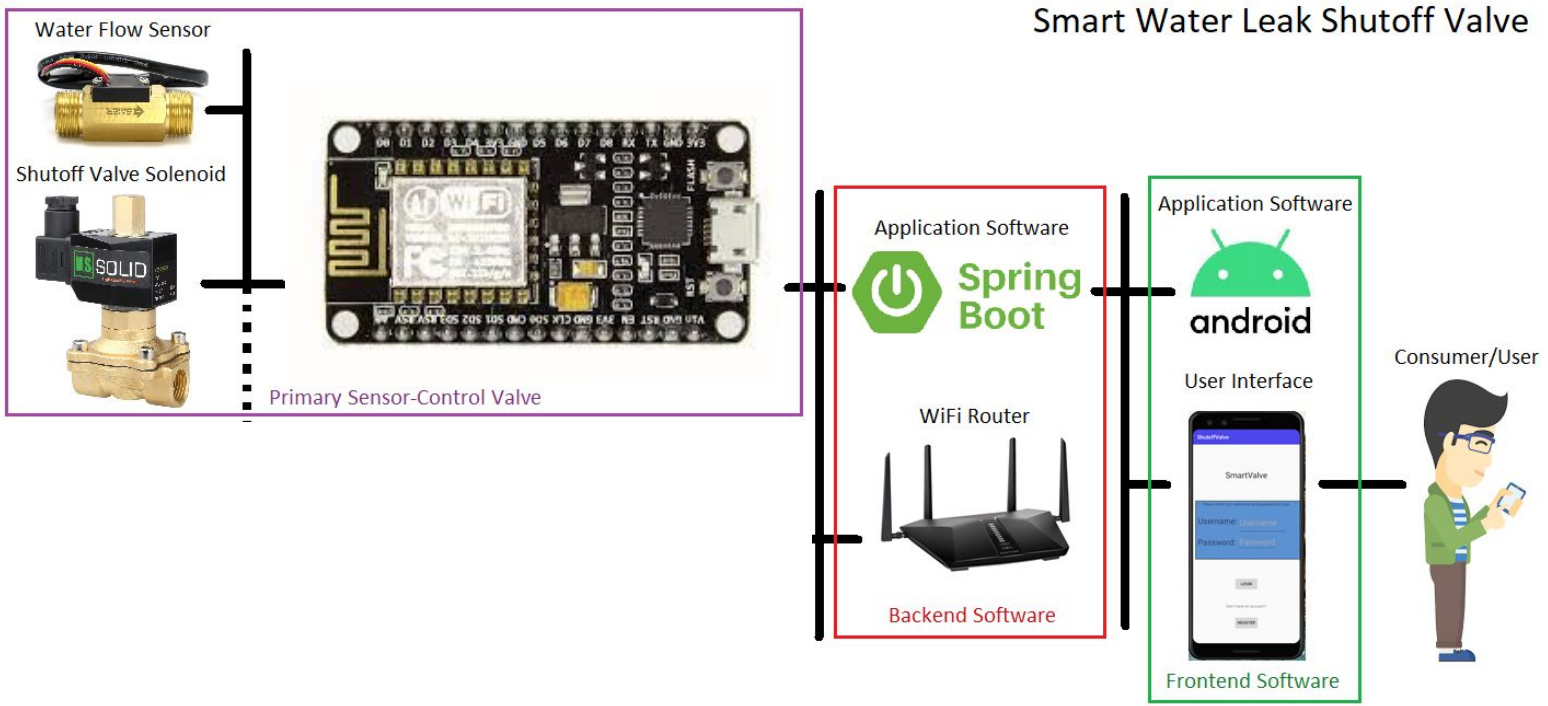
Overview

- Purpose
  - To detect and inform the user of any water flow abnormalities.
  - To automatically shut the valve to prevent further water damage.
- Main Goal
  - Develop a mobile application and water valve that can communicate with each other to control and report the flow of water through a pipe. The valve can also be automatically controlled through a water usage schedule.
- Requirements
  - Affordabile
  - User-friendly
  - Accuracy

	
Flo by Moen	Phyn Plus Smart Water Assistant
$486.57	**$699.99**

Conceptual Sketch

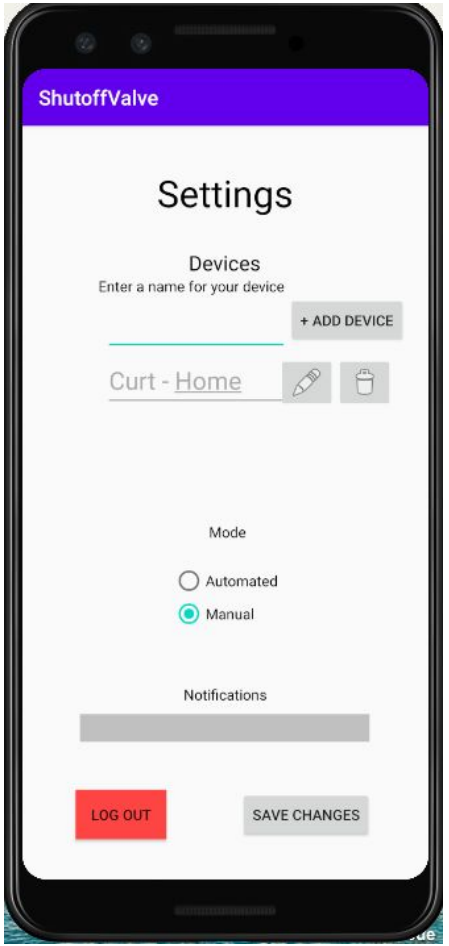


Software Challenges

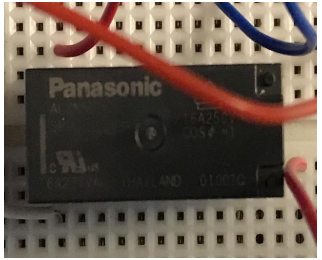
- Security
- Fail-safes for lost internet connection
- Lost Data
- User Acceptance Testing

Software Progress

- Page where users can enter a schedule for the device to automatically control waterflow
- Wifi module code to communicate with application
- Page for updating a device's setting and viewing water usage data
- Added https capability



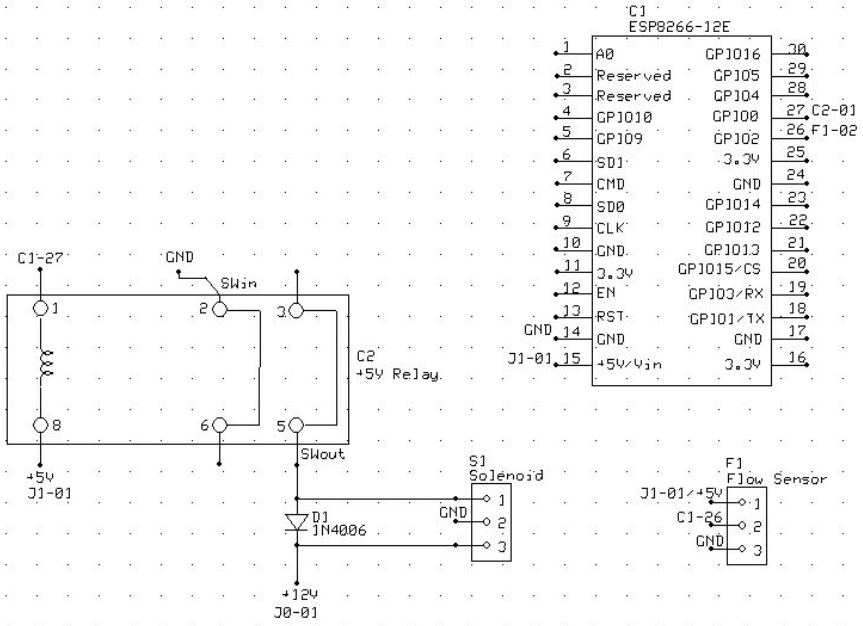
Hardware Challenges

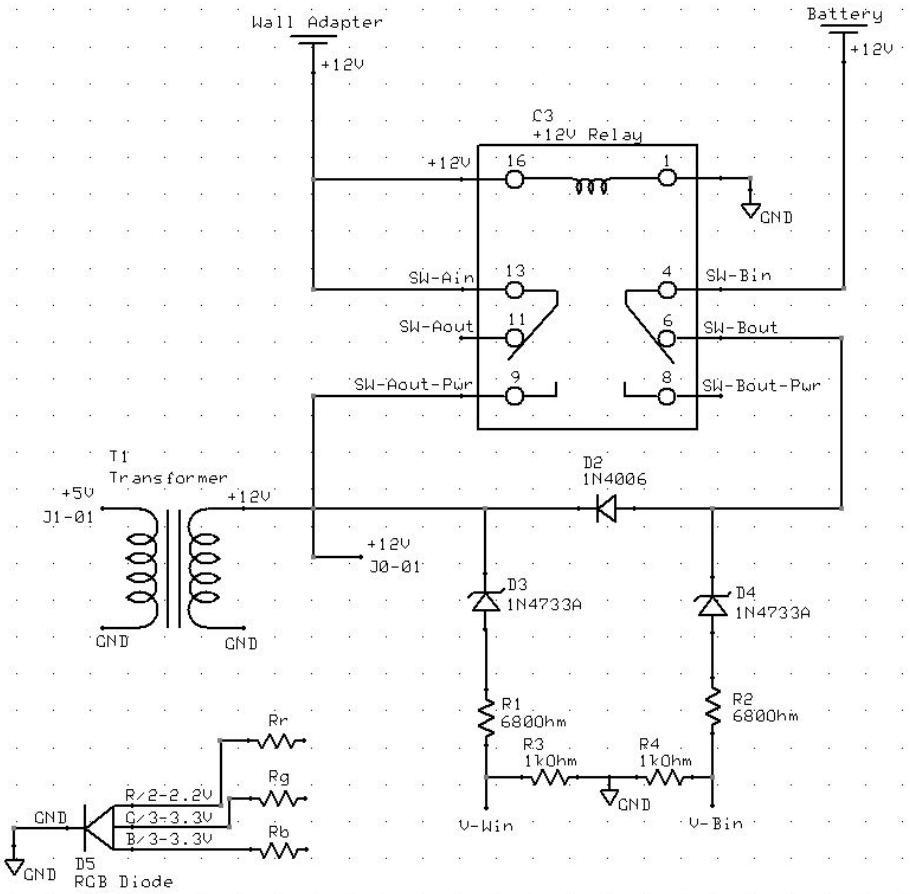


- BJT Overheating
  - Discovered through full hardware testing
  - Switched to a relay
- Backup Battery Implementation
  - Size vs Power
  - How to notify the user of low battery

Hardware Progress

Improved Circuit Design





Hardware and Software Goals

- Add a secondary power source (rechargeable battery).
- Fuse protection system.
- Add 3-phase switch for the use for the user to manually switch the solenoid open/close or to adhere to the MCU auto switching.
- Sensor accuracy.
- Viewing daily/weekly/monthly water usage.
- Test and modify device.
- UI - user interface - improvements on looks.

Engineering Standards

- Consumer electronics = 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.
    - This standard is about designing and integrating new technologies into a consumer's home - what safeties need to be considered, what legal regulations need to be followed, etc.
- 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
    - This standard is about surge protectors for application on multiconductor balanced or unbalanced information and communications technology (ICT) circuits and smart grid data circuits are addressed in this standard.
- 1008 - IEEE Standard for Software Unit Testing
    - Making sure that they work together.
- 1063 - IEEE Standard for Software User Documentation

Our Team. Questions?

Team Email: **sdmay21-11@iastate.edu -- Email questions and ideas here.

Software Team

- Matthew Brandt - Backend Software Developer/ Meeting Planner -- brandt98@iastate.edu
  - Back end software development and testing
- Curt Kissel - Frontend Software Developer -- cskissel@iastate.edu
  - Front end software development, research, and testing

Hardware Team

- Cody Juracek - Hardware Researcher -- cjuracek@iastate.edu
  - Researching hardware components and design layout
- Wolfgang Morton - Hardware Engineer -- wvmorton@iastate.edu
  - Prototype assembly and testing
- Grace Wilkins - Report Manager -- wilkins1@iastate.edu
  - Develop code to test and assess hardware components