Smart Water Leak Shut Off Valve

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Overview

Flo by Moen

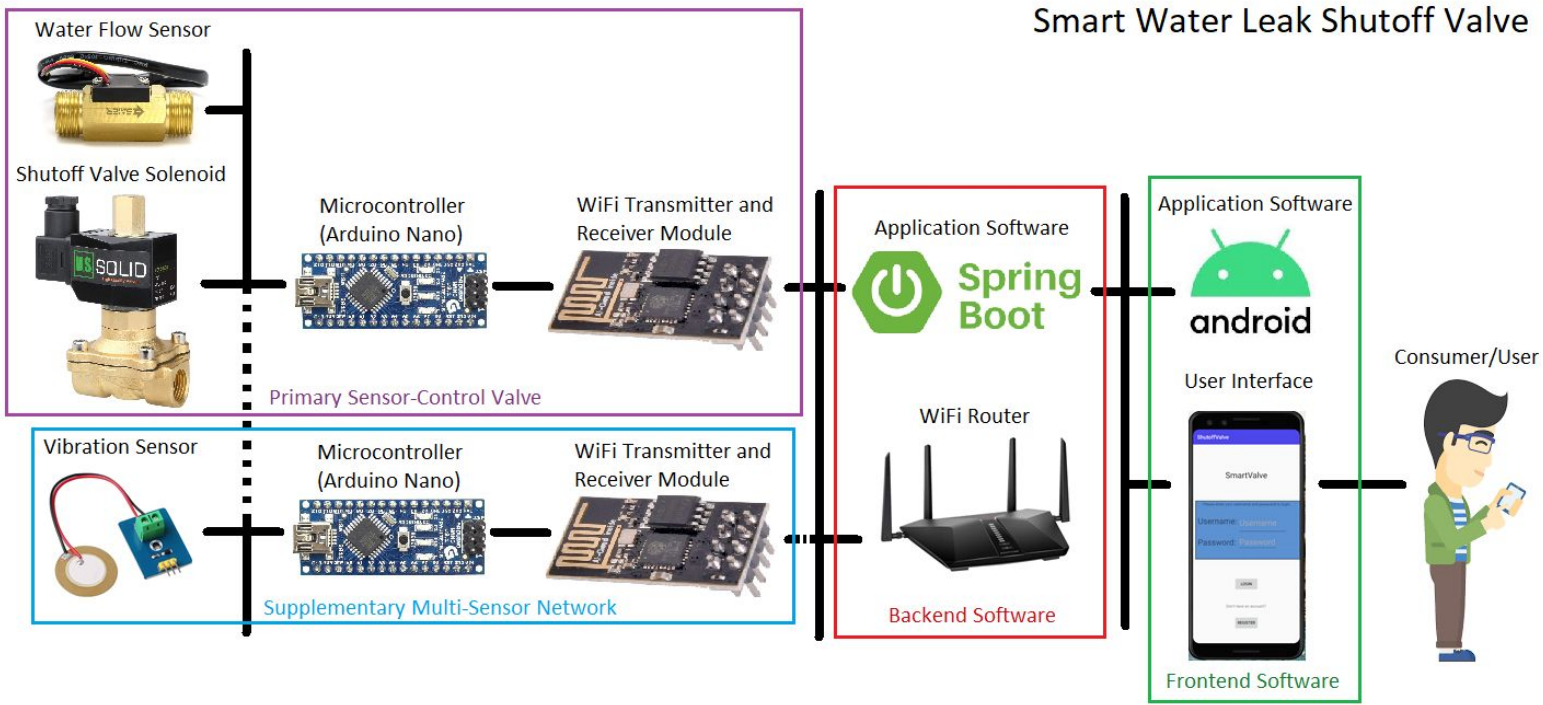
$486.57

Phyn Plus Smart Water Assistant

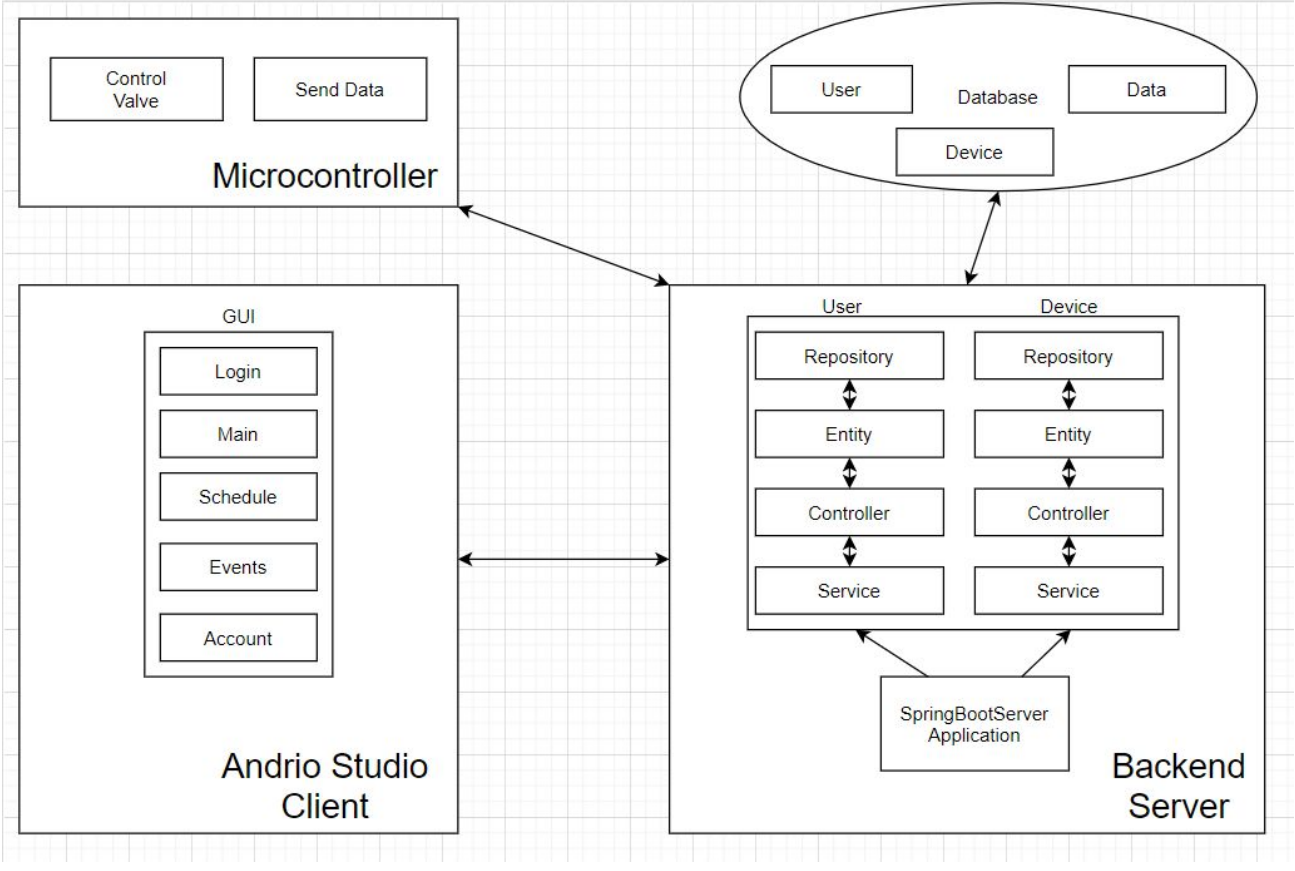
$699.99

- 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.
- Affordability
  - We want our solution to be a feasible option for most homeowners, so we would like to keep the cost of the end product below $150.
- Accessibility
  - The hardware component needs to be a size that allows easy integration into a home's water system.
  - Depending on the final implementation, some plumbing knowledge may be required for installation.
  - The product needs to be able to run on common household voltages.
- Technology
  - The user of the product will need a WiFi network for the product to connect to, as well as a mobile device.

Conceptual Sketch

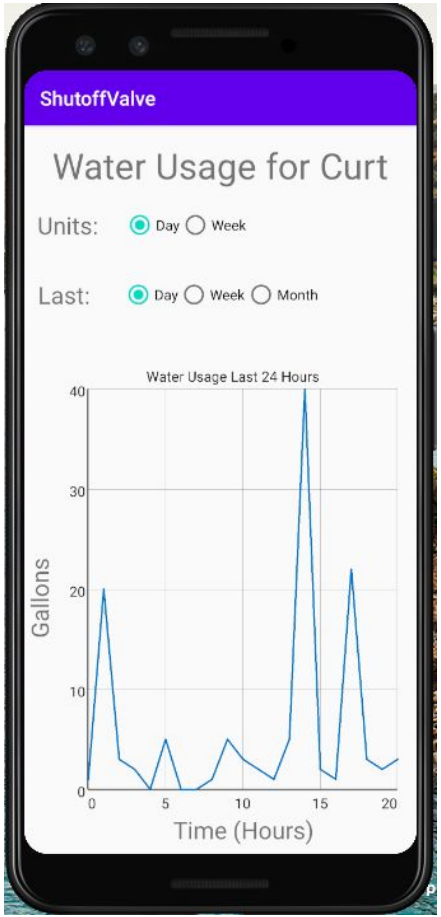


Software Implementation Plan



Software Progress

- Established communication between android studio and spring application.
- Created entities and methods for users, devices, and waterflow data.
- Tested methods for user creation, adding devices, and recording rates for waterflow.



Software Challenges

- Recognizing the hardware device from the Android application.
- Sending/Receiving Signals.
- Lost Data.
- Differentiation between wanted and unwanted water usage.

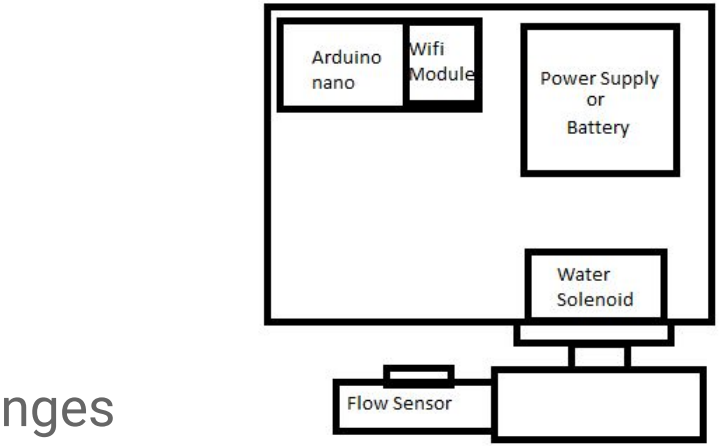
Software Goals

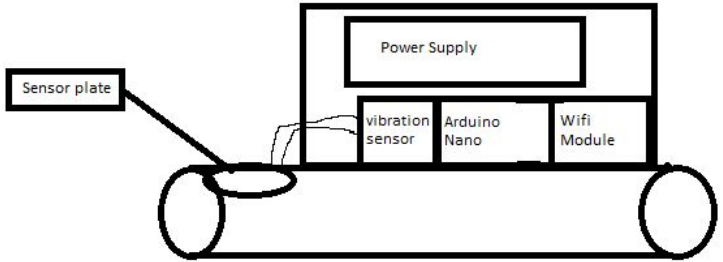
- Allow users to open/close water valve from mobile app
- Send alerts to users when device detects leaks
- Clean up the GUI for the application
- Testing

Hardware Progress

Progress made this semester:

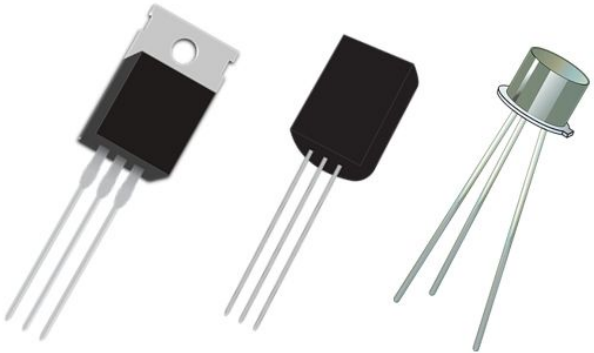
- Part Testing
- Prototype assembly & design changes

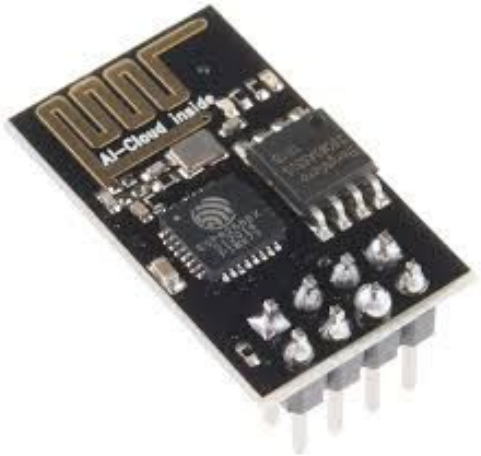




Hardware Challenges

- Testing accuracy
- Load constraints
- WiFi module





Hardware Goals

- Connect device to app software via WiFi module.
  - Two-way transmission and receiving.
    - The device transmits recorded data for the user to comprehensively read and understand.
    - The user sends commands back to the device (ex: open/close valve).
- Once flow sensor is complete, implement multi-sensor network. (new concept, currently exploring this option).
  - Both flow sensing and vibration sensing.
  - Place vibration sensors throughout the piping system. They will record and inform the user of any flow irregularities, which will trigger the valve to close.
  - This will help pinpoint where the leakage is occurring.

Our Team. Questions?

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

Software Team

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

Test Plans

- Hardware Plan:
  - Previous testing of major components
    - Solenoid
    - Flow Sensor
  - The next step
    - Test the parts together
- Software Plan:
  - Verify the user interface accurately displays data to the user.
  - J Unit Testing.
- Overall Plan:
  - See if the school can facilitate a test piping system where we have access to running water and wall plugin.
    - Considering of using a janitor’s closet.