HydroLink

Water Consumption Measurement Device

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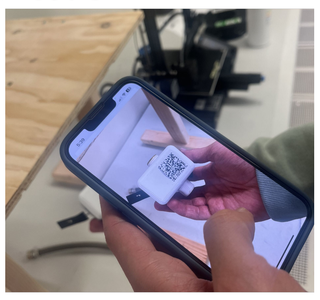
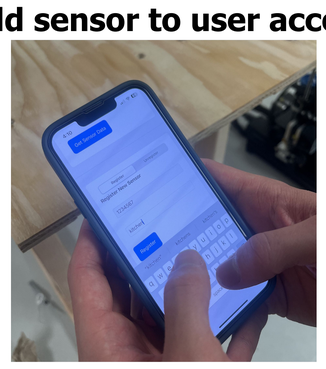
Installation Steps

1. Register sensor through QR code



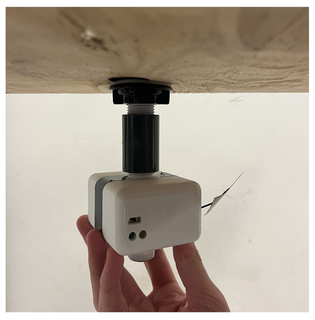
2. Add sensor to user account



3. Unscrew sink inlet pipe

4. Attach female-to-female adapter

5. Attach sensor and screw on inlet pipe



6. Turn sensor on

7. Re-attach inlet pipe

It's that easy!

General Overview

Need Statement

For the regular homeowner, we propose a device that attaches to faucets to track and store water usage statistics. The goal is to help users reduce utility costs and minimize their environmental impact by providing accurate and convenient monitoring of water consumption within their homes.

Design Objectives

- Design a simple yet effective installation for most standard faucet and water inlet fixtures.
- Create a robust and secure webserver for data storage and retrieval
- Provide a seamless user experience on an accompanied mobile app, providing real-time data and updates from a consumer's sensors.
- Reach an accuracy level of less than 5% with water session sensing and calculation.

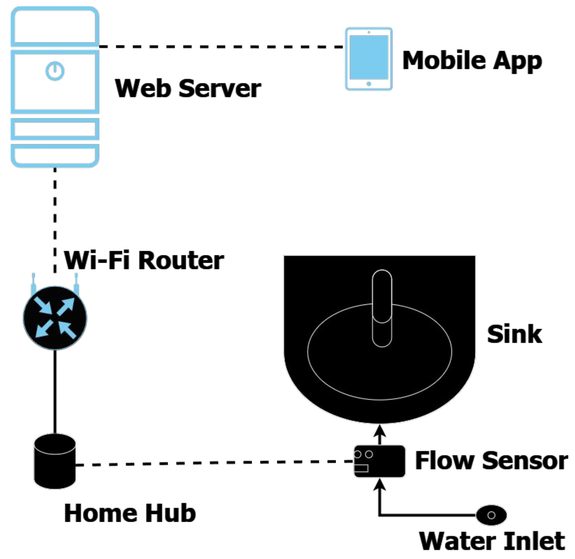


Fig. 1 Full Overview Diagram

Fig. 2 Design Prototype for Sink Attachment

iOS App Design

Accompanying Swift App used to view historical data.

Register/de-Register new sensors using QR code scanner on app.

View data for specific sinks, with multiple sensors.

Secure user login and registration through JWT Token Authorization.

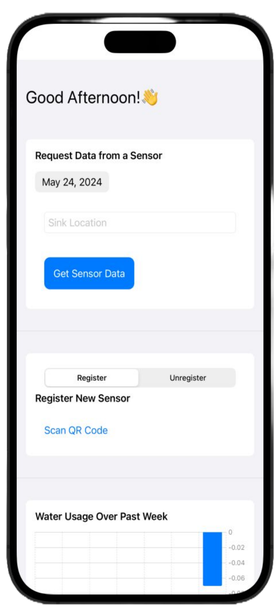


Fig. 3 Mobile App Home Page

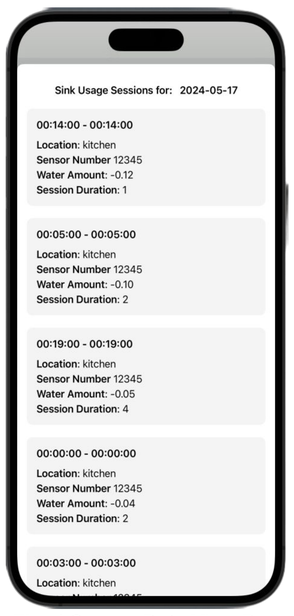


Fig. 4 Sensor Data View Page

Web Server Design

Remote Web Server hosted on AWS Lightsail for sensor data storage and user data retrieval.

Reverse Proxy by Nginx handles incoming data packets from "Home Hub".

User Apps request data through JWT Token Authorization to verify credentials and provide correct data.

Back-end routing service written in Flask, rapid querying to a PostgreSQL database with tables for User, Session, Registered Sensors Data.

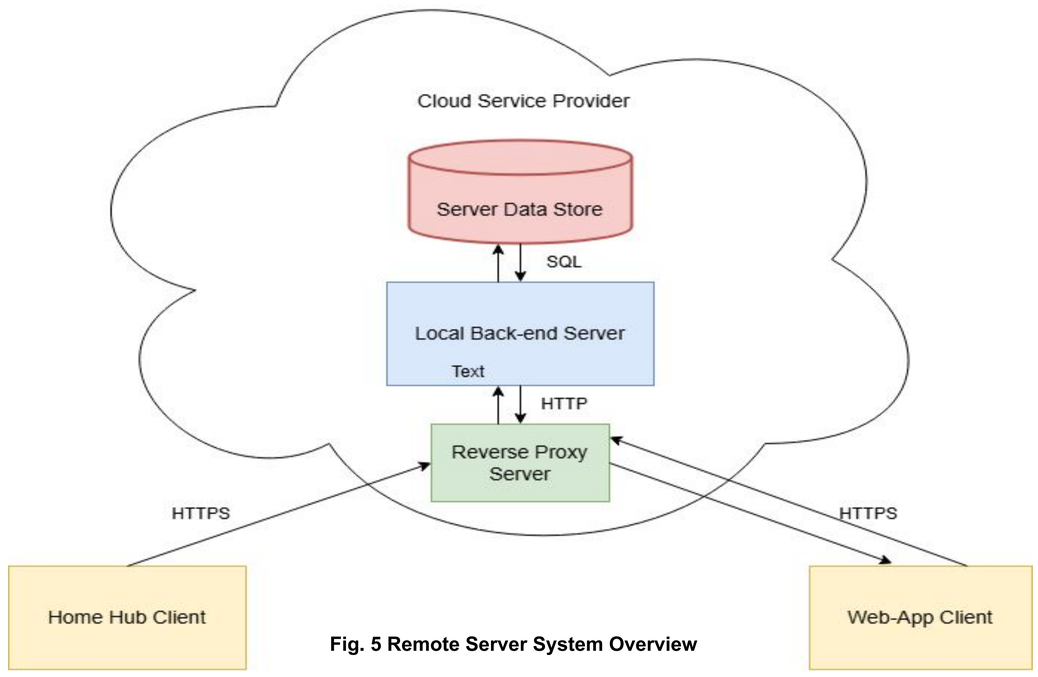


Fig. 5 Remote Server System Overview

Hardware Design

Breakdown Animation

Sensing Attachment & Home Hub

Hardware is composed of two parts, IoT Sensing Device and "Home Hub".

Data collected from sink in "sessions", sending data once sink stops running to Home Hub for processing.

Connection via MQTT Broker for seamless and secure connection.

Data from Home Hub sent to webserver w/ API key & sensor ID via HTTPS request.

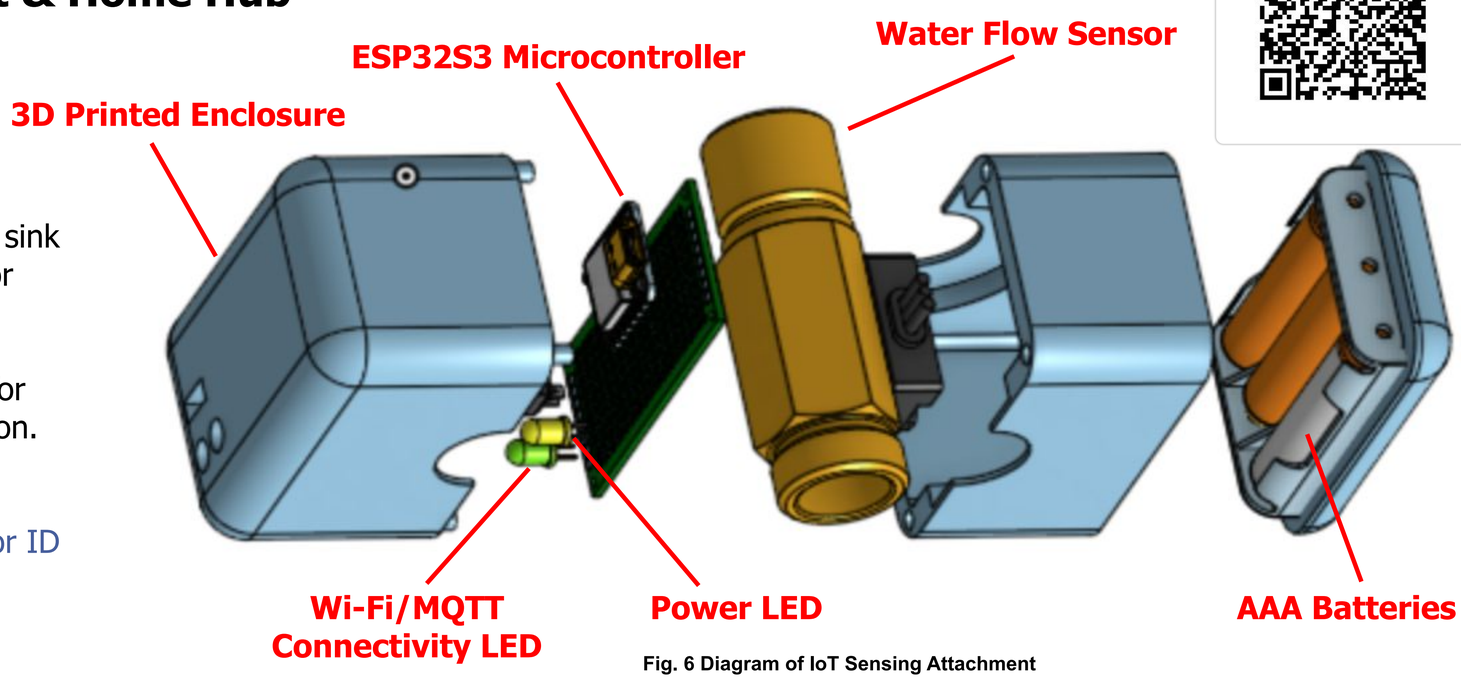


Fig. 6 Diagram of IoT Sensing Attachment