WATER MONITORING WEBPAGE WITH FAUCET SIMULATOR FOR HOMEOWNERS AND WATER METER MANUFACTURERS

A Capstone Proposal

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EXECUTIVE SUMMARY

The Water Monitoring Webpage With Faucet Simulator provides a tool for use by anyone who has their own hardware. This differs from other monitoring software primarily designed to be used with hardware made exclusively by the same company. The Webpage will serve as one element of the water monitoring system. Users and hardware will communicate with the web page using a web application programming interface (API). The Webpage using an API makes no distinctions between hardware, allowing it to be universal from an implementation point of view. With this webpage, users will be able to view overall usage, set water monitoring alerts, and use the water faucet simulator. The simulator will assist with providing data in absence of hardware.

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PART 1

INTRODUCTION/BACKGROUND

PROJECT NAME AND DESCRIPTION

There are water systems in place that offer end to end solutions that include hardware and software. Water monitoring hardware exists through different manufacturers as well. The software alone is limited with some companies offering solutions tailored to a specific end user with a specific hardware in mind. There are fewer software options available with most being proprietary. The proposed project offers users an open source solution without the need for specific hardware. **TODO: More in depth discussion**

PROBLEM/ISSUE: AFFORDABLE OPEN-SOURCE SOFTWARE FOR WATER MONITORING

California is facing new challenges with providing water to its residents, caused by the recent droughts. The scrutiny on water consumption has become more necessary as a result. In May of 2022, the Governor of California requested local agencies to implement water restriction policies. Residents in Vista California for example, have been asked to water no more than three days a week at ten minutes or less per water station. Although creating water or finding a way to receive water is a challenge on its own, there are two main ideas that can help with reducing overall water consumption. One idea is to change the habits of individuals by providing insight into their consumption. Another idea is to replace wasteful systems with more efficient ones; for example, switching to water friendly systems such as a low gallon per flush toilet. Regardless of

the approach, monitoring water usage habits and finding solutions to reduce water usage are important in solving the issue of water shortage.

SOLUTION: OPEN-SOURCE WEBPAGE WITH WATER MONITORING SIMULATOR

The Water Monitoring Webpage With Faucet Simulator can be a tool for changing the habits of individuals through usage insight. Although water monitoring software is not a new idea, our team offers a solution that is intended to be user friendly, and open source. Users of the web page will not be burdened with "contacting" software vendors for information, or have to "call for more information." This is accomplished through the use of a well described API, intuitive interface, and open source information. **TODO: More in depth discussion**

EVIDENCE OF NEED

Many people are unable to afford software to monitor your household water usage. This software is usually only available with the purchase of expensive hardware who charge a premium for their own custom software solutions. With many of the water authorities in California mandating limited water usage it is becoming important for people of all income levels to have the ability to easily monitor their water usage in real time. By providing people access to open source water monitoring and water usage simulation software it is expected that more people will be able to increase the efficiency of their water usage. For those looking to invest in hardware this also gives them an opportunity to try similar software before they purchase their equipment.

PROJECT GOALS AND OBJECTIVES

GOALS

- The main webpage will serve as the frontend and will be connected to a backend of the system, users will be able to view water usage.
- The main webpage will allow users to create an account with username and password.
- There will be a database for storing user data during the monitoring process
- The website will a have a page dedicated to describing the API
- There will be a separate application for the water faucet simulator

OBJECTIVES

- Create an open Website for all to use regardless of hardware requirements
- Make the user interface intuitive and as simple and concise as possible
- Provide an interface that is adaptable to changes with monitoring requirements
- Develop an API with room to grow
- Provide a water faucet simulator that provides useful insight on water usage
- Implement user sessions to allow for licensing of faucets to prevent shared data/usage

ENVIRONMENTAL SCAN

There are companies with products that have software in the form of an app that provide water usage information; however, users are required to buy the accompanying hardware. The solutions they offer cover the three main components that make up a water monitoring system: water meter, network hardware, software application. Companies such as AlertLabs, PowerX, and BlueBot offer water monitoring software, but are used with their custom hardware. Even though these companies offered paid solutions they have demonstrated how effective water monitoring solutions can be. In case studies documented by Alert Labs Inc., they provide evidence as to how their solutions helped Minto Apartments detect water leaks which resulted in repairs and an estimated savings of $100,000 in water related expenses (2022).

Chetu offers developers to build the software made for specific customer requirements. AquaCUE offers software. The Water Monitoring Webpage seeks to provide a solution to the first component, the software application component, and is used as a stand alone product to be paired with a user provided network hardware and water meter.

AlertAQ by Alert Labs, is software that operates through cellular communication, users buy hardware that communicates with software through a cellular network. PowerX Technology and Bluebot are two similar solutions to AlertAQ regarding a hardware centered approach; however, networking is provided through wifi. The difference between these existing solutions and the Water Monitoring Webpage we intend to design is, it will be targeted to those who wish to bring their own hardware. There will be no hardware requirement, only an API requirement if users connect hardware to the webpage.

PART II

SOCIAL AND LEGAL CONSIDERATIONS

STAKEHOLDERS AND COMMUNITY

The main stakeholder is the individual user looking for open software. Water meter manufacturers and water districts represent a minor stakeholder position. There is no specific client for this project. The end user is anyone interested in using the simulator and using their own hardware if they have it. Potential clients outside of the end user could be water meter manufacturers such as Minomess that offer the meter, but who do not provide supporting software. The water faucet simulator would be useful for individuals interested in viewing the impact of everyday water usage. Water districts can also benefit by working with our team to test hardware for future smart meter installations in residential communities.

The stakeholders and community will gain by having a website to use and test hardware if they have it. This can lead to reduced water consumption and lower water bills. Companies that manufacture water monitoring systems can use the webpage to verify future products. However, that does not come without its respective trade-off which could cause our companies to lose revenue if a product release is delayed due to undesirable simulation results.

REFERENCES

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