Spring Term CS Capstone Design Document

April 29, 2021

Software Application for Water Level Control

Prepared for:

The Hinsdale Wave Research Laboratory,
Oregon State University

Prepared by:

Harrison Moore
Briam Kim
Daniel Aguilar

Abstract

This document describes the design components of the Hinsdale Wave Laboratory mobile application for it's researchers. It starts with an overview discussing the scope and purpose of the project. Next will discuss the design principles that will be used to develop the app, which includes design stakeholders, viewpoints, and rationale. The last section covers the three major components of the application: backend, UI, and lab script.

Contents

List of Figures

1 Overview

1.1 Scope

The goal of this project is to create a mobile application that can control the water level at the Large Wave Flume and Directional Wave Basin at the Hinsdale Wave Laboratory[1]. The app will be able to set a target water level that the wave lab will then fill to that target water level. The lab will also have fail-safe measures that include max filling duration and max filling capacity. The mobile app will also inherit existing functionality of the previous system that can see the history of the water levels over time.

1.2 Features and Changes

The main purpose of this project is to build an application that allows the opening of a water valve which will promote the flow of water into a large wave pool. This document exists to provide a detailed overview of the design plans. Since our development has started we have mainly focused on the front end of the application.

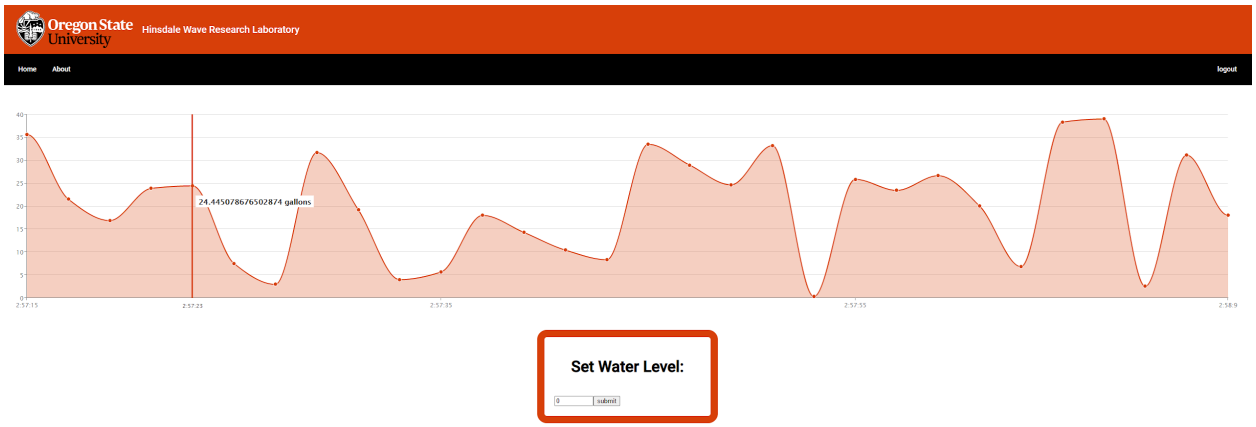

Figure 1: Alpha Version Demo

This is the state of our web application. We now have a realized design that involves a simple interface. The chart uses a zingchart API that takes in data and will be our display of the water level history. We also have a form to set the water level of the wave lab. As of now, we do not have the app hooked up to any backend, but that will be our focus moving forward.

The code used to run this web app is hosted on our team github repository. We have yet to have this site hosted anywhere as we had to do a rewrite of the software since the old system had no good documentation in order to run the software. This has slowed down the development process, but the team will now have full control over the technologies used, and a better understanding of the software.

1.3 Technologies and Algorithms

Our main focus on the technologies we decided to use and algorithms we have focused on thus far include ideas regarding learning from the mistake of our predecessors on this project and create code that follows a more rigorous guide of credentials and readability whilst leaving ample room for comments when required. We want our code to be able to be read easily so that should an unforeseen problem occur, it can be easily rectified.

2 Definitions

- **Python:** an interpreted, high-level and general-purpose programming language.
- **Swift:** IOS development programming language
- **Xcode:** Development environment for macOS containing software development tools for IOS.
- **UI:** User interface
- **National Instruments LabVIEW**: systems engineering software for applications to control and access hardware.

3 Project Context

3.1 *Database and Deployment*

The database used to keep track of water levels is still in a strictly front end stage and further work needs to be done to connect it to the backend. When completed, users will be able to see the graph of water levels through a set up server.

3.2 *Software and Hardware*

- **Visual Studios:** Used for developing python.
- **GitHub:** Used by developers to collaborate, save, retrieve and share files.
- **National Instruments LabVIEW:** Software for controlling the filling valve and receiving data from the pressure gauge.
- **Filling Valve:** Used to fill water into the pool.
- **Pressure Gauge:** Used to dictate fullness of pool.
- **Lab Setup:** Computer connected to the NI LabVIEW system that controls/receives data from the instruments.
- **Phone:** Main device for application use.

4 Design Description

The following section will discuss the design of the project.

4.1 Design Fundamentals

4.1.1 Figure 1: Alpha Version Demo

This design shows our current ideas for what the front end of the system will look like. With a simple OSU style design, we stick with the themes of the school, which the Hinsdale group is a part of, as well as improve upon their current system which is lacking.

4.2 Research and Future Progression

To continue on our current design, we plan to implement the backend of our work as our next major task. That is to say that we are to hook up our interface with the equipment at the Hinsdale Laboratory. To do this, we will examine

the code of the old application and see how it was hooked up there before going back into our own code and recreating it there.

4.3 Testing Efforts

Testing this project will be difficult after we hook it up the backend systems. Due to the current outbreak, we would need to find a time where we can go on site and test to see if our system can open and close the valves as it has been done prior. Though this is further down the line, until that point we will be using other methods to simulate the opening and closing of a valve through the command line.

4.4 Design Rationale

Our main focus when coming up with our design was to keep things clean, straight forward, and minimalistic. We understand the task of our application and when it is received, we do not want the design to be too complex and take away from the experience of using it. We want a long lasting design which can be used pleasingly without any sort of negative interactions that would cause the user to want to change the design in recent years.

5 Recent Changes

This term we focused on our last few tasks. We met with the other Hinsdale Wave lab team and got a lot of new information about the project that we weren't aware of. There is a sea computer at the wave lab that polls data from the instruments that we need access to. I have reached out to the people that helped them but were unable to get ahold of them. Other than that we were able to get our login system working since the term started. We were also able to revamp the site to fix some bugs regarding responsiveness of the browser window.

Bibliography

[1] P. Lomonaco, “App to control the water level at Hinsdale Wave Research Lavoratory,” oregonstate.edu. Retrieved October 10, 2020, from https://eecs.oregonstate.edu/capstone/submission/pages/viewSingleProject.php?id=4HNX453tKp4hBTc2