Vision and Scope
for
Salish Sea Water Weather Station

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Version 1.0
2019-05-03

Table of Contents

Revision History

Authors	Date	Description	Version
RL, SV, MG, KS	2018-5-3	Document Created	1.0

1 Business Requirements

1.1 Background

The Salish Sea Water Weather Station project was created to introduce middle schoolers to cyber security concepts, as well as collect environmental data for public use. The project consists of a waterproof device with a variety of environmental sensors, a mobile app to retrieve data from the devices, and a website to view collected data. Each year, WWU and the SEA Discovery Center together host a cyber security summer camp for about 60 middle schoolers. Each student is given a device to place in the Salish Sea, from which they use the mobile app to collect data from them. The app then transfers the data to the website, where it could be viewed by scientists and the general public.

1.2 Business Opportunity

The cyber security summer campers benefit from having a real-world example with which to engage. As the camp is situated near to the SEA Discovery Center, they can easily use an example that helps benefit marine research, and perhaps get them interested in it as well. Two versions of this have been developed previously, but there are several opportunities to improve it.

1.3 Business Objectives and Success Criteria

Our main business goals are to increase the engagement of the summer camp students with cyber security concepts, as well as collecting as much data about the Salish Sea as we reasonably can. Being able to provide researchers with a wide variety of data will help increase our understanding of our environment. We also want to increase public engagement with cyber security, and creating a project that can capture the attention of middle schoolers while teaching them the concepts is a great way to do that.

Since our goals of gathering a wider variety of data and increasing student engagement will both result in a larger amount of data gathered, this gives us a convenient metric. We can consider the project to be a success if the devices and students at the next summer camp successfully send more data to the servers than the previous camp.

1.4 Customer and Market Needs

Our main user base will be middle schoolers at a summer camp. As such, our app should be engaging, while still relating to the cyber security concepts they are learning at camp. The device will be left floating in the Salish Sea for extended periods, and so we want to ensure they are waterproof and reliable. The website should be able to provide the data collected in meaningful ways, both for the public and for researchers.

1.5 Business Risks

There are a few risks our project may run into. We may not be able to provide an adequate schematic for constructing a usable device by the deadline, or not complete the mobile app in time. We could also provide a device or app with less functionality than its predecessors. In any of these cases, we can mitigate the risks by keeping backups of the current app and device design, as we know they already work.

2 Vision of the Solution

2.1 Vision Statement

The vision for the Salish Sea Water Weather Station project is to integrate the fields of environmental sea research and computer security into a singular cohesive unit for middle school students. Attendees of the SEA Discovery Summer Camp at Western's satellite campus in Poulsbo, WA will work towards collecting environmental data the system while also being introduced to critical components and concepts of computer security often unseen. Our team will continue to iterate upon the previous groups work to increase the number of sensors included in the system, enhance general performance, and broaden the interactions with computer security concepts during student interactions.

2.2 Major Features

1. The addition of more and/or new sensors to the current data collection buoy
2. Increasing the storage capabilities of the buoy to the maximum that the hardware allows
3. Increasing buoy's power efficiency to increase the battery life

4. Adding more features to the android application used to collect data from the buoy and return it to the central database
5. Increasing the ease of access in the application for the students so they can focus more on exploring the cybersecurity
6. Adding more features to the database website including visualization of more cyber security concepts during profile creation and data deposition

2.3 Assumptions and Dependencies

This project will require the continued hosting of the database and website by the Cyber Range at the Poulsbo campus. Introducing more sensors and battery life to the buoy will increase the cost of the system so continued, and possibly additional, funding approval will be required. The distribution of the android application by the google play store or by local upload in Poulsbo to student devices will be a requirement for interaction with the students. Continued support and production of the minicomputer used in the buoy will also be necessary for this system and as future iterations are developed.

3 Scope and Limitations

3.1 Scope of Initial Release

The goal of this project is primarily to iterate on the work on the weather data station performed by previous development teams. We are planning on expanding the battery capacity of the device, adding additional sensors to the data station, and finishing work on the mobile app used to interface with the data station. The previous group focused heavily on improving the design and circuitry of the device, so we will not be making any changes to the core components, such as the processor. However, we will be improving the battery capacity of the device, as well as making its power use more efficient, such that it will be able to operate independently for a longer period of time. We will also be adding additional sensors to those already present on the device, and will be adding support for the additional input in both the app and the website used to access the database. Finally, we will be picking up where the previous group left off on the development of the mobile app, which will most likely involve setting up a way for users to connect and upload data to the website database, as well as improving the user interface and login experience.

3.2 Scope of Subsequent Releases

Due to the current design's availability for expansion, future releases will likely accommodate further improvement on the sensor capabilities of the data station. Other areas of focus are the durability of the physical components, use of the device in the cyber security summer camp, and data visualization on the website and/or the mobile app to facilitate learning about the data that the weather station will be gathering.

3.3 Limitations and Exclusions

There are a few key limiting factors to the expansion of the product, the first and foremost of which is funding. Because the weather station is intended to be used with the cyber security summer camp, money used to buy necessary components will come through the camp's sponsors. As of right now, that sponsorship is uncertain, so we will be focusing on producing a single device that continues to be functional and delivers on the goals of the project. This is subject to change, so in the future our scope may expand to include producing several or more working data stations. Due to the funding requirements, all new components must fit within the proposed budget for each device, which will be around $50. This will limit the size and quality of additional components, such as sensors, that we intend to add.

4 Business Context

4.1 Stakeholder Profiles

The primary stakeholders of the Salish Sea Water Weather Station are the middle school students attending the summer cyber security summer camp hosted by Western Washington University. These students will be responsible for some assembly of the sensor systems and deploying the systems, and will be the primary group of people to collect the data from the system at regular intervals using the mobile app and Bluetooth. The purpose of their responsibilities is to allow the students to learn some basics of cyber security as well as the intersections of computer science and other fields.

Another group of stakeholders are the camp counselors and staff who will assist the students with assembly and deployment, as well as the purpose of the project overall. They will be facilitating the exchange of knowledge with the last group of stakeholders, researchers and the general public. The data that the students collect will go to a server where it can be downloaded for personal or research use.

4.2 Project Priorities

The first priority of this project is to maintain the existing functionality of the current system and its features. As long as we can do so without reducing the functionality of the current system, our next priority is to improve its functionality and add more sensors to the device so that more data can be collected. On the software side of the system, our first priority is to improve upon the mobile app to implement further security and improved UI to increase the functionality and ease of use of the app and data collection. For business priorities, we want to ensure we have enough hardware and time to assemble the hardware into the Weather Stations before the summer camp begins, which will depend on the available budget and human resources.

4.3 Operating Environment

The physical product will first be used in the summer camp classroom, where middle school students will do the final assembly of the unit. Once the units are completely assembled, they will be deployed to predesignated points in the Salish Sea and Puget Sound, where they will remain until removed, likely in no more than a year. The Android mobile app will be used by students and camp counselors to retrieve data from the device weekly after its deployment. The website, built on the Django framework, will be hosted on a server farm and accessible via the Internet for individuals or labs to access at will. The computational system itself will be inside of a Nalgene brand water bottle, where it will connect to the sensor system running on a Texas Instruments board.