

Introduction

Bay Observation Boxes or BOBs allow researchers to easily measure water quality and other data in a cost-effective way. But there is one major problem: for BOB to be effective, awareness must be raised for it in the community. This means that BOB needs to be easy to transport and display at events. In its current state, the BOB display is cumbersome and hard to transport. Our project aims to solve this problem by condensing everything in the BOB display into a single carrying case that doubles as a display stand itself. The case will feature foam inserts to protect the sensitive electronics and will be able to be rolled on wheels. Another part of this project is making the BOB display engaging and to do this an electronic version of BOB will be incorporated to draw viewers in.

Objectives

The main objectives for the BOB case is making it lightweight, easy to carry, and take up as little space as possible. Some of the features that the case for BOB will have are posters that have all of the information on BOB will be able to roll up with panels of wood that are laser cut. Have all of the displays be able to be carried in a case as big as the TV, with the fish tank attached to the top. The last objective that it needs to accomplish is being appealing to look at so people are interested in BOB and what the project is about. With the limited time and resources our scope for the project have been narrowed the reason being is originally there were more designs to get people's attention. Some of the challenges that might stand in the way are wiring and creating the model for each of the designs for the project. The main objective that this project will help and improve is environment, reasoning being it will help spread the main goals of what BOB is trying to achieve.

Design Strategy

To design the project, a rough 3D model will be created in CAD to verify dimensions and ensure that everything fits properly. The animatronic will be 3D printed, and will also need to be designed in CAD as well as test printed to ensure that the mechanism works properly. 3D printing allows the design to iterate quickly. To decrease waste in time and filament, smaller prints of the important parts of the mechanism will be done to ensure functionality before the final print is completed. Designs for the foam inserts inside the box will be created in AutoCAD and then printed onto paper to use as a template for cutting and to check dimensions. Group members will be split between these tasks so that they can be completed efficiently.

Plan of Action

1. Create a Digital model of the project, including the inside and outside of the case, and the dispenser for the business cards.
2. Buy/Acquire Wood, Aluminum extortion, 3D printer filament , foam, and basic equipment (Nuts, bolts, drills, etc.)
3. Create a calendar for group members to meet up and assist with the construction.
4. Begin construction of the Bob Case
5. Testing that everything fits within the case, that the weight is manageable and can be moved on its wheels, and that it can comfortably fit inside the car.

Verification

Testing Procedures

The project will be tested in a variety of ways to ensure that it meets all of the criteria laid out in the objectives. The car itself will need to be tested for durability and weight, as well as being

easy to transport. To test this the prototypes will be weighed and then adjusted until they are as light as possible. To test for durability the case will be dropped from various heights and jostled around and then inspected for damage. Testing for ease of use is fairly subjective, but the case will be transported over various distances and any inconveniences will be noted and adjusted for.

Tolerance Analysis

The most crucial part of the project is the case, as everything needs to fit securely inside while also being easy to unpack. Careful measurements will need to be taken of everything that needs to fit inside the case, then drawings will be done in AutoCAD and printed to scale. These will be used to cut the foam inserts as well as verify the measurements taken against the actual parts that need to fit in the case. The other part of the project that will need to be evaluated is the BOB robot. Due to the amount of moving parts, test prints of each section of the mechanism will be done before the complete assembly is printed. 3D printers don't create perfectly accurate parts so this will be accounted for when designing the parts.

Cost and Schedule

Cost

- Plywood \$35
- Aluminum extrusion \$70
- 3D printer filament (ABS/PETG) \$20
- Foam, \$20
- Electronics \$50
- basic equipment (Nuts, bolts, drills, etc.) \$15
- Dream Salary \$25/hr
- Estimated Total \$210

Schedule

- Rest of October - Designing and beginning construction
- Mid November - Finish construction and start testing the project
- Late November - Any tweaks that must be made will be made as everything gets finalized
- December - Final due date
- In total a month and a half for planning and construction

Bibliography

Arduino. (2024, March 4). *Servo Motor Basics with Arduino*. Docs.arduino.cc.

<https://docs.arduino.cc/learn/electronics/servo-motors/>

BOBs Project – St. Mary's River Watershed Association. (2022). Smrwa.org.

<https://smrwa.org/programs/bobs-project/>

ASA | Prusa Knowledge Base. (n.d.). Help.prusa3d.com.

https://help.prusa3d.com/article/asa_1809

Instructables. (2018, November 30). *Card Feeder for a Trading Card Machine.*

Instructables.

<https://www.instructables.com/Card-Feeder-for-a-Trading-Card-Machine/>