Final Project Proposal

Year: 2021 Semester: Fall Team: 8 Project: Sink or be Sunk

Creation Date: Aug. 23, 2021 Last Modified: Aug. 26, 2021

Team Members (#1 is Team Leader):

Member 1: Mitchell Arndt Email: [arndt20@purdue.edu](mailto:arndt20@purdue.edu)

Member 2: Garrett Brillhart Email: [gbrillha@purdue.edu](mailto:gbrillha@purdue.edu)

Member 3: Joe Mislansky Email: [jmislans@purdue.edu](mailto:jmislans@purdue.edu)

Member 4: Molly Arito Email: [marito@purdue.edu](mailto:marito@purdue.edu)

1.0 Project Description:

To create the most engaging and socially distanced version of Battleship, our team has conceptualized a variety of ways to enhance the game experience while keeping its integrity. The first obstacle is to maintain social distancing. Our team plans to implement a connection between two battery-powered boards via WIFI from the ESP32 and web sockets, allowing for optimal and adjustable distancing. We will use a server to host the code for the gameplay logic, which validates legal plays on both boards. To reinvigorate gameplay, our team will engage with the players through touch, sight, and sound. Players will firmly place or lock-in, their boats on the boards at the beginning of the game and place pegs into their opponent’s board to simulate missiles or torpedoes (depending on gameplay selection). For each “attack”, LEDs corresponding to hits or misses will flash on both players’ boards, creating a stronger visual appeal. When a boat is decimated, each setup will vibrate and audibly announce which boat has sunk, which will not only keep players interested but reproduce the incentive to win. Finally, to put a spin on the traditional playing style, we will create a variety of game modes. These different modes will allow players to play casually or competitively, quickly, or for longevity. The various play options will further player interest simply by allowing the players to play towards an objective of their choice. Additionally, with each game console battery-powered, players can enjoy the game experience from the comfort of their couch.

2.0 Roles and Responsibilities:

## Team leader & Server Engineer – Mitch Arndt

### Expertise:

Mitch has experience developing full-stack web applications through his CS minor as well as personal projects. Additionally, Mitch is knowledgeable with embedded programming through developing the drive system controller with the club Autonomous Motorsport Purdue.

### Tasking:

Maintains communication within the team, ensures all tasks are completed, and facilitates all decision-making. Focusing on WebSocket server to maintain data flow between boards. “Flex” member who assists other team members as workloads and issues fluctuate with software, hardware, and systems.

## Systems engineer – Joe Mislansky

### Expertise:

Joe has had considerable experience leading teams within the engineering and client relations worlds. He spent the summer coordinating systems and groups together to host successful conferences in a role at Purdue. He has gained exposure to programming through his courses at Purdue as well as individual projects. Additionally, he has taught courses that have a focus on systems and block diagrams.

### Tasking:

Responsible for integration of all systems including the PCB, embedded and server gameplay software, microcontroller, WIFI, and serial communication, and other components into a coherent and working system. Designs high-level theory of operation and interaction between components. Responsible for the high-level functional overview, block diagrams, and component selection.

## Hardware engineer – Molly Arito

### Expertise:

Molly is an ECE Shop Associate, which has helped her gain exposure to different devices/components along with their capabilities, PCB design tools, and circuitry debugging. She has experience with through-hole and surface mount soldering. Further, she pays great attention to detail and has strong interests in PCB design.

### Tasking:

Responsible for hardware design and implementation including design of printed circuit board, electrical schematics, and layouts. Ensuring LED array, ship, audio, microcontroller, WIFI controller, and “attack” pin connections are soldered and implemented accurately. Responsible for battery monitoring and packaging assembly.

## Software engineer – Garrett Brillhart

### Expertise:

Garrett has experience with software development and embedded programming through creating programs utilizing API in summer internships, programming courses through Purdue, and a software development personal project. He has strong interests in specializing in the software side of Computer Engineering for both microcontrollers and high-level code.

### Tasking:

Responsible for design and implementation of software. Responsible for source code from the server for decision-making and overall game flow. Ensuring microcontroller responsibilities are fulfilled including but not limited to ship detection, LED attack signaling, audio effects, indicating battery status, and reading user inputs.

2.1 Homework Assignment Responsibilities

|  |  |  |  |
| --- | --- | --- | --- |
| *Design Component Homework* | | *Professional Component Homework* | |
| 3-Software Overview | Garrett | 9-Legal Analysis | Garrett |
| 5-Electrical Overview | Mitch | 10-Reliability and Safety Analysis | Molly |
| 7-Mechanical Overview | Molly | 11-Ethical/Environmental Analysis | Joe |
| 8-Software Formalization | Joe | 12-User Manual | Mitch |

3.0 Estimated Budget

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Type** | **Name** | **Quantity** | **Unit Price** | **Total Price** |
| Mechanical | Plastic Battleship Board Game | 1 | $20.00 | $20.00 |
|  | 3D Printed Ship Pieces | 10 | $2.00 | $20.00 |
|  | Plastic Case Assembly | 4 | $8.00 | $32.00 |
|  | Torque Hinge Assembly | 4 | $3.00 | $12.00 |
| Electrical | Rumble Motor | 2 | $5.00 | $10.00 |
|  | Speaker | 2 | $2.50 | $5.00 |
|  | ESP32 - Dev Board | 1 | $20.00 | $20.00 |
|  | ESP32 - Chip | 2 | $4.00 | $8.00 |
|  | STM32F - Dev Board | 1 | $20.00 | $20.00 |
|  | STM32F - Chip | 2 | $10.00 | $20.00 |
|  | Voltage Regulator | 2 | $1.00 | $2.00 |
|  | RGB LEDs | 256 | $0.10 | $25.60 |
|  | Batteries | 4 | $1.25 | $5.00 |
|  | PCB | 4 | $2.50 | $10.00 |
|  | Resistors | 40 | $0.10 | $4.00 |
| Other | Shipping | 1 | $30.00 | $30.00 |
| **Total** |  |  |  | $243.60 |

4.0 Project Specific Success Criteria

1. An ability to detect when a user positions their ship pieces on the game board
2. An ability to relay game information to a player’s game boards via a WIFI connection.
3. An ability to light individual LEDs in a matrix in response to game events
4. An ability to control the flow of gameplay on a WebSocket server.
5. An ability to monitor the charge level of the game board’s battery through a visual led indicator.

5.0 Sources Cited:

No sources were needed.