BaselineTech

Project Charter

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Product Overview

Problem Statement

Since snowboarding is a seasonal based activity with limited availability in urban areas, snow sport enthusiasts may struggle to regularly engage in this sport. Access to snow mountains and resorts is restricted and requires time-consuming travel, making frequent practice extremely difficult. This limited access can impede skill development and the entertainment of the sport. In addition to the hindrance of skill maintenance for experienced users, beginners can often feel intimidated or hesitant from starting. Snowboarding is a very dangerous sport to get trained in, with possibilities of falls and serious accidents. The physical demands and potential for injury decrease the overall participation and enjoyment of this sport.

Proposed Solution

BaselineTech proposes a snow sport simulator that provides an immersive experience for training and entertainment all year round. This also provides a safer opportunity for beginners to get more familiar with navigating the snow-sport terrain. This product will require easy installation and will allow the users to set a constant incline value and control their own momentum while they are on the board. Position data will be recorded and will be displayed to the user from an interface.

Current Development

The clients have an initial prototype and have pitched to multiple investors. They have a rendered version of a few iterations of their vision for the product. The latest version includes a model of a gyroscope-based riding surface. They also have software engineers that are currently working on the virtual environment of the game.

Existing Alternatives

There are current alternatives on the market, but they do not offer all the ease of installation and haptic feedback that BaselineTech offers. Products such as Proleski mimic ski and snowboard conditions, and can be seen in some entertainment complexes. However, these products present significant limitations when it comes to installation and user accessibility. Additionally, their lack of haptic feedback makes them less appealing to the everyday consumer seeking a seamless and personalized experience. Therefore, there are no snowboard simulators on the market that offer user-friendly design and feedback data that BaselineTech proposes.

Regulatory & Safety Requirements

Safety Requirements

1. This product will include handlebars to help balance the user.
2. An emergency stop button will be included within the user's reach.
3. The user will be assumed to be wearing a helmet.

Product Requirements

1. This product shall accurately simulate the movements of snowboarding.
2. This product shall have 2 rotational degrees of freedom, with the roll being able to tile up to 30-40 degrees.
3. This product shall be able to have snowboards of varying sizes be mounted to it.
4. This product shall have safety features for if the user loses their balance.
5. This product shall function with users that weigh up to 150 lbs.
6. This product shall collect and send usable data of snowboards movement to a PC, via bluetooth, in real time.
7. This product will require minimal setup from the user, requiring an initial incline value.
8. The main electrical components will be hidden from the user, ensuring a user-friendly experience.

Milestones

Date: 10/24/2024

ECE:

- Brainstorm the sensors and electronics needed for sensing the roll and yaw of the board.
- Select a microcontroller that can send information to a PC via wifi/Bluetooth.
- Select a method to track the angle of the board's yaw and the pressure of the roll.
- Create and finish the schematic for all electrical systems and have it approved by the chiefs.
- Test and ensure that the selected sensors for yaw and roll work properly.
- The microcontroller is set up and tested to ensure it works properly and can send data in real time.

ME:
- Each different tilting/rotating mechanism has a basic proof of concept prototype demonstrating how it will move and consisting of mostly 3d-printed and OTS parts.
  - This includes the left and right leaning mechanism, the manual up and down tilt mechanism, and the linear side to side with rotation/turning mechanism.
- The snowboard mounting mechanism has a 3d-printing prototype demonstrating how it clamps, but not necessarily integrated into a larger mounting plane.
- Safety feature methods and designs have been decided on and some cad has been made.
- There are sketches and completed cad for how each mechanical sub assembly will be integrated with one another.
  - Specifically, how the different tilting/rotation mechanisms, board mounting mechanisms, and safety systems integrate with one another in the overall frame, and where electrical components are placed in the integrated system.

Milestone 2

Date: 12/5/2024

ECE:
- Create PCB design for design review with chiefs, and use feedback to finalize the board..
  - Order the PCB and test the board to ensure that all components work properly and revise the board if needed.
- Weight and pressure sensors accurately detect the snowboarder's side-to-side movement on board.
- Sensors for detecting the yaw of the board are accurately detecting the board's movements.
- A PCB with a microcontroller, power system, and two sensor subsystems for data collection.
- A power system that can provide correct voltage to the microcontroller and sensors.

ME:
- Individual subsystems have been designed and assembled with final machined and OTS parts.
- Testing has been done for each subsystem confirming that:
  - The tilting and movement mechanisms function with up to 150 lbs of weight.
  - Varying sizes of snowboards can be mounted securely and easily.
- Safety mechanism and overall framing has been built.
- User testing is done with the safety mechanism to confirm that it can support the user and prevent them from getting hurt if they lose their balance.
- All the subsystems have been integrated into the full frame.
- Electronics are securely mounted and enclosed.
- Overall testing of the fully integrated system is done, confirming that all subsystems work with one another.