Final Project Proposal

Year: 2020   **Semester:** Fall

Creation Date: August 26, 2020

Project Name: Snow-weAR Goggles

Last Modified: 3 September 2020

Team Members:

Member 1: Kennedy Monaco

Email: monacok@purdue.edu

Member 2: Carrie Kemmet

Email: ckemmet@purdue.edu

Member 3: Mitchell Ciupak

Email: ciupak@purdue.edu

Member 4: Peter Sumner

Email: sumner3@purdue.edu

1.0 Project Description:

No significant changes have been made to the project design since the initial proposal was submitted. Revisions include adding a compass sensor, specifying a radio type (using a LoRa chipset), and indicating the presence of power circuitry to monitor and allocate power usage. This device's purpose is the same: it reports metrics such as speed, direction, partner location, and current location using an OLED display located around the rim of snow sport goggles, providing an augmented reality experience.

2.0 Roles and Responsibilities:

Kennedy Monaco - Team Leader

> Kennedy will be designing the User Interface aspects of the Snow-weAR Goggles project, including programming the OLED Display and assisting with PCB layout and design. Her main focus during her career at Purdue has been in the fields of software engineering and machine learning. Participation in multiple team projects and extracurriculars have prepared her for a leadership role.

Mitchell Ciupak - Systems Engineer

> Aside from being the team lead for Inertial Measurement Unit functionality, Mitchell is responsible for assuring all components and software work concurrently and synchronously when needed. Mitchell is also responsible for testing these functionalities and deciding final components. As Systems Engineer, Mitchell will also prepare all block diagrams and necessary documentation to guide further products.

Peter Sumner - Software Engineer

> Peter is responsible for implementing the project components integrated with GPS. As the Software Engineer, he will prototype the source code design and will be involved in the development and integration of each software component.

Carrie Kemmet - Hardware engineer

> Carrie will be managing the power, radio, and PCB aspects of the design. Although a computer engineer, she started her time at Purdue as an electrical engineer and has experience in PCB and schematic reviews and design from her summer internship. She has not worked with radio protocols before, but has significant experience in serializer-deserializer interfaces and is excited to expand her knowledge of chipsets to radio as well.

2.1 Homework Assignment Responsibilities

Design Component Homework		Professional Component Homework	
3-Software Overview	*Mitchell*	9-Legal Analysis	*Peter*
5-Electrical Overview	*Carrie*	10-Reliability and Safety Analysis	*Mitchell*
7-Mechanical Overview	*Peter*	11-Ethical/Environmental Analysis	*Carrie*
8-Software Formalization	*Kennedy*	12-User Manual	*Kennedy*

3.0 Estimated Budget

Mechanical	Estimated Cost
Microcontroller	$40.00
Battery Pack	$40.00
Electrical	
PCB	$20.00 x 4 = $80.00
IMU	$50.00 [4]
GPS	$12.00 [2]
Radio chipset and antenna (LoRa)	$30.00 [1] x 2 = $60.00
OLED Display	$26.00 [6] x 2 = $52.00
Misc. Electrical Components	$50.00
Other	
Ski Helmet	$40.00 [3]
Ski Goggles	$20.00 [5]
Total Cost	$444.00

* Shipping is not factored into the budget as it is difficult to accurately predict at this time

4.0 Project Specific Success Criteria

The following project specific success criteria are proposed for Snow-weAR Goggles:

1. An ability to operate for 5 hours at 0 degrees Fahrenheit when stationary based on hardware selection and power consumption.
2. An ability to estimate battery level.
3. An ability to report speed using GPS and IMU sensors.
4. An ability to send and receive GPS location data via radio chipset between devices.
5. An ability to toggle relevant user information on an OLED display.

5.0 Sources Cited:

[1] Mouser.com. 2020. *Lora | Mouser Electronics, Inc. Europe*. [online] Available at: <https://www.mouser.com/Search/Refine?Keyword=lora> [Accessed 28 August 2020].

[2] Amazon.com. 2020. *Amazon.com, Inc.* [online] Available at: <https://www.amazon.com/Microcontroller-Compatible-Sensitivity-Navigation-Positioning/dp/B07P8YMVNT> [Accessed 28 August 2020].

[3] Amazon.com. 2020. *Amazon.com, Inc.* [online] Available at: <https://www.amazon.com/OutdoorMaster-Ski-Helmet-Certified-Different/dp/B074P2RSV9/ref=sr_1_5?_encoding=UTF8&c=ts&dchild=1&keywords=Snow%2BSport%2BHelmets&qid=1598630007&s=outdoor-recreation&sr=1-5&ts_id=11030590011&th=1> [Accessed 28 August 2020].

[4] SparkFun.com. 2020. *SparkFun Electronics*. [online] Available at: <https://www.sparkfun.com/products/16832> [Accessed 28 August 2020].

[5] Amazon.com. 2020. *Amazon.com, Inc.* [online] Available at: <https://www.amazon.com/s?k=Snow+Sport+goggles&i=sporting&ref=nb_sb_noss_2> [Accessed 28 August 2020].

[6] Crystalfontz.com. 2020. *Crystalfontz.com Inc.* [online] Available at: <https://www.crystalfontz.com/product/cfal12856a00151b-128x56-transparent-oled-screen?kw=&origin=pla&gclid=Cj0KCQjw09HzBRDrARIsAG60GP_ve_T8M9iFXV-0Vg4iSpOWhMuCC46nF_f5zZ1VuId3WumlA-ropUUaAnpTEALw_wcB> [Accessed 28 August 2020].