

## *Progress Report for a Bicycle Smart Helmet*

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## Introduction

At Cycle bright Solutions the project that we are currently working on is a Bicycle smart helmet. This helmet contains turn signal and brake lights, to alert other riders and motorists whether they are turning or stopping. The reason behind this product is to decrease accidents due to miscommunication between motorist and cyclists, especially in poor weather condition and at night with low visibility.

Given that the law in BC requires a cyclist to wear a helmet integrating a solution in the helmet was the perfect approach. Thus, users don't have to purchase extra accessories or attachment to benefit. Indeed, all they need to purchase is the helmet making our product very attractive. Therefore, having this system to be wireless provides the rider the ability to have full control of their bicycle, while signalling their intention to other riders and motorists.

## Schedule

Due to weather conditions the shipping of our components got delayed and we received our items later than we expected. As a result Cycle Bright Solutions is currently one week behind the original schedule. The team was supposed to be done with the integration of the first phase of the prototype; however, we are currently in the implementation and integration of the first development phase functionalities.

## Financial

The ISSEF fund run by ESSS was our only source and the details are summarized in the following table:

Amount asked with contingency	\$744
Funding received	\$350 and Arduino Uno (unused)
Amount spent	\$265
Future expenditure	\$50
Amount left for contingency	\$35

## Progress

### Planning and Research:

The smart Helmet consists of two main subsystems which can be designed, implemented and tested separately then further integrated. Due to the time and budget constraints, the proof-of-concept will be built through two development stages.

Phase 1: The main goal of the Smart Helmet is to replace the hand signals by turn signals that can be easily triggered by the user. Thus, the first stage of the development will focus solely in delivering such functionality. In other words, this phase will be dedicated to the design and implementation of the triggering circuit and its synchronization with the microcontroller which will be responsible for turning on and switching off the LED signals as per the user request.

Phase 2: After designing the main functionality of the Smart Bicycle Helmet, this development stage will focus on adding the break trigger, the fall notification system and the Bluetooth speaker.

Continuous research led us to change some of the design choices from using the Arduino Uno provided by ESSS and tow batteries to power the LEDs and the other components, to using one battery and an Arduino Flora board.

#### Design and user experimentation:

The design methods chosen are strongly based on making the smart helmet portable and lightweight as well as easy to use. Thus, user input was taken from different members of the team who enjoy cycling.

#### Material Acquisition and testing:

Most of the project components are ordered and by the end of this week the totality of the needed material will be at the disposal of the team members. Individual component testing was conducted to assure high performance and the compatibility of the different components.

#### Documentation:

Our Documentation is on time. We used the 3 days late submission for design specification. And we will be starting

### **Remediation**

Due to the needed voltage and current ratings of both the Arduino Uno and the LEDs used, we had to change to another board that is more compatible with lower voltages. We had to order the Flora board after purchasing most of our components. This unexpected change didn't delay our progress more than the delay occurred before since it only took one day to receive it. However, the amount paid came out of our contingency budget. To avoid schedule slippage, every task is assigned to two team members to assure that the subsystems get delivered on time.

## Conclusion

Cycle Bright Solutions is committed to providing an effective solution to improve the safety of cyclists. Our team is excited about the production of the first Cycle Bright Solutions' product, the Smart Helmet. This product will introduce a safer way to communicate between cyclists and other vehicles and reduce the percentage of accidents.

Among the wide range of helmets already available on the market, our approach for this smart helmet is relatively inexpensive, comfortable, safe and easy to use (fully integrated into the helmet, wireless and semiautonomous) and we hope that it will kick-start a whole new generation of helmets.

Our project is coming along quite fine; the research part is on going through the whole process, we were a little delayed from our original schedule due to the delay of the arrival of the parts however, despite that we are working endlessly to make up for lost time, and are currently working on debugging the first stage of our project.