

Goal

Goals

What we want to achieve is to protect our bicycle riders in the night through our smart safety helmet. The aim of this design is to build a helmet that consists several sensors to collect data and then send to the microcontroller .Finally, the microcontroller on the helmet receive and process the data sent by sensors to control different type of lights, including two turn lights, one braking light and a flashlight.

Motivations and Objectives

Motivations

- A In 2012, 29% of the bicycle accidents were caused by crushing into a motor vehicle due to low visibility.
- B Expensive to install street lights along all the streets. Some of the streets are extremely dark at night.

Objectives

- A Design an smart wearable device that keep cyclers safe when they cycling in the dark.
- B The device can be easily control through simple gestures of head instead of using hands that may disturb riding.

Research Challenges

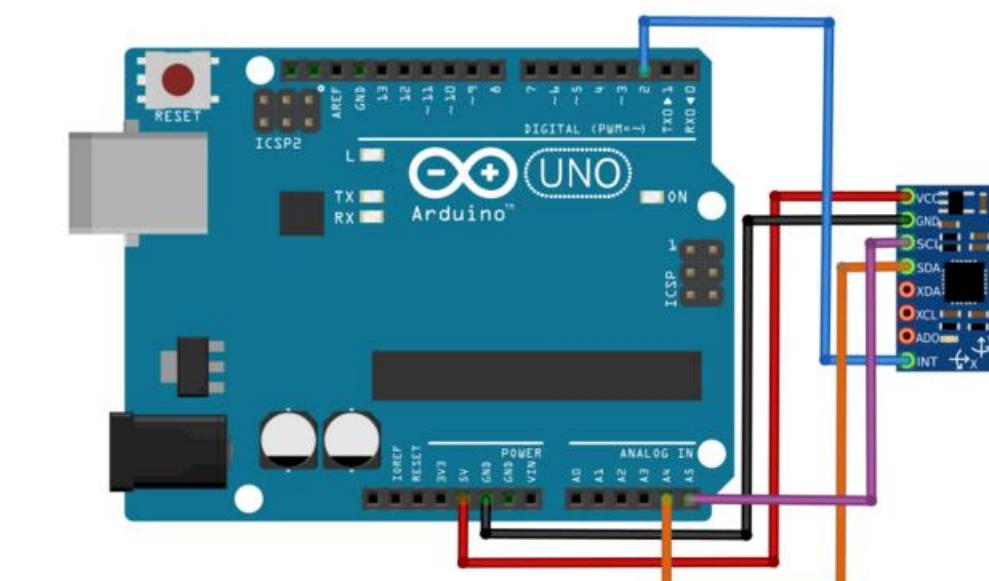
- Challenge 1: Adjusting the voltage difference of arduino output, sensors and LED.
- Challenge 2: The algorithm to detect the tilt angle in the space
- Challenge 3: Will have error if work with accelerometer and gyroscope separately.
- Challenge 4: Find the most suitable gesture for the interactive action between human and controller.

Acknowledgement

We would like to thank Prof. Godrich and Adafruit.

Methodology

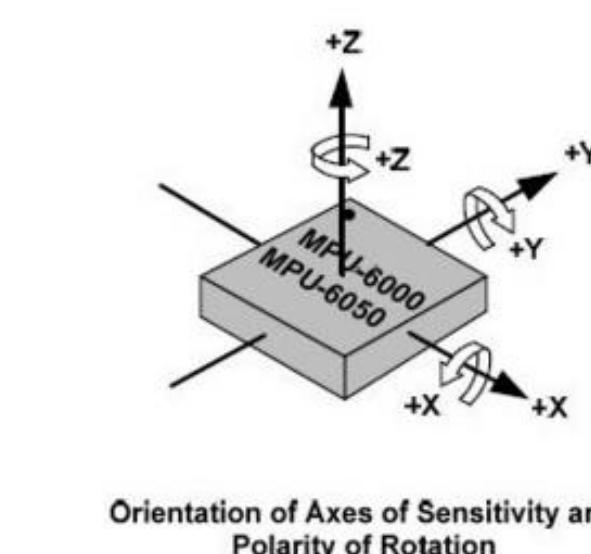
- Arduino was used to process signal received from sensors to control pattern of lights.



- Install all the above parts inside of helmet to make it work.

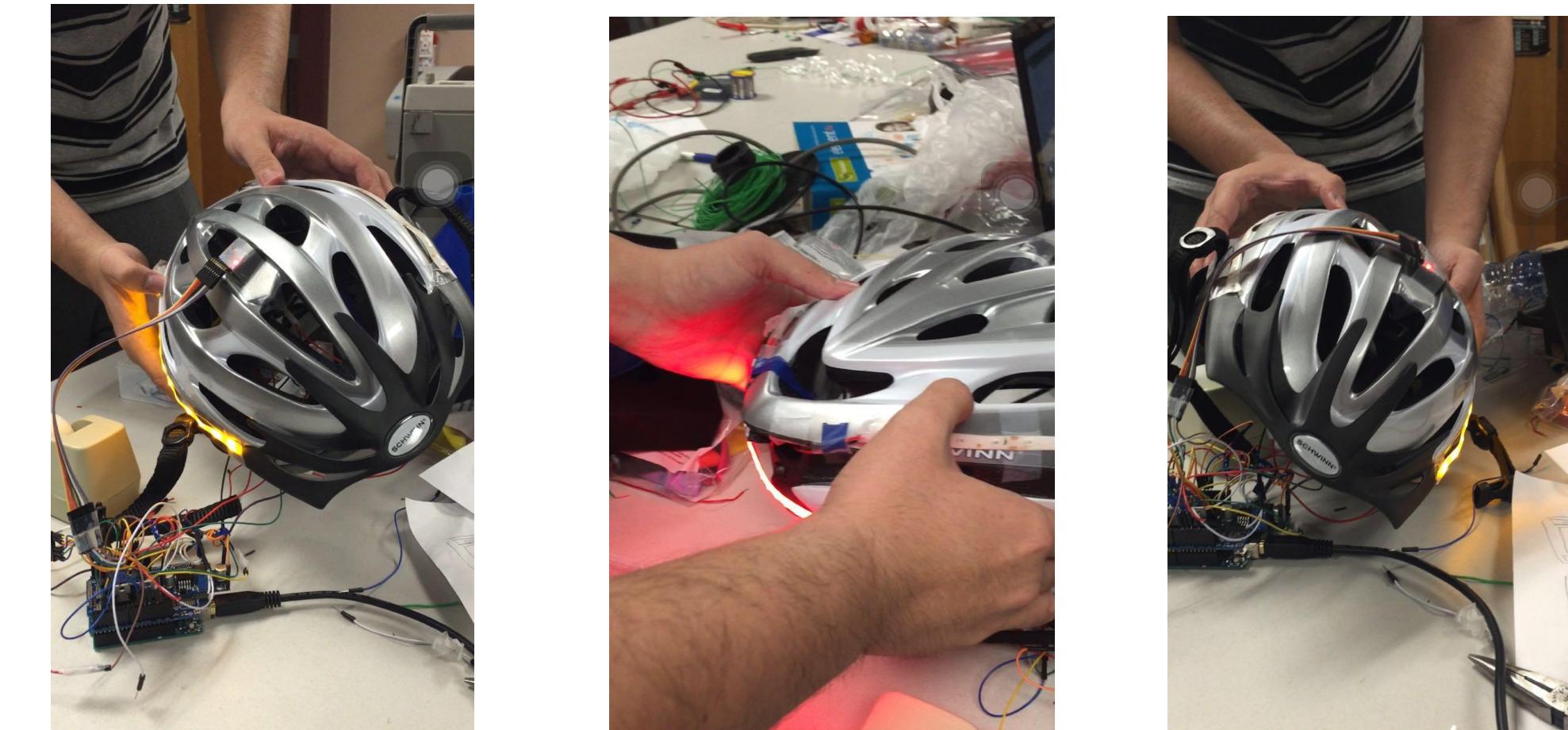


- Accelerometer & Gyro sensor used to calculate tilt angles and acceleration



Results

- Left light can be lighten up while head turned to left and Right light can be lighten up while head turned to right .



- Braking light on while slowing down

Discussion

We have successfully implement the arduino controller with the light intensity sensor, accelerometer and gyro sensors. The whole system works well and pass the test of real bicycle ride.

References

- [1] National Highway Traffic Safety Administration, "2012 National Survey on Bicyclist and Pedestrian Attitudes and Behaviors"
- [2] ARDUINO MPU 6050 – BEST IMU SENSOR TUTORIAL,<http://diyhacking.com/arduino-mpu-6050-imu-sensor-tutorial/>