Beta System

# Bicycle Safety Assistant User Manual

Present by Group 9

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## Introduction:

“Bicycle safety assistant” is a system that helps users to detect the vehicles from the back by the combination of a microcomputer, alert device and ultrasonic sensor. Users could set up the system on their bike by attaching the devices on it and the alert device could alert the user by led light and audio feedback. It could greatly increase the saftness for users when they are riding a bike and let them enjoy the experience of riding without worrying about danger from behind.

## Computer Prototype entry:

We designed a virtual environment simulating a crowded street in Unity engine where you can do the prototype testing in the simulated use case scenario. We published our WebGL project on simmer.io platform so that you can easily have access to our computer prototype by visiting to this link. Please open your speaker when you start testing the prototype.

## System Limitation:

Due to the limitation of hardware we used, our system have some limitations:

1. The ultrasonic sensor maximum distance for detecting object distance is 5m, so we could not set the detection distance more than 5 meters. And for its effectual Angle is less than 15°, so we cannot detect an object which location is more than 15° of ultrasonic sensor.
2. System cannot last for a very long time, because all the power is supplied by the battery. And our system consume a lot of energy
3. Since we are using ultrasonic sensors to detect objects, we cannot justify what things are being detected: either a person or a car. And we also cannot detect object above or below the ultrasonic sensor, so we have to make sure the height of ultrasonic sensor is lower than the

# Prerequisites:

Users need two 9V batteries to supply the power of the system.

# System Usage guide:

1. **Turn on the device**

   User could turn on the device by switching the switches on the battery box (the black rectangle box which has on and off) to “on” and the user could see the arduino light up.

Switch off, device turned off

Switch on, device turned on

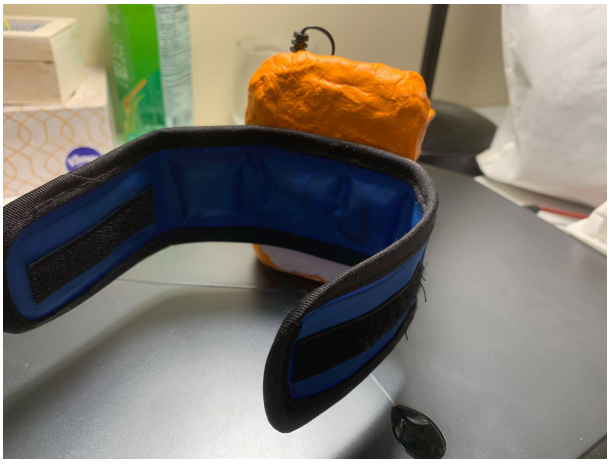
Switch off, device turned off

Switch on, device turned on

2. **Installation on the bicycle**
   a. **Install sensor box**

Please place the sensor device at the back of the bicycle using the nylon magic tape. Notice the sensor device should be placed in an appropriate height for detecting the moving objects behind, also there shouldn't be any blocking part of the bicycle when you place the sensing device.

Attention!! The ultrasonic sensor which is used to detect vehicles becomes the eyes of the "cute dogs". Please do not let anything block the view of the "dog eyes"



**b. Install alert box**

Please place the alert box at the handle of the bicycle using the bike mounter. The bike mounter is a normal bike mounter (black metal holder shown in the below image) which normally holds a phone but since our alert device could also fit in, we decided to use it to attach our device on it. By loosening the screw and opening the circle section of the bike mounter, you can put it to the bike grip. Then tight the screw of the mounter, and drag the upper part (which is used for

holding the box), the user could easily place the alert device on the mounter. Please adjust the angle and position to make the LED light indicator facing in a suitable direction where you can easily notice the alert feedback during your riding. The alert box should also be placed in a safe location without distraction.


**Now you are ready to enjoy safe riding!!!!**

3. **Instruction of status (feedback)**

Led light blinking & buzzer buzzing:

- The led light will blink and the buzzer will buzz for 1 sec if the sensor detects that there is a car approaching behind and the distance between the bike and the car is under or equal to 1.5 m.
- The led light will blink and the buzzer will buzz for 1 sec and then stop if a car is always within 1.5 m between the bike and the car.

Led light & buzzer idle:

- If the led light and the buzzer have no action then it means the biker is safe and there is no car from behind.

- If the led light and the buzzer has no action and there is a car behind then it means the alert device has already informed the user before and is waiting to detect another car if the current car leaves the detect range.

Button function:

When the alert device is buzzing and blinking, the user could choose to turn off this alert by simply pressing the button on the alert device and then the alert device will go back to silence immediately. Here is a demo to show you how to do it.
https://drive.google.com/file/d/1PAQ7ByMn1fluOcXo2-NBayECTHxBPRLx/view?usp=sharing

4. **Turn off the device**

Users could turn off the device by switching the switches on the battery box (the black rectangle box which has on and off) to “off” and the user could see the arduino light disappear.

Switch on, device turned on

Switch off, device turned off

Switch on, device turned on

Switch off, device turned off

## Contact:

If you have any concerns or questions, please don't hesitate to reach out to us by email :)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**Hope you enjoy our product~**