**Introduction:**

This document outlines the requirements for the development of a printed circuit board (PCB) and associated firmware for **New Radar PCB**. The purpose of this project is to design, develop, and integrate a high-quality PCB with custom firmware to meet the functional specifications and performance criteria outlined below.

**Project Overview:**

This project is a based on new radar sensor, intended to use for cycling safety.

**Requirements:**

The PCB should support the following items (BOM) :

|  |  |  |
| --- | --- | --- |
| **Component** | **Model/Description** | **Qty** |
| Radar | L508 | 1 |
| WiFi | Wifi | 1 |
| Bluetooth | Bluetooth | 1 |
| High Brightness LED | High Brightness LED 5V | 1 |
| Battery | 3.7 ~ 5V Battery (4000 ~ 5000mA) | 1 |
| Gyro | GY-521 | 1 |
| Camera | OV5640 | 1 |
| Battery LED | RGB LED 5V | 1 |
| Button | Button | 2 |

**PCB Design Concept:**

Camera

Radar  
Connector

Switch 1 connector

C Type USB to charge battery

Camera connector

RGB LED  
Connector

WiFi and Bluetooth

Switch 2 connector

MCU

SD card slot

FLASH LED  
Connector

Battery  
Connector

GYRO

\*\* you can integrate WiFi, Bluetooth, and Gyro with PCB. Other items such as radar, LED, battery, switch, and camera should have connector in PCB so that we can connect separately.

**PCB Design Requirements:**

1. PCB size should be max 45 x 45 mm. More smaller, more better.
2. Use USB Type-C for charging the battery. If possible flashing the code as well.
3. Any battery between 3.7V ~ 5V should be acceptable to connect with PCB.
4. There will be 2 switches. Switch 1 will turn ON and OFF device, another switch 2 will control LED flash OFF, ON, and Flash LED. So, LED switch 2 should be connected to PWM pin to control it.
5. There are 2 LED connectors. 1 LED will be used for flashing which is very bright LED. Another LED is RGB LED which will display battery health.
6. SD card slot should be on board, and it should be in the corner of PCB.
7. Radar module should be connected with this PCB using connector. You can choose which connector can be used.
8. We want to connect camera module separately like in between PCB and camera module should have some wire.

**PCB Firmware Functions:**

*While using bike computer-*

1. Read radar signal data and verify the number of incoming objects with their speed and distance and then send this data over via BLE to bike computer PCB.
2. Record live camera feed and save every 2 min video in “video” folder on SD card automatically.
3. Read gyro data all the time to detect accident. If any accident occurs, save that timestamp video to separate folder named “accidents” in SD card.
4. There is a button to control flash LED. Here is the control mechanism:
   1. 1 time press – LED turn ON
   2. 2 time press – LED flashes (delay 500ms)
   3. 3 time press – LED turn OFF
5. Read battery health (%) and display over the battery RGB LED. During charging this LED should be ON and OFF (blinking) to check battery is fully charged or not. If battery is fully charged the LED should be OFF. Also when we turn ON the device this battery LED should be always ON to display battery condition. Here is the condition:
   1. If battery health is 0% ~ 30% : Light Red
   2. If battery health is 31% ~ 70% : Light Green
   3. If battery health is 71% ~ 100% : Light Blue

*While using mobile app-*

1. Read radar signal data and verify the number of incoming objects with their speed and distance and then send this data over via WiFi to mobile app.
2. Record live camera feed and save every 2 min video in “video” folder on SD card automatically.
3. Read gyro data all the time to detect accident. If any accident occurs, save that timestamp video to separate folder named “accidents” in SD card.
4. There is a button to control flash LED. Here is the control mechanism:
   1. 1 time press – LED turn ON
   2. 2 time press – LED flashes (delay 500ms)
   3. 3 time press – LED turn OFF
5. Read battery health (%) and display over the battery RGB LED. During charging this LED should be ON and OFF (blinking) to check battery is fully charged or not. If battery is fully charged the LED should be OFF. Also when we turn ON the device this battery LED should be always ON to display battery condition. Here is the condition:
   1. If battery health is 0% ~ 30% : Light Red
   2. If battery health is 31% ~ 70% : Light Green
   3. If battery health is 71% ~ 100% : Light Blue

**Application Update Needed:**

1. Read radar data and update the mobile app accordingly.
2. Read battery % data.
3. See accident folder data separately to see accident video files.
4. Control Flash LED via a button.

**\*\* This document included requirements for camera version. So you can skip gyro and sd card functions.**