**Introduction:**

This document outlines the requirements for the development of a printed circuit board (PCB) and associated firmware for **Bike Computer 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 small bike computer-based PCB project, intended to use for cycling.

**Requirements:**

The PCB should support the following items (BOM) :

|  |  |  |  |
| --- | --- | --- | --- |
| **No.** | **Model/Description** | **Size** | **Qty** |
| 1 | Object Detection LED | 2.8 x 2.4 x 1.75 mm | 6 |
| 2 | Battery RGB LED | 3.5 x 3.5 x 1.9 | 1 |
| 3 | Digital LED | 19 x 25.1 x 3.85 mm | 1 |
| 4 | GPS | 26 x 35 x 3 mm | 1 |
| 5 | Buzzer | 5 x 5 x 2 mm | 1 |
| 6 | Battery 3.7V 1500mAh | 34 x 52 x 8 mm | 1 |
| 7 | micro controller (ESP32-C3-WROOM-02-N4) | 34 x 53 x 5 mm | 1 |
| 8 | Switch | 6 x 6 x 5 mm | 2 |

**PCB Design Concept:**

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A computer generated electronic device

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BUZZER FREQ. SWITCH

GPS and BATTERY CONNECTOR

BATTERY   
RGB LED

OBJECT   
DETECTION LED

RADAR PCB   
CONNECTION LED

A drawing of a building

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BUZZER

\*\* you have to integrate number display, LED, buzzer, and Bluetooth with PCB. Other items such as battery, switch, and GPS should have connector in PCB so that we can connect separately.

**PCB Design Requirements:**

1. PCB size should be max 34 x 53 mm.
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 where one will turn ON and OFF the device, another one will control buzzer dB.
5. There are 2 types of LED connectors. LED 1 will be used for showing incoming objects in every 30 meters using 5 individual LED’s. and 1 extra LED for bluetooth connection. LED 2 is RGB type LED which will display battery health.
6. Buzzer should be integrated with PCB itself.
7. GPS, switch and Battery should be externally connected. Others should be integrated with PCB.
8. You should integrate number display A black and white digital display

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**PCB Firmware Functions:**

1. When the device is power ON, the PCB should try to connect with radar PCB automatically. One LED will be used to show user that this PCB is connected with radar PCB or not. This LED will be this one.

A computer screen shot of a computer screen

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1. Read radar signal data from radar PCB via BLE and turn on LED individually based on incoming object. Our radar can detect object upto 150 meter. So, in the PCB there are 5 of LED 1 which needs to display incoming object data. These are the LED which will show object’s distance data.

A computer screen shot of a computer screen

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Each LED will have their own distance. Such as-

* 1. LED 1.1 : only light when there is one or multiple objects in the range of 0 ~ 30m
  2. LED 1.2 : only light when there is one or multiple objects in the range of 31 ~ 60m
  3. LED 1.3 : only light when there is one or multiple objects in the range of 61 ~ 90m
  4. LED 1.4 : only light when there is one or multiple objects in the range of 91 ~ 120m
  5. LED 1.5 : only light when there is one or multiple objects in the range of 121 ~ 150m

1. Buzzer will only activate for 1 second when LED 1.1 and LED 1.2 light is on. Otherwise, it will be always off.
2. There will be 2 switches where one switch will turn ON and OFF the device by pressing. Another switch will control buzzer dB by pressing.
3. Speed data should be display in km/h from GPS and display over the number display. Only 2 digit needs to display.
4. Read battery health (%) and display over the battery RGB LED 2. 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

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1. Buzzer frequency switch will be used to control buzzer sound frequency. 1 press low sound, 2 time press medium sound, 3 time press lounder sound. It can be controlled when device is powered ON.
2. GPS will display 2 digit speed data via 7 segment all the time when device power ON.