BMS PCB- Connections

1. **Components:**

- The HiLetgo board is the 5V source.
- The Bela runs directly on 5V.
- The OpenBCI needs 3.3V.
- The LDO regulator (MCP1700) converts 5V to 3.3V.

2. Preparing the PCB

If the PCB does not have holes drilled, then:

Tools we Need:

- A small PCB hand drill or Dremel
- 0.8 mm or 1.0 mm drill bit
- Eye protection (PCB dust is sharp and irritating)

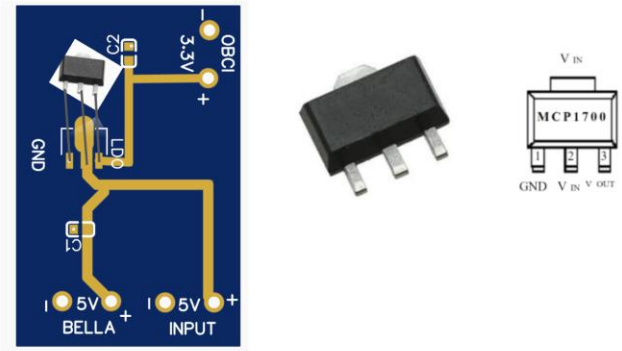
How to Drill Properly:

1. Locate the gold circular pads. These are your drill targets.
2. Place the drill bit exactly in the center of the pad.
3. Drill straight down with light pressure.
4. After drilling, scrape away rough copper edges so the surface is clean and flat.

Note: Crooked holes make soldering harder.

3. Soldering the Components

A. LDO Regulator (MCP1700)



1. Check orientation carefully. The flat side of the MCP1700 must match the board marking as shown in the above figure.
2. Insert the three legs through the holes so the body sits close to the PCB.
3. Flip the board and solder each leg:
    a. Heat the pad and the leg at the same time.
    b. Add a small amount of solder.
    c. You want a clean cone shape, not a blob.
4. Trim the extra leg length after soldering.

Note: Avoid solder touching adjacent pins.

B. Capacitors (C1 and C2)

These stabilize the voltage and reduce electrical noise.

- Solder C1 (100uF) near the INPUT side.
- Solder C2 (10uF) near the OBCI side.

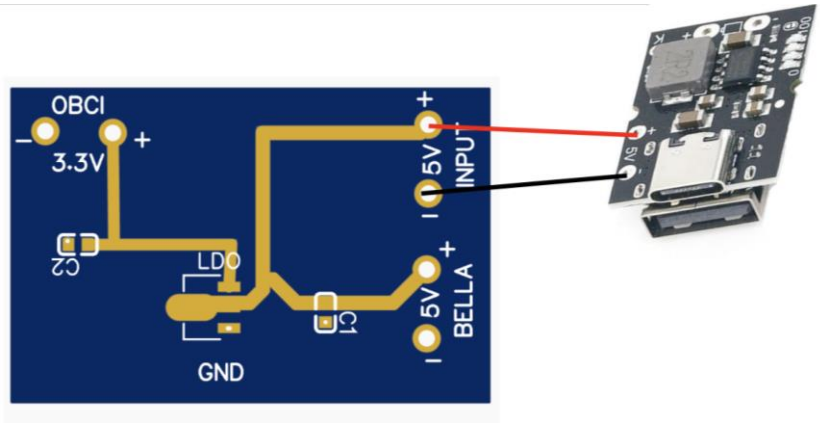
Make sure they sit flat against the board and are properly soldered.
If these are missing or poorly soldered, you may get unstable sensor readings later.

4.Final Wiring Map

Follow this exactly. Power wiring mistakes are expensive.

Main Power In: PCB INPUT (+) and (−) → HiLetgo 5V and GND

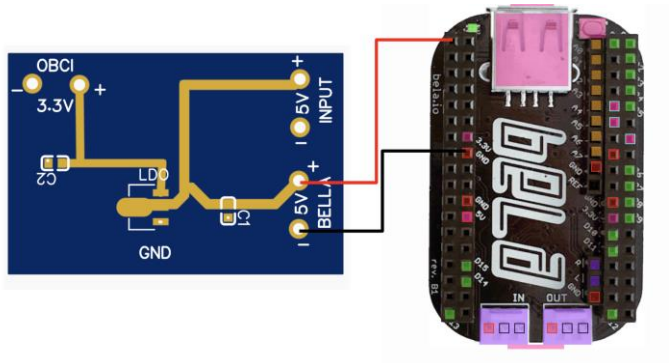
Red to positive, Black to ground as shown in the figure below.



Bela Power: PCB BELLA (+) and (−) → Bela 5V and GND

Red to positive, Black to ground as shown in the figure below.

Do not guess polarity. Double check every connection before applying power.



5. If Something Does Not Work

Nothing turns on:

1. Check the battery and the wiring between battery and HiLetgo board.

2. Bela works but OpenBCI does not: The LDO may be reversed. Confirm the flat side orientation.
3. Boards get hot: Likely a short circuit. Inspect for solder bridges between pads.
4. OpenBCI receives 5V: This is dangerous. The LDO pins may be bridged with solder. Fix immediately.
5. Sensor data looks unstable: Check that C1 and C2 are properly soldered. They smooth the power supply.

6. Final Safety Check Before Connecting Devices

1. **Tug Test:** Gently pull each wire. If it moves, resolder it.

2. **Visual Inspection:** Look closely for stray wire strands or solder bridges.

3. **Multimeter Check:**

With the battery connected:

- INPUT should read around 5V
- BELA port should read around 5V
- OBCI port should read about 3.3V

If you do not see these values, stop and fix the issue before connecting your boards.

4. Pre Power Check

Before connecting Bela or OpenBCI, do these two tests.

I. **Continuity Test:**
   - Set the multimeter to continuity mode.
   - Touch one probe to a positive hole and the other to a negative hole.
   - **It should not beep.**
   - If it beeps, you have a short circuit. Find it and remove the extra solder before proceeding.

II. Voltage Test

1. Turn the system on.
2. Measure:

- INPUT: around 5V
- BELA: around 5V
- OBCI: about 3.3V

If OpenBCI shows 5V, do not connect it. Fix the regulator issue first.

7. Final Assembly

Once everything measures correctly:

1. Disconnect the battery.
2. Solder final wires to Bela and OpenBCI.
3. Double check polarity again.
4. Reconnect the battery and confirm status LEDs turn on normally.

Build slowly. Check twice. Power once.