

PCB Design Document

Cement Mixer Monitoring System

1. Introduction

This document outlines the PCB design process for converting the breadboard-based Cement Mixer Monitoring System circuits into compact, robust printed circuit boards. The PCB was designed using EasyEDA and manufactured through JLCPCB.

2. Design Platform and Tools

Design Tool: EasyEDA

Manufacturer: JLCPCB

Design Files: Schematic and PCB layout created in EasyEDA's online editor

Export Format: Gerber files (RS-274X standard) for fabrication

3. Design Process

a. Schematic Capture

Each component (ESP8266, MPU6050/SCT013, LED, resistors, connectors) was added using the EasyEDA parts library.

Connections were routed logically to minimize wire crossing and maximize readability.

b. PCB Layout

Converted schematic to PCB using EasyEDA's automatic netlist tool.

Manual routing was used to ensure trace clearance and short path lengths.

Power and ground traces were kept wide enough to handle battery currents.

c. Design Constraints

Board Type: 2-layer

Size Optimization: Layout compacted to minimize PCB dimensions without overlapping traces

Silkscreen: Component labels and indicators added for clarity

Holes: Mounting holes were added at the corners to enable mechanical stability using screws

4. Board Specifications

Board Dimensions: Approx. 60mm x 40mm (varies based on circuit)

Copper Weight: 1 oz

Thickness: 1.6mm

Solder Mask Color: Green

Finish: HASL (Hot Air Solder Leveling)

Assembly Option: Hand-soldered after delivery

5. Ordering from JLCPCB

Gerber files were exported from EasyEDA and directly uploaded to JLCPCB.

Standard options selected with default layer stack, 5 boards ordered for initial testing.

Lead time: ~5–7 days for production and delivery

6. Assembly Notes

All components were manually soldered.

Solder pads were easy to access due to careful component spacing.

Testing was done using USB power before field deployment with 9V batteries.

7. Observations and Outcome

The final PCB significantly reduced wiring clutter compared to the breadboard setup.

It enabled reliable mechanical mounting and consistent sensor readings.

Future revisions could consider:

- Integration of both circuits on a single board
- JST connectors for easy sensor swapping
- Dedicated LiPo charging and regulation circuits

8. Reference Video

Please follow this YouTube video for further clarification and guidance

<https://www.youtube.com/watch?v=iB-n8Nbt18A>