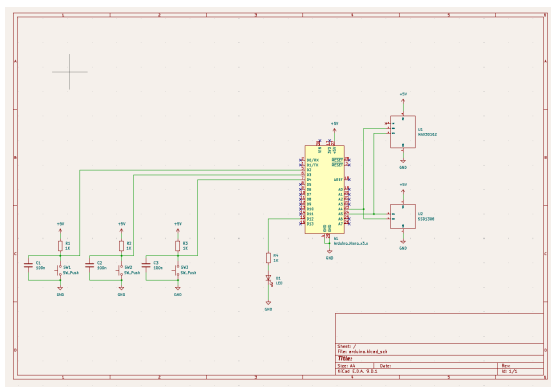
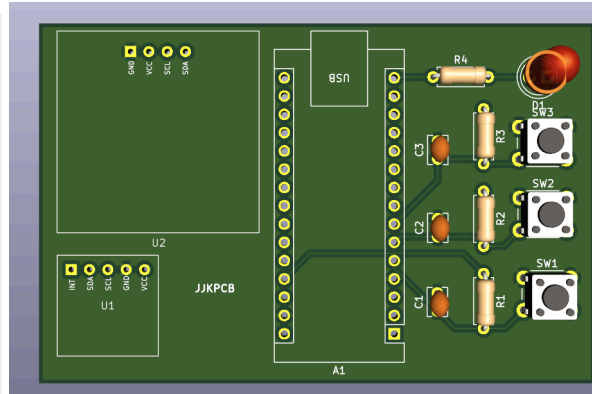


## Heartbeat Monitor PCB Design



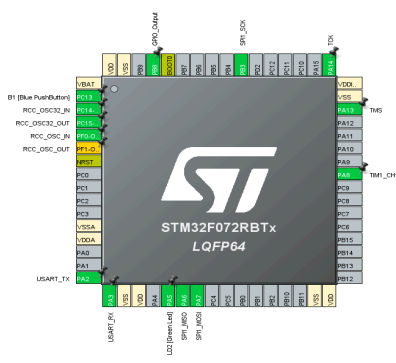
*SPO2 KiCad schematic overview*



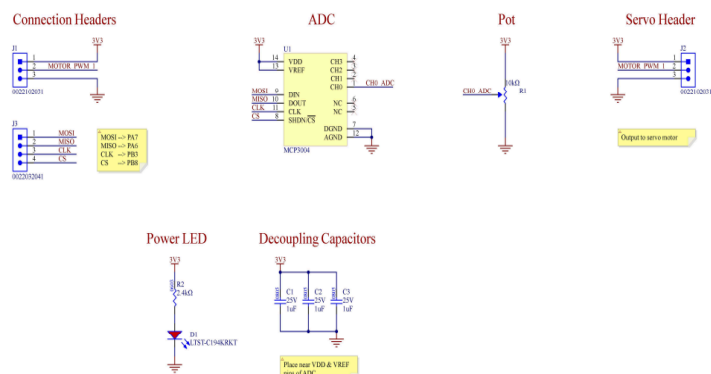
*SP02 Sensor PCB Design*

- Designed a custom PCB in **KiCad** around the **MAX30102** pulse-oximetry sensor for heartbeat and SpO<sub>2</sub> monitoring
- Integrated **PC** communication with an Arduino for live BPM and SpO<sub>2</sub> tracking on an OLED display
- Optimized component placement and decoupling-capacitor layout to minimize noise and maximize signal clarity
- Implemented **USB-C** power input with ESD protection and proper footprint for reliable power delivery
- Exported production-ready Gerber files and verified manufacturability, ensuring correct footprints and clearances

## Motor Tester ([Github](#))

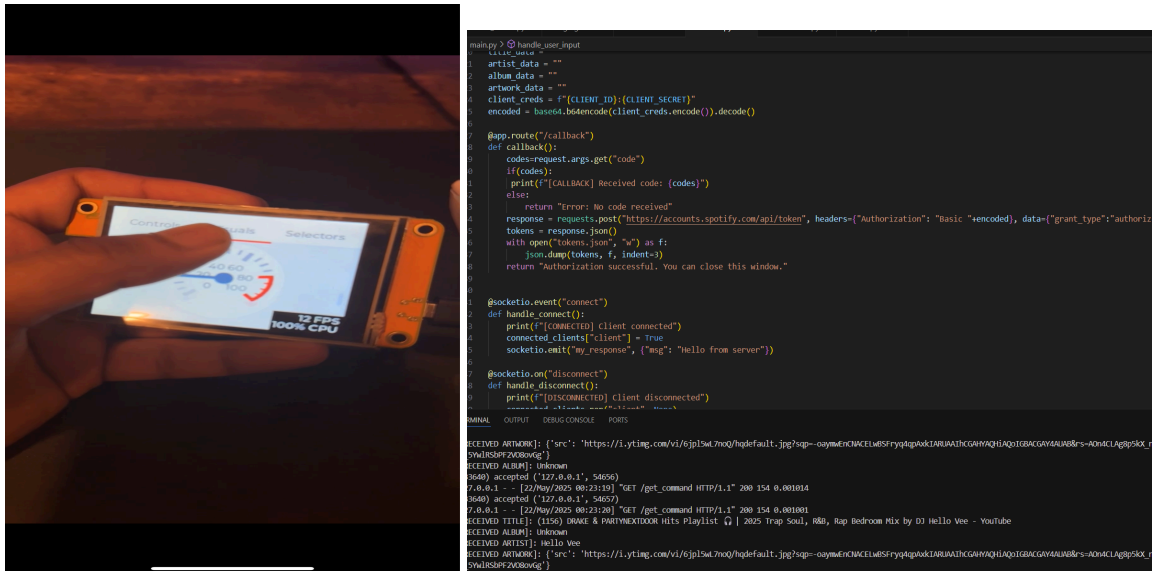


*STM32 IOC Pinout*



*Motor Tester Schematic (ADC, LED, Servo, SPI)*

- Automated servo and continuous-rotation motor evaluation by implementing STM32 firmware that reads potentiometer positions via an SPI-connected ADC and outputs corresponding PWM control signals
- Developed robust SPI drivers to sample external ADC voltages (0–3.3 V) in real time, ensuring accurate capture of analog control inputs
- Tuned STM32 timer-based PWM to translate ADC readings into precise speed and direction commands, enhancing test consistency and repeatability

ESP32 Media Controller Dashboard ([GitHub](#))

ESP32 UI Showing CPU Usage    Python Server receiving metadata from Spotify & YT ([Server Github](#))

**Overview:** Handheld touchscreen device that displays and controls YouTube, Spotify, and Discord media without needing to touch your computer.

**Hardware & UI:** ESP32 drives a 2.8" SPI TFT display and capacitive touch panel, with LVGL layouts for play/pause, skip, and volume controls.

**Browser Extension ([Extension Github](#)):** Created chrome extension to call the YouTube Metadata API to pull video title, playback state, and timestamp, packages it into JSON, and sends it via WebSockets.

### Communication:

- **Incoming:** Flask Websocket server ([ws://localhost:5000](#)) relays JSON messages from the browser to the device.
- **Outgoing:** Device sends button-press commands back to the server over UART to trigger play, pause, or skip actions.

**Real-Time Feedback:** Touch commands instantly update media on your computer, and live status (e.g., current video title) appears on the device screen.