Physical Computing Project

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"MINI ION"

1. Project Concept

This project is a digital lighting desk that allows you to control LEDs or LED strips directly from a p5.js sketch.

ESP32-S3 acts as a bridge between the computer and hardware.

p5.js is the software interface where you control the lights using buttons, sliders, or keys.

Commands are sent over serial communication from p5.js to ESP32, which controls the LEDs in real time.

2. How to Use It

- Connect hardware
- LEDs or LED strips connected to ESP32 pins.
- ESP32 connected to your computer via USB.
- Run p5.js sketch
- The interface has buttons, sliders, or keys representing different lights.
- Control lights
- Interacting with the interface sends commands to ESP32.
- ESP32 updates LED brightness or state instantly.
- The interface shows visual feedback for active lights.

3. How It Works Technically

- ESP32-S3 listens for data from the computer via serial port.
- p5.js sends comma-separated values for each LED channel (0–255 brightness).
- Example: 255,128,0,64,255,0,192,128
- ESP32 receives the string and splits it into individual channel values.
- Each LED's brightness is updated using PWM (analogWrite).
- This loop repeats continuously, allowing real-time control.
- Flow:
- p5.js interface → Serial data → ESP32 → LEDs update

Key Points

- 8-channel control: Each LED can be controlled separately.
- Real-time updates: Changes on p5.js instantly affect the LEDs.
- Software-driven: No sensors or potentiometers; all control comes from p5.js.

- Debug-friendly: ESP32 prints received values to Serial Monitor for checking