👾👾👾 **Ultimate 1D RG…** by WorksAsDesigned

👾👾👾 Ultimate 1D RGB Invaders (ESP32-Edition) 👾👾👾 [Arcade Action]

By WorksAsDesigned in Circuits > Arduino 2,286 25 4 Featured

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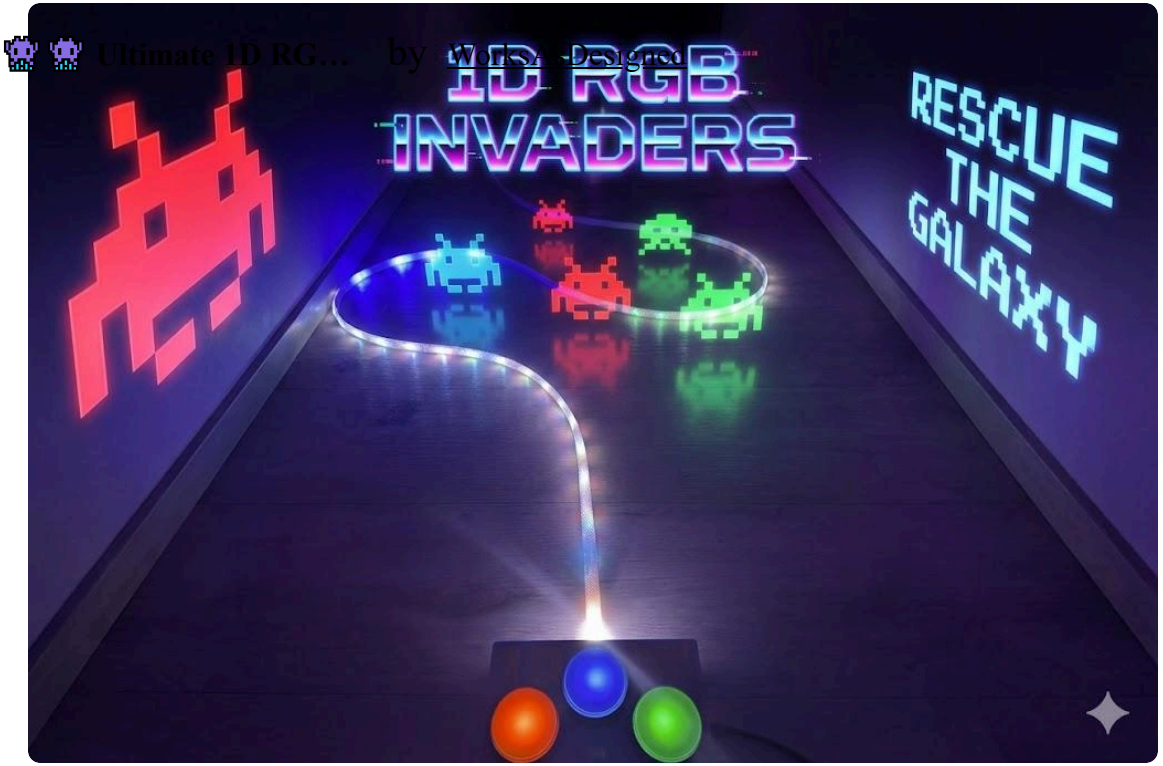

👾👾👾 Ultimate 1D RGB Invaders (ESP32-S3 Edition) 👾👾👾

The 1D Arcade Shooter that proves you don't need 4K graphics to sweat.

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Welcome to Ultimate RGB Invaders. You are about to turn a strip of lights into a battlefield. You control a spaceship (a single, brave pixel) fighting against waves of chromatic enemies. It has Bosses. It has Highscores. It has a Web Interface because we are living in the future.

This project is optimized for the **ESP32-S3**. Why? Because it supports I2S Audio for that crisp retro-arcade sound. Maybe not Dolby digital --- but if the game has a resolution of 1x240 pixels... it fits :-)

Video demo at the end of the documentation.

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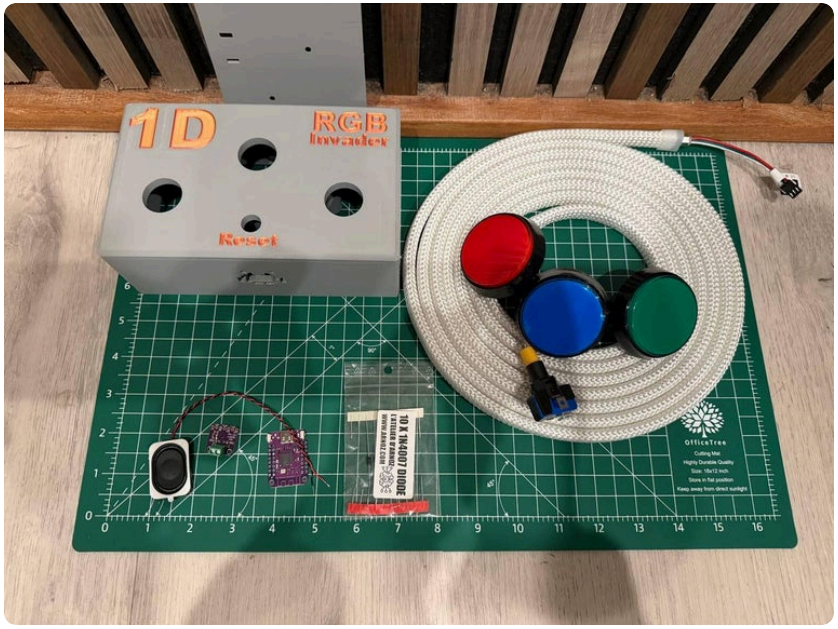
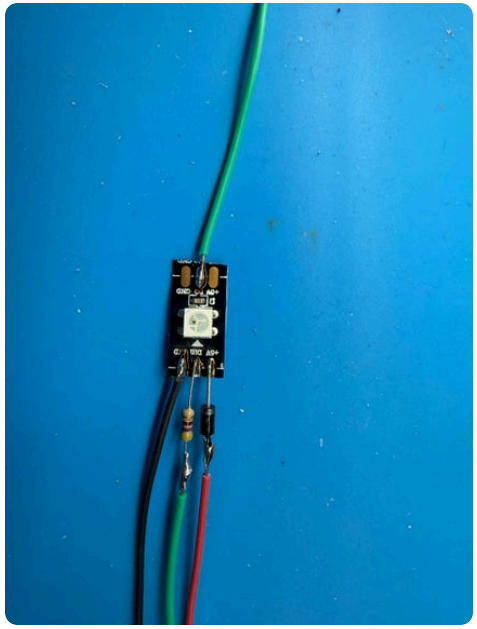
Supplies





- ESP32-S3
- WS2812B (4m 60LED/m) - take the coated one - looks better and is more durable
- MAX98357A Amplifier
- 4 Ohm 3W Speaker
- 3x 60mm Arcade Buttons (red, green, blue)

- 1x 12mm Button (metal)
- 3A (better 5A) 5V Power Supply (e.g. USB C) mabe not from AliExpress. or buy a better one from e.g. Anker
- USBC PD Board
- 3D printed Case

Optional:

Sometimes cheapLED stripes tend to flicker. A sacrifying LED (using a 1n4007 diod in the +5V to that single LED) and a 330 Ohm resistor in the data line should solve this problem. Usually it should work without.

You get all parts e.g. at AliExpress for around 35-50€

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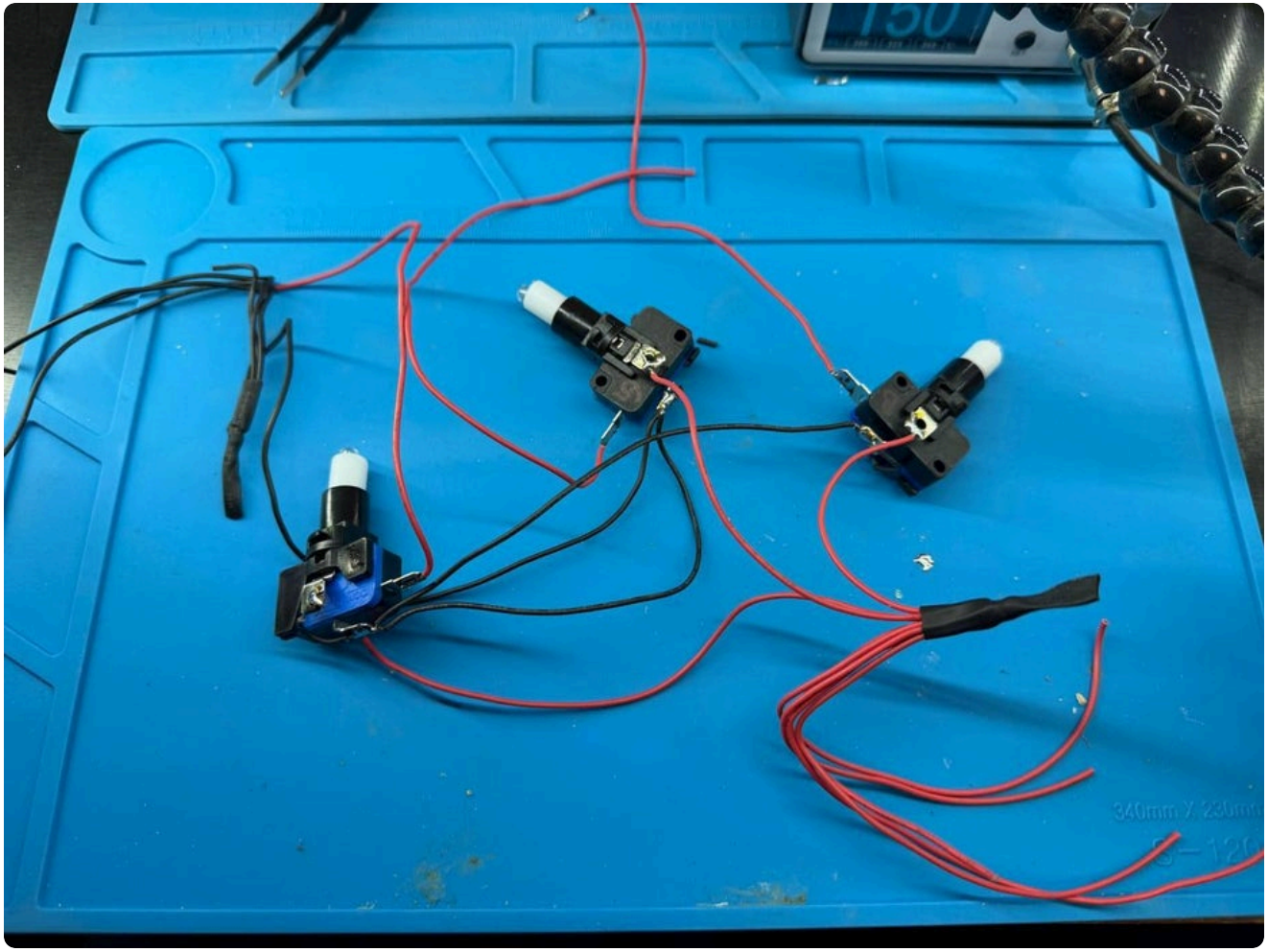
Step 1: Start With the Buttons



Don't fear the soldering iron. You need to attach two wires to every button.

- **Signal Wire:** Solder a distinct color wire to one leg of each button.
- **Ground Wire:** Solder a black wire to the other leg. You can daisy chain all those ground wires together.
- 💡 **Pro Tip: Daisy-chain the Ground wires!** Solder one long black wire that hops from button to button, so you only have ONE single Ground wire going back to the ESP32. Saves a ton of mess.

Optional:

Most Arcade buttons have a built in LED (usually powerd with 12V). You can also connect them to +5V and the common ground.

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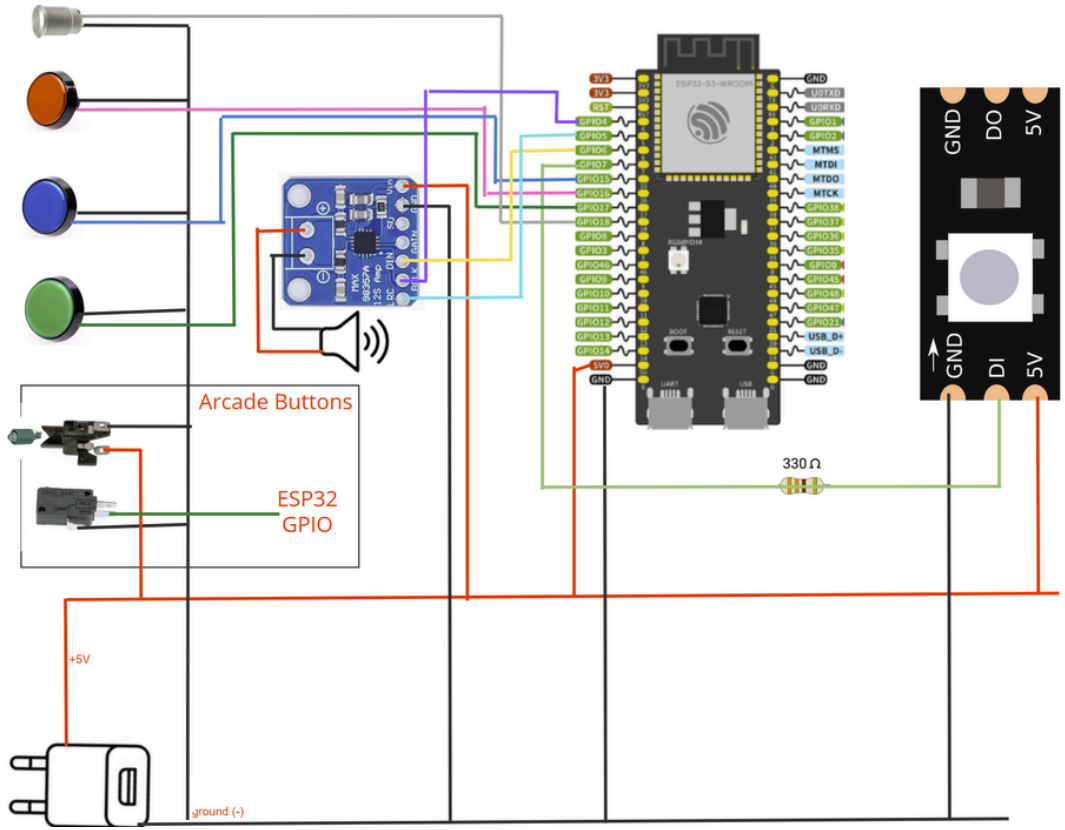
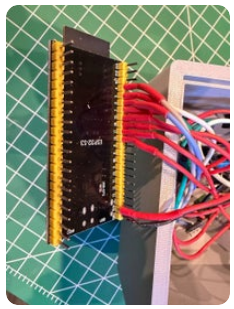
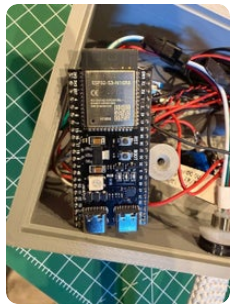
Step 2: ESP32 - Soldering All Those Tiny Legs (the Hard Part :-)







This is the heart of the machine. ESP32 S3

A) Power Distribution (USB-C PD Board)

Configure your USBC-PD Board to output **5V**. Connect the output to a Wago terminal or solder point to split the power three ways:

- Vbus (or Vin) pin of your ESP32
- Vin of the amplifier
- Vin of the LED strip
- optional : light LED of arcade buttons

ALL ground (buttons, ESP, LED, amp, ...) can be connected together.

⚠ ***CRITICAL:*** *The LED Strip takes power directly from the PD Board, NEVER through the ESP32!*

Next ist the tricky part. Many rather small soldering tasks to the ESP:

Component ESP32-**S3** Pin Note

GPIO 7 LED Data to the stripe (Green wire usually)

GPIO 15 Button Blue

GPIO 16 Button Red

GPIO 17 Button Green

GPIO 18 12mm metal button Menu / WiFi

ESP32 to amplifier:

GPIO 4 Audio BCLK

GPIO 5 Audio LRC

GPIO 6 Audio DIN

5V & ground to your power source

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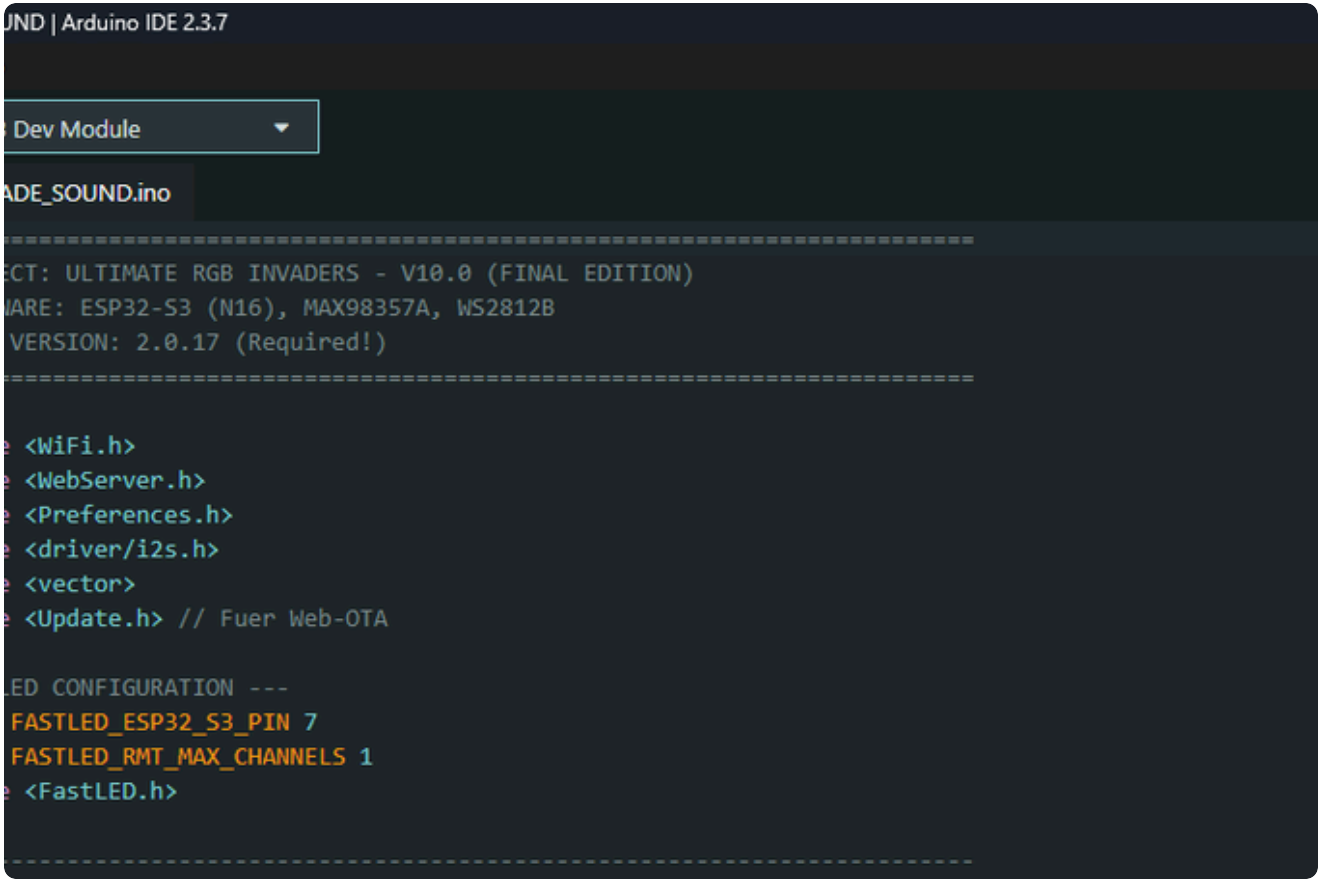
Step 3: Software



Get the code onto the chip.

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Step 0: Download the source code from github (take the SOUND version):

https://github.com/worksasdesigned/1D-RGB-Invader

Minor updates will be privided as OTA update (just upload the latest bin file in webinterface)

This is where most people fail. **Read carefully.**

Step 1: Install Arduino IDE & Libraries

1. Download & Install Arduino IDE 2.x.
2. Go to Sketch -> Include Library -> Manage Libraries.
3. Search for **FastLED** (by Daniel Garcia) and install it.

Step 2: Board Settings (The "Audio Trap")

The audio engine requires a specific core version to run without glitches.

1. **Board Manager:** Search for esp32 by Espressif.

2. 👉 **DOWNGRADE:** Select **Version 2.0.17** from the dropdown list and install. **Do NOT use Version 3.0.x!**
3. **Select Board:** ESP32S3 Dev Module.

Step 3: Tools Menu Settings

Set these exactly as shown to avoid boot loops: (especially many cheap clone boards have issues with regular settings)

- **Flash Mode:** DIO 80MHz
- **PSRAM: Disabled** (Crucial! The code runs in internal RAM).
- **USB CDC On Boot: Disabled** (Use the UART port for upload).
- **Flash Size:** 8MB or 16MB (depending on your board).

Step 4: Upload

1. Connect USB cable to the port labeled **UART** (or COM), *not* the one labeled USB (if your board has two).
2. If upload fails: Hold BOOT, Press RST, Release BOOT.
3. Upload Sketch.
4. Compilation might take a few minutes.

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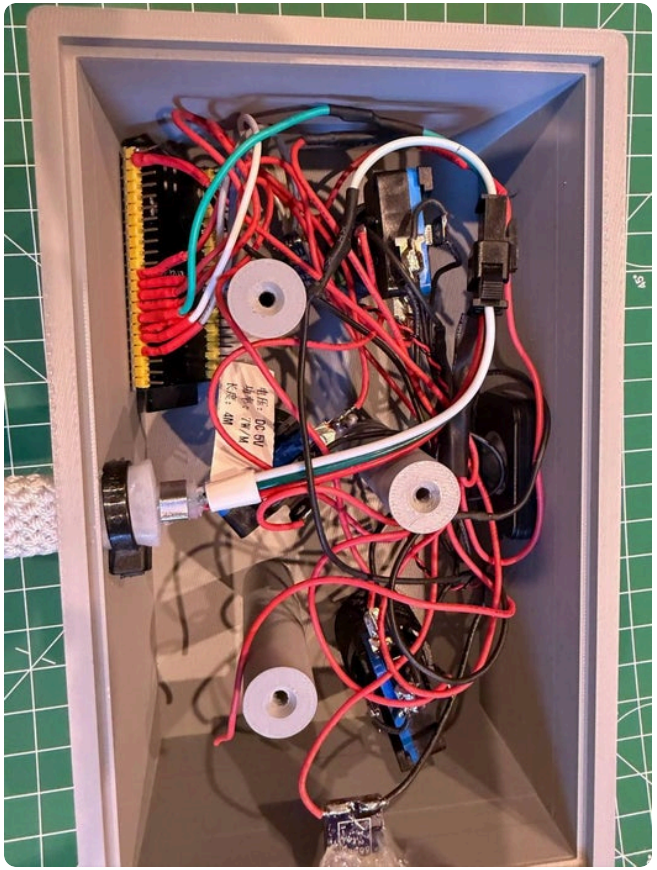
Step 4: Box It



Time to hide the cable mess...noone will ever see it again ;-)

Find the STL files for the Box here:

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https://makerworld.com/de/models/2254346-1d-rgb-invader-retro-game#profileId-2455425

Later updates can be done via OTA update function.

1. Mount the buttons into your 3D-printed case (screw them in tight).
2. Use a drop of hot glue to secure the ESP32, the Amplifier and the USBC-PD board.
3. **Cable Management:** Use zip ties. A loose wire inside can block a button or cause a short circuit during a boss fight.
4. Close the lid.

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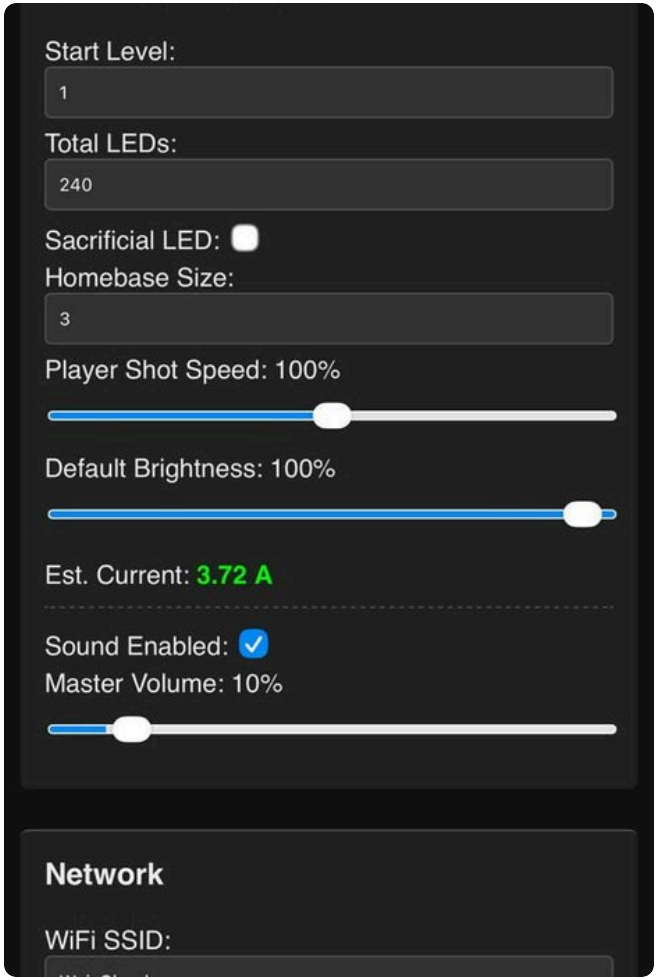
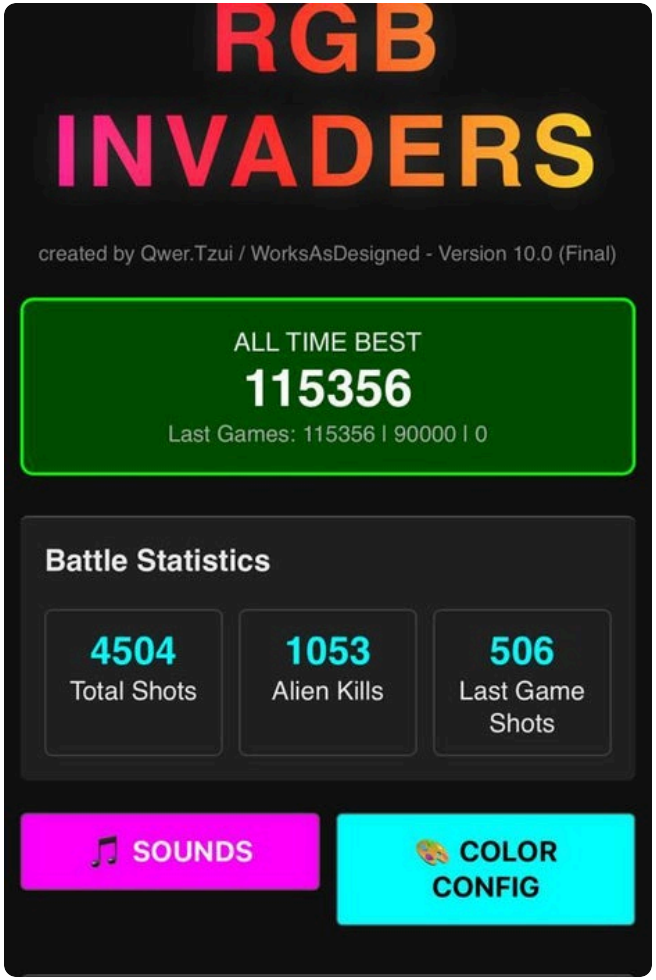
Step 5: Setup and Config





Web Config & Setup

1. Plug in the USB-C Power Supply (min 3A recommended) into the USBC-PD **NOT** into the ESP32
2. **Enter Menu:** Press & Hold the **12mm metal Button (Pin 18)** for 3-4 seconds. The strip flashes BLUE.
3. **Connect:** Phone WiFi -> ESP-RGB-INVADERS (**Pass: 12345678**).
4. **Browser:** Go to 192.168.4.1.
5. **Configure:** Set your total LED count (e.g., 240, 288) and brightness (start low!). Check the "Sound" box.
6. **Save:** The system reboots.

Optional:

You can connect your RGB Invaders machine to your wifi and give it a fixed IP address.

OTA updates are also possible.

Later you can use this settings page to fine tune all levels, bosses, colors, sounds - pretty much everything which is somehow relevant for the game.

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The game balance is very well tested (for a 240LED stripe). Hard but possible. There is also a simplified **kids-mode**.

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Step 6: Play!

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Now go destroy some pixels!

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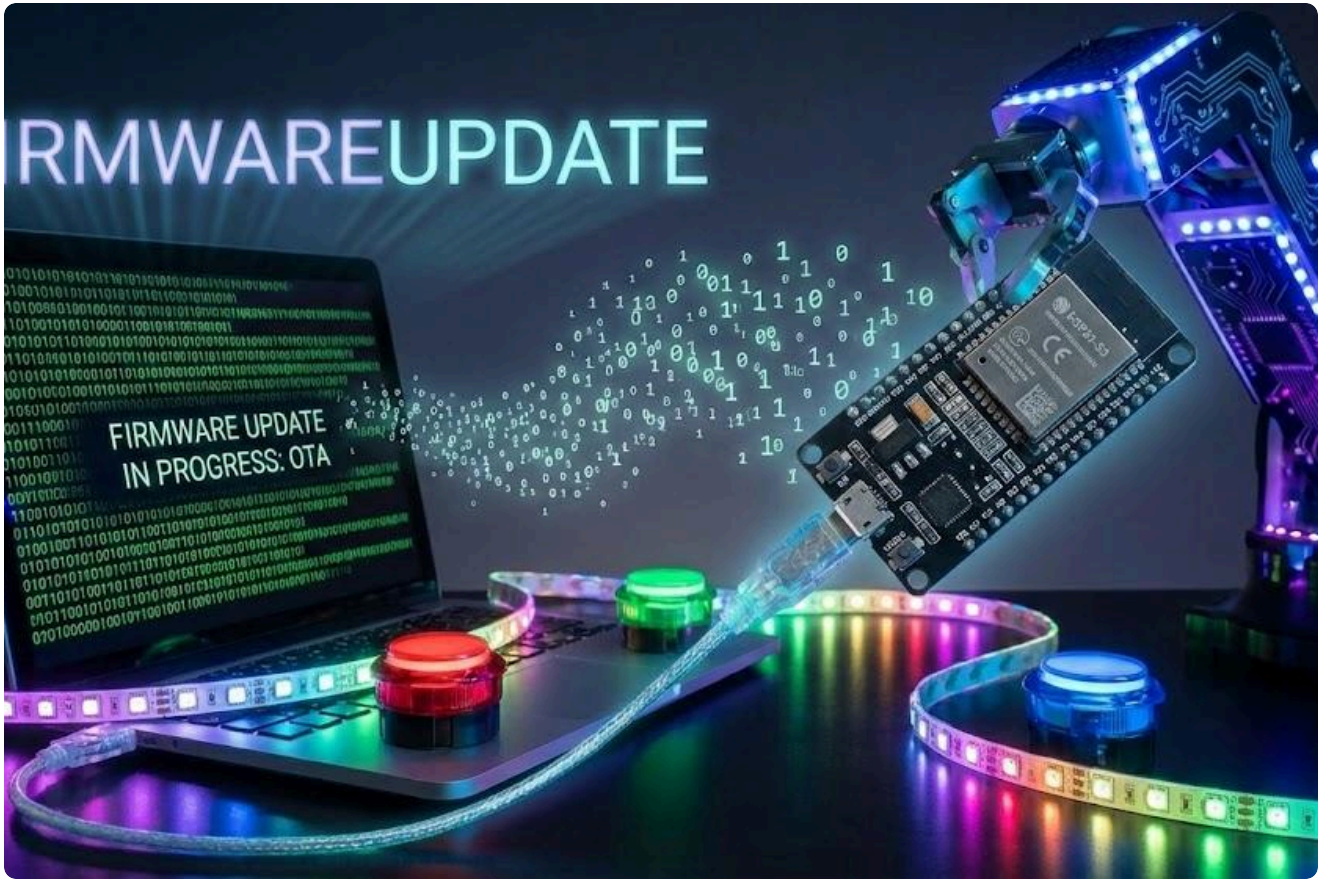
Step 7: Software Version



Major Versions can be found as source code on github (V10.0). LINK

Minor Updates are provided as *bin file in the bin folder. Simply use OTA firmware update and upload the bin.

Version 10.9.3

- another Bonus stage "Simon says style"
- small adjustments of bosses
- bonus stage now triggered automatically when reaching full points. and as easter egg in boss level screen. :-)

Version 10.7

- Bonus stage added (Beatsaber style).

Version 10.6

- Boss 1 adjusted. If not the entire 3-LED weapon gets destroyed in the current section, remaining weapon LEDs also become active at the end of next section. Boss shoots more Laser shots. (+3 per LED)

- Boss 2 adjusted. If you just spam all colors, boss gets angry (white blink) and reacts
- Endless Mode added. Once you have defeated the RGB Overlord, you can activate Endless Mode and directly start in Level 11
- You can now set your old statistics if you update the game and it would be overwritten. http://192.168.4.1/setscore?hs=50000&shots=20000&kills=5000

Version 10.2

- Boss balancing optimized
- Levels adjusted

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Step 8: Videos

Some example videos. First level. This will get MUCH faster after the first boss ;)