XToys ESP32-C3

WebSocket Receiver Documentation

Tuna-Toys

2025

XToys

ESP32-C3

WebSocket Receiver

Complete Hardware & Software Documentation

v1.0 — 2025

github.com/Tuna-Toys/xtoys_esp32_c3

Contents

Introduction

The **XToys ESP32-C3 WebSocket Receiver** connects your DIY hardware to XToys.app — the browser-based teledildonics platform.

What It Does

- Connects to your WiFi network
- Hosts a WebSocket server (port 81)
- Receives commands from XToys
- Controls 2 bidirectional motors via DRV8833
- Controls 3 optocoupler outputs
- RGB LED status feedback

What It Doesn't Do

This is a **dumb receiver**. All intelligence lives in XToys:

- No pattern generation
- No data storage
- No cloud connection
- No internet required

It listens. It responds. That's it.

Hardware

Components

Component	Qty	Purpose
ESP32-C3 Super Mini	1	Controller
DRV8833 Motor Driver	1	Dual H-bridge
PC817 Optocoupler	3	Button simulation
220 Ohm Resistor	3	LED current limiting
DC Motors	1-2	Your toys
5V USB Power	1	ESP32 power
3-10V DC Supply	1	Motor power

ESP32-C3 Super Mini

Spec	Value
CPU	32-bit RISC-V @ 160MHz
RAM	400KB SRAM
Flash	4MB
WiFi	802.11 b/g/n (2.4GHz)
Size	22.5mm x 18mm
Power	5V USB-C

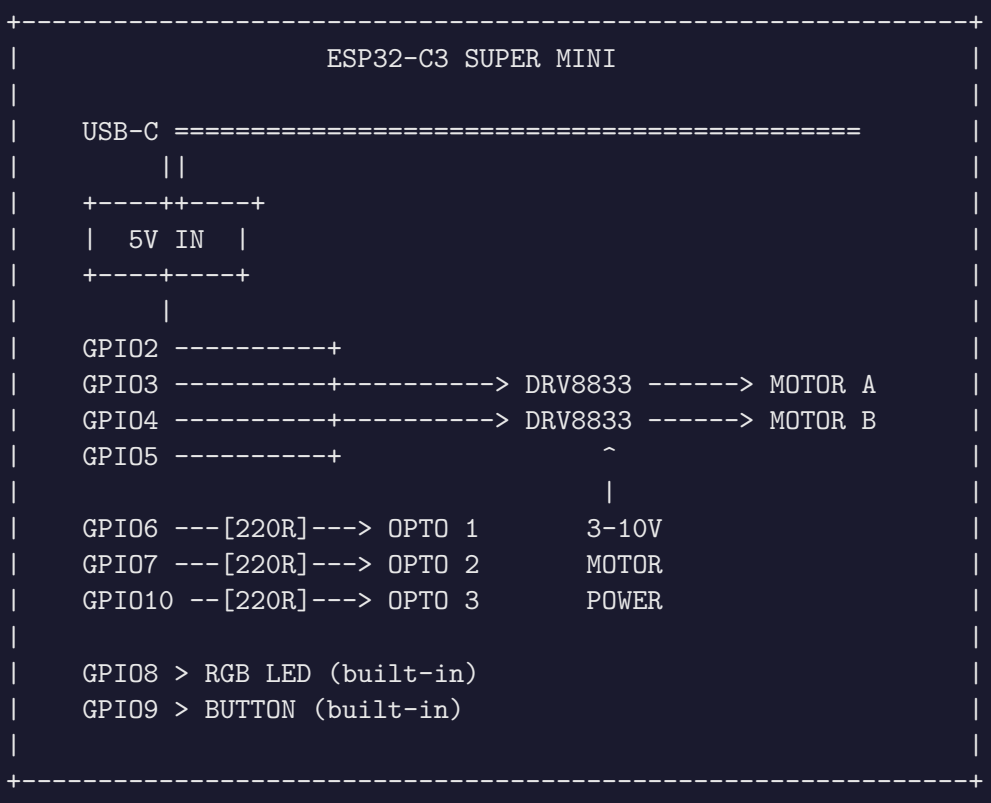
Built-in: RGB LED (GPIO8), Boot Button (GPIO9)

Pin Assignments

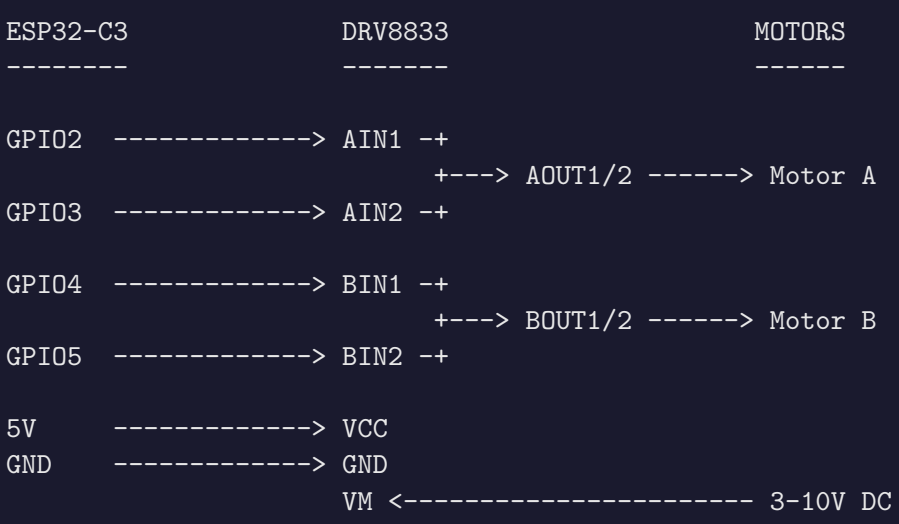
GPIO	Function	Type
2	Motor A IN1	PWM
3	Motor A IN2	PWM
4	Motor B IN1	PWM
5	Motor B IN2	PWM
6	Optocoupler 1	Digital
7	Optocoupler 2	Digital
8	RGB LED	WS2812
9	Boot Button	Input
10	Optocoupler 3	Digital

Wiring

System Overview



DRV8833 Wiring



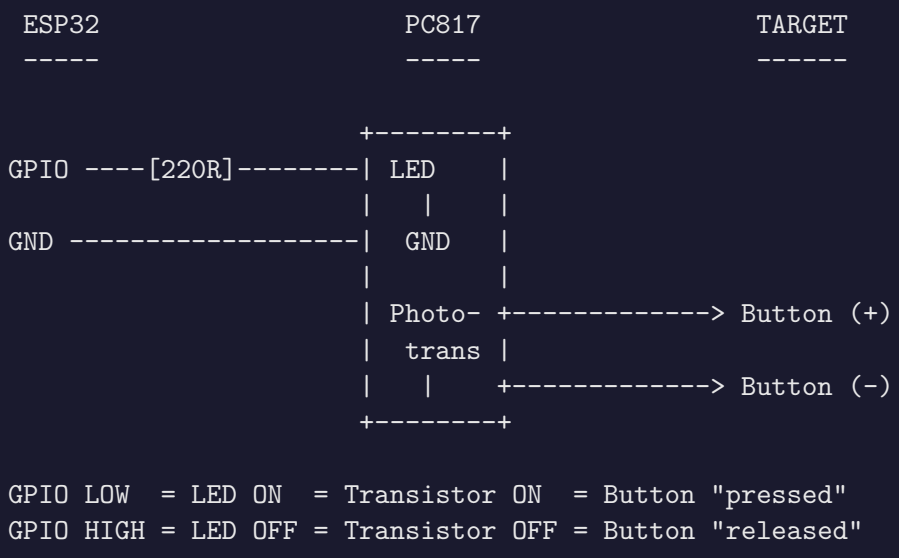
Motor Control Logic

IN1	IN2	Result
PWM	LOW	Forward
LOW	PWM	Reverse
LOW	LOW	Coast

IN1	IN2	Result
HIGH	HIGH	Brake

PWM: 20kHz frequency, 8-bit resolution

Optocoupler Wiring




```
GPIO LOW  = LED ON  = Transistor ON  = Button "pressed"
GPIO HIGH = LED OFF = Transistor OFF = Button "released"
```

Optocouplers provide **electrical isolation** — your ESP32 stays safe!

Operating Modes

Modes tell XToys what your motors do. Short press the button to cycle.

Mode 1: Vibe + Suck (Magenta)

Output	Function
Motor A	Vibration intensity
Motor B	Suction pump

Mode 2: Thrust + Rotate (Orange)

Output	Function
Motor A	Thrust speed
Motor B	Rotation speed

Mode 3: Thrust + Vibe (Cyan)

Output	Function
Motor A	Thrust speed
Motor B	Vibration

Mode 4: Suck + Speed (Pink)

Output	Function
Motor A	Suction
Motor B	Movement speed

Mode 5: Dual Vibe (Green)

Output	Function
Motor A	Vibration 1
Motor B	Vibration 2

LED Status

Color	Pattern	Meaning
Red	Pulsing	No WiFi connection
Yellow	Solid	WiFi OK, waiting for XToys
Green	Solid	XToys connected!
Purple	Pulsing	WiFi config mode
Orange	Flashing	Long press warning
Various	Brief flash	Mode change indicator

Button Controls

Action	How	Result
Cycle Mode	Short press	Next mode
Show Mode	Double tap	LED blinks mode number
Factory Reset	Hold 3 sec	Clears WiFi, restarts

WebSocket Protocol

Connection

```
ws://[DEVICE-IP]:81
```

Device Info (sent on connect)

```
{
  "type": "deviceInfo",
  "mode": "Vibe + Suck",
  "modeId": 0,
  "motorA": "vibe",
  "motorB": "suck",
  "optos": 3
}
```

Commands

JSON Format

```
{"a": 75, "b": 50}
{"motorA": -100, "motorB": 100}
{"vibe": 80, "suck": 60}
{"thrust": 70, "rotate": 40}
{"o1": true, "o2": false, "o3": true}
{"stop": true}
```

Simple Format

```
a:75
b:-50
o1:1
o2:0
stop:1
```

Parameter Names

Motor A	Motor B	Optos
a, motorA	b, motorB	o1, opto1
vibe, vibe1	vibe2	o2, opto2
thrust	rotate	o3, opto3
suck (mode 4)	suck, speed	

Value Ranges

Output	Range
Motors	-100 to +100
Optos	true/false or 1/0

Negative motor values = reverse direction.

Setup Guide

Step 1: Arduino Libraries

Install via Library Manager:

- **WebSockets** — Markus Sattler
- **ArduinoJson** — Benoit Blanchon
- **Adafruit NeoPixel**

Step 2: Board Settings

Setting	Value
Board	ESP32C3 Dev Module
USB CDC On Boot	Enabled
Flash Size	4MB
Partition	Default 4MB with spiffs

Step 3: Flash Firmware

1. Connect ESP32-C3 via USB-C
2. Select COM port
3. Upload sketch
4. Wait for completion

Step 4: WiFi Setup

1. Power on — LED pulses purple
2. Connect to WiFi: **XToys-ESP32-Setup**
3. Browser opens (or go to 192.168.4.1)
4. Select your network
5. Enter password
6. Pick default mode
7. Save — device restarts

Step 5: Find IP Address

- Check router DHCP list
- Serial monitor @ 115200 baud
- Network scanner app

Step 6: Connect XToys

1. Open XToys.app
2. Add WebSocket device
3. URL: ws://[IP]:81
4. Connect and enjoy!

Troubleshooting

Red LED (pulsing)

Problem: Can't connect to WiFi

- Check SSID/password
- Move closer to router
- 2.4GHz only (no 5GHz)
- Long press to reset

Yellow LED but no connection

Problem: WebSocket failing

- Verify IP address
- Same network as phone?
- Firewall blocking port 81?
- Try reconnecting in XToys

Motors not working

Problem: Commands received but no movement

- Check DRV8833 wiring
- Motor power connected?
- Voltage in 3-10V range?
- Test: {"a": 100}

Device keeps resetting

Problem: Power issues

- Use quality USB supply (5V 1A+)
- Add 100uF cap on motor power
- Separate ESP32 and motor power

Optos not triggering

Problem: Button simulation failing

- 220 Ohm resistors installed?
- Check LED polarity
- Correct mode selected?

Specifications

Electrical

Parameter	Value
ESP32 Voltage	5V DC (USB-C)
Motor Voltage	3-10V DC
Motor Current	1.5A cont. / 2A peak
Opto LED Current	~10mA
Total Power	~500mA typical

Timing

Parameter	Value
PWM Frequency	20kHz
PWM Resolution	8-bit (256 steps)
WebSocket Port	81
Button Debounce	50ms
Long Press	3000ms
Double Click Window	400ms

Network

Parameter	Value
WiFi Standard	802.11 b/g/n
WiFi Band	2.4GHz
Config SSID	XToys-ESP32-Setup
Config IP	192.168.4.1
Serial Baud	115200

Firmware

Parameter	Value
Flash Usage	~300KB
RAM Usage	~50KB
Settings Storage	~1KB

Safety

General

- **Adults only**
- Disconnect power before wiring changes
- Don't exceed voltage ratings
- Waterproof if needed for your application

Electrical

- Use protected power supplies
- DRV8833 has thermal shutdown
- Motors stop on disconnect
- Long press = emergency reset

Thermal

- DRV8833 gets warm under load
- Provide ventilation
- Heatsink for sustained >1A

Happy Building!

github.com/Tuna-Toys/xtoys_esp32_c3

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