



IoT project

Master of Science in Engineering

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Group 2

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Project Overview

Developed an integrated system using ESP32 and E2002BL network analyzer.

ESP32 operates in two modes:

- **Slave Mode:** ESP32 responds to data requests from software like Modscan.
- **Master Mode:** ESP32 queries the E2002BL device directly.

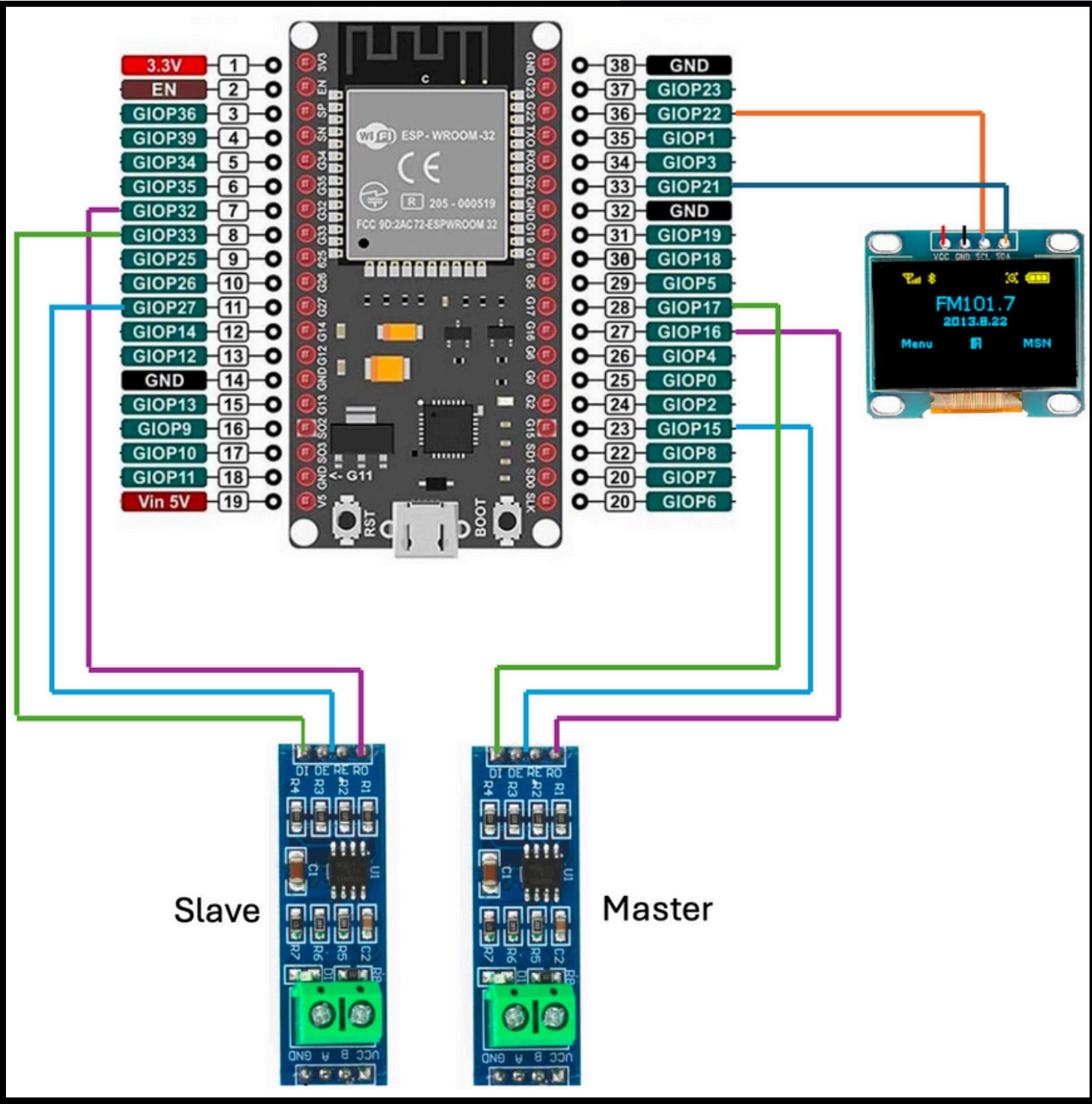
Features:

- **Wi-Fi network.**
 - **Web Server.**
 - **Config and Analytics Page** with real-time data.
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Pin Setup

RS485 Slave	RS485 Master	Oled Display (optional)
RX: GPIO 32	RX: GPIO 16	SCK: GPIO 22
TX: GPIO 33	TX: GPIO 17	SDA: GPIO 21
DE: GPIO 27	DE: GPIO 15	-



Libraries and methods used

ModbusRTUMaster:

- **Initialization:** `ModbusRTUMaster modbus(Serial2, dePin);`
- **Start Communication:** `modbus.begin(9600, SERIAL_8N1, rxPin, txPin);`
- **Reading Values:** `modbus.readHoldingRegisters(slaveId, i-1, registersArray, 2);`

ModbusRTUSlave:

- **Initialization:** `ModbusRTUSlave modbusSlave(Serial1, dePin);`
- **Start Communication:** `modbusSlave.begin(slaveId, 9600, SERIAL_8N1, rxPin, txPin);`
- **Handling Requests:** `modbusSlave.poll();`

WebServer & DNS Server:

- **Initialization:** `WebServerManager webServerManager("CONFIGURE_ME", "", master, swap);`
- **Listening on Port 80:** `server.handleClient();`
- **Initialization:** `dnsServer.start(53, "*", WiFi.softAPIP());`

Endpoints explanation (I)

Endpoint	Request Type	Description
/setWifi	POST	Set new Wi-Fi configuration
/config	GET	Render configuration page
/readRegister	GET	Read data from network analyzer
/addData	POST	Add new register
/deleteData	DELETE	Delete a register

Endpoints explanation (II)

Endpoint	Request Type	Description
/updateData	PUT	Update a register
/toggleMaster	POST	Toggle between master and slave mode
/toggleSwap	POST	Toggle for register swap (MSB-LSB)
*	-	Redirect all requests to the DNS server to launch the captive portal

WiFi config setup

- ESP32 creates a Wi-Fi network named 'CONFIGURE_ME_ESP32_G2'.
- Captive portal
- Enter SSID and password for new network.
- ESP32 connects and displays IP address for further configuration.

WiFi Configuration

SSID:

Password:

Submit



Log In to Captive Wi-Fi

Cancel

Congratulations!

You are successfully connected.

This is the IP address to access the web server that exposes the data:

192.168.68.108

Configuration Page

Accessible via browser using IP address /config

Welcome to the configuration page

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Master Mode

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Master Mode



















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Swap configuration

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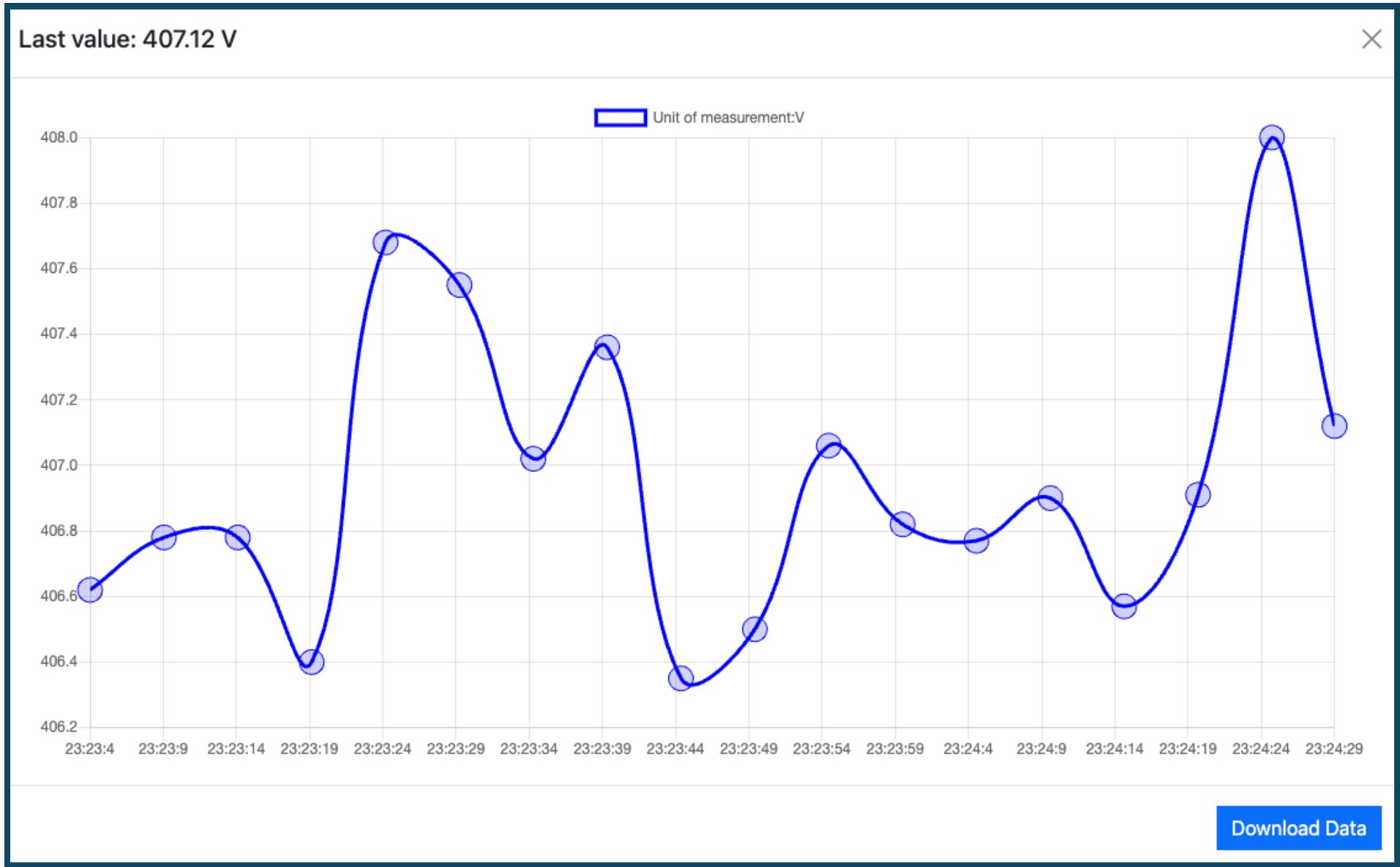
Swap configuration

ID	Start Register	Length	Type	R/W	Label	Description	Unit	Action
1	100	2	Float	Read Only	V12	Linked Voltage Phase 1-2	V	  
2	102	2	Float	Read Only	V23	Linked Voltage Phase 2-3	V	  
3	104	2	Float	Read Only	V31	Linked Voltage Phase 3-1	V	  
4	158	2	Float	Read Only	Temperature	Temperature (internal probe)	Celsius	  
5	165	1	Int	Read Only	Alarm 1	Alarm 1 state	-	  
6	308	2	Float	Read/Write	VTP	VT primary voltage value	V	  



Analytics chart

Real-time interactive graph updating every 5 seconds.
Data exportable to CSV.



TSM_IoT_Proje	
Time	Value
0:12:43	408.06
0:12:43	408.06
0:12:43	408.06
0:12:44	407.85
0:12:49	407.39
0:12:53	407.63
0:12:59	407.97
0:13:3	407.66
0:13:8	407.90
0:13:14	407.46
0:13:19	407.09
0:13:23	407.71
0:13:28	407.43
0:13:34	407.57
0:13:38	407.92

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Demo



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Thank you

