

Domotica with ESP32 mesh network

8 digital inputs

8 digital outputs

clock synchronized with NTP server

fully operable via web page

outputs can be controlled via:

- day
- time
- input
- a combination of these 3
- manually

network is built automatically, modules can be added or removed

network rebuilds itself.

Check every minute whether all modules are still connected



Status of the various inputs and outputs clearly visible as well as the clock.

Each input or output has 4 options to be displayed,

- | | |
|-----------------------------|-----------------|
| * not active | not highlighted |
| * active not controlled (0) | green |
| * active controlled(1) | red |
| * active but no feedback | yellow |
- of module with this number

these colors are identical for the web page

12:07

VoWiFi LTE 92%

uitgangen

		dag	aan	uit	in	M
0	uitgang 0	8	24:00	24:00	0	<input type="checkbox"/>
1	uitgang 1	8	24:00	24:00	1	<input type="checkbox"/>
2	uitgang 2	8	24:00	24:00	0	<input type="checkbox"/>
3	uitgang 3	8	24:00	24:00	1	<input type="checkbox"/>
4	uitgang 4	8	12:30	14:40	0	<input type="checkbox"/>
5	uitgang 5	8	24:00	24:00	x	<input type="checkbox"/>
6	uitgang 6	8	24:00	24:00	x	<input type="checkbox"/>
7	uitgang 7	8	24:00	24:00	x	<input type="checkbox"/>

ingangen

- 0 ingang 0
- 1 ingang 1
- 2 ingang 2
- 3 ingang 3
- 4 ingang 4
- 5 ingang 5
- 6 ingang 6
- 7 ingang 7

klok

instellen

thieu-b55 februari 2023



Some useful addresses

ESP32 and Arduino IDE :

<https://randomnerdtutorials.com/installing-the-esp32-board-in-arduino-ide-windows-instructions/>

ESP32 mesh / How to install painlessMesh Library :

<https://randomnerdtutorials.com/esp-mesh-esp32-esp8266-painlessmesh/#more-100202>

ESP32 mesh :

<https://docs.espressif.com/projects/esp-idf/en/stable/esp32/api-guides/esp-wifi-mesh.html>

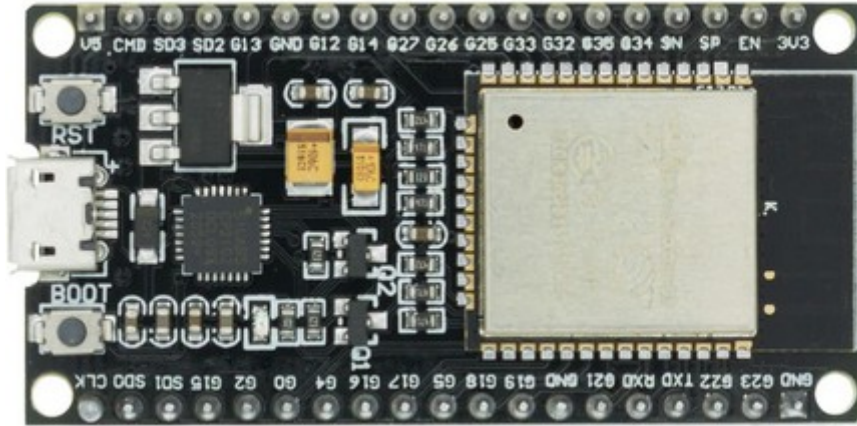
this project on github :

<https://github.com/thieu-b55/Easy-esp32-domotica-with-esp32-mesh>

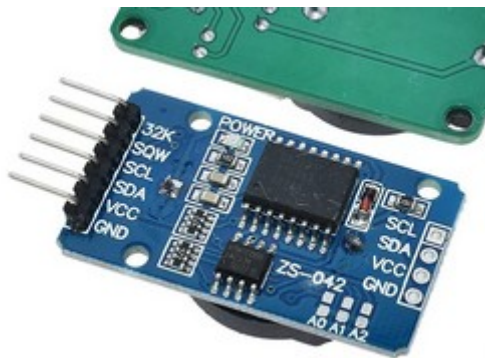
ESP32 domotica

Main module parts

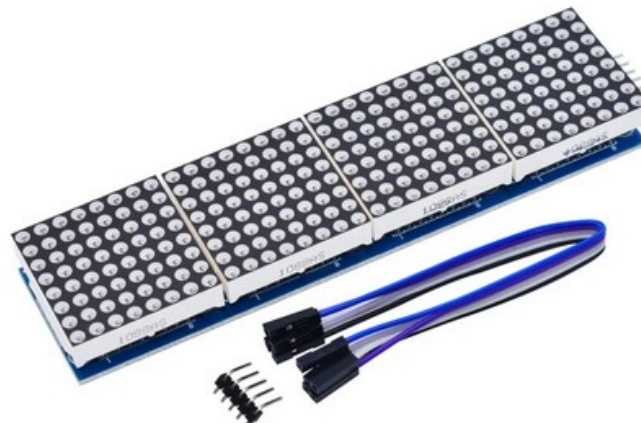
2 x ESP32 Devkit (ESP32 module cannot be part of a mesh network and web server at the same time).



1x DS3231 clockmodule **with SQW output**



1 x MAX7219 led display



Ledstrip 16 leds WS2812B

led 0 – 7 output
led 8 – 15 input

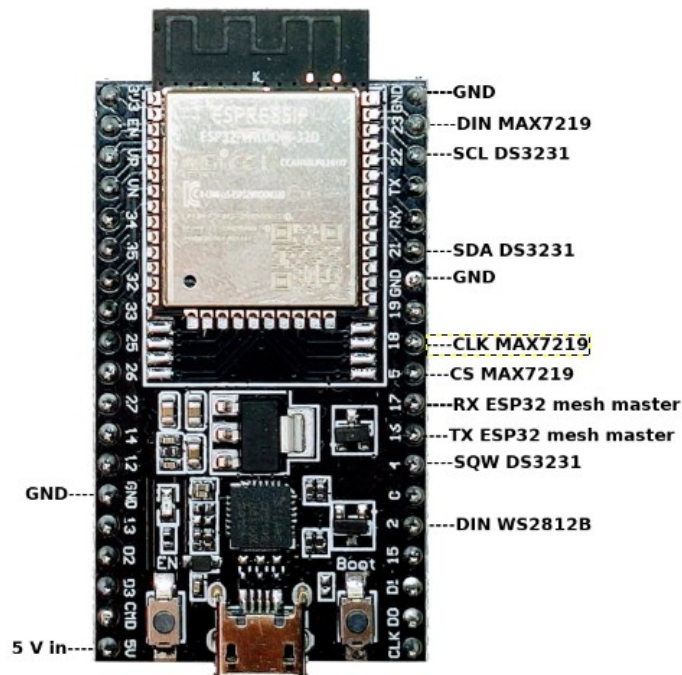
led 0 = output 0
led 8 = input 0

led 7 = output 7
led 15 = input 7

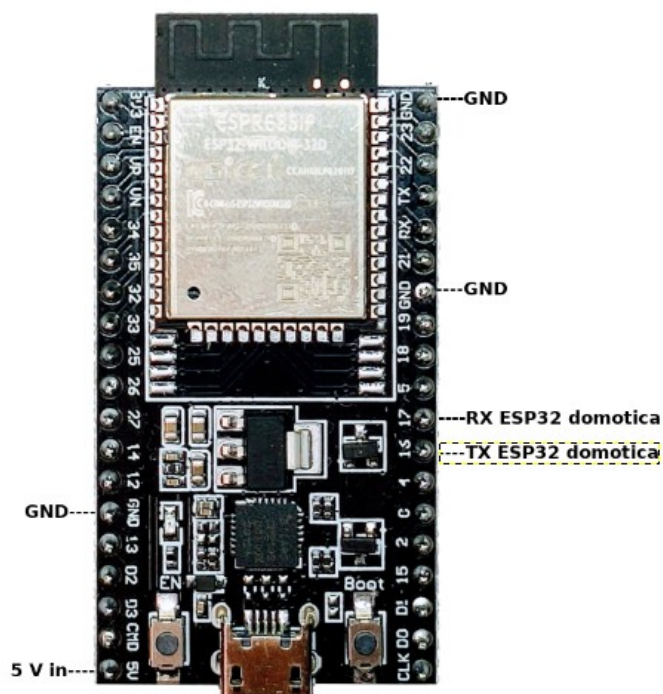
The ESP32 home automation module consists of 2 ESP32 devkit modules which are connected to each other via the serial port.

An ESP32 cannot be a web server and mesh node at the same time.

Connections ESP32_domotica



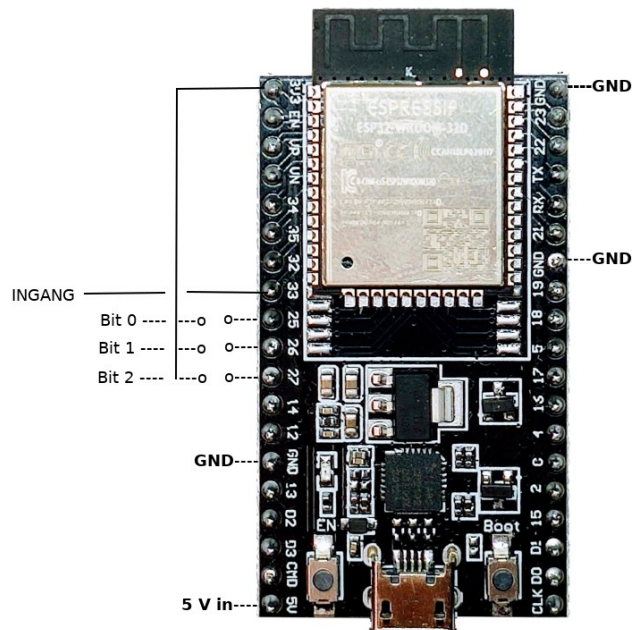
Connections ESP32_domotica_mesh_master



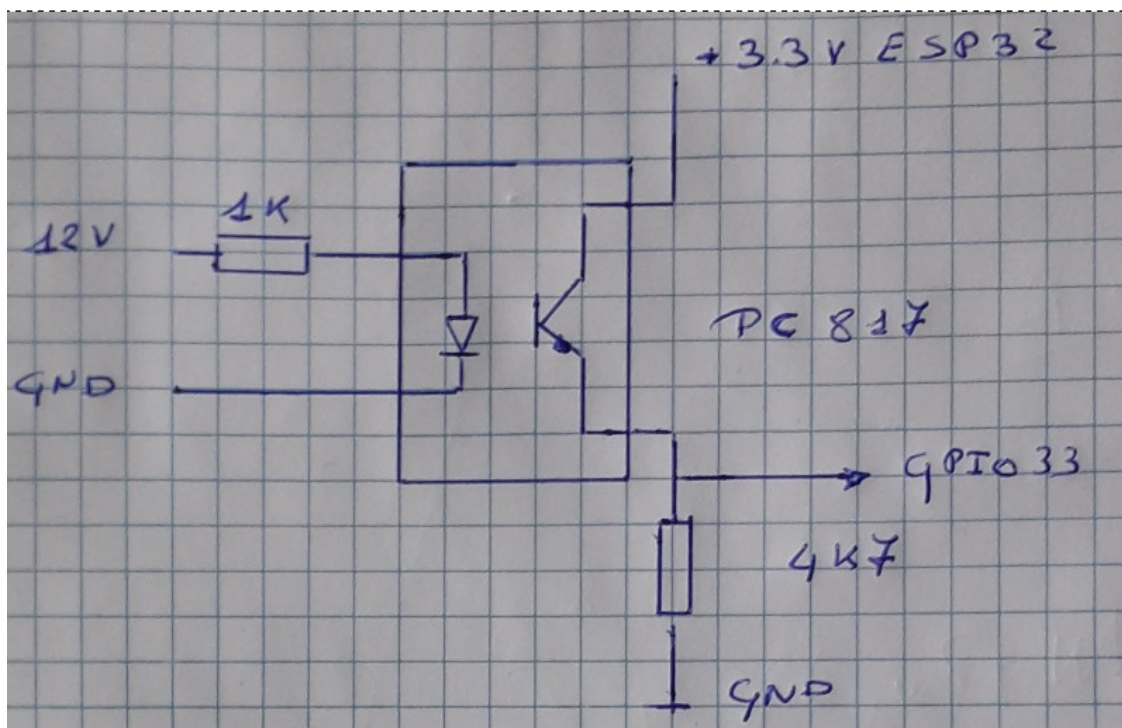
1 ESP32 Devkit is required for each of the input or output modules

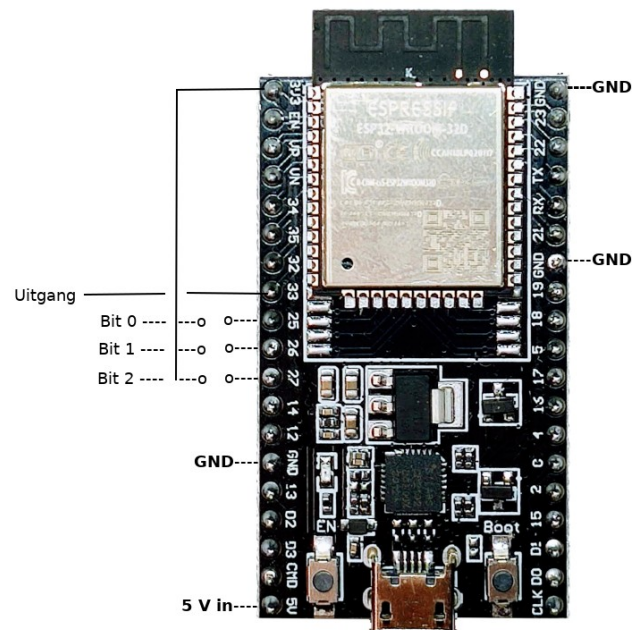
ESP32 domotica input

U



Input with optocoupler

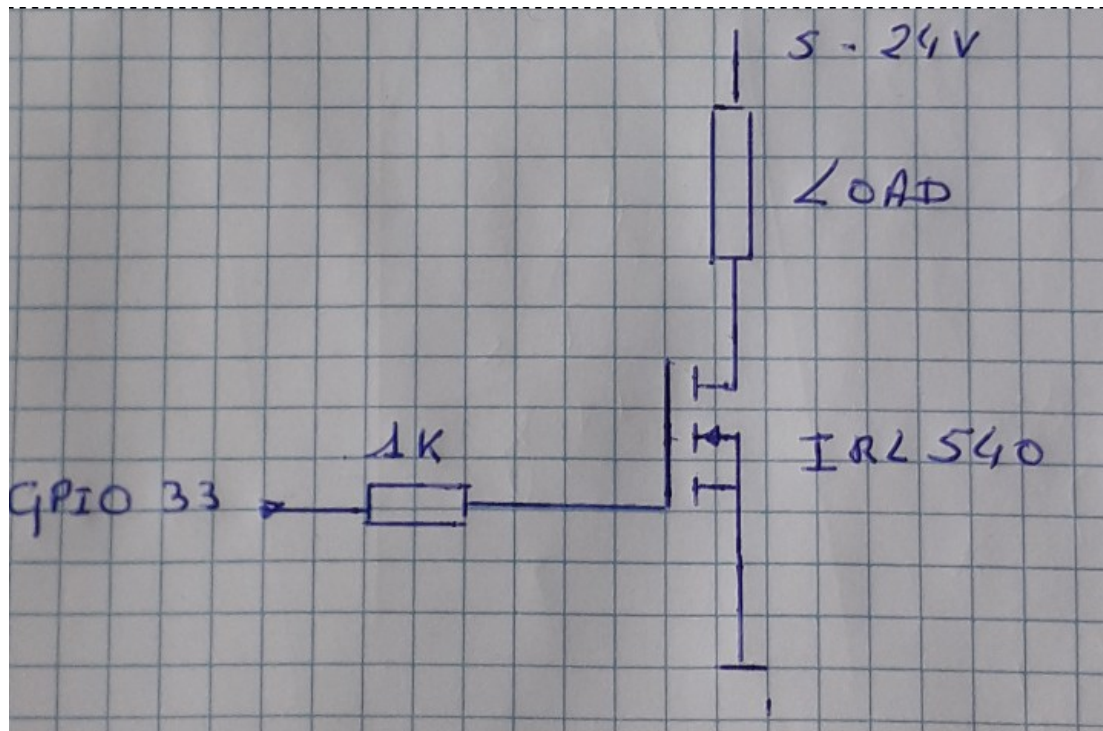




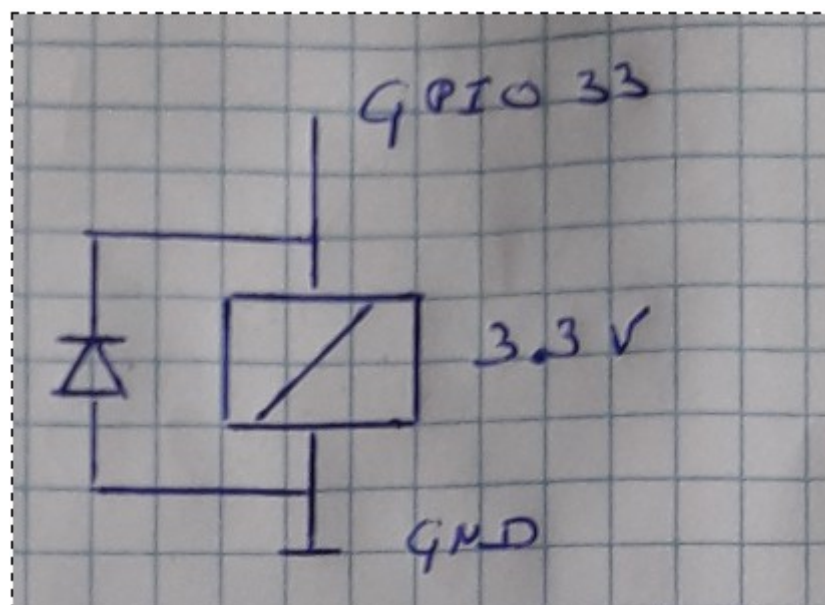
Address	Bit 2	Bit 1	Bit 0
0	0	0	0
1	0	0	1
2	0	1	0
3	0	1	1
4	1	0	0
5	1	0	1
6	1	1	0
7	1	1	1

Each output module must have a unique address 0-7

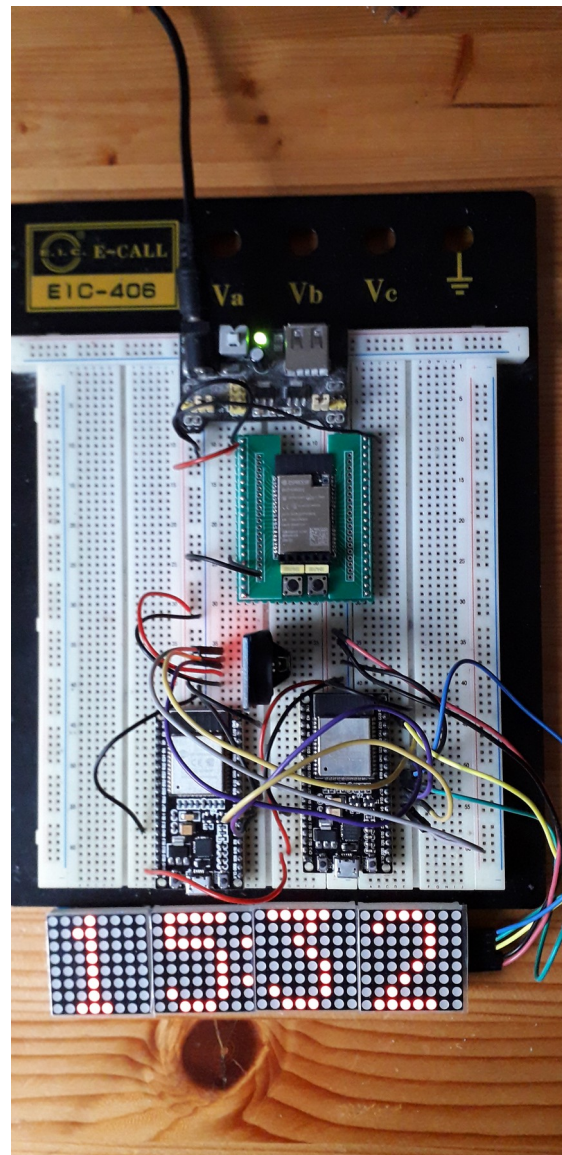
MOSFET OUTPUT



Relais output



ESP32 domotica
ESP32 domotica mesh master
DS3231
MAX7219
together on a breadboard (only the bottom 2 modules)



Built together in one housing



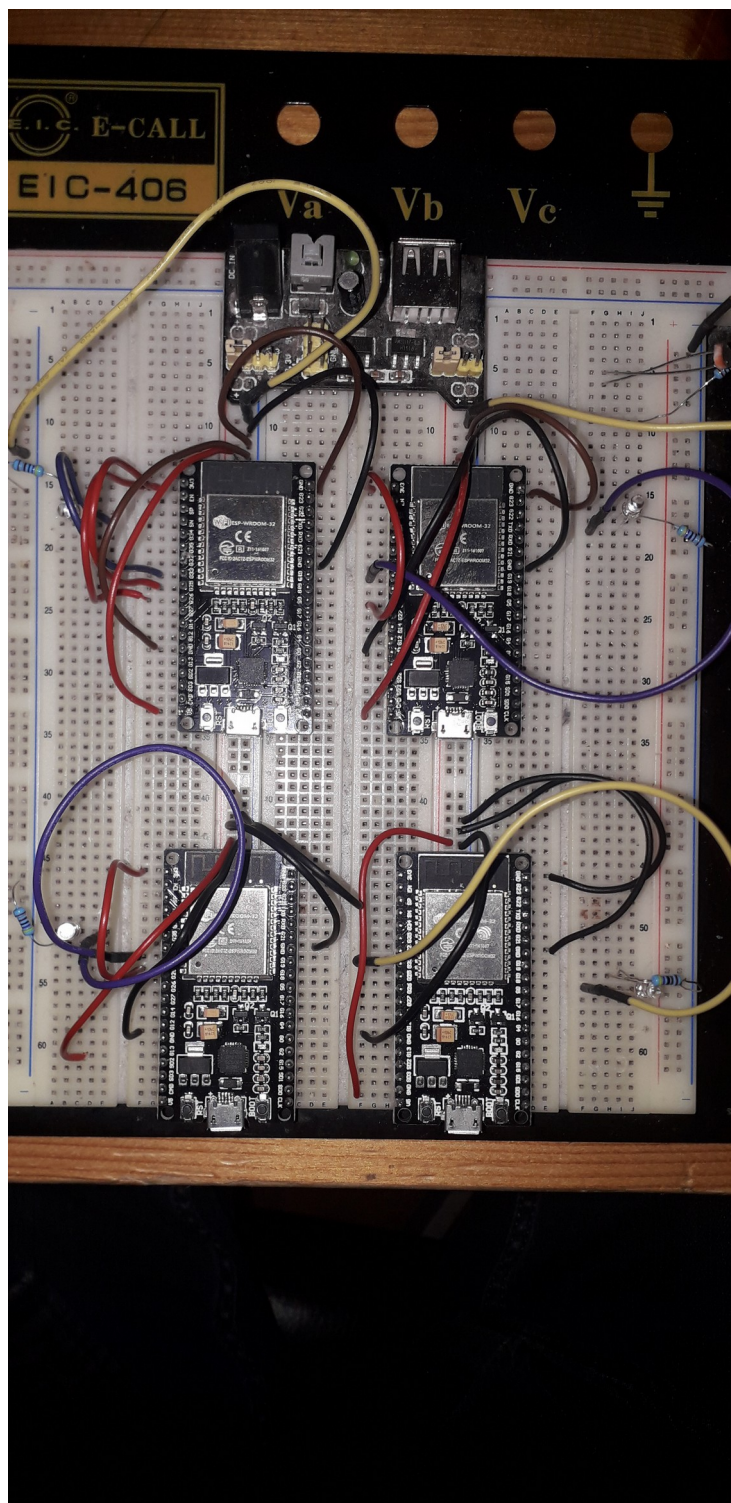
Top 8 LEDs show the status of the input modules
Bottom 8 LEDs show the status of the output modules

There are 4 options for both inputs and outputs

no light	input or output not active
yellow	Input or output is active but no feedback from a module with this adress
green	module active and input / output 0
red	module active and input / output 1

more explanation on active not active later in this manual.

3 output modules
1 input module
on breadboard

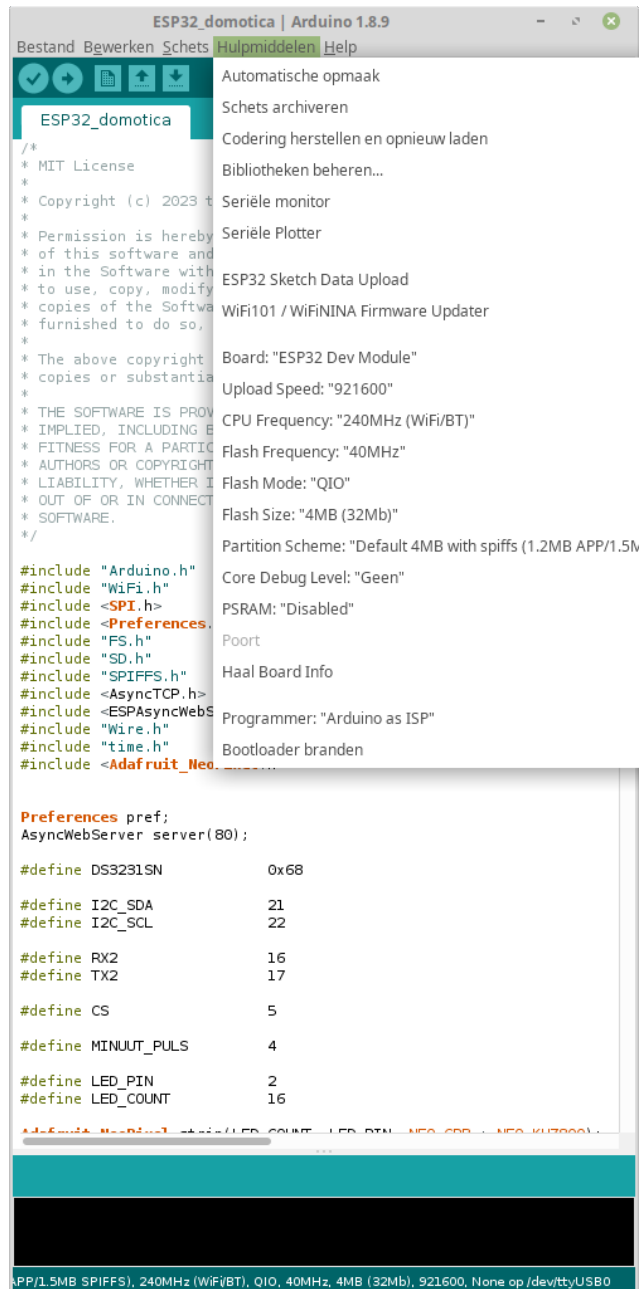


After building, programming

This project on github :

<https://github.com/thieu-b55/Easy-esp32-domotica-with-esp32-mesh>

Open the program ESP32_domotica.ino with the Arduino IDE and use the following settings



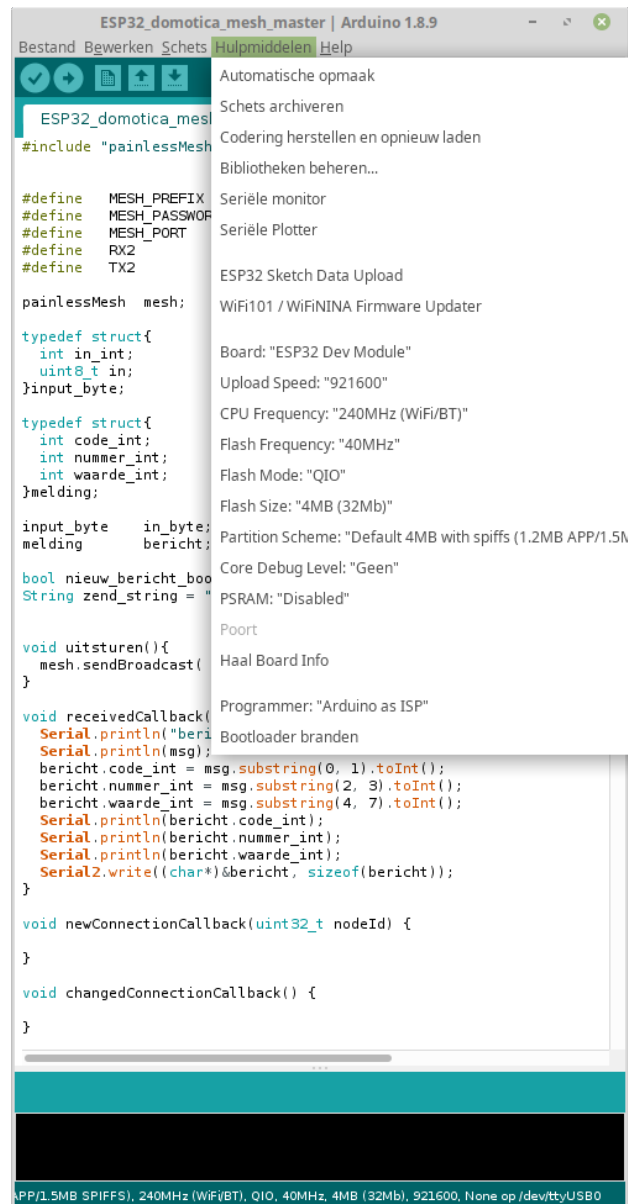
Program the ESP32_domotica ESP32

Open the program ESP32_domotica_mesh_master.ino in the Arduino IDE

```
#define MESH_PREFIX "ESP32"
#define MESH_PASSWORD "ESP32_pswd"
#define MESH_PORT 6666
```

The above data can be changed, but all modules of this network must have the same data

Use the following settings



Program the ESP32_domotica_mesh_master ESP32

Open the program ESP32_domotica_ingang.ino in the Arduino IDE

```
#define MESH_PREFIX "ESP32"
#define MESH_PASSWORD "ESP32_pswd"
#define MESH_PORT 6666
```

The above data can be changed, but all modules of this network must have the same data

Use the following settings



Choose the desired address using GPIO25; GPIO26 and GPIO27, address is only read during startup.

Program the ESP32_home automation_input ESP32

The above data can be changed, but all modules of this network must have the same data

Choose the desired address using GPIO25, GPIO26 and GPIO27, address is only read during startup.

```
#define MESH_PREFIX "ESP32"
#define MESH_PASSWORD "ESP32_pswd"
#define MESH_PORT 6666
```



When using for the first time, the network data must first be entered.
Connect to

Network: ESP32rc
Password: ESP32pswd

Open the web page at 192.168.4.1

The screenshot shows a mobile browser interface for the ESP32 Network settings. At the top, the status bar displays the time 11:07, VoLTE and LTE+ signal icons, and a 64% battery level. Below the status bar, the browser address bar shows a star icon, an information icon, the URL 192.168.4.1, and a refresh icon. The main content area is titled "ESP32 Netwerk instellingen". It contains two input fields: "ssid :" and "pswd :". Below these fields, the text "Gewenst IP address (default 192.168.1.222)" is displayed. Underneath this text are four input boxes containing the numbers 192, 168, 1, and 222. A "Bevestig" button is located below the IP address boxes. At the bottom of the screen, there is a navigation bar with icons for back, forward, home, star, tabs, and a menu.

11:07 VoLTE LTE+ 64%

☆ ⓘ 192.168.4.1 ↻

ESP32 Netwerk instellingen

ssid :

pswd :

Gewenst IP address (default 192.168.1.222)


< > 🏠 ☆ 📄 ☰




Enter the details of the WiFi network, if desired the IP address can also be changed, is set to 192.168.1.122



Press <Bevestig> ESP32 restarts after 5 seconds.

Network ESP32rc no longer available, go to the WiFi network and go to 192.168.1.122 or to the IP address of your choice


Startup screen

11:09 

 VoWiFi LTE1  63% 

192.168.1.122



uitgangen

	dag	aan	uit	in	M
<div>0</div>	8	24:00	24:00	x	<input type="checkbox"/>
<div>1</div>	8	24:00	24:00	x	<input type="checkbox"/>
<div>2</div>	8	24:00	24:00	x	<input type="checkbox"/>
<div>3</div>	8	24:00	24:00	x	<input type="checkbox"/>
<div>4</div>	8	24:00	24:00	x	<input type="checkbox"/>
<div>5</div>	8	24:00	24:00	x	<input type="checkbox"/>
<div>6</div>	8	24:00	24:00	x	<input type="checkbox"/>
<div>7</div>	8	24:00	24:00	x	<input type="checkbox"/>

ingangen

0

1

2

3

4

5

6

7



klok

instellen


thieu-b55 februari 2023

Press <klok>

11:28VoIP LTE1 60%



192.168.1.222



Instellen klok

Instellen tijdzone en zomertijd

Maandag 11:27

uren

minuten

zomertijd

1

0

0

OK

Led helderheid (0 <-> 15)

4

OK


begin pagina

uren : time difference in hours between local time and UTC time (+ / -)
minuten : time difference in minutes (30 or 0) between local time and UTC (no negative)
zomertijd : 1 if now summer time otherwise 0

Press <OK> to adjust time.

Led helderheid :0 – 15 brightness of the MAX7219
Press <OK> to adjust

Press <begin pagina>

11:09 

 VoWiFi LTE1  63% 



192.168.1.222



uitgangen

	dag	aan	uit	in	M
<input type="text" value="0"/>	8	24:00	24:00	x	<input type="checkbox"/>
<input type="text" value="1"/>	8	24:00	24:00	x	<input type="checkbox"/>
<input type="text" value="2"/>	8	24:00	24:00	x	<input type="checkbox"/>
<input type="text" value="3"/>	8	24:00	24:00	x	<input type="checkbox"/>
<input type="text" value="4"/>	8	24:00	24:00	x	<input type="checkbox"/>
<input type="text" value="5"/>	8	24:00	24:00	x	<input type="checkbox"/>
<input type="text" value="6"/>	8	24:00	24:00	x	<input type="checkbox"/>
<input type="text" value="7"/>	8	24:00	24:00	x	<input type="checkbox"/>

ingangen

klok

instellen

thieu-b55 februari 2023

Press <instellen>

11:17

VoIP LTE1 63%



192.168.1.222



Instellen domotica

Instellen uitgangen

-

1

+

Label

Dag

Aan

Uit

In

uitgang 1

8

24:00

24:00

x

Dagelijks

Bevestig

Instellen ingangen

-

0

+

Label

ingang 0

Bevestig

begin pagina



Instellen uitgangen

-
1
+

Label	Dag	Aan	Uit	In
uitgang 1	8	24:00	24:00	x
Dagelijks				

Bevestig

Set outputs

select the desired output with < - > and < + >

Label : if desired name for the output (max 10 characters)

When should an output switch:

Dag : 1 Monday
 2 Tuesday
 3 Wednesday
 4 Thursday
 5 Friday
 6 Saturday
 7 Sunday
 8 daily
 9 weekdays
 10 weekend

Aan : time to switch output to <1>
 24:00 time switch off service

Uit : time to switch output to <0>
 if Aan = 24:00 off duty

In : desired input that must be <1> before output can be <1>
 x no check on input

Press <Bevestig>

Do this for all desired outputs

Instellen ingangen

0

Label

ingang 0

Bevestig

Same for the inputs

select the desired input with < – > and < + >


Label : if desired name for the input (max 10 characters)

Press <Bevestig>

When everything is filled in press <begin pagina>

begin pagina

The software checks every minute for the available inputs and outputs, at startup or when changing the configuration it can take a few minutes before all modules are found.

11:27  Voip LTE1  61% 

uitgangen						
		dag	aan	uit	in	M
	uitgang 0	8	24:00	24:00	0	
	uitgang 1	8	24:00	24:00	x	
	uitgang 2	8	24:00	24:00	0	
	uitgang 3	8	11:30	11:35	x	
	uitgang 4	8	12:30	14:40	0	
	uitgang 5	8	24:00	24:00	x	
	uitgang 6	8	24:00	24:00	x	
	uitgang 7	8	24:00	24:00	x	

ingangen	
	ingang 0
	ingang 1
	ingang 2
	ingang 3
	ingang 4
	ingang 5
	ingang 6
	ingang 7

klok
instellen

thieu-b55 februari 2023

Colors and their meaning are identical for the LED strip and the web page

Example of the home page with a configuration with 5 active inputs and 1 active input

active >> **output** can be controlled
input the state of the input is taken into account

not active >> **output** cannot be sent
input a <1> of the input is not taken into account

An output / input is switched active or inactive by pressing the desired number of the output / input

an inactive output / input has the background color for the LED strip <off>

active	yellow	output / input is active but no feedback from a module with this address (yet).
	green	module has reported and the output / input is <0>
	red	module has reported and the output / input is <1>

When does an output switch

<div>0</div>	uitgang 0	8	24:00	24:00	0	<div></div>
--------------	-----------	---	-------	-------	---	-------------

Here output 0 <1>
 output is active
 and is switched manually
 manually pressing the last box

blue >> output manually on <1> (if active)

<div>1</div>	uitgang 1	8	24:00	24:00	x	<div></div>
--------------	-----------	---	-------	-------	---	-------------

Here output 1 <1>
 output active
 day = 8 daily
 on = 24:00 time off
 in = x no input specified

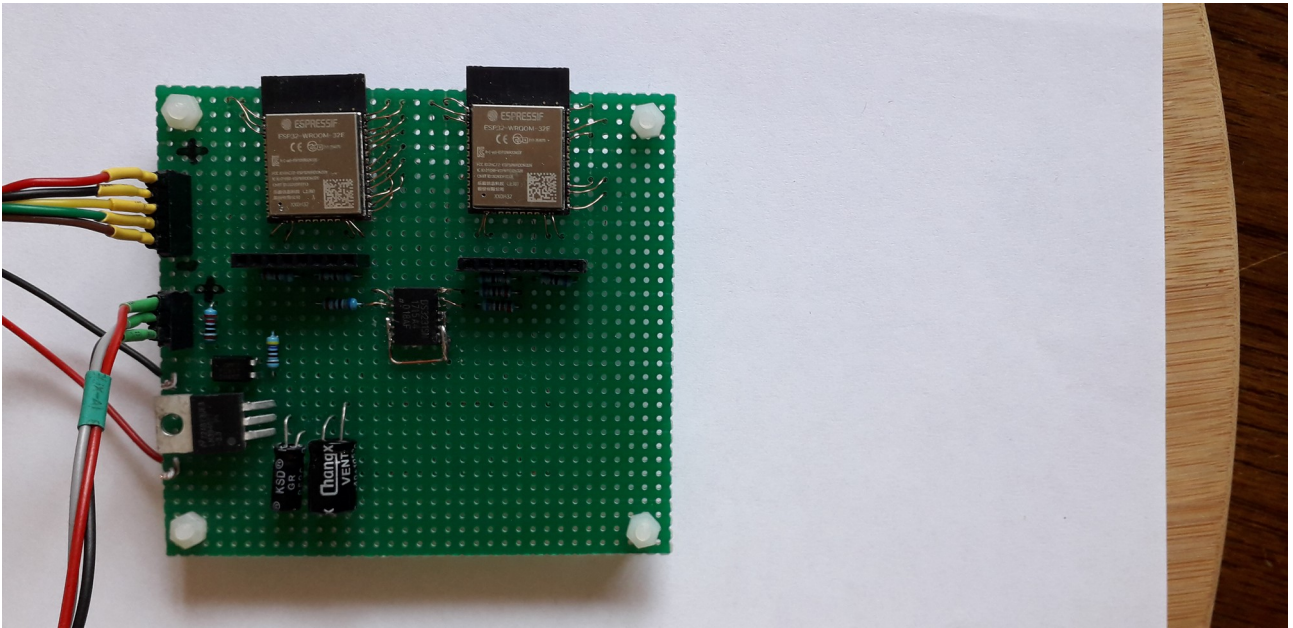
<div>3</div>	uitgang 3	8	24:00	24:00	1	<div></div>
<div>4</div>	uitgang 4	8	12:30	14:40	0	<div></div>
<div>5</div>	uitgang 5	8	24:00	24:00	x	<div></div>
<div>6</div>	uitgang 6	8	24:00	24:00	x	<div></div>
<div>7</div>	uitgang 7	8	24:00	24:00	x	<div></div>
ingangen						
<div>0</div>	ingang 0					
<div>1</div>	ingang 1					

output 3 <1>
 active
 day = 8
 time = 24:00
 in = input 1
 input 1 <1> red

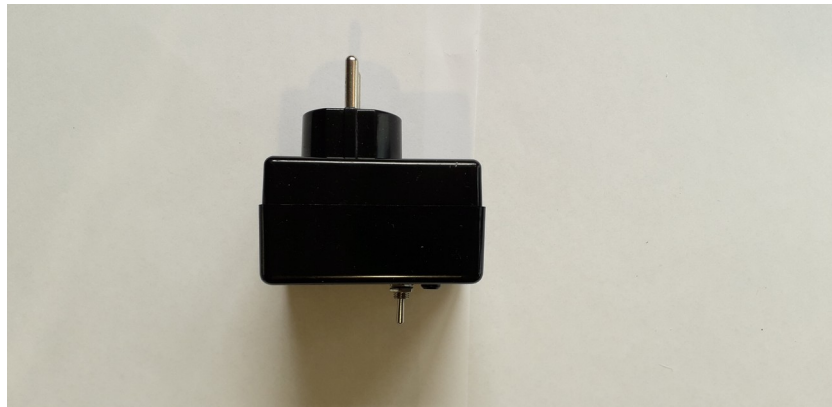
output = 1 if :
 active **and** day **and** aan **and not** uit **and** in
 or
 active **and** manual

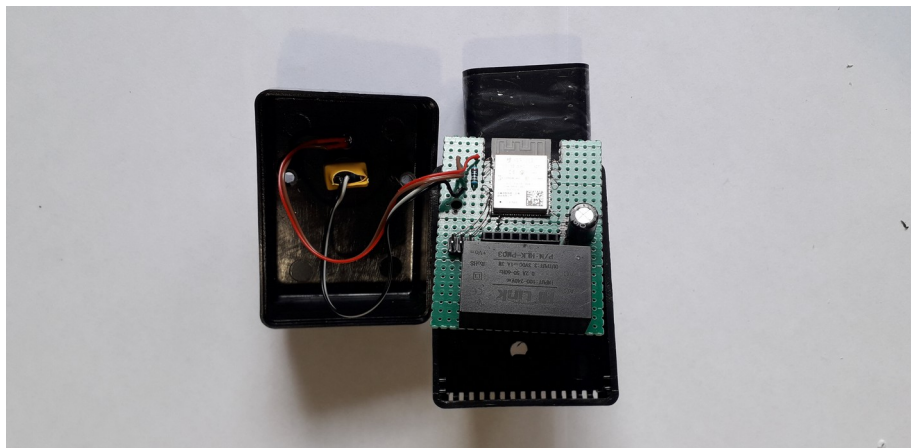
Build with ESP32 WROOM modules

Main board

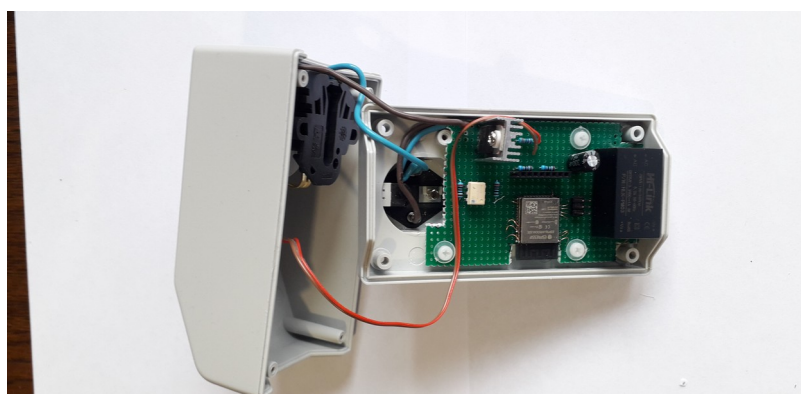


Input





Output



That's all,
greetings,
thieu-b55