ESP32 clock - clock radio - internet radio / MP3 player - control via web page.

ESP32 wekkerradio webinterface

Alarm	Dag	Tijd	Mode	Wake_up
1	Dagelijks	06:58	radio	1
2	Woensdag	12:34	mp3	0
3	Weekdagen	00:00	mp3	0

+	Aktief	Dag	Tijd	Mode	Wake_up
2	1	3	12:34	0	0
-					

OK

Radio bediening

-	Alarm	+

Radio 1 Classics

Radio 1 Classics

-	+	OK

EQ -40 <-> 6   Volume 0 <->21

L : 2   M : 0   H : 2   V : 16

OK

Instellen zender en url : 10

-	+	OK

Instellen tijdzone zomeruur

Vrijdag   10:42

uren	minuten	zomertijd
1	0	0

OK

Klok helderheid (0 <-> 15)

0

OK

thieu-b55 januari 2023

Clock
Large and clear display.
Internal clock synchronized 2 x day with NTP server.
Time zone and winter / summer time correction manually via web page.
Adjustable clock display brightness.

clock radio
3 programmable alarms
* certain day
* daily
* weekdays
*weekend
mp3 player or internet radio as alarm source.
Possibility to be awakened by a freely selectable wake-up call.
Automatically turns off after 1 hour.
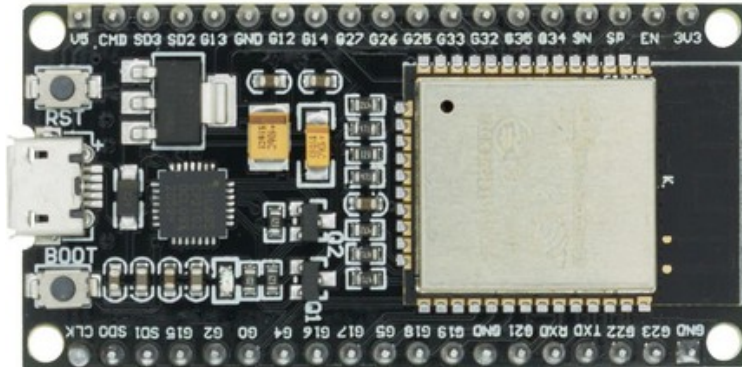
Internet radio
10 pre-programmed internet radios, can be changed via web page.
Tone and Volume control.
Continuous operation or as an alarm.
Random mp3 player 5000+ mp3 files without problem.
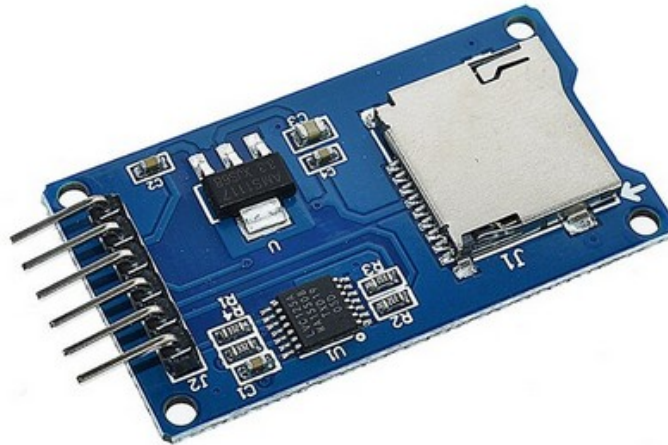
What do we need

ESP32-WROOM (38 pin versie)

https://nl.aliexpress.com/item/32864722159.html?
spm=a2g0o.productlist.main.1.61942b27Eg45Rj&algo_pvid=1e38ae4b-13a1-4111-bf98-
932a2d50efc6&algo_exp_id=1e38ae4b-13a1-4111-bf98-932a2d50efc6-0&pdp_ext_f=%7B
%22sku_id%22%3A%2212000028744589167%22%7D&pdp_npi=2%40dis%21EUR
%213.71%213.71%21%21%21%21%21%40210212c016740610529416210d0669%211200002874
4589167%21sea&curPageLogUid=wgT9nNbq322I

PCM5102A
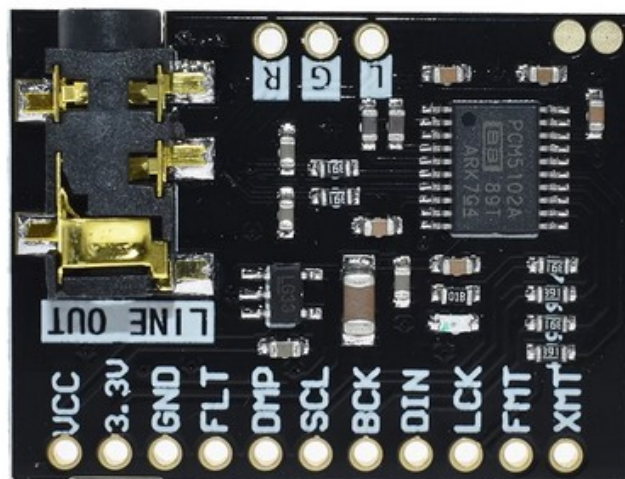
https://nl.aliexpress.com/item/33004561102.html?
spm=a2g0o.productlist.main.7.6693j1Vuj1VuNK&algo_pvid=9dfdb51f-aaf3-48d1-b5fe-
64b830e67c62&algo_exp_id=9dfdb51f-aaf3-48d1-b5fe-64b830e67c62-3&pdp_ext_f=%7B
%22sku_id%22%3A%2267118680566%22%7D&pdp_npi=2%40dis%21EUR
%215.76%211.44%21%21%21%21%21%40212244c416740698615196556d0685%216711868056
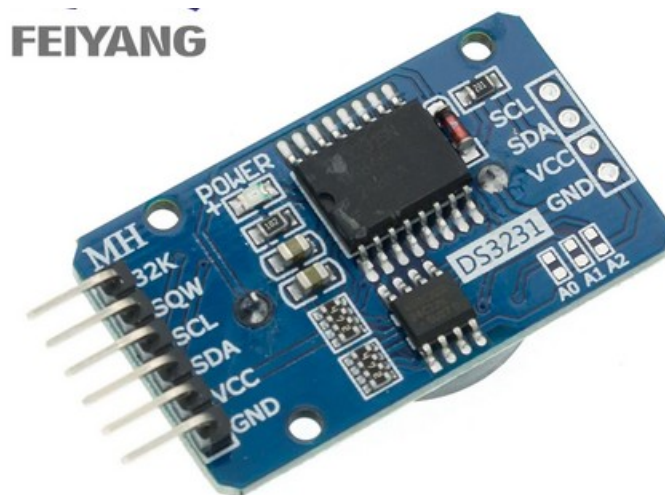6%21sea&curPageLogUid=zWKmpHWXxf05

SD card module

SD card FAT32 formatted
Depends on number of mp3 files, otherwise minimal size is sufficient.

DS3231 RTC

MAX7219 module

https://nl.aliexpress.com/item/4000587266290.html?
spm=a2g0o.productlist.main.3.533e6eba6edqN9&algo_pvid=f41d132e-4c7c-4e1a-b8c5-
77b4bc1ea871&algo_exp_id=f41d132e-4c7c-4e1a-b8c5-77b4bc1ea871-1&pdp_ext_f=%7B
%22sku_id%22%3A%2210000003439612437%22%7D&pdp_npi=2%40dis%21EUR
%214.49%213.69%21%21%21%21%21%4021021118167406144473856175d0688%211000000343
9612437%21sea&curPageLogUid=RUunHGplwHcQ

Glasfolie wit mat
dimming brightness MAX7219 module
https://www.gamma.be/nl/assortiment/decoratiefolie-mat-wit-346-0001-45x200cm/p/B389981

5V stereo versterker

https://nl.aliexpress.com/item/32791319633.html?
spm=a2g0o.productlist.main.23.656633a7pQVaRS&algo_pvid=140d2c11-5b6b-4201-b402-
c7aa658dc2ab&algo_exp_id=140d2c11-5b6b-4201-b402-c7aa658dc2ab-11&pdp_ext_f=%7B
%22sku_id%22%3A%2263650640578%22%7D&pdp_npi=2%40dis%21EUR
%212.17%211.41%21%21%21%21%21%4021021aa21674061872037824d0701%216365064057
8%21sea&curPageLogUid=elbg0VoJ1Wxb

2 x luidspreker

https://www.allekabels.be/luidspreker-zelfbouw/237/1370099/full-range-speaker-58-cm-23-8-10-w.html

Mosfet IRL540 / IRF540
IRL540L Vgs(th)   1.0V   2.0V
IRF540F Vgs(th)   2.0V   4.0V

IRF540 does what it should do, but if in stock IRL540 is recommended

R 1K
R 4K7

Pushbutton

5V (USB)power supply

1 x smartphone for operating radio / clock radio.

Internet connection is necessary

Connections

5V power supply

+5V	5V	ESP32-WROOM
	VCC	PCM5102A
	VCC	MAX7219
	DC+	amplifier

GND	GND	ESP32-WROOM	**3X**
	GND	PCM5102A	
	GND	SD module	
	GND	RTC DS3231	
	GND	MAX7219	
	Source	IRF(IRL)540	amplifier ON/OFF

ESP32-WROOM

+5V	<<	+5V	power supply
GND	<<	GND	power supply
GND	<<	GND	power supply
GND	<<	GND	power supply
GND	>>	R4K7	

+3.3V	>>	+3V3	SD module
	>>	VCC	DS3231RTC
	>>	pushbutton alarm off	

GPIO25	>>	DIN	PCM5102A
GPIO26	>>	LCK	PCM5102A
GPIO27	>>	BCK	PCM5102A

GPIO5	>>	CS	SD module
GPIO23	>>	MOSI	SD module
GPIO19	>>	MISO	SD module
GPIO18	>>	SCK	SD module

GPIO21	>>	SDA	DS3231
GPIO22	>>	SCL	DS3231
GPIO32	>>	SQW	DS3231

GPIO15	>>	CS	MAX7219
GPIO13	>>	DIN	MAX7219
GPIO14	>>	CLK	MAX7219

GPIO4	>>	Pushbutton Alarm OFF	

GPIO33	>>	Gate	IRF(IRL)540	amplifier ON/OFF

PCM5102A

5V	<<	+5V	power supply
GND	<<	GND	power supply
FLT	<<	GND	PCM5102A
DMP	<<	+3.3V	PCM5102A
SCL	<<	GND	PCM5102A
BCK	<<	GPIO27	ESP32-WROOM
DIN	<<	GPIO25	ESP32-WROOM
LCK	<<	GPIO26	ESP32-WROOM
FMT	<<	GND	
XMT	<<	+3.3V	PCM5102A

Audio

Left out	>>	Left in amplifier
Right out	>>	Right in amplifier

Do not connect GND-out to GND-in amplifier, amplifier is controlled by IRF540 via the GND

SD module

+3V3	<<	+3.3V	ESP32-WROOM
GND	<<	GND	Voeding
CS	<<	GPIO5	ESP32-WROOM
MOSI	<<	GPIO23	ESP32-WROOM
MISO	<<	GPIO19	ESP32-WROOM
SCK	<<	GPIO18	ESP32-WROOM

DS3231 RTC

VCC	<<	+3.3V	ESP32-WROOM
GND	<<	GND	ESP32-WROOM
SDA	<<	GPIO21	ESP32-WROOM
SCL	<<	GPIO22	ESP32-WROOM
SQW	<<	GPIO32	ESP32-WROOM

MAX7219 module

VCC	<<	+5V	power supply
GND	<<	GND	power supply
CS	<<	GPIO15	ESP32-WROOM
DIN	<<	GPIO13	ESP32-WROOM
CLK	<<	GPIO14	ESP32-WROOM

Drukknop alarm uit

GPIO4	<<	pushbutton N.O.	<<	+ 3.3V ESP32-WROOM
GPIO4	<<	R 4K7	<<	GND

Versterker

DC+	<<	+5V	power supply
DC-	<<	Drain	IRF540 (IRL540)
Left in	<<	Left out	PCM5102A
Right in	<<	Right out	PCM5102A

DO NOT CONNECT AUDIO GROUND

IRF540(IRL540)

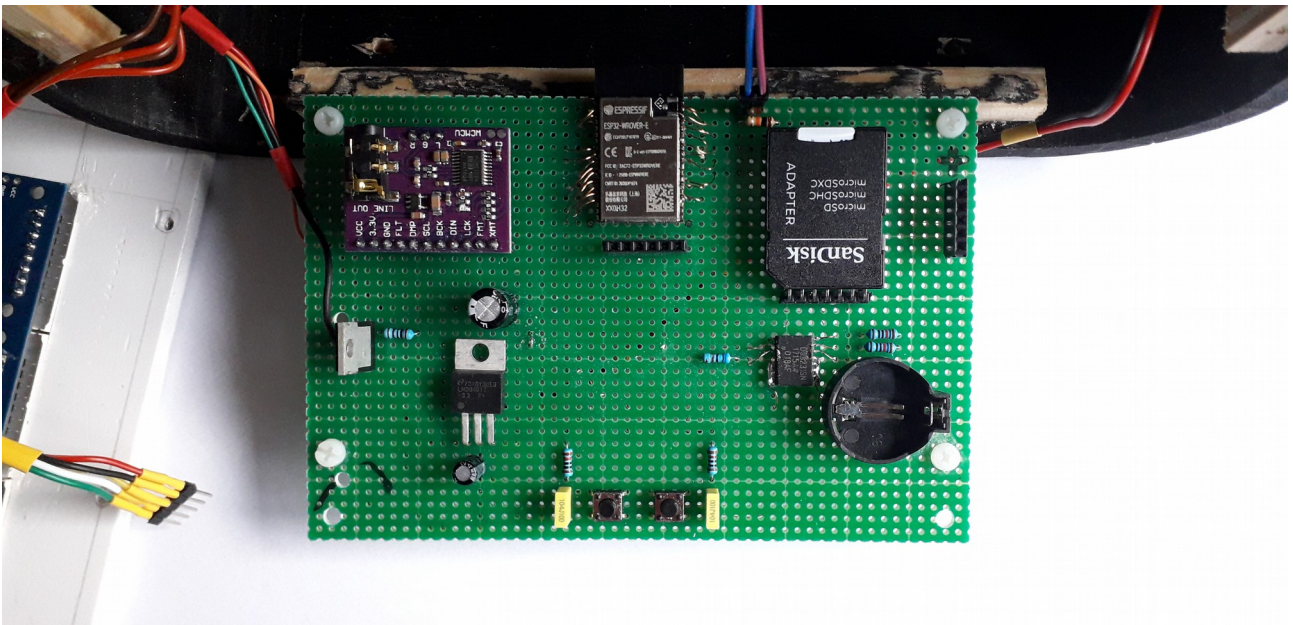Source   <<   GND   power supply
Drain   >>   GND   amplifier
Gate   << R 1K << GPIO33 ESP32-WROOM

Breadboard
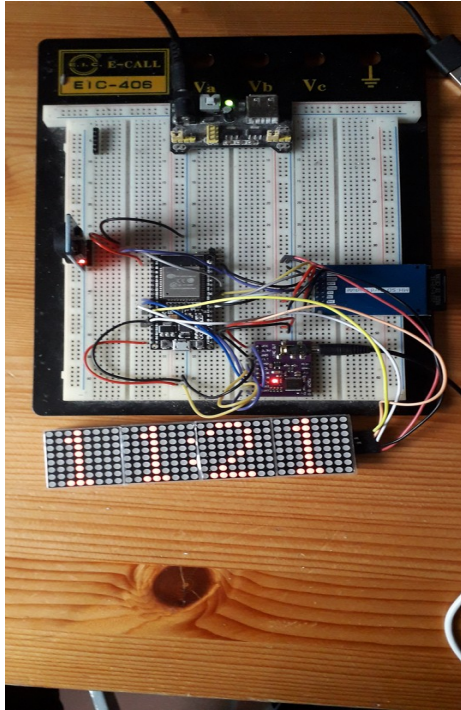
Hobby versie

If desired, stick 1 or more layers of foil (see 'what do we need' above) on the MAX7219 module to reduce the light intensity.

Go to https://github.com/thieu-b55/ESP32-clock-radio-with-web-interface

download het zipbestand :   SD card files.zip en unzip.
download het programma :   ESP32_webradio_WROOM_wekker.ino

Copy the files you find in the SD card files folder to the SD card and place the SD card in the SD card holder.

Open the program ESP32_webradio_WROOM_wekker.ino with the Arduino IDE.

Settings of the Arduino IDE see screen print. Port setting depends on your configuration.

Upload programma in ESP32-WROOM

On 1st use : connect to

network :   **ESP32klok**
password :   **ESP32pswd**

Open webpage on address 192.168.4.1

Below **ESP Netwerk instellingen**
ssid
pswd
fill in of home network.

Below **Gewenst IP address ...**
if desired, a different IP address can be entered here. Take the range of the modem into account.

After <Bevestig> ESP32 restarts automatically, if everything has been entered correctly, the network ESP32klok is no longer available.
Reconnect to your home network and go to 192.168.1.178, or to the IP address of your choice.

ESP32 wekkerradio webinterface

Alarm	Dag	Tijd	Mode	Wake_up
1	Dagelijks	06:58	radio	1
2	Woensdag	12:34	mp3	0
3	Weekdagen	00:00	mp3	0

+	Aktief	Dag	Tijd	Mode	Wake_up
2	1	3	12:34	0	0
-					

OK

Radio bediening

-	Alarm	+

Radio 1 Classics

Radio 1 Classics

-	+	OK

EQ -40 <-> 6   Volume 0 <->21

L : [2]   M : [0]   H : [2]   V : [16]

OK

Instellen zender en url : 10

[   ]

[   ]

-	+	OK

Instellen tijdzone zomeruur

Vrijdag   10:42

uren	minuten	zomertijd
1	0	0

OK

Klok helderheid (0 <-> 15)

[0]

OK

thieu-b55 januari 2023

Hoe werkt het :

Clock radio

3 aktieve alarmen

Alarm	Dag	Tijd	Mode	Wake_up
1	Dagelijks	06:58	radio	1
2	Woensdag	12:34	mp3	0
3	Weekdagen	00:00	mp3	0

1 aktief alarm

Alarm	Dag	Tijd	Mode	Wake_up
1	Dagelijks	06:58	radio	1

In this box on the web page we see which alarms are active and what the settings are. Only the active alarms are shown.

Set alarms

+	Aktief	Dag	Tijd	Mode	Wake_up
1	1	8	06:58	1	1

[-]

[OK]

In this box we can set the 3 alarms.
+ moves to the next alarm
– to the previous alarm

Aktief
0   alarm not active
1   alarm active

Dag
Which day(s) should be alerted
1: Monday 2: Tuesday 3: Wednesday 4: Thursday 5: Friday 6: Saturday 7: Sunday 8: daily
9: weekdays 10: weekend

Tijd
Hour and minutes of alarm start

Mode
0   mp3 player. Make sure that the mp3 list has been created, see further in the manual.
1   internetradio

Wake_up
0   geen wake_up
1   if there is a file wake_up.mp3 in the root of the SD card, it will be opened first before switching
       to mp3 player or internet radio

Acceptwith OK

Radio/mp3 alarm of aan

+/- kiezen Alarm of Aan
Alarm   radio/mp3 player plays when there is an alarm
Aan   radio/mp3 player plays as long as On is selected. Alarms are not working now.

Silence alarm using push button connected to GPIO4 of ESP32
Alarm turns itself off after 1 hour
To switch off the alarm permanently, set the alarm to inactive.

Set time zone summer/winter time

uren   hours deviation from UTC time + or –
minuten   minutes deviation from UTC time (0 or 30)
zomertijd   1 = summer time   0 = winter time
Accept with OK

Light intensity

Klok helderheid (0 <-> 15)

| 0 |

OK

Enter the desired brightness of the display here. Value from 0 to 15.

Accept with OK

How does it work :

Channel selection
Choosing another channel when the radio is in Alarm mode is not always possible, it is best to put the radio in the On position before wanting to change channels.

Radio 1 Classics

Radio 1 Classics

| - | + | OK |

Radio 1 Classics is radio that is currently playing.
If title and performer are available, they will be shown below.

selection box
Radio 1 Classics is now in the selection box, using the + and – button you can select another station.
Accept with OK

In the selection list there is also the option to create mp3 list and mp3 player, more about this later in the manual.

Volume en EQ

EQ -40 <-> 6   Volume 0 <->21

L : [0]   M : [0]   H : [0]   V : [18]

[OK]
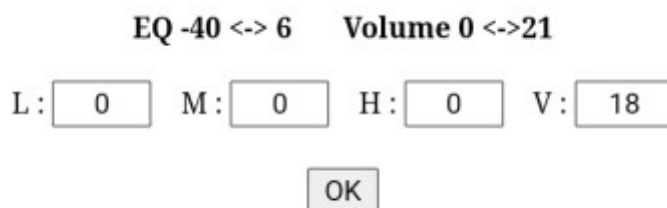
L : laag
M: midden
H: hoog

V: volume

L M H   kan je instellen tussen -40 en 6
V   kan je instellen tussen 0 en 21
bevestigen met <OK>

Set channels

Instellen zender en url : 6

Radio 10 Non-Stop

http://playerservices.streamtheworld.com/api/livestrean

-    +   OK

Already set channels or still empty positions can be changed as desired. Maximum channels that can be set is 10.
In the first box under <Set channel and url : ..> you can enter a random name for the channel.
The web address of the sender must be entered in the second box.
moving to a next or previous position is done with the <-><+> keys.

Accept with <OK>,

mp3 speler.

It is best to put the radio in the On position and not in the Alarm position before reading the mp3 files.

Before listening to mp3 files, song lists must first be created.
With a large number of mp3 files, it is advisable to divide them evenly into different folders.
Starting from mp3_0 and so on mp3_1, mp3_2.
These numbers must follow each other. Program stops searching if the following mp3_X folder does not exist.
It is best to have about as many files in each mp3_X folder as there are mp3_X folders.
so with 900 mp3's this gives 30 mp3_X folders with 30 mp3 files each.
SD program reads sequentially and in this way it takes the fewest number of reads to find the last mp3 file.

Important:
If this is not the 1st time you are making an mp3 list, you must first delete all songlistx folders from the SD card.

Screenshot of SD card with mp3_. folders that have not yet been imported.

mp3_0	32,8 kB	map
mp3_1	32,8 kB	map
mp3_2	32,8 kB	map
mp3_3	32,8 kB	map
mp3_4	32,8 kB	map
mp3_5	32,8 kB	map
mp3_6	32,8 kB	map
mp3_7	32,8 kB	map
mp3_8	32,8 kB	map
mp3_9	32,8 kB	map
mp3_10	16,4 kB	map
pswd	20 byte	plattetekst-document
ssid	14 byte	plattetekst-document
totaal	4 byte	plattetekst-document
zender_data.csv	4,9 kB	CSV-document

Once you've copied all your mp3s to the SD card and deleted any songlistx folders, put the SD card back in its slot.

In the channel selection section go to <mp3 lijst maken> and press <OK>

TOM BROWNE - Funkin' for Jamaica

mp3 lijst maken

| - | | + | | OK |

Reading starts.
The program needs about 2 minutes per 1000 mp3 files if they are evenly distributed over several mp3_X folders as described above.
The progress of the import can be followed by pressing the refresh circle at the top right of the web page.

After reading all mp3 files, the program switches to mp3 player

mp3 speler

Liesbeth List - Brussel

mp3 speler

| - | | + | | OK |

Screenshot of the SD card after reading the mp3_.. folders

mp3_0		32,8 kB	map
mp3_1		32,8 kB	map
mp3_2		32,8 kB	map
mp3_3		32,8 kB	map
mp3_4		32,8 kB	map
mp3_5		32,8 kB	map
mp3_6		32,8 kB	map
mp3_7		32,8 kB	map
mp3_8		32,8 kB	map
mp3_9		32,8 kB	map
mp3_10		16,4 kB	map
songlijst0		16,4 kB	map
songlijst1		16,4 kB	map
songlijst2		16,4 kB	map
songlijst3		16,4 kB	map
songlijst4		16,4 kB	map
songlijst5		16,4 kB	map
songlijst6		16,4 kB	map
songlijst7		16,4 kB	map
songlijst8		16,4 kB	map
songlijst9		16,4 kB	map
songlijst10		16,4 kB	map
pswd		20 byte	plattetekst-document
ssid		14 byte	plattetekst-document
totaal		4 byte	plattetekst-document
zender_data.csv		4,9 kB	CSV-document

Important:
to avoid a possible endless loop in the event of an error during mp3 playback, it will always start up as a web radio after a reset or power failure.

So that was about it,
greetings and happy listening,
thieu-b55