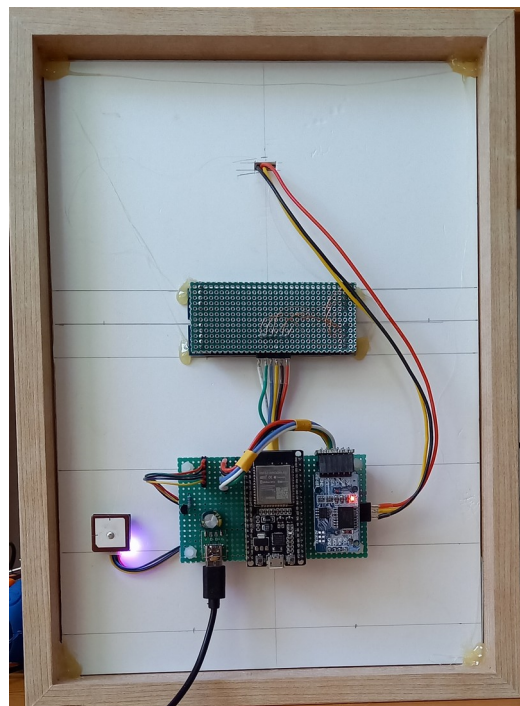


## ESP32 clock analog / digital with GPS correction



## ESP32 clock

digital indication of:

- time
- date
- temperature

analogue display by 60 leds led ring WS2812B

indication of:

hour	3 blue leds
hour	3 blue leds

for demo video see Github :

<https://github.com/thieu-b55/ESP32-analogue-digital-clock>

DS3231SN RTC module is synchronized with GPS module every hour

Ambient temperature measurement using DS18B20

The following data can be set via ESP32 own network

when used without GNSS module

- time
- date

when used with GNSS module

- summer time
- UTC difference

Network : ESP32Klok  
Password : ESP32pswd  
IP address : 192.168.4.1

21:28

VoLTE

94%

☆

i

192.168.4.1

ESP32 Klok Temperatuur

Tijd

21:28

OK

Datum

20

08

2024

OK

Zomertijd

Uur

Minuten

01

00

OK

UTC Verschil

Uur

Minuten

01

00

OK

GPS signaal

gps ontvangst

thieu-b55 augustus 2024

<

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☰

## Parts

1 x ESP32-WROOM-32D 38pin

[https://nl.aliexpress.com/item/32834130422.html?spm=a2g0o.order\\_list.order\\_list\\_main.198.1eb479d2IpAig9&gatewayAdapt=glo2nld](https://nl.aliexpress.com/item/32834130422.html?spm=a2g0o.order_list.order_list_main.198.1eb479d2IpAig9&gatewayAdapt=glo2nld)

2 x MAX7219 8 digit Led display

[https://nl.aliexpress.com/item/32830440792.html?spm=a2g0o.order\\_list.order\\_list\\_main.187.1eb479d2IpAig9&gatewayAdapt=glo2nld](https://nl.aliexpress.com/item/32830440792.html?spm=a2g0o.order_list.order_list_main.187.1eb479d2IpAig9&gatewayAdapt=glo2nld)

1 x WS2812B 60 leds RGB ledring

[https://nl.aliexpress.com/item/32790922417.html?spm=a2g0o.productlist.main.5.16cewbhkwbhkWK&algo\\_pvid=3430a787-54fe-4b73-98fa-afa7bab868fd&algo\\_exp\\_id=3430a787-54fe-4b73-98fa-afa7bab868fd-2&pdp\\_npi=4%40dis%21EUR%216.90%213.66%21%21%217.47%213.96%21%40211b61bb17241829763166314eac31%2163688207982%21sea%21BE%21924161374%21X&curPageLogUid=vIKmSjItBvRK&utparam-url=scene%3Asearch%7Cquery\\_from%3A](https://nl.aliexpress.com/item/32790922417.html?spm=a2g0o.productlist.main.5.16cewbhkwbhkWK&algo_pvid=3430a787-54fe-4b73-98fa-afa7bab868fd&algo_exp_id=3430a787-54fe-4b73-98fa-afa7bab868fd-2&pdp_npi=4%40dis%21EUR%216.90%213.66%21%21%217.47%213.96%21%40211b61bb17241829763166314eac31%2163688207982%21sea%21BE%21924161374%21X&curPageLogUid=vIKmSjItBvRK&utparam-url=scene%3Asearch%7Cquery_from%3A)

1 x DS18B20

[https://nl.aliexpress.com/item/1005006431660780.html?spm=a2g0o.productlist.main.3.710b2d50YHi3jg&algo\\_pvid=3b315357-7d94-4d88-a46f-ada2b104e61a&algo\\_exp\\_id=3b315357-7d94-4d88-a46f-ada2b104e61a-1&pdp\\_npi=4%40dis%21EUR%214.66%212.38%21%21%2135.94%2118.33%21%402103868d17241832642518983e9011%2112000037153674695%21sea%21BE%21924161374%21X&curPageLogUid=gLrdECccmfNs&utparam-url=scene%3Asearch%7Cquery\\_from%3A](https://nl.aliexpress.com/item/1005006431660780.html?spm=a2g0o.productlist.main.3.710b2d50YHi3jg&algo_pvid=3b315357-7d94-4d88-a46f-ada2b104e61a&algo_exp_id=3b315357-7d94-4d88-a46f-ada2b104e61a-1&pdp_npi=4%40dis%21EUR%214.66%212.38%21%21%2135.94%2118.33%21%402103868d17241832642518983e9011%2112000037153674695%21sea%21BE%21924161374%21X&curPageLogUid=gLrdECccmfNs&utparam-url=scene%3Asearch%7Cquery_from%3A)

1 x DS3231 RTC module met SQW uitgang

[https://nl.aliexpress.com/item/32666603579.html?spm=a2g0o.productlist.main.3.3f5577d2ztyv0e&algo\\_pvid=31cf147f-ff5a-480a-86ea-7ce2295529d5&algo\\_exp\\_id=31cf147f-ff5a-480a-86ea-7ce2295529d5-1&pdp\\_npi=4%40dis%21EUR%212.28%212.28%21%21%212.47%212.47%21%402103868d17241834046355161e9011%2159946031405%21sea%21BE%21924161374%21X&curPageLogUid=3Jiat2bhYO1n&utparam-url=scene%3Asearch%7Cquery\\_from%3A](https://nl.aliexpress.com/item/32666603579.html?spm=a2g0o.productlist.main.3.3f5577d2ztyv0e&algo_pvid=31cf147f-ff5a-480a-86ea-7ce2295529d5&algo_exp_id=31cf147f-ff5a-480a-86ea-7ce2295529d5-1&pdp_npi=4%40dis%21EUR%212.28%212.28%21%21%212.47%212.47%21%402103868d17241834046355161e9011%2159946031405%21sea%21BE%21924161374%21X&curPageLogUid=3Jiat2bhYO1n&utparam-url=scene%3Asearch%7Cquery_from%3A)

1 x GNNs module

[https://nl.aliexpress.com/item/1005001892952440.html?spm=a2g0o.store\\_pc\\_allItems\\_or\\_groupList.new\\_all\\_items\\_2007550354655.1005001892952440&gatewayAdapt=glo2nld](https://nl.aliexpress.com/item/1005001892952440.html?spm=a2g0o.store_pc_allItems_or_groupList.new_all_items_2007550354655.1005001892952440&gatewayAdapt=glo2nld)

1 x 2200uF

1 x 3K3

1 x 5V voeding

Note on the led ring.

Not every segment worked for me, ring consists of 4 segments, maybe it is safer to order 2 rings.

## Connections

### 5V Power Supply

5V	>>	5V	ESP32-WROOM
	>>	VCC	MAX7219 8 digit display tijd
	>>	VCC	MAX7219 8 digit display temperatuur / datum
	>>	VIN	Ledring
GND	>>	3 x GND	ESP32-WROOM
	>>	GND	MAX7219 8 digit display tijd
	>>	GND	MAX7219 8 digit display temperatuur / datum
	>>	GND	GNSS module
	>>	GND	RTC module
	>>	GND	DS18B20
	>>	GND	Ledring

### ESP32-WROOM

3 x GND	<<	GND	Power Supply
5V	<<	5V	Power Supply
3V3	>>	VCC	RTC module
	>>	VCC	GNSS module
	>>	R 3K3	
I2C			
SDA GPIO21	>>	SDA	RTC module
SCL GPIO22	>>	SCL	RTC module
SPI			
MOSI GPIO23	>>	DIN	MAX7219 8 digit display tijd
	>>	DIN	MAX7219 8 digit display temperatuur / datum
MISO GPIO19		NIET GEBRUIKT	
SCLK GPIO18	>>	CLK	MAX7219 8 digit display tijd
	>>	CLK	MAX7219 8 digit display temperatuur / datum
CS			
GPIO26	>>	CS	MAX7219 8 digit display tijd
GPIO27	>>	CS	MAX7219 8 digit display temperatuur / datum
SERIAL2			
RX GPIO16	>>	TX	GNSS module
TX GPIO17	>>	RX	GNSS module
GPIO39	<<	SQW	RTC module
GPIO4	<<	DATA	DS18B20
	>>	R 3K3	
GPIO25	>>	DATA IN	Ledring

**RTC module**

VCC	<<	3V3	ESP32-WROOM
GND	<<	GND	Power Supply
SDA	<<	GPIO21	ESP32-WROOM
SCL	<<	GPIO22	ESP32-WROOM
SQW	>>	GPIO39	ESP32-WROOM

**MAX7219 8 digit display tijd**

VCC	<<	5V	power supply
GND	<<	GND	power supply
DIN	<<	GPIO23	ESP32-WROOM
CLK	<<	GPIO18	ESP32-WROOM
CS	<<	GPIO26	ESP32-WROOM

**MAX7219 8 digit display temperatuur / datum**

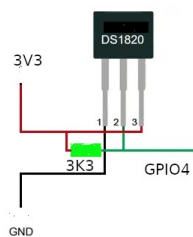
VCC	<<	5V	power supply
GND	<<	GND	power supply
DIN	<<	GPIO23	ESP32-WROOM
CLK	<<	GPIO18	ESP32-WROOM
CS	<<	GPIO27	ESP32-WROOM

**GNSS module**

VCC	<<	3V3	ESP32-WROOM
GND	<<	GND	Power Supply
RX	<<	GPIO17	ESP32-WROOM
TX	>>	GPIO16	ESP32-WROOM

**DS18B20**

VCC	<<	3V3	ESP32-WROOM
GND	<<	GND	ESP32-WROOM
DATA	<<	GPIO4	ESP32-WROOM
	<<	R3K3	

**Ledring**

VCC	<<	5V	Power Supply
	<<	+	2200uF
GND	<<	GND	Power Supply
	<<	-	2200uF
DATA IN	<<	GPIO25	ESP32-WROOM

**R3K3**

side 1	<<	3V3	ESP32-WROOM
side 2	<<	DATA	DS18B20

## C2200 uF

+	>>	5V	Ledring
-	>>	GND	Ledring

Used libraries and ESP32 Arduino core version

AsyncTCP	<a href="https://github.com/me-no-dev/AsyncTCP">https://github.com/me-no-dev/AsyncTCP</a>
ESPAsyncWebServer	<a href="https://github.com/me-no-dev/ESPAsyncWebServer">https://github.com/me-no-dev/ESPAsyncWebServer</a>

ESP32 Arduino core zie board beheer

### esp32

by **Espressif Systems** versie **3.0.3** **INSTALLED**

Boards in deze package:

ESP32 Dev Board, ESP32-S2 Dev Board, ESP32-S3 Dev Board, ESP32-C3 Dev Board, Arduino Nano ESP32.

Once the necessary connections have been made and the ESP32\_GPS\_tijd\_temperatuur.ino program has been loaded into the ESP32, we can start.

Program works with and without GNSS module.

Without GNSS module accuracy depends on accuracy of RTC module.

With GNSS module the RTC module is set to the GPS time every hour.

The parameters are set via the web page.

Connect to

Network:	ESP32Klok
pswd:	ESP32pswd
IP:	192.168.4.1

21:28 94%

192.168.4.1

### ESP32 Klok Temperatuur

**Tijd**

21:28

OK

**Datum**

20 08 2024

OK

**Zomertijd**

Uur Minuten

01 00

OK

**UTC Verschil**

Uur Minuten

01 00

OK

**GPS signaal**

gps ontvangst

thieu-h55 augustus 2024

When used without GNSS module, time and date can be set here. Enter the correct time here, no account is taken of any set summer time or UTC difference.

**Tijd**

21:28

OK

**Datum**

20 08 2024

OK

Summer time can be set here. The ESP32 clock does not know when summer time starts or ends, so this may have to be done manually twice a year.

**Zomertijd**

**Uur    Minuten**

01 00

OK

Possible settings are 30 minutes, 0 hours and 1 hour.  
The 30 minute option is for the approximately 382 residents of the Lord Howe Islands

see

<https://www.timeanddate.com/time/change/australia>

[https://en.wikipedia.org/wiki/Lord\\_Howe\\_Island](https://en.wikipedia.org/wiki/Lord_Howe_Island)

Difference with UTC time can be set here

**UTC Verschil**

**Uur    Minuten**

01 00

OK



Here you can see if there is GPS reception

GPS signaal

gps ontvangst

greetings,  
thieu-b55

For program and demo video see:

<https://github.com/thieu-b55/ESP32-analogue-digital-clock>

Translated by google translate