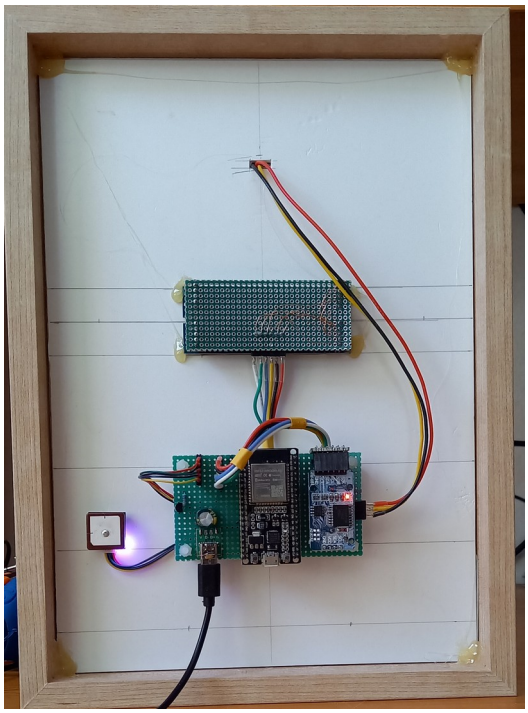
ESP32 clock analog / digital with GPS correction



ESP32 clock

digital indication of:
- time
- date
- temperature

analogue display by 60 leds led ring WS2812B
indication of:

hour	3 blue leds
minutes	1 red led
seconds	1 green led
hour position	1 green/red led

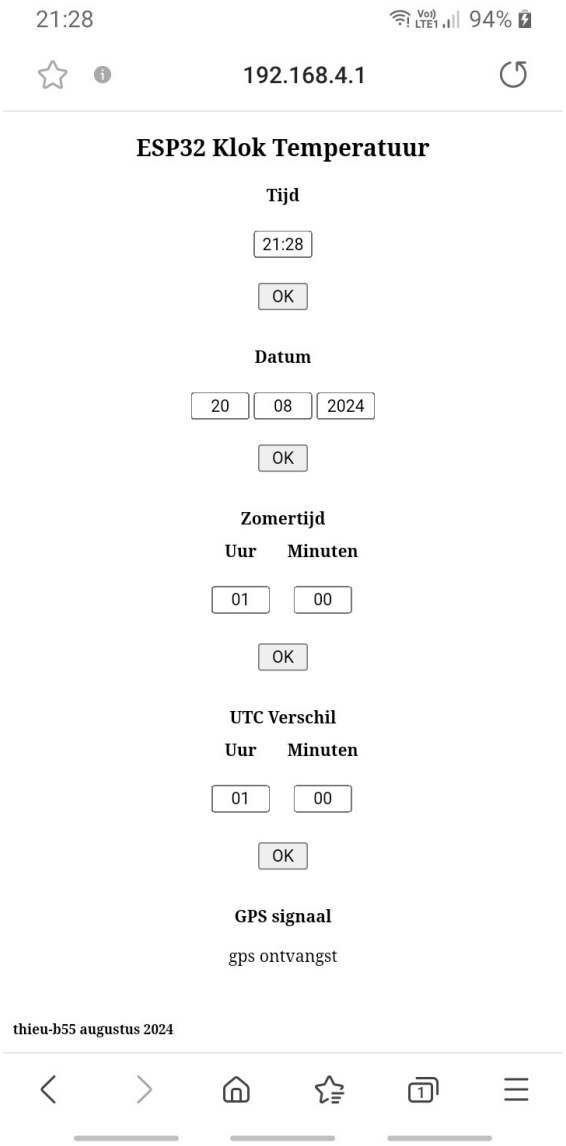
for demo video see Github :
- https://github.com/thieu-b55/ESP32-analogue-digital-clock

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



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

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

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=vIKmSjJtBvRK&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%21120000037153674695%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

1 x GNNS module
https://nl.aliexpress.com/item/1005001892952440.html?pdp_npi=4%40dis%21EUR%21%E2%82%AC%2027%2C35%21%E2%82%AC%2027%2C35%21%21%2129.62%2129.62%21%40211b812f17241840228128863eb633%211120000034599873764%21sh%21BE%21924161374%21X&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

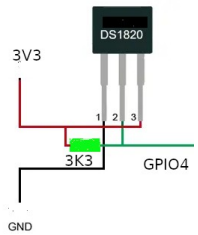
VCC	<<	5V	power supply
GND	<<	GND	power supply
DIN	<<	GPIO23	ESP32-WROOM
CLK	<<	GPIO18	ESP32-WROOM
CS	<<	GPIO27	ESP32-WROOM

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

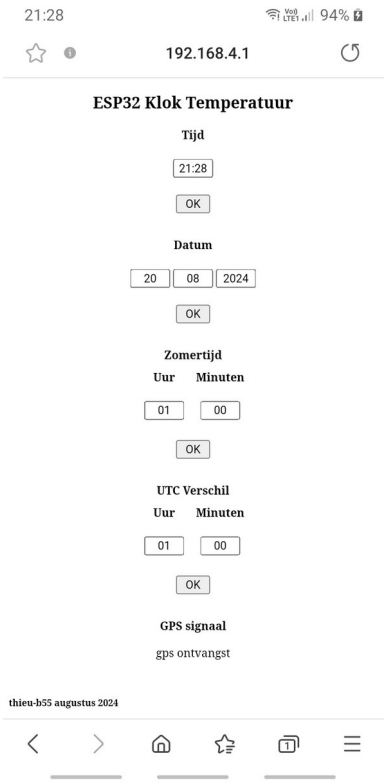
Used libraries and ESP32 Arduino core version

AsyncTCP	https://github.com/me-no-dev/AsyncTCP
ESPAAsyncWebServer	https://github.com/me-no-dev/ESPAsyncWebServer

ESP32 Arduino core zie board beheer

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

Netwerk:	ESP32Klok
pswd:	ESP32pswd
IP:	192.168.4.1



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.

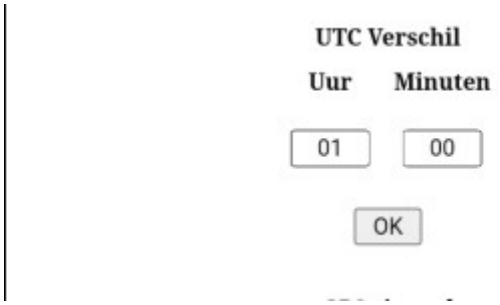
Summer time can be set here. The ESP32 clock does not know when summer time starts or ends, so this may have to be done manually twice a year.

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

Difference with UTC time can be set here



Here you can see if there is GPS reception

greetings,
thieu-b55

For program and demo video see:

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

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