

Epaper Clock Display

Assembling instruction

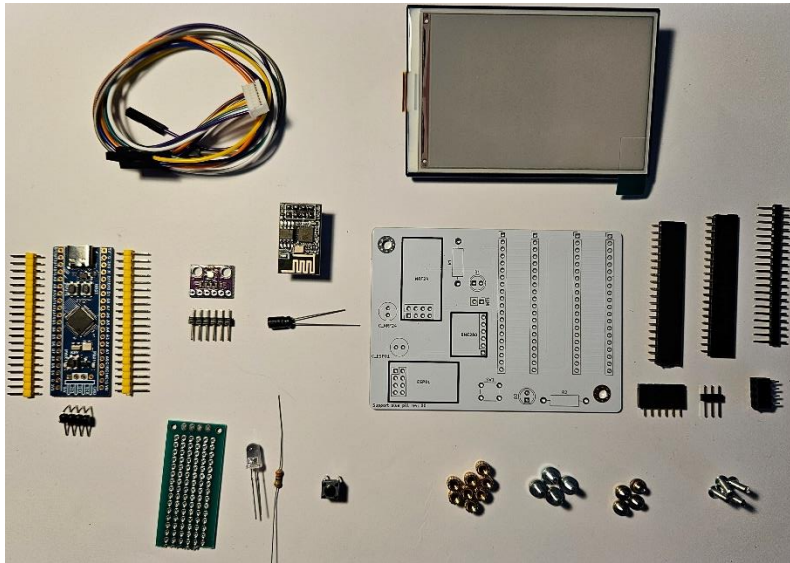


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1 Bill of Materials



1.1 Electronics

- EPAPER Display: 3.52-inch e-Paper display (B), e-ink, 360×240, Red/Black/White, SPI interface
- STM32: WeAct Studio STM32F103CBT6 Bluepill Plus (ARM STM32)
- BME280 sensor, 3.3 V, SPI/I²C
- ESP-01S Wi-Fi module
- 10 µF capacitor
- PCB / Board from:
https://github.com/gratinDeTopinambour/Epaper_Clock_stm32/tree/75e67bf902ec7e3da256f629115687a51065c9e0/Electronics%20and%20schematics

1.2 Connectors (2.54mm pitch)

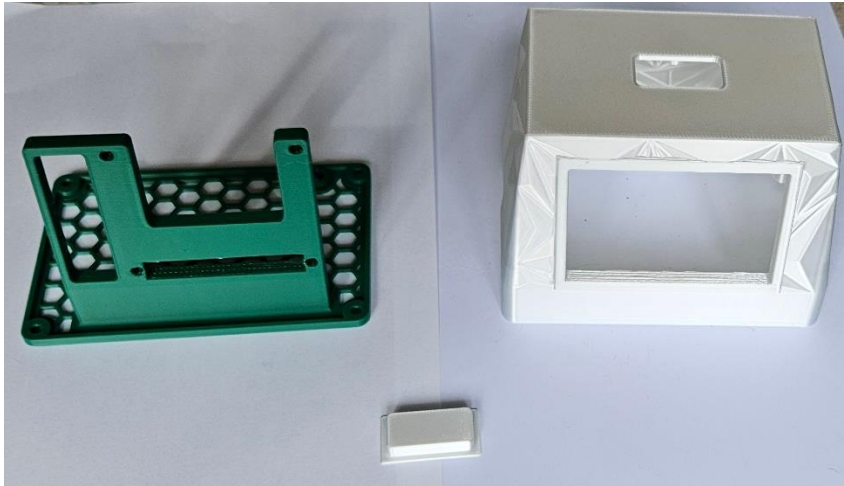
- 2 × 20-pin female header, 2.54 mm
- 1 × 20-pin male header, 2.54 mm
- 1 × 3-pin male header, 2.54 mm
- 1 × 6-pin female header, 2.54 mm
- 1 × 4×2-pin (8-pin) female header, 2.54 mm

1.3 Light and switch

- 6×6×5 mm push button switch
- 5 mm LED (max 3 V)
- Resistor (LED series resistor, value as per schematic)
- Test board / prototyping board

1.4 Fasteners & Mechanical Parts

- 8 × threaded inserts: 3DZWMAN D4.6, L5.7, d3.9, M3
- 8 × M3 screws
- 4 × M2.5 screws (for the display)



1.5 3D-Printed Parts

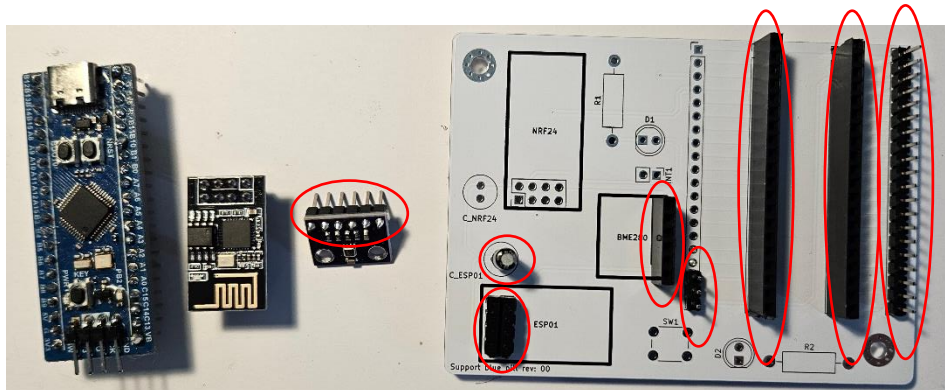
https://github.com/gratinDeTopinambour/Epaper_Clock_stm32/tree/75e67bf902ec7e3da256f629115687a51065c9e0/3D_print

- 1 × 3D-printed switch holder
- 1 × 3D-printed top cover
- 1 × 3D-printed bottom cover

2 Assembling Instruction

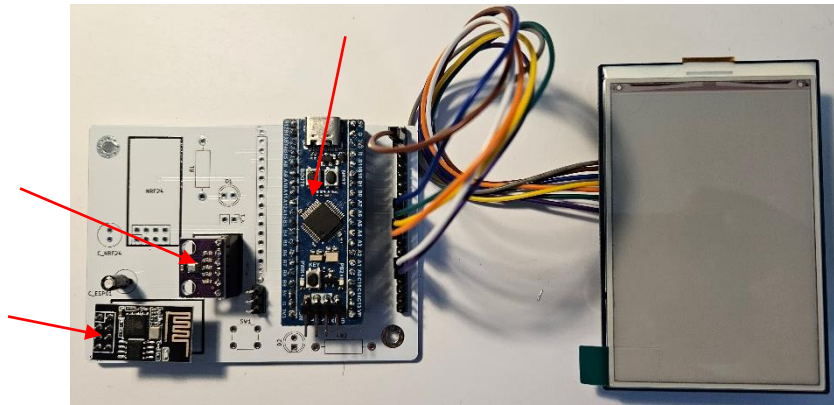
2.1 Soldering on the PCB

- Solder all connectors (headers) in their corresponding positions on the PCB.
- Solder the 10 μ F capacitor at position C_ESP01.



2.2 Plug-in Modules

- Insert the **BME280** module in its designated connector.
- Insert the **ESP-01** module in its designated connector.
- Insert the **STM32 (WeAct Bluepill Plus)** into its 20-pin female headers.



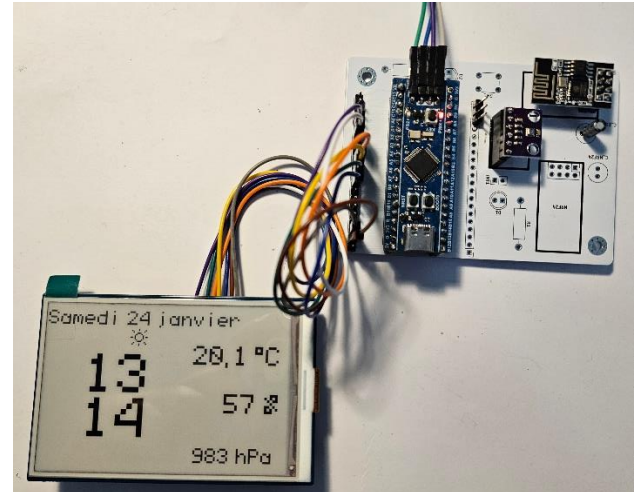
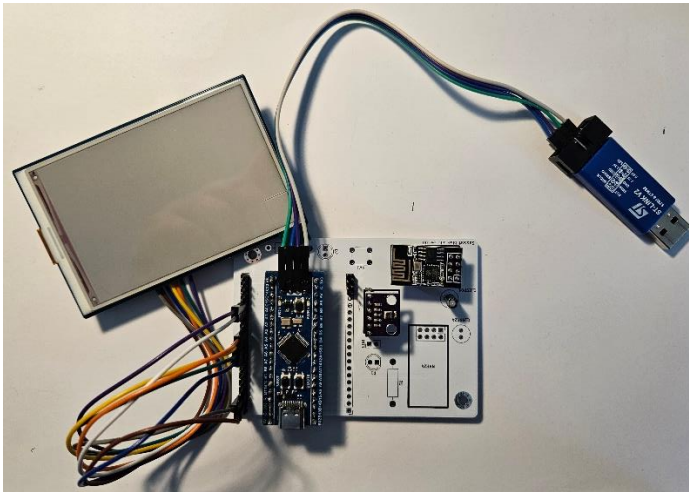
2.3 Connect the e-Paper Display

Wire the e-Paper connector to the STM32 as follows:

- EPD BUSY → PA0
- EPD RST → PA1
- EPD CS (chip select) → PA4
- EPD SCK / CLK → PA5
- EPD DC (data/command) → PA6
- EPD MOSI / DIN → PA7
- EPD GND → GND
- EPD VCC / VDD → 3.3 V

2.4 Programming and configuration instructions

- Use an ST-Link to connect the STM32 board to your computer.
- Open the project in STM32CubeIDE.
- In main.c, replace all instances of
- `Init_Wifi("Wifi_name", "Wifi_pswd");`
- with your own Wi-Fi name (SSID) and password.
- Program (flash) the STM32 board with the code.
- After flashing, check that the e-paper display shows the correct date and time.
- If the display does not show the correct information, there may be a Wi-Fi connection problem.
- Try pressing the reset button on the STM32 board—this may resolve the issue.



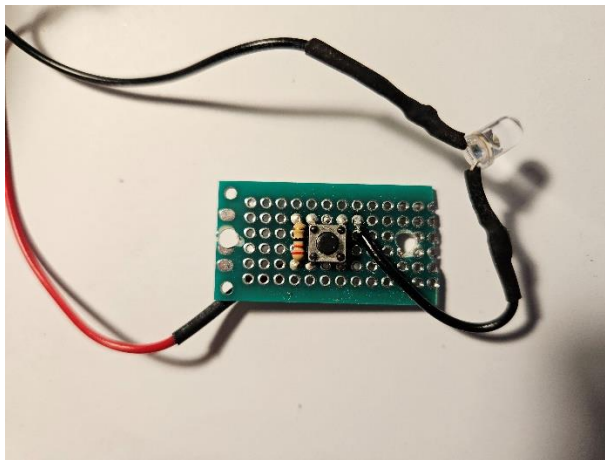
2.5 Light switch

2.5.1 Preliminary Functional Test

- Power up the assembled PCB and let it display the hour information.
- Observe the display for a period of time to ensure it functions correctly and does not exhibit any glitches before proceeding with final assembly.

2.5.2 Switch and LED Test Board Assembly

- While the board is running, prepare a small prototype (test) board at least 35 mm wide.



- **Mount the Components:**
 - a. Solder the push button switches at the center of the test board.
 - b. Connect a resistor in series with the switch.
Calculate the resistor value with:

$$R > (3.3 \text{ V} - \text{LED_Voltage}) / \text{LED_max_current}$$
 For a typical white LED:

$$\text{LED_Voltage} \approx 3 \text{ V}$$

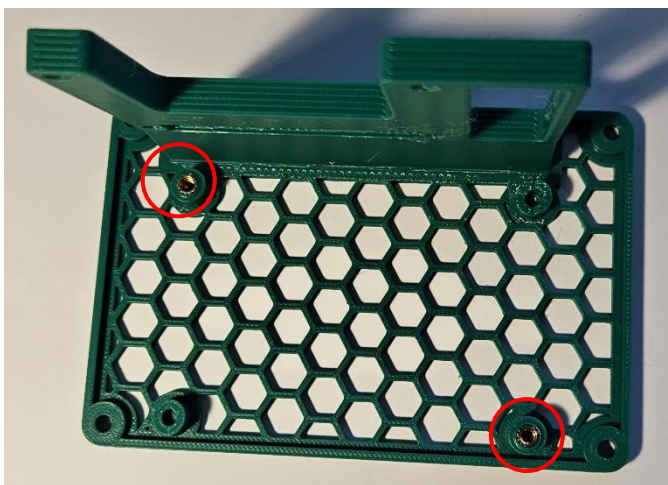
$$\text{LED_max_current} \approx 20 \text{ mA (0.02 A)}$$
 Suggested resistor value: about 100 Ω
- **Wire Connections:**

- a. Solder a wire (about 10 cm long) to one leg of the switch; this will connect to the 3.3 V supply.
- b. On the other side of the resistor, solder a second wire (about 4 cm long) for the LED connection.
- c. Connect the anode (longer leg) of the LED to this 4 cm wire.
- d. Connect the cathode (shorter leg, flat side) of the LED to another 10 cm wire, which will connect to ground.
- e. Important: Ensure correct polarity—do not swap the LED's anode and cathode.

2.6 Assembly

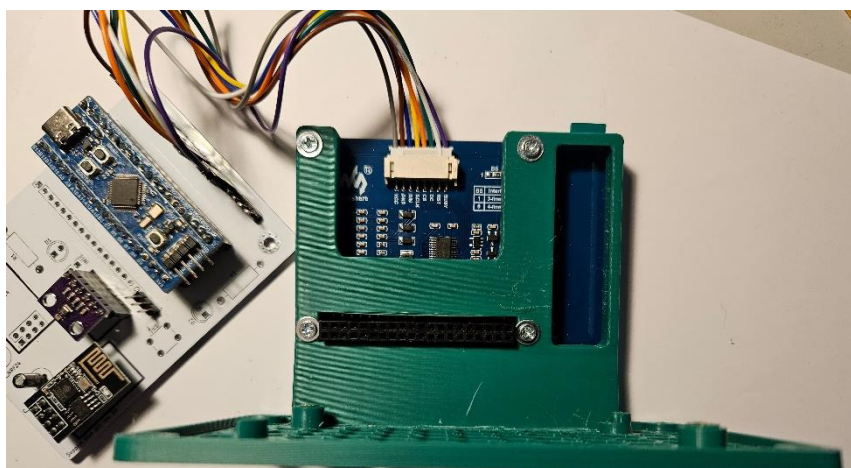
2.6.1 Insert Fixings

- Place all threaded inserts into their corresponding holes in the 3D-printed parts. Use a soldering iron or a heated tool if needed to set the inserts securely.



2.6.2 Mount the E-paper Display

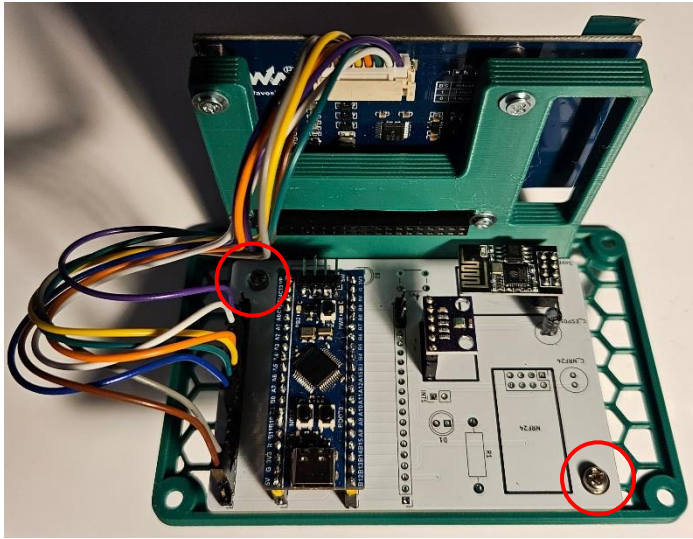
- Align the e-paper display with the front panel.
- Screw the display onto the front panel.



2.6.3 Mount the PCB

- Place the assembled PCB onto the bottom section of the enclosure.

- Screw the board to the bottom panel.



2.6.4 Prepare the Button Board

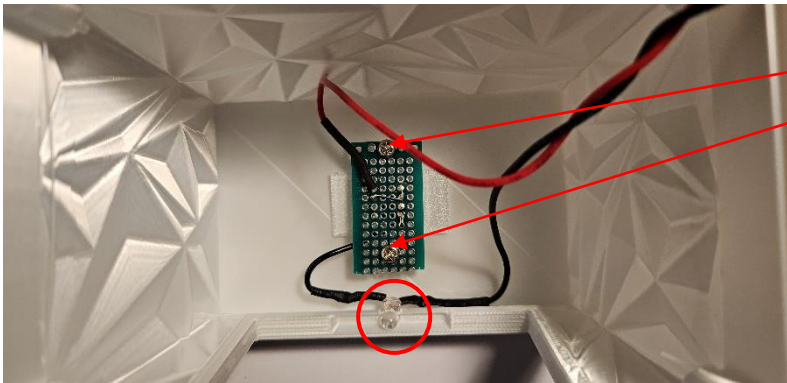
- Mark and drill two holes on the button board so they align with the inserts on the inside of the top 3D-printed shell.

2.6.5 Install the 3D-printed Switch Cap

- Fit the 3D-printed switch cap into position.
- Screw the button board in place to secure the switch. Make sure the button is centered on the switch.

2.6.6 LED Placement

- Insert the LED into the 5 mm hole on top of the display area of the enclosure.



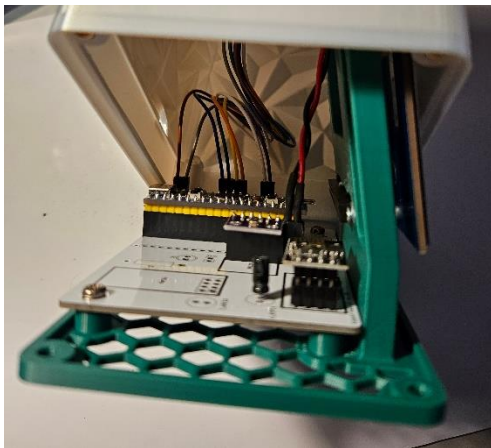
2.6.7 Wire Connections

- Connect the switch wire to the 3.3V main power line.
- Connect the LED wire to ground.
- Test the LED with power applied to ensure correct polarity—if it does not light, reverse the LED wiring.



2.6.8 Enclosure Assembly

- Place the top part of the 3D-printed enclosure onto the bottom.
- Secure enclosure parts by screwing them together



2.6.9 Final Check

- Power up the assembly and confirm the e-paper display works correctly, displaying the desired information.
- Verify that the LED and switch function as expected.

