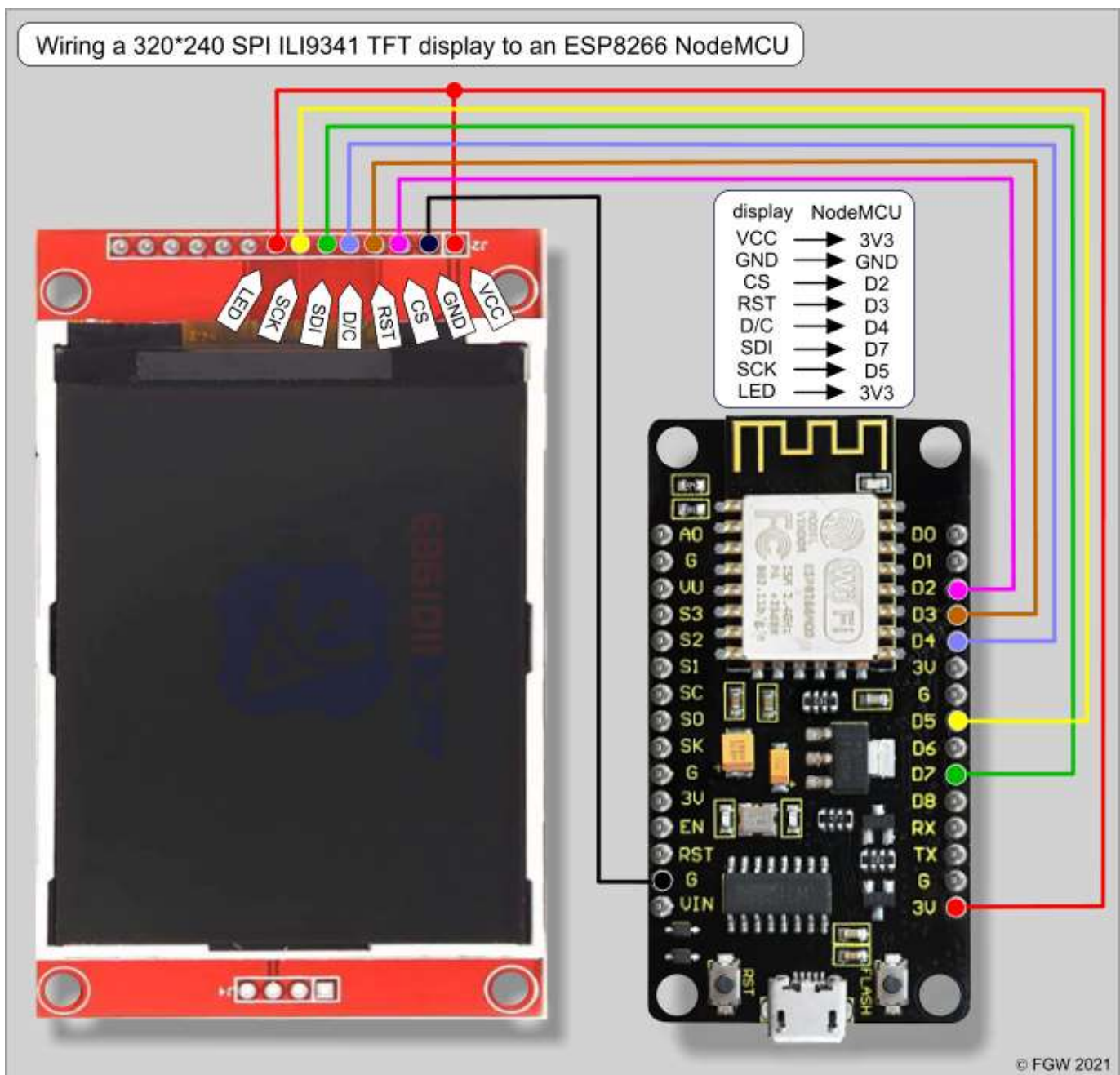


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Arduino projects

Wiring an ILI9341 SPI TFT display with ESP8266 based microcontroller boards: NodeMCU and Wemos D1 mini



by Floris Wouterlood – The Netherlands – May 2, 2021

— Introduction

The ESP8266 is a well performing microcontroller chip that is fully Arduino compatible. Its WiFi capability makes boards with this chip easy implementable as IOT devices. Here we wire two representative ESP8266 boards: NodeMCU and Wemos D1 mini to a single-row 14-pin header, 320*240 TFT display that uses the four-wire SPI interface.

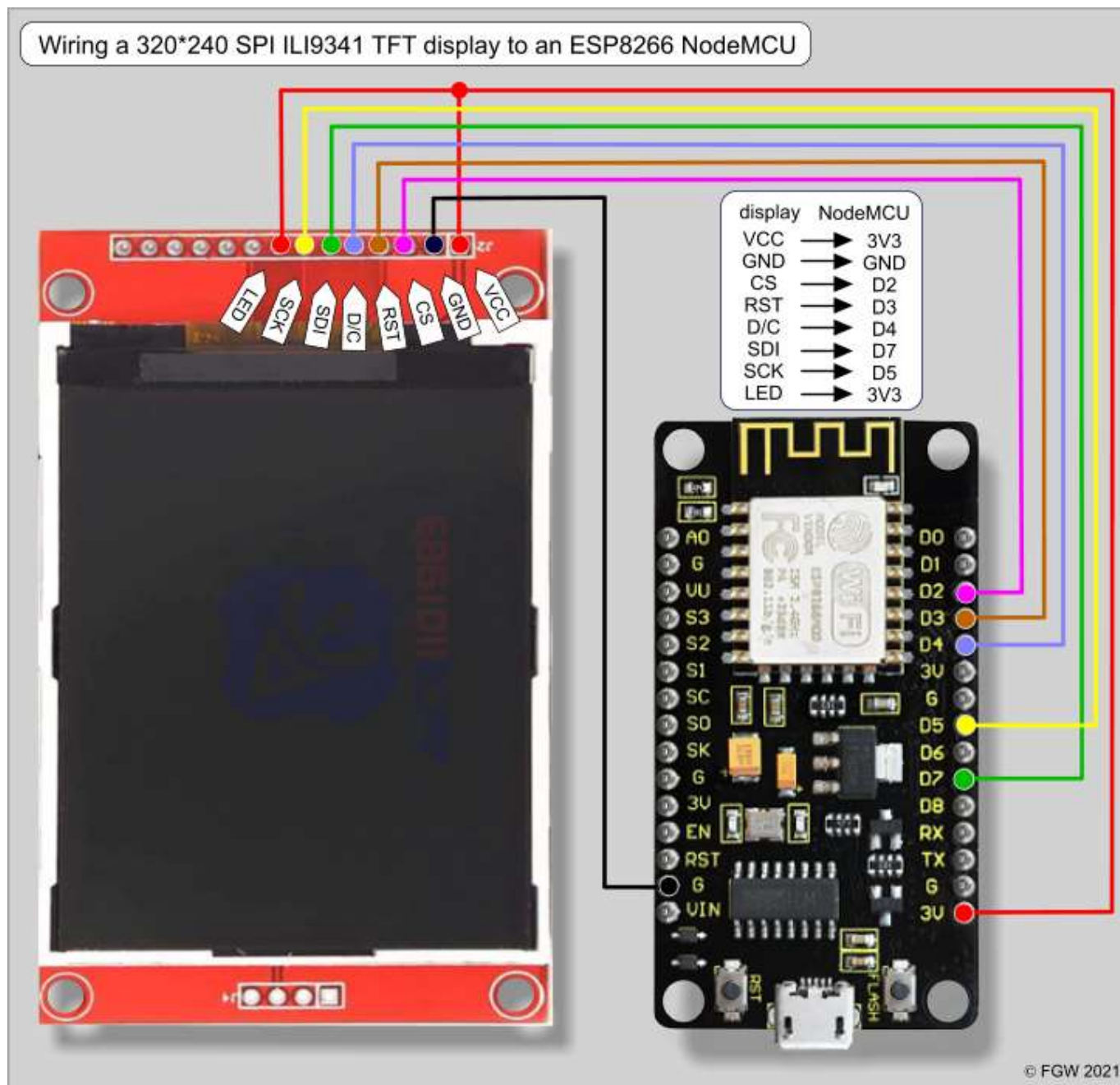


figure 1. Wiring diagram: 2.8 inch diagonal 320*240 TFT display and an ESP8266 NodeMCU board.

ILI9143 controlled TFT displays

Here we connect a 320x240 ILI9341 TFT display that has a SPI pin-out. This breakout board has 3.3V controller logic while power supply and background illumination operate on either 3.3V and 5V. ESP8266 microcontroller boards support displays with up to 320x480 pixels

The display shown in figure 1 has a touch screen. It has a single row of 14 pins (figure 1; see also figure 3). The pins supporting ‘touch’ as well as those associated with the SD card reader are not connected: we concentrate on displaying text, variables, graphics and fast sequences of memory-loaded bitmaps (‘image frames’). The ILI9341 controller is fast and, in combination with an ESP8266, performs excellently.

Libraries and pins

The sketch uses the “Adafruit_GFX.h” and “Adafruit_ILI9341.h” libraries. This requires a constructor with defined CS, RST and DC pins. The ‘Clock’ (SCK) pin of the display is connected to pin D5 and the ‘DATA’ (MOSI) pin is wired to pin D7.

The pin connectivity table for the TFT/ESP8266 is as follows (visualized in figures 1, 2 and 3).

TFT	ESP8266 NodeMCU	Wemos D1 mini
VCC	3V3	5V
GND	GND	GND
CS	D2	D2
RST	D3	D3
D/C	D4	D4
SDI (MOSI)	D7	D7
SCK (CLK)	D5	D5
BL	3V3	5V

The use of the “Adafruit_GFX.h” and “Adafruit_ILI9341.h” libraries makes it necessary to supply a ‘constructor’:

- `Adafruit_ILI9341 tft = Adafruit_ILI9341 (TFT_CS, TFT_DC, TFT_RST);`

where you can use the previously defined pins or, alternatively, fill in their exact values or their Arduino Uno equivalents:

- `Adafruit_ILI9341 tft = Adafruit_ILI9341 (D2, D4, D3);`

or the Arduino Uno equivalents for pins D2, D4 and D3:

- `Adafruit_ILI9341 tft = Adafruit_ILI9341 (4,2,0);`

These three constructors all work!

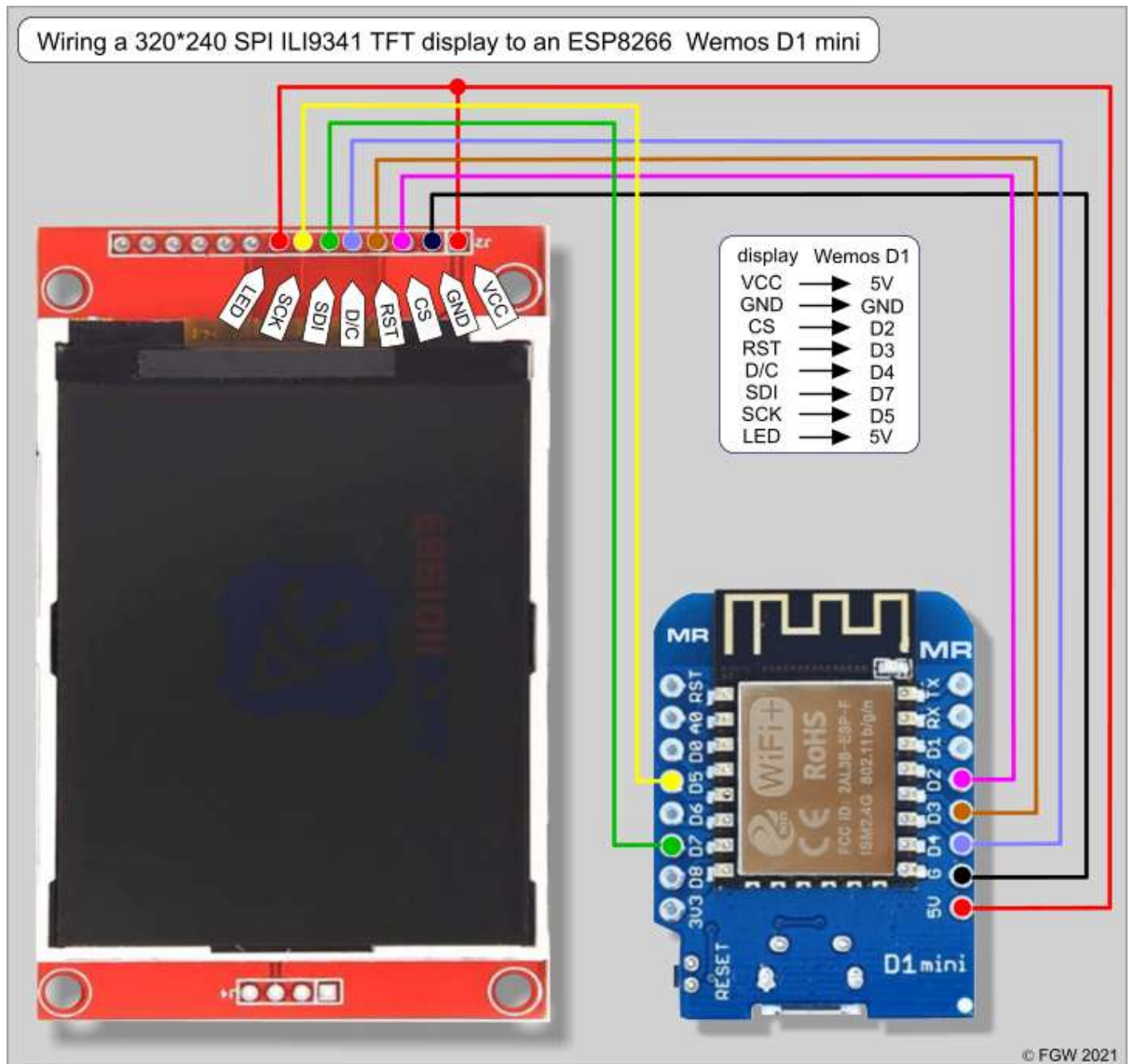


figure 2. Pin to pin wiring diagram: 2.8 inch diagonal 320*240 TFT display and a ESP8266 Wemos D1 mini microcontroller board.

At work

Figure 3 shows a Wemos D1 mini board mounted on a prototyping breadboard together with a 2.8 inch ILI9341 SPI TFT display according to the wiring diagram shown in Figure 2. The ESP8266 is running a demo adapted for the “Adafruit_GFX.h” and “Adafruit_ILI9341.h” libraries from Bodmer’s ‘Clock’ example for his TFT_eSPI library.

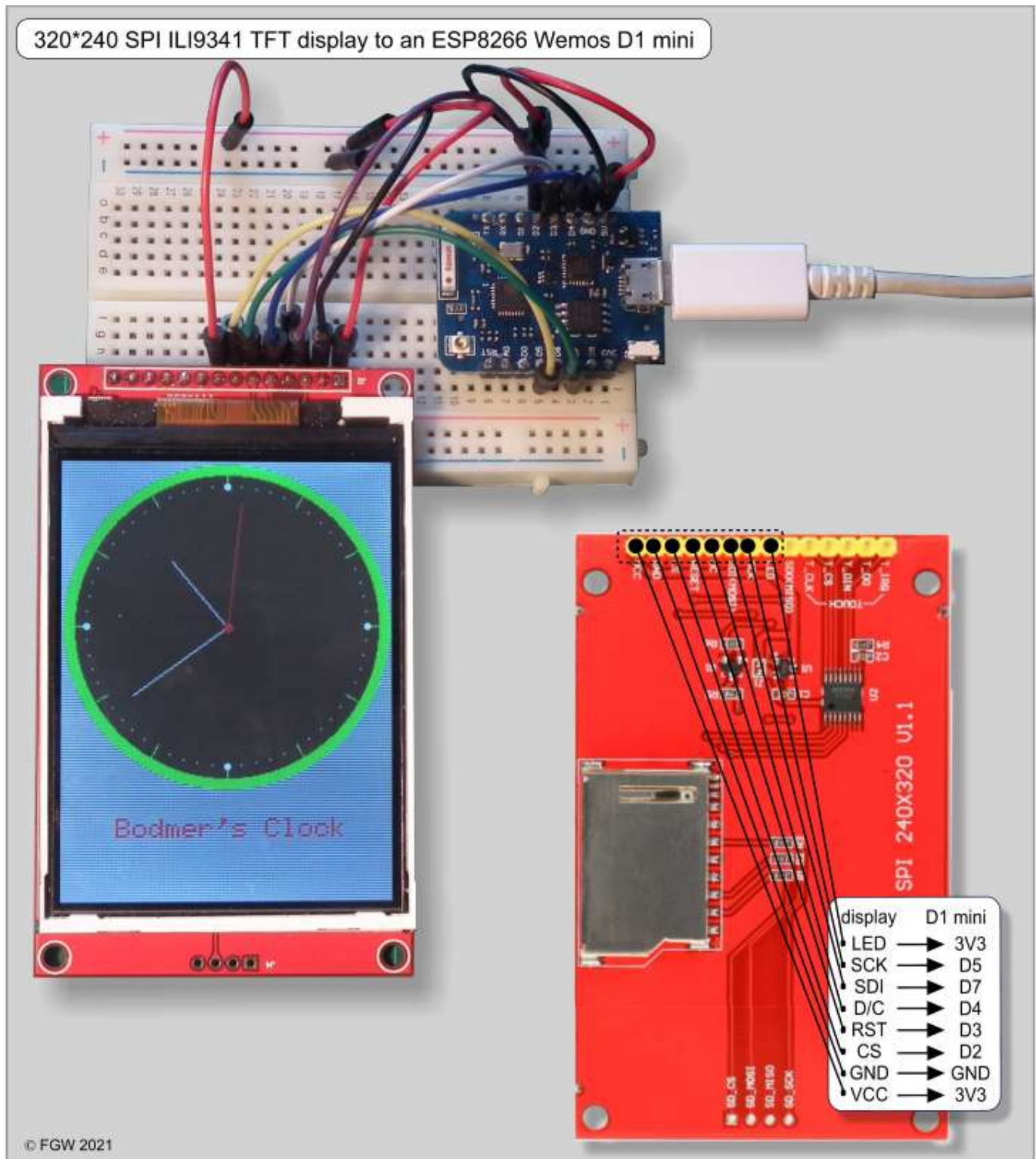


figure 3: Wemos D1 mini running Bodmer's Clock example on an ILI9341 TFT display.

Downloadable sketches

There are two sketches:

- **ESP8266_ILI9341_Adafruit_demo.ini**: the well known Adafruit repertoire of graphic tests that illustrate the performance of the display.
- **ESP8266_ILI9341_Adafruit_Bodmers_clock.ino**, a real time analog clock example adapted from Bodmer's TFT_eSPI library examples (display visible in figure 3).

These two sketches are packed in a ZIP file:

ESP8266_ILI9341_Adafruit_demo_Bodmers_clock_demo.zip

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Published by floriswouterlood

this running-out-of-control hobby started from the desire to monitor production of my solar

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May 2, 2021

Uncategorized

8 thoughts on “Wiring an ILI9341 SPI TFT display with ESP8266 based microcontroller boards: NodeMCU and Wemos D1 mini”

1. Eric

says:

May 3, 2021 at 12:59 am

Thank you very much for the help here. I made the mistake of buying a “ThingPulse weather station” It was supposed to be a weather station but I could not get it to work. The board layout the provided is all wrong and the code will not compile. Again, Thank you now I can build and code my own weather station for my home.

2. Pete

says:

January 17, 2022 at 11:55 pm

Fantastic tutorial, it actually works! Thanks! 😊

1. floriswouterlood

says:

January 29, 2022 at 10:46 am

Hi Pete,

Great, thanks for the compliment. I started this site just for the purpose of assisting folks that – just as I do – struggle with this fantastic stuff.

3. gaurav

says:

January 31, 2022 at 4:01 pm

ILI9341 keeps going into sleep mode. Any advice how to fix this? Often turns on with white screen. I followed this exact setup with wemos d1 pro with ili9341. Please help!

4. gaurav

says:

January 31, 2022 at 4:08 pm

I am getting this issue: <https://forum.arduino.cc/t/ili9341-white-screen-sleep-mode-caused-by-unstable-power/322737>

5. gaurav

says:

January 31, 2022 at 4:09 pm

Ili9341 keeps showing white screen when connected to wemos d1 pro

1. floriswouterlood

says:

January 31, 2022 at 9:17 pm

The sketch uses the TFT_eSPI.h library created by Bodmer. This library uses User_Setup.h files. You have to select the User_Setup.h that matches your microcontroller! Bodmer provides in the library a score of User_setup.h's. Check one that matches your combination of microcontroller- display and you are up & running.

6. gaurav

says:

February 1, 2022 at 6:14 am

I am having this issue: <https://forum.arduino.cc/t/ili9341-white-screen-sleep-mode-caused-by-unstable-power/322737>

Would the above solution fix my problem?

Also how do I change User_setup.h?

Thanks

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