Simple Projects

Simple Electrical and Electronics Projects

August 29, 2019 / Simple Projects

Interfacing ESP8266 NodeMCU with ILI9341 TFT display

This tutorial shows how to interface ESP8266 NodeMCU (ESP-12E) board with ILI9341 TFT display.

The ILI9341 TFT module contains a display controller with the same name: ILI9341. It's a color display that uses SPI interface

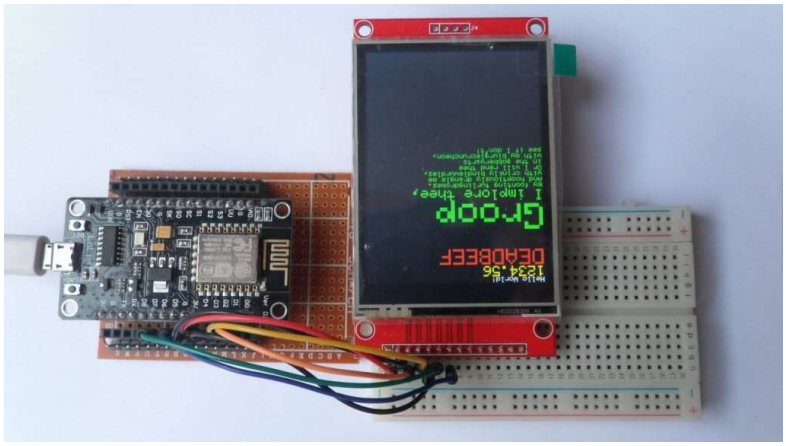
support 5V (not 5V tolerant).

TFT: Thin-Film Transistor.

SPI: Serial Peripheral Interface.

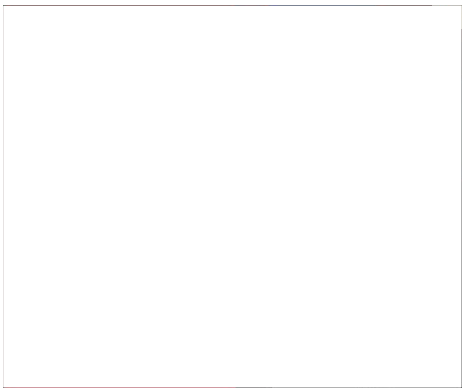
Project Hardware Required:

- NodeMCU board
- ILI9341 TFT display module (2.2", 2.4", 2.8" ...)
- Micro USB cable (for programming and powering the whole circuit)
- Breadboard
- Jumper wires



NodeMCU with ILI9341 TFT display circuit:

Project circuit schematic diagram is shown below.



CURRENT TRANSFORMER
DC MOTOR DHT11 DHT22
DS18B20 DS1307 DS1621
DS1631 DS3231 GPS
HC-SR04 ILI9341 TFT
INTERRUPT JOYSTICK
L293D L6234 LCD LED
LM35 LM335 LM4040
MCP1501 MMC/SD CARD
NOKIA 5110 PWM
REMOTE CONTROL
ROTARY ENCODER
SSD1306 OLED ST7735 TFT
ST7789 TFT STEPPER MOTOR
THYRISTOR TRIAC UART
ULN2003 USB VGA
VOLTAGE TRANSFORMER

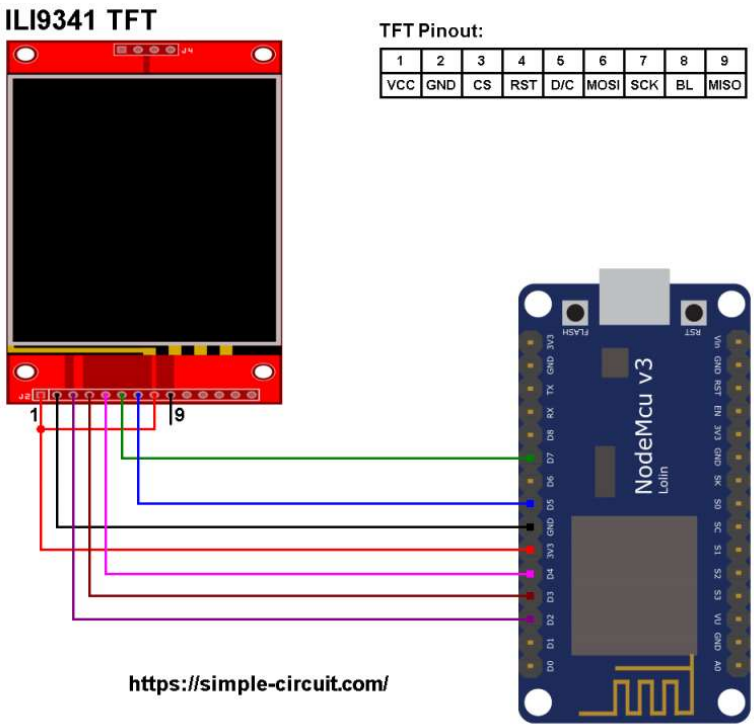
So, the display part pins are numbered from 1 to 9 (from left to right): VCC (5V), GND (ground), CS (chip select), RST (reset), DC (or D/C: data/command), MOSI (or SDI), SCK (clock), BL (back light LED) and MISO (or SDO).

MOSI: master-out slave-in.

SDI: serial data in.

MISO: master-in slave-out.

SDO: serial data out.



The ILI9341 TFT display is connected to the NodeMCU board as follows:

CS pin is connected to D2 (ESP8266EX GPIO4),

RST pin is connected to D3 (ESP8266EX GPIO0),

D/C pin is connected to D4 (ESP8266EX GPIO2),

MOSI pin is connected to D7 (ESP8266EX GPIO13),

SCK pin is connected to D5 (ESP8266EX GPIO14),

VCC and BL are connected to pin 3V3,

GND is connected to pin GND of the NodeMCU board.

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Interfacing NodeMCU with ILI9341 TFT display code:

The Arduino code below requires two libraries from **Adafruit Industries**:

The first library is a driver for the ILI9341 TFT display which can be installed from Arduino IDE library manager (Sketch —> Include Library —> Manage Libraries …, in the search box write "ili9341" and choose the one from Adafruit).

The second library is Adafruit graphics library which can be installed also from Arduino IDE library manager.

The previous two libraries can also be installed manually:
Download both libraries from the following two links:
Adafruit ILI9341 TFT library —> **direct link**
Adafruit graphics library —> **direct link**

Go to Arduino IDE —> Sketch —> Include Library —> Add .ZIP Library … and browse for the .zip file (previously downloaded).
The same thing for the second file.

Hints:

The previous 2 libraries are included in the main code as shown below:

```
1 #include <Adafruit_GFX.h>       // include Adafruit graphi
2 #include <Adafruit_ILI9341.h>   // include Adafruit ILI934
```

The ILI9341 TFT display is connected to NodeMCU hardware SPI module pins (clock and data), the other pins which are: CS (chip select), RST (reset) and DC (data/command) are defined as shown below:

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```
7 Adafruit_ILI9341 tft = Adafruit_ILI9341(TFT_CS, TFT_DC, TF
```

Full Arduino code:

The following Arduino code is from Adafruit ILI9341 library (graphicstest.ino) with some modifications in order to work with the above circuit diagram.

```
328
329   tft.fillScreen(ILI9341_BLACK);
330   w     = min(tft.width(), tft.height());
331   start = micros();
332   for(i=0; i<w; i+=6) {
333     i2 = i / 2;
334     tft.drawRoundRect(cx-i2, cy-i2, i, i, i/8, tft.color
335   }
336
337   return micros() - start;
338 }
339
340 unsigned long testFilledRoundRects() {
341   unsigned long start;
342   int           i, i2,
343                 cx = tft.width()  / 2 - 1,
344                 cy = tft.height() / 2 - 1;
345
346   tft.fillScreen(ILI9341_BLACK);
347   start = micros();
348   for(i=min(tft.width(), tft.height()); i>20; i-=6) {
349     i2 = i / 2;
350     tft.fillRoundRect(cx-i2, cy-i2, i, i, i/8, tft.color
351   }
352
353   return micros() - start;
354 }
```

The following video shows my simple hardware circuit test:

Measurement using PIC18F46K22 Microcontroller

ILI9341 TFT

« ESP8266 NodeMCU with DS3231 RTC and Nokia 5110 LCD

NodeMCU with Nokia 5110 LCD and LM35 Temperature Sensor »

12 comments

Michele says:

September 8, 2019 at 2:35 pm

Thank you, very useful info!

Reply

Erwin says:

January 6, 2020 at 11:25 pm

LCD is only white, nothing happens

Reply

David Latter says:

March 13, 2022 at 7:03 pm

#define TFT_CS D2 // Chip select control pin
#define TFT_DC D4 // Data Command control pin
#define TFT_RST D3 // Reset pin (could connect to RST pin)

Reply

Pete Mi0VAX says:
March 24, 2020 at 2:37 pm

For some reason the pins on my ESP8266 12-E NodeMCU Kit weren't defined as D2 D3 and D4 ; if you get an error on compile try replacing the define lines as such:

#define TFT_CS 4 // TFT CS pin is connected to NodeMCU pin D2 = GPIO 4
#define TFT_RST 0 // TFT RST pin is connected to NodeMCU pin D3 = GPIO 0
#define TFT_DC 2 // TFT DC pin is connected to NodeMCU pin D4 = GPIO 2

Reply

mbob says:
August 6, 2020 at 12:12 am

Thank you! This made it work for me. (Actually I'm using a different display and even a different display driver. I'm also using the LoLin NodeMCU module.) Regardless of all that, it's working thanks to you.

Reply

r4nd0m says:
May 1, 2020 at 7:46 pm

White screen only 😕

August 29, 2020 at 1:43 pm

If in case, you still have the issue
Like Pete mentioned,
#define TFT_CS 4 // TFT CS pin is connected to NodeMCU pin D2 = GPIO 4
#define TFT_RST 0 // TFT RST pin is connected to NodeMCU pin D3 = GPIO 0
#define TFT_DC 2 // TFT DC pin is connected to NodeMCU pin D4 = GPIO 2

this should do the job

Reply

David Latter says:
March 13, 2022 at 7:04 pm

Have you tried this, it worked for me,
#define TFT_MOSI D7
#define TFT_SCLK D5
#define TFT_CS D2 // Chip select control pin
#define TFT_DC D4 // Data Command control pin
#define TFT_RST D3 // Reset pin (could connect to RST pin)

Reply

Soren Thorsen says:
August 24, 2020 at 6:37 pm

Thank you. Works with no problem. Safed me a lot of time 🙂

Reply

Erdie says:
March 13, 2021 at 1:45 pm

Im am currently testing the code line by line and inspecting the output.
thanks
Erdie

Reply

David Latter says:
March 13, 2022 at 7:25 pm

Did you fix this? How?

Reply

K says:
March 31, 2022 at 9:11 pm

I'm getting a white screen. I'm using an Arduino Nano. Any ideas how to fix this? I have tried changing the code to the suggestions above

Reply

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