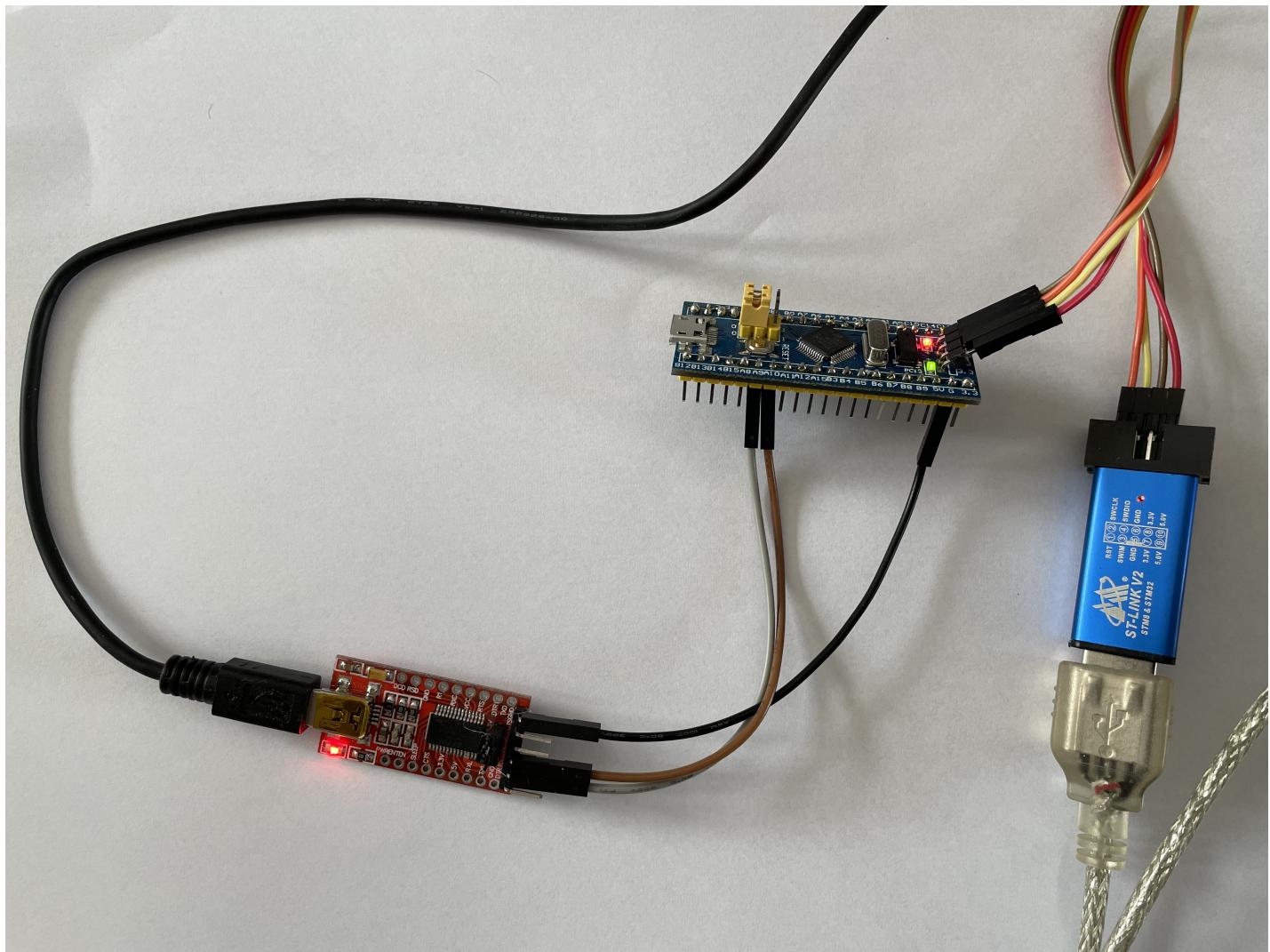


# My "Blue Pill" Projects Test Setup

## Description and Evaluation

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## 1. Project goals

The project is created to test the HW / SW setup for projects based on the so-called "Blue Pill STM32 board".

The SW setup is based on VSCode with PlatformIO extension and STM32 board operated with the Arduino environment.

The HW setup allows to program the board with an ST-Link V2 adapter and also serial communications with a (Linux) PC via a USB/Serial adapter.

In a second HW setup the control of a LCD via the I2C interface is tested.

The "Blue Pill" STM32 board has a STM32F103C8T6 processor with 20KB RAM and 64KB EEPROM running at 72MHz. See also "Blue Pill F103C8" in PlatformIO.

## 2. Project 1 Hardware Setup

The project setup for the HW part is shown in figure 1.

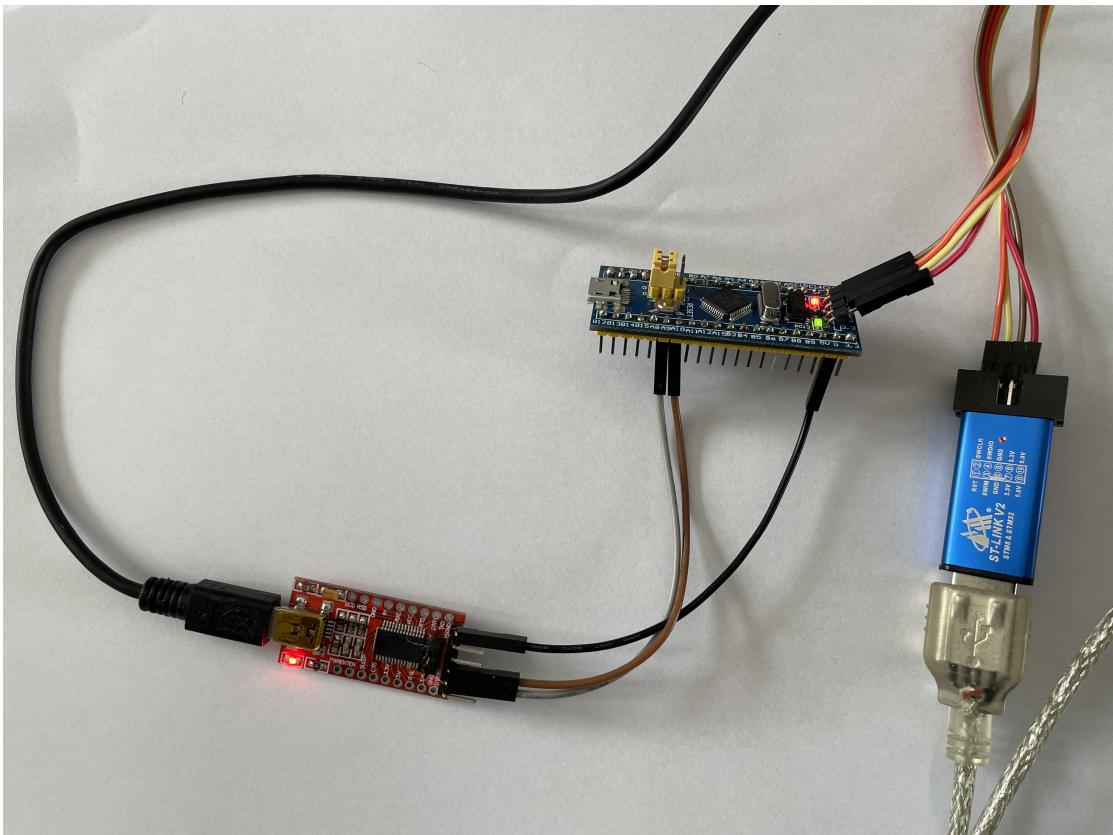


Figure 1: Hardware setup

Note: The jumper positions of the two yellow jumpers on the (blue colored) "Blue Pill"

board.

Programming is done with the (metallic blue) ST-Link V2 module. There are four pins connected with the Blue Pill board. The connections are done as follows (Table 1):

Blue Pill	Cable color	ST-Link V2
GND	Brown	GND (Pin 6)
3.3V	Red	3.3V (Pin 8)
CLK	Orange	SWCLK (Pin 2)
DIO	Yellow	SWDIO (Pin 4)

Table 1: Connection Blue Pill to ST-Link V2

A USART serial interfacing between the Blue Pill board and the PC / IDE is realized with the (red) USB/Serial adapter board. Note the jumper position on the board is such that the 3.3V output voltage is provided (but not connected in this setup) as the "Blue Pill" processor is operated with 3.3V. In the software the Arduino Serial1 interface port is used. The connection between the USB/Serial adapter and the Blue Pill board is done as follows (Table 2):

Blue Pill	Cable color	USB/Serial
GND	Black	GND
TX1 (Pin PA9)	Gray	RX
RX1 (Pin PA10)	Brown	TX

Table 2: Connection Blue Pill to USB/Serial adapter (Setup 1)

The USB/Serial adapter appears under /dev/ttyUSB0 in the Linux operating system. This port has to be selected in the IDE, when the Serial Monitor is activated.

### 3. Project 1 Software Setup (first sketch)

The project setup for the IDE part with the first Arduino sketch is shown in figure 2. The picture shows the PlatformIO IDE within the VSCode editor and the main Arduino sketch which implements the simple blinking of the on-board LED and the output of data via the Serial1 port.

The picture also shows the output of dots (see the sketch code) via the USB/Serial adapter and the Serial1 Arduino interface to the Arduino Serial Monitor displayed in the lower part of the IDE.

The development cycle is controlled by pressing the relevant buttons in the blue bottom line of the IDE (see the call-outs of the buttons when moving over them with the mouse pointer).

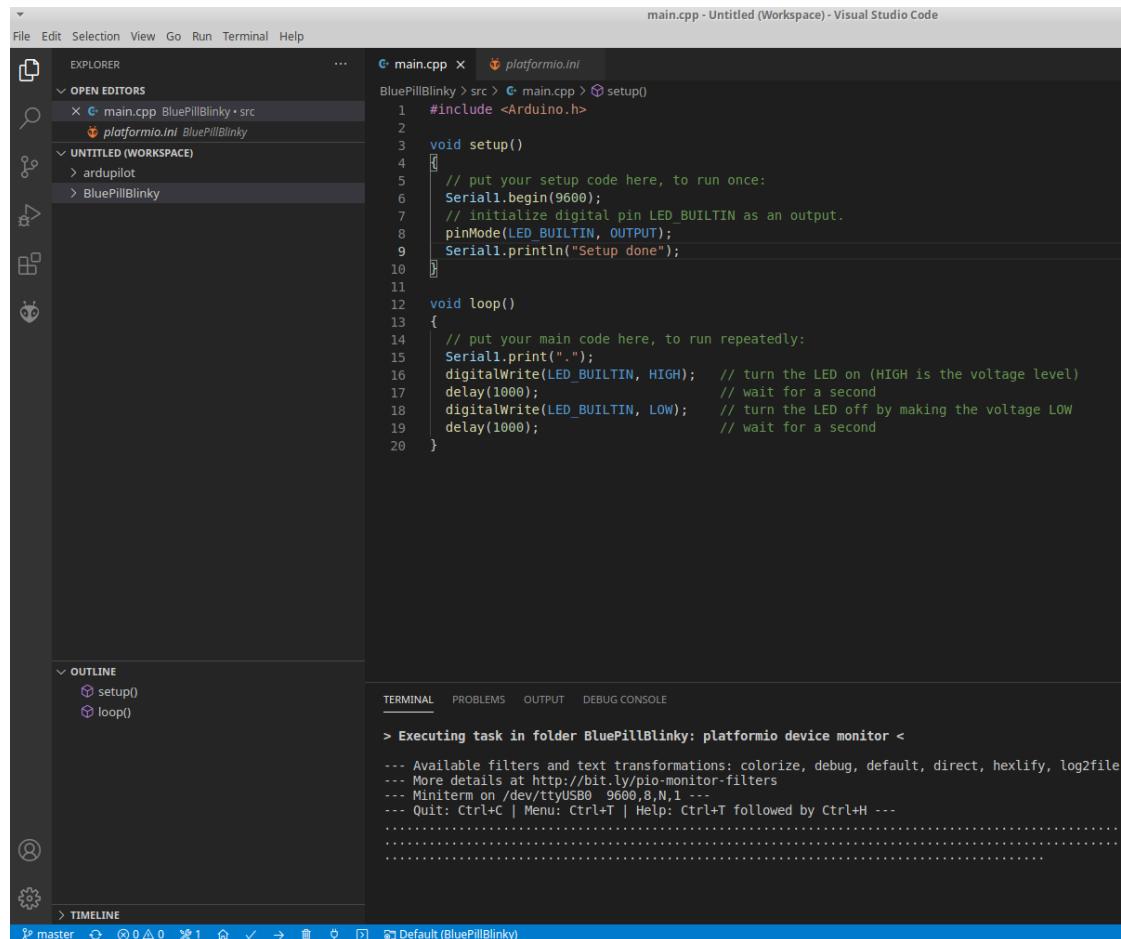


Figure 2: VSCode/PlatformIO (Arduino environment) IDE

**Important Note:** If you have multiple projects within the Platform IDE, do not forget to select the right project in the bottom line (in the figure here: "Default (BluePill-Blinky)") before compiling.

Compilation is done by pressing the "Check" button.

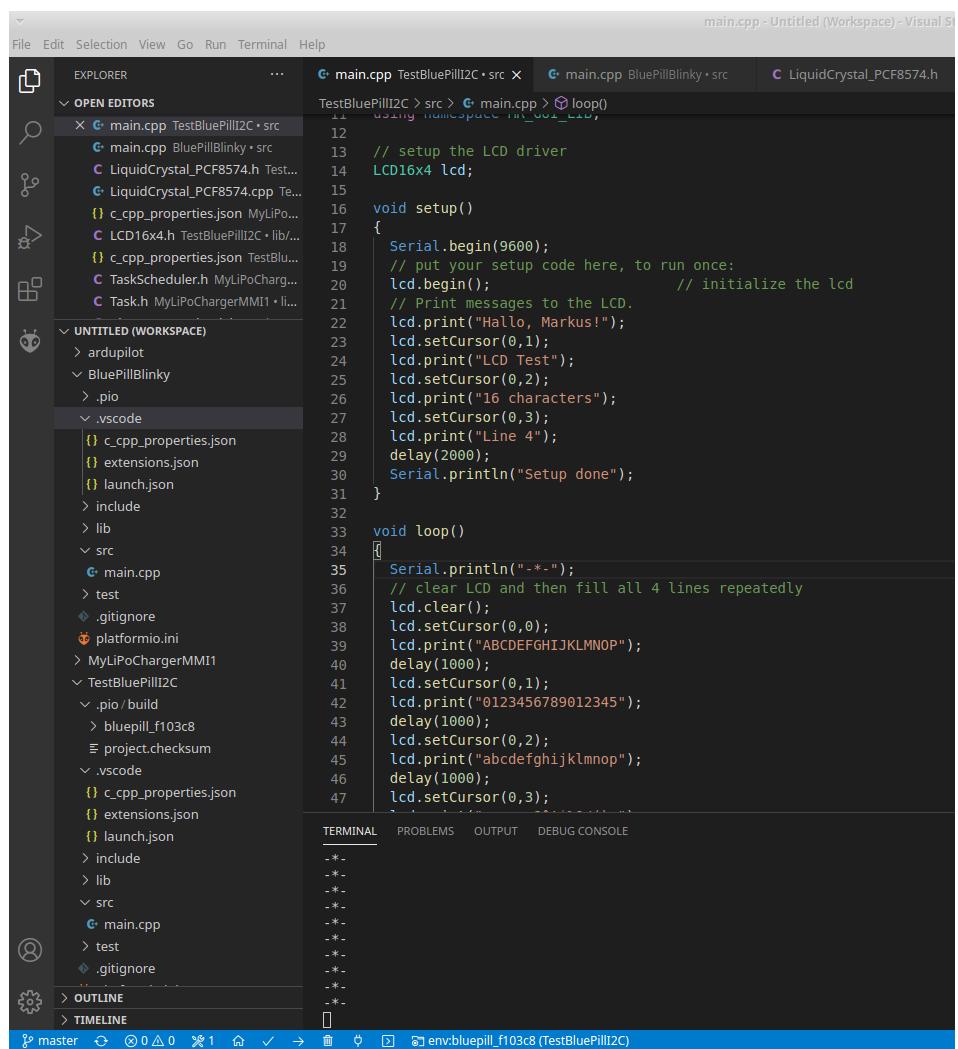
Program download is done by pressing the "Right Arrow" button.

Activation of the Serial Arduino Monitor is done with the "Plug" button.

To switch back to the PlatofromIO home screen is done with the "Home" button.

### 3.1. Project 2: LCD control via I2C (second sketch)

The IDE with the second Arduino sketch is shown in figure 3. The sketch controls a



The screenshot shows the VSCode interface with the PlatformIO extension. The Explorer sidebar on the left lists several projects and files, including 'TestBluePillI2C' and 'BluePillBlinky'. The main editor area displays the 'main.cpp' file for the 'TestBluePillI2C' project. The code in the editor is as follows:

```

main.cpp - Untitled (Workspace) - Visual Studio Code
File Edit Selection View Go Run Terminal Help
main.cpp TestBluePillI2C + src × main.cpp BluePillBlinky + src × LiquidCrystal_PCF8574.h
TestBluePillI2C > src > main.cpp > loop()
11 // using namespace std;
12
13 // setup the LCD driver
14 LCD16x4 lcd;
15
16 void setup()
17 {
18     Serial.begin(9600);
19     // put your setup code here, to run once:
20     lcd.begin(); // initialize the lcd
21     // Print messages to the LCD.
22     lcd.print("Hallo, Markus!");
23     lcd.setCursor(0,1);
24     lcd.print("LCD Test");
25     lcd.setCursor(0,2);
26     lcd.print("16 characters");
27     lcd.setCursor(0,3);
28     lcd.print("Line 4");
29     delay(2000);
30     Serial.println("Setup done");
31 }
32
33 void loop()
34 {
35     Serial.println("-*-");
36     // clear LCD and then fill all 4 lines repeatedly
37     lcd.clear();
38     lcd.setCursor(0,0);
39     lcd.print("ABCDEFGHIJKLMNP");
40     delay(1000);
41     lcd.setCursor(0,1);
42     lcd.print("0123456789012345");
43     delay(1000);
44     lcd.setCursor(0,2);
45     lcd.print("abcdefghijklmnop");
46     delay(1000);
47     lcd.setCursor(0,3);

```

The terminal at the bottom shows the output of the serial port:

```

TERMINAL PROBLEMS OUTPUT DEBUG CONSOLE
-*-
-*-
-*-
-*-
-*-
-*-
-*-
-*-
-*-

```

Figure 3: VSCode/PlatformIO IDE (second sketch)

16x4 character LCD connected to the "Blue Pill" board via the I2C interface. In this sketch the Serial Arduino interface is used for test messages to the Serial Monitor of the IDE. It is connected to pins PA9 (TX1) and PA10 (RX1) and via the USB/Serial adapter to the PC. The IDE shows in the lower part the Serial Monitor and the messages received from the "Blue Pill" board.

The HW setup for this test is shown in figure 4. The connection from the ST-Link V2

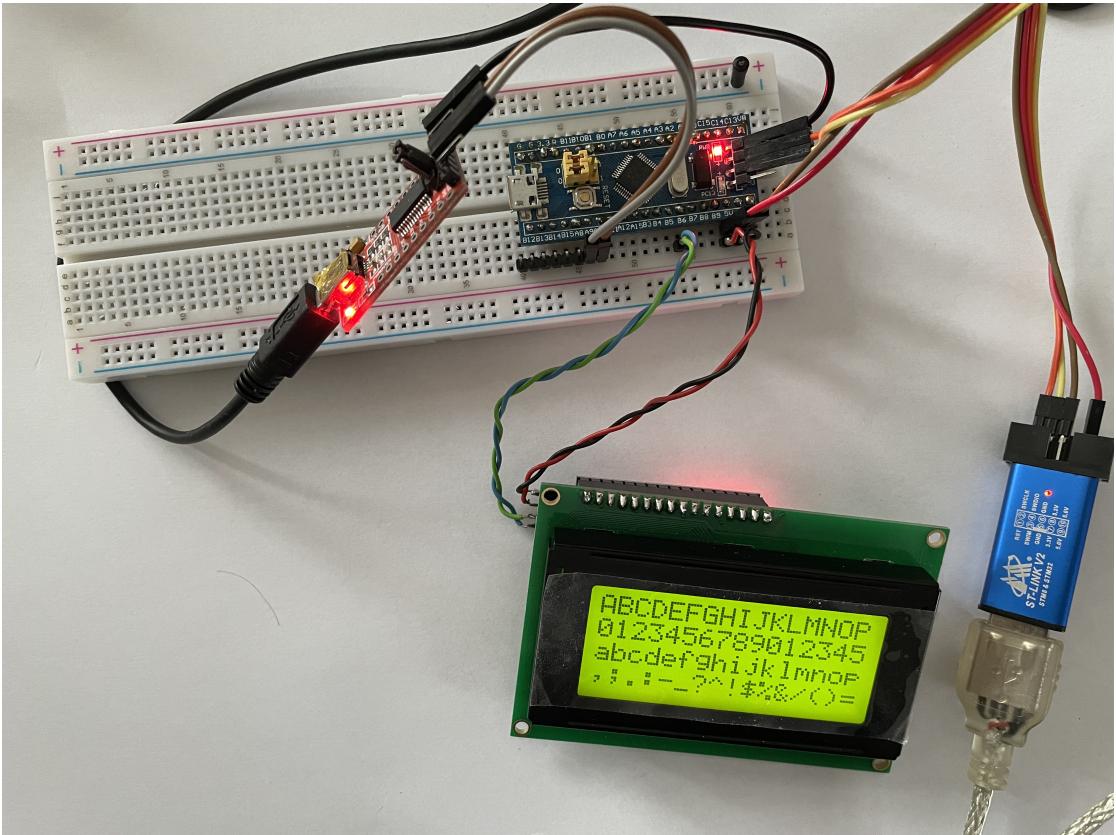


Figure 4: VSCode/PlatformIO IDE (second sketch)

adapter to the "Blue Pill" board is now using the 5V pins according to the following table (Table 3). The 3.3V for the processor is now provided by the on-board fixed power regulator. The 5V power supply is also required for the LCD. The connection between the "Blue Pill" board and the I2C adapter of the LCD is done here as follows (Table 4): The connection between the "Blue Pill" board and the USB/Serial adapter is equal to setup 1 (Table 2).

<b>Blue Pill</b>	<b>Cable color</b>	<b>ST-Link V2</b>
GND	Brown	GND (Pin 6)
5V	Red	5V (Pin 10)
CLK	Orange	SWCLK (Pin 2)
DIO	Yellow	SWDIO (Pin 4)

Table 3: Connection "Blue Pill" to USB/Serial adapter (Setup 2)

<b>Blue Pill</b>	<b>Cable color</b>	<b>I2C LCD</b>
GND	Black	GND
5V	Red	5V
SCL1 (Pin PB6)	Blue	SCL
SDA1 (Pin PB7)	Green	SDA

Table 4: Connection "Blue Pill" to I2C adapter of the LCD (Setup 2)

## A. Appendix A

### A.1. Pin-out of the "Blue Pill" board

Figure 5 shows the pin-out of the "Blue Pill" board.

### A.2. Helpful Links

PlatformIO IDE

"Blue Pill F103C8" in PlatformIO

Installing PlatformIO and creating a sample program for STM32 Blue Pill  
Arduino Getting Started and Tutorials

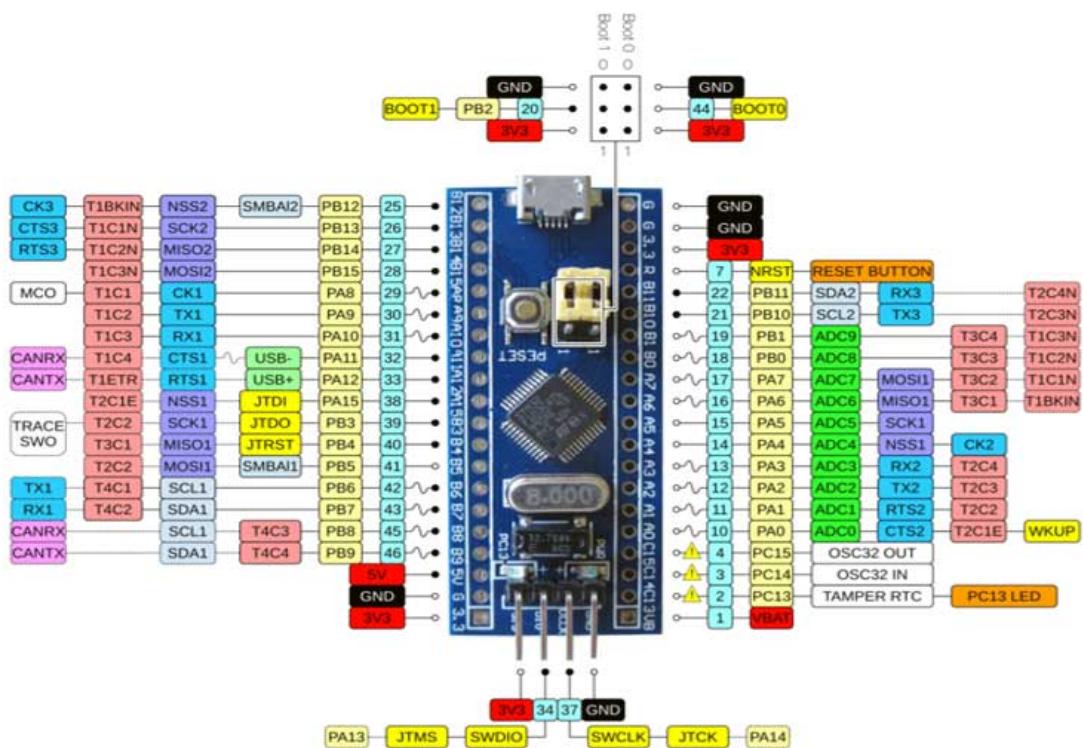


Figure 5: Pin-out of the "Blue Pill" board