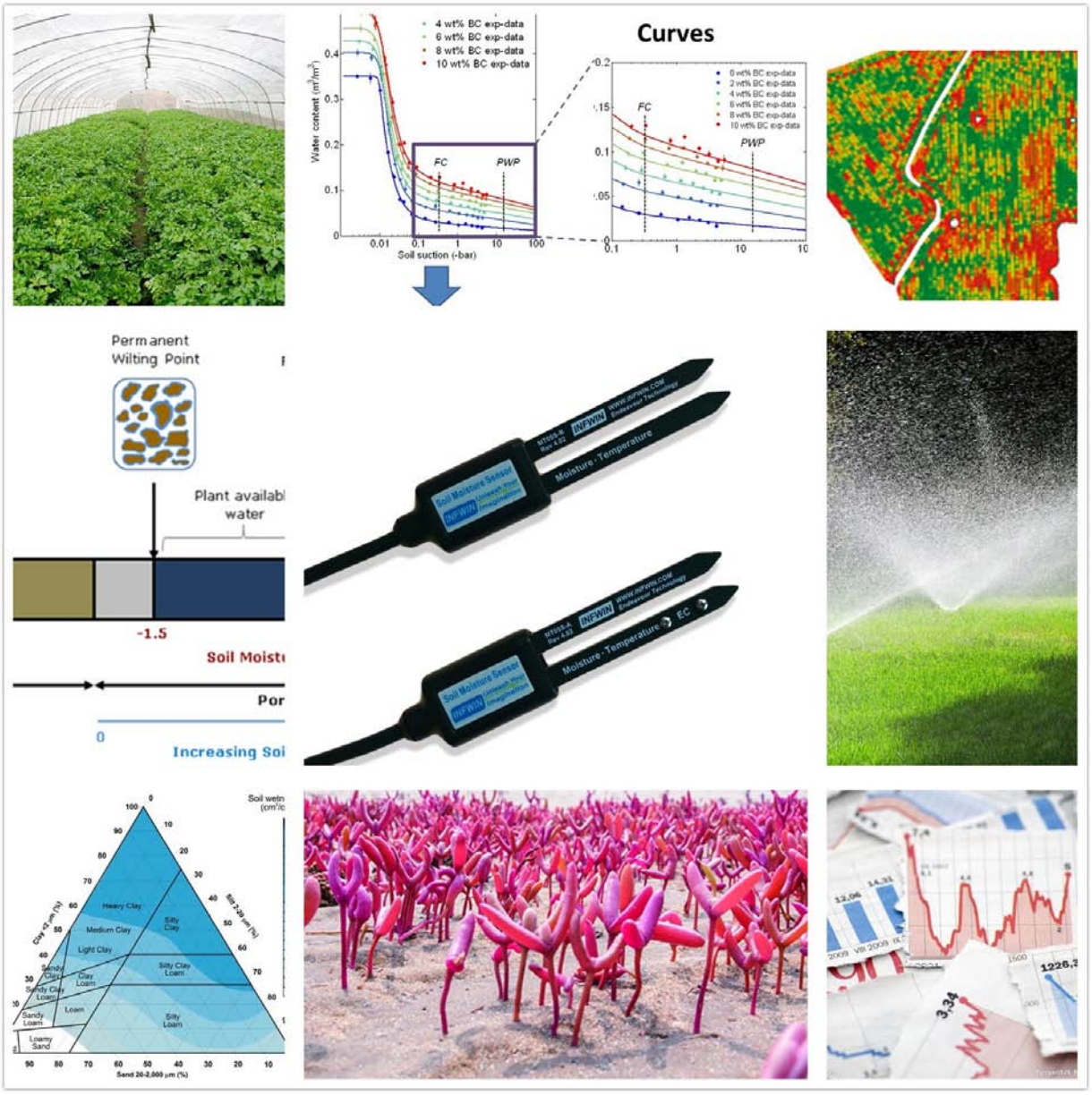
Application Note
MT05S 1-Wire Soil Moisture, EC, Temperature Sensor Demo and Testing



Index

1 Customer Support

Thank you very much for your order. Our success comes from the continuous faith in the excellence of our products and services, something we are committed to and would never sacrifice. Our customer service, especially in the after sales phase, guarantees the satisfaction of our clients. In line with this strategy, we appreciate that you can share with us your feedback at any time for our improvement, be it positive or negative, so if we can serve you better in anyway, please do inform us.

Website

http://www.infwin.com

E-Mail

infwin@163.com

Telephone

+86-411-66831953, +86-4000-511-521

Fax

+86-411-82388125

2 MT05S Introduction

2.1 Key Features

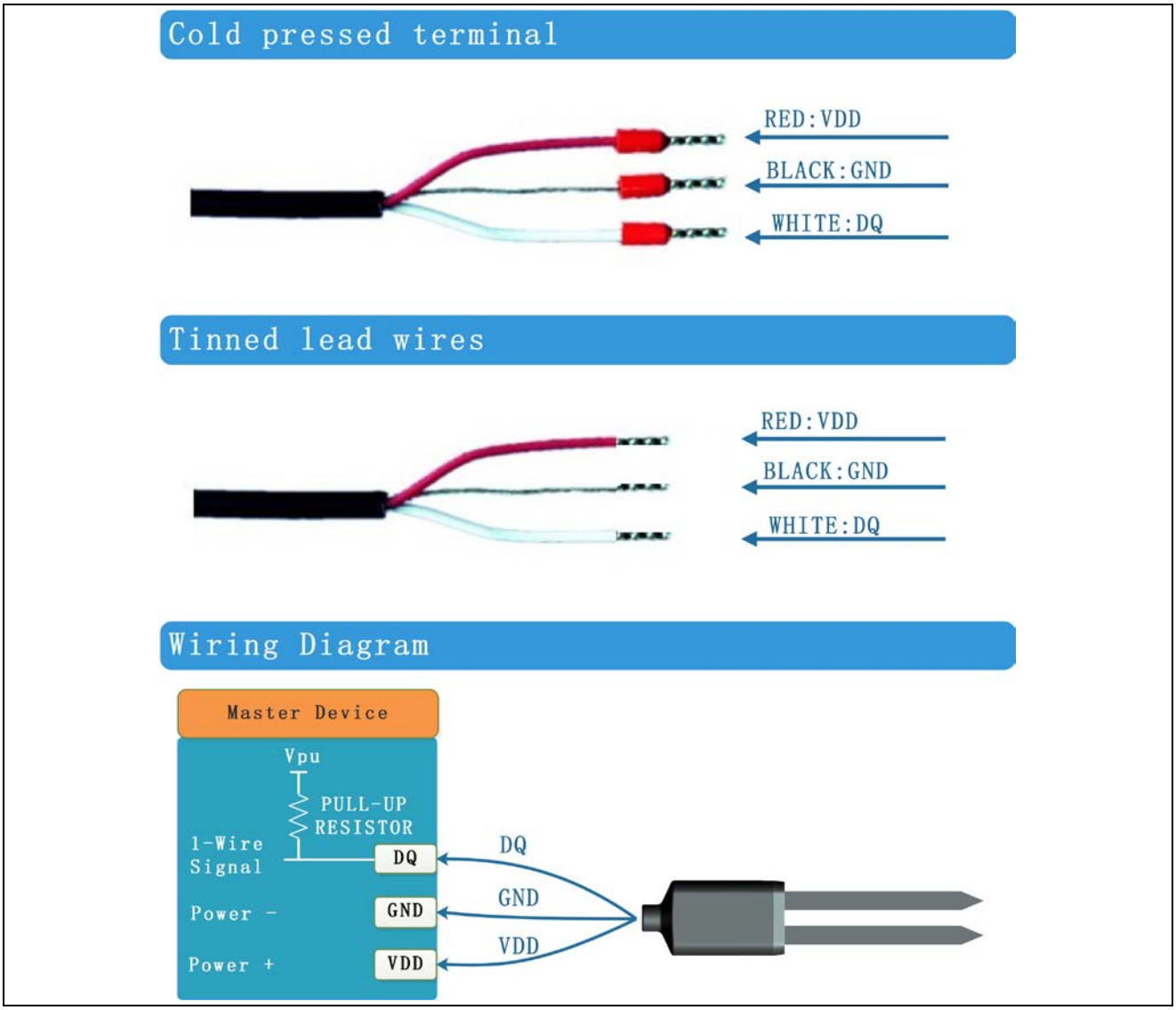
MT05S is 1-Wire soil moisture sensor, measuring soil moisture content, temperature and EC(Conductivity). It sealed with resin packaged plastic body with sensing rods which can be insert directly into the soil with long time stability. Sensor with relatively small size and can be used for pot culture and Seedling tray. The sensor is applicable for science research, irrigation, greenhouse, smart agriculture etc.

- MT05S-A for Soil Moisture, Temperature, EC measurement.
- MT05S-B for Soil Moisture, Temperature measurement.
- Power Supply 2.7-12V DC, Low Quiescent current Max. 30uA.
- Water proof to IP68 ratings and can be directly buried into soil.
- 1-Wire bus interface, Operation compatible with DS18B20.
- Connect to MCU, Arduino, Raspberry PI etc by ONE I/O pin with a PULL-UP resistor.
- Software library for DS18B20 can be reused to read/write the sensor.
- Small Dimension 20*11*95mm with high accuracy and excellent stability.
- Operating temperature -40~85°C.

2.2 Ordering Infomation

Parameters	**Code**	**Comments**
Code 1: Product Series	MT05S	MT05S series sensor with 1-Wire Interface
Code 2: Measuring Parameters	A B	Soil Moisture & Temperature & EC Soil Moisture & Temperature
Code 3: Power Supply	B	2.7-12V DC
Code 4: Connector	B C	Cold pressed terminal pre-tinning wire
Code 5: Cable Length	005	5 meters
Ordering Code Example: MT05S sensor with 1-Wire Interface, Measuring Parameters Soil Moisture & Temperature & EC, 2.7-12VDC Power supply, Cold pressed terminal, Cable Length 5 meters. Ordering Code is : MT05S-ABB005		

2.3 Wiring



3 Testing case and Preparation

3.1 Testing Case

The testings are based on following platform and boards. It can be easily migrated to others.

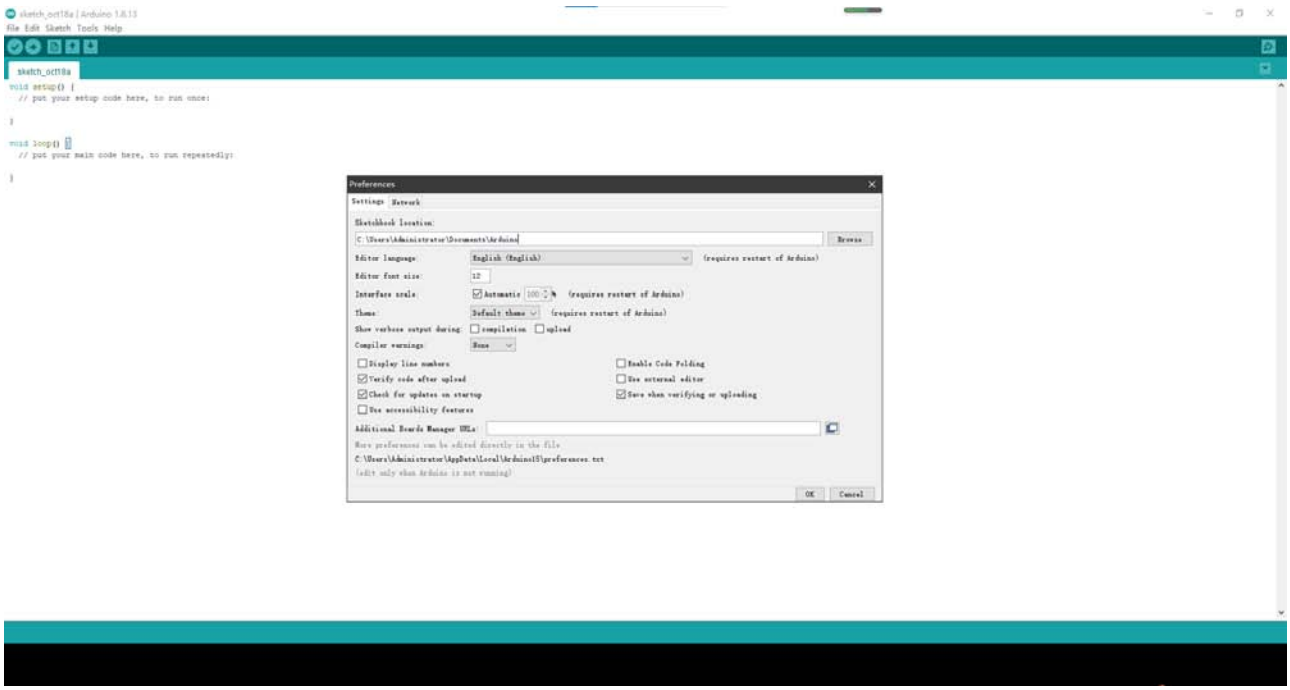
Platform	Boards
Arduino IDE	ESP32 DOIT DevKit V1, NodeMCU 32S
Visual Studio Code	ESP32 DOIT DevKit V1, NodeMCU 32S
Raspberry PI	Raspberry PI 3 Model B

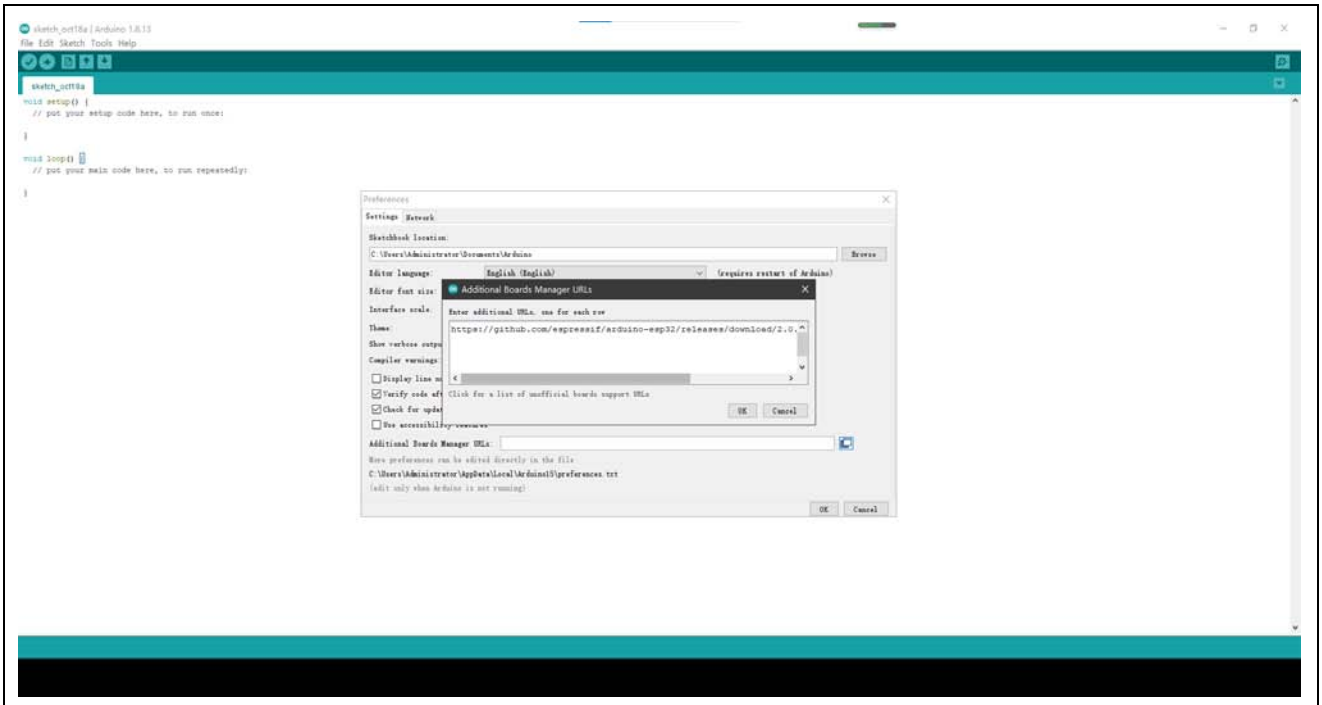
3.2 Arduino IDE ESP32 Support Package

Please Install Arduino IDE first, and follow steps below to install support package or libraries.

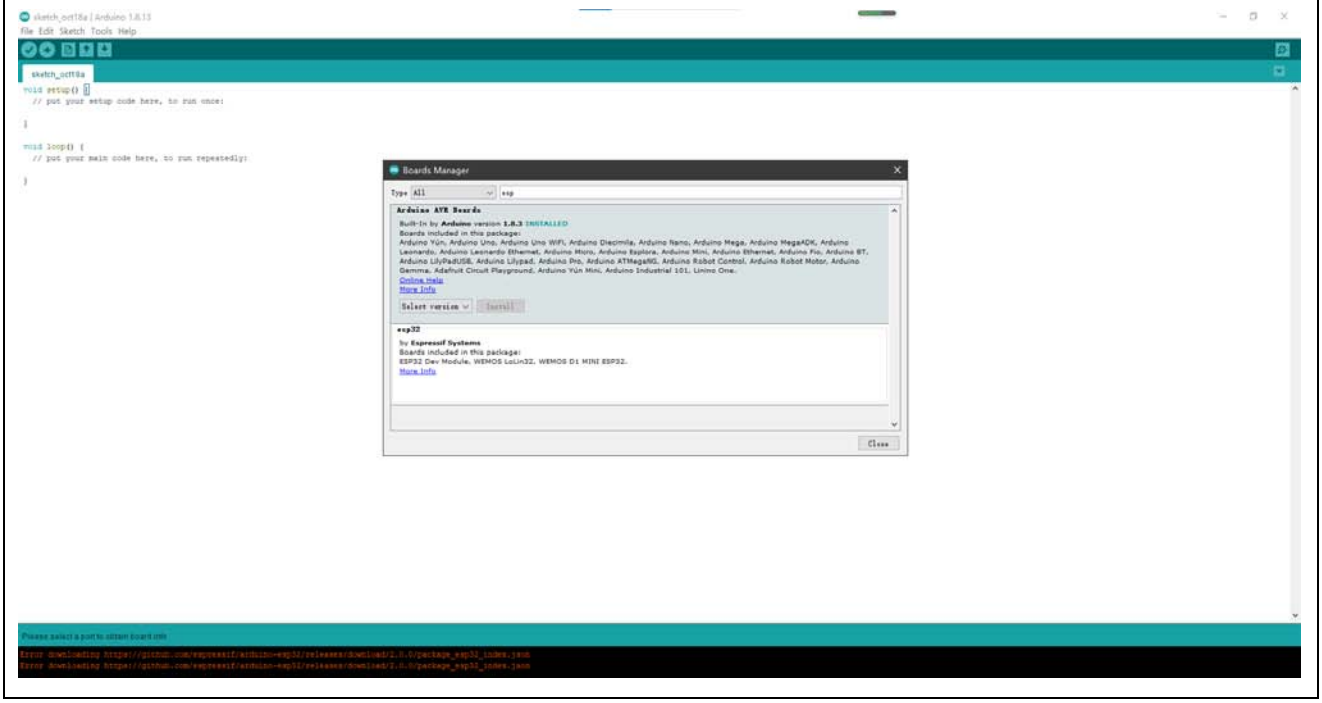
● Startup Arduino IDE

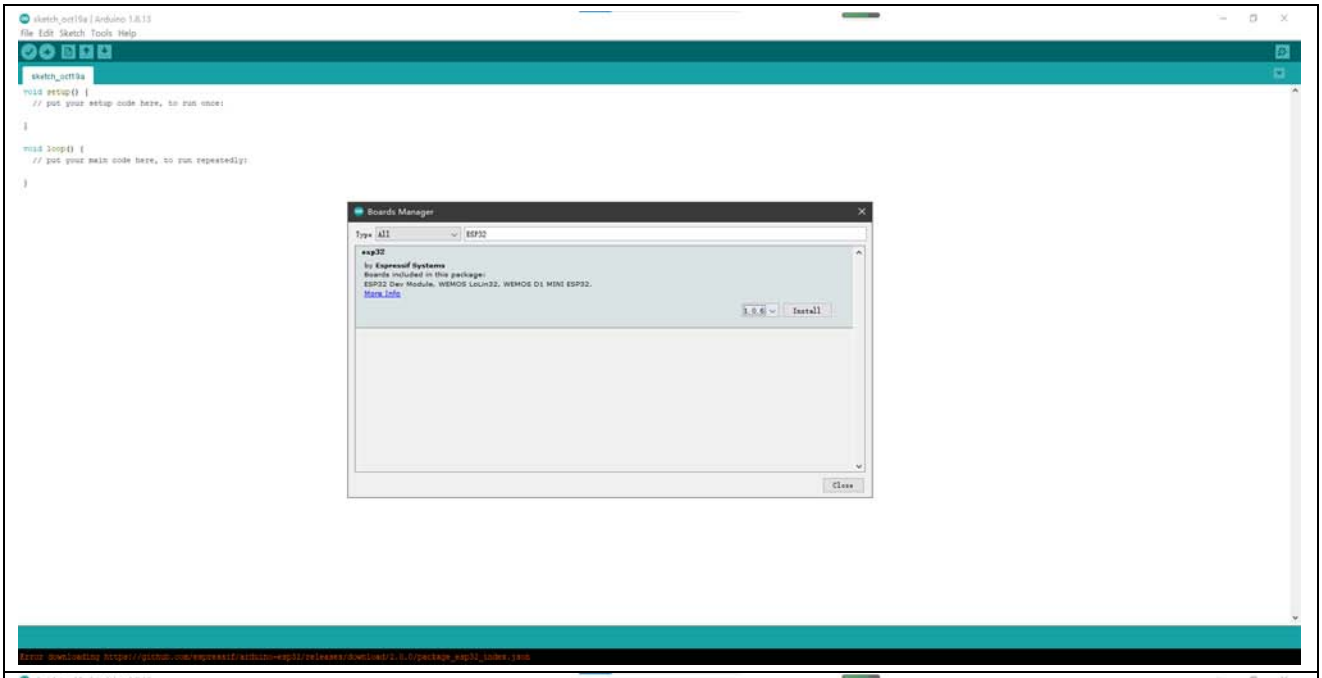
● Install “Additional Boards Manager URLs” in Menu>File>Preference, input
https://github.com/espressif/arduino-esp32/releases/download/2.0.0/package_esp32_index.json

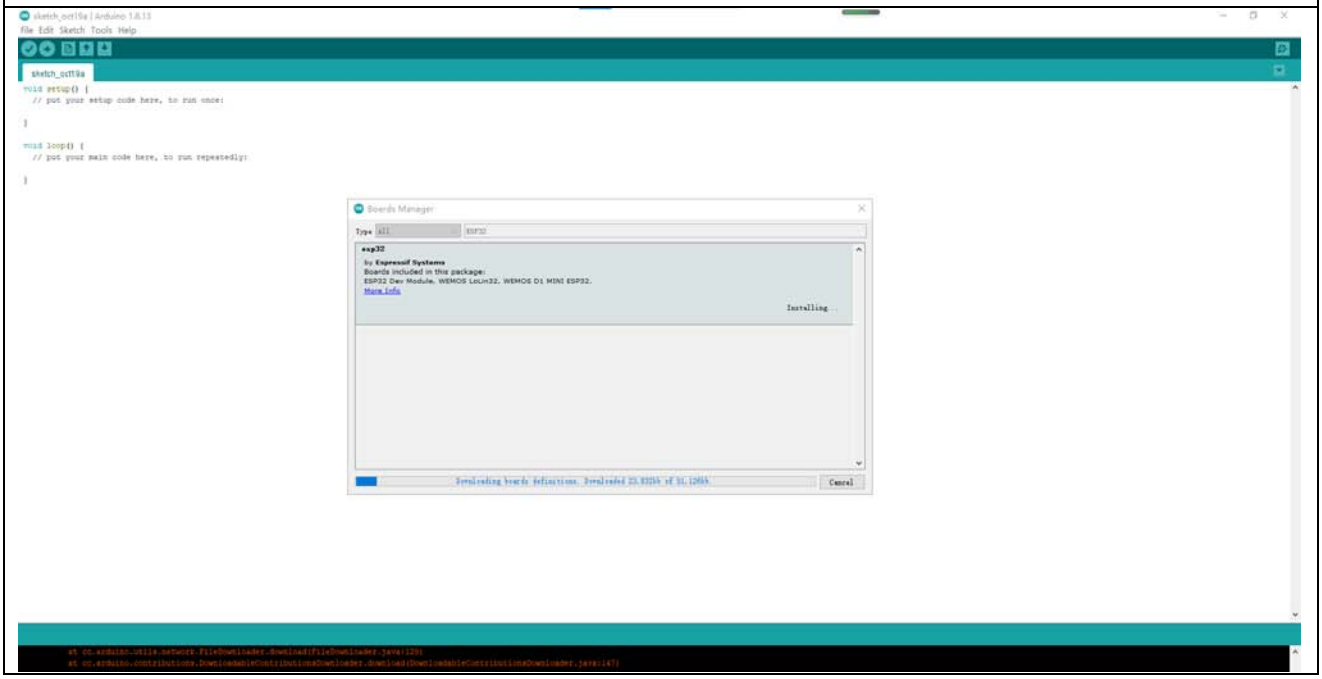


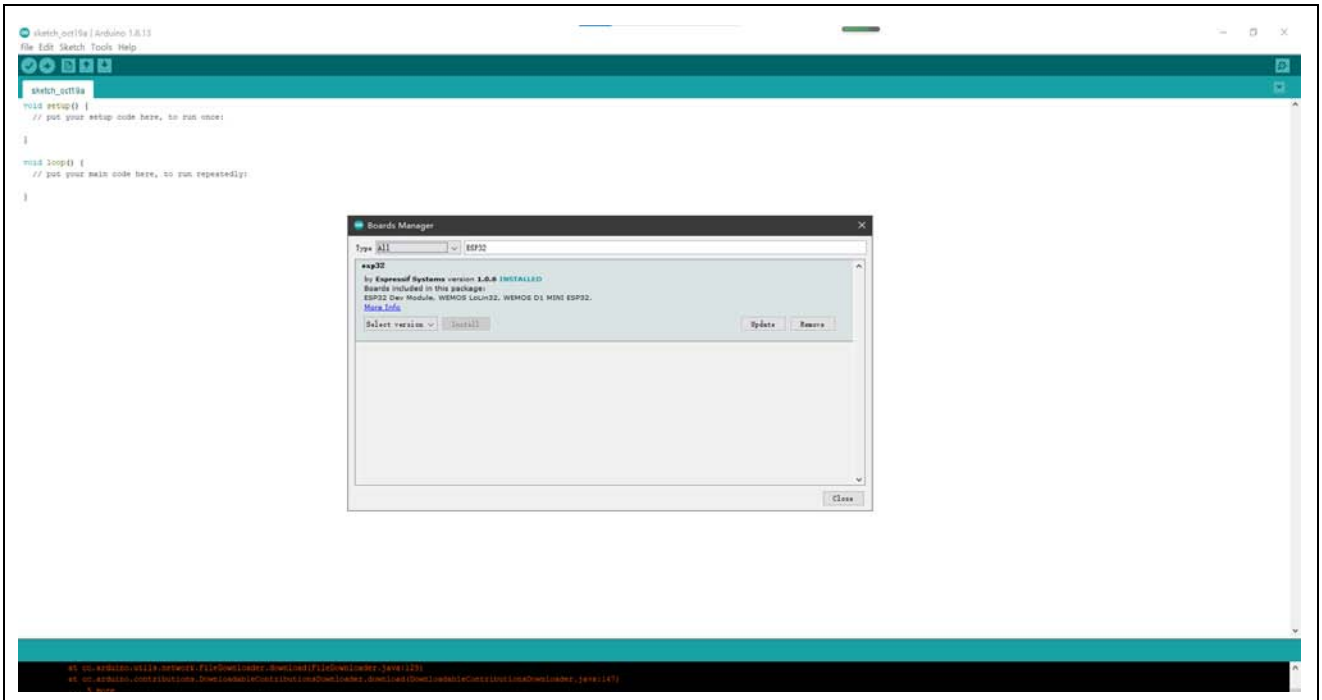


● Install Boards support package in Menu>Tools>Board>Boards Manager, then find ESP32 and select version “1.0.6” to install.

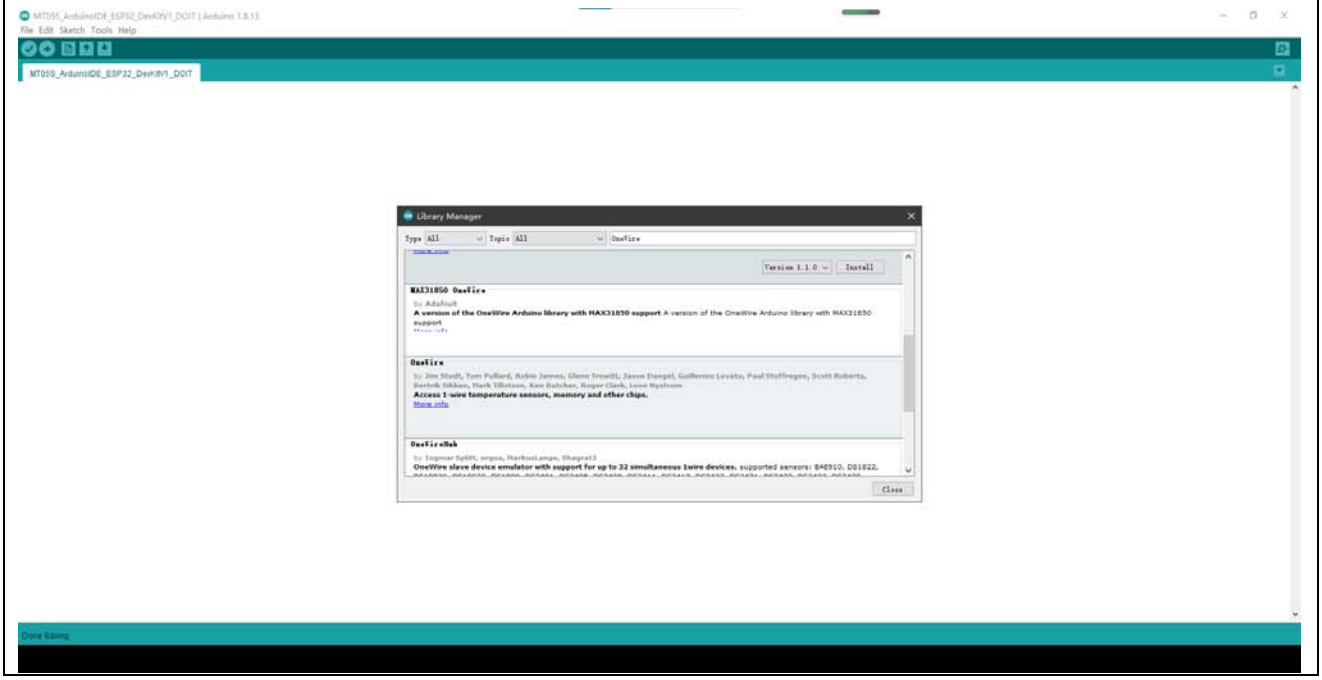


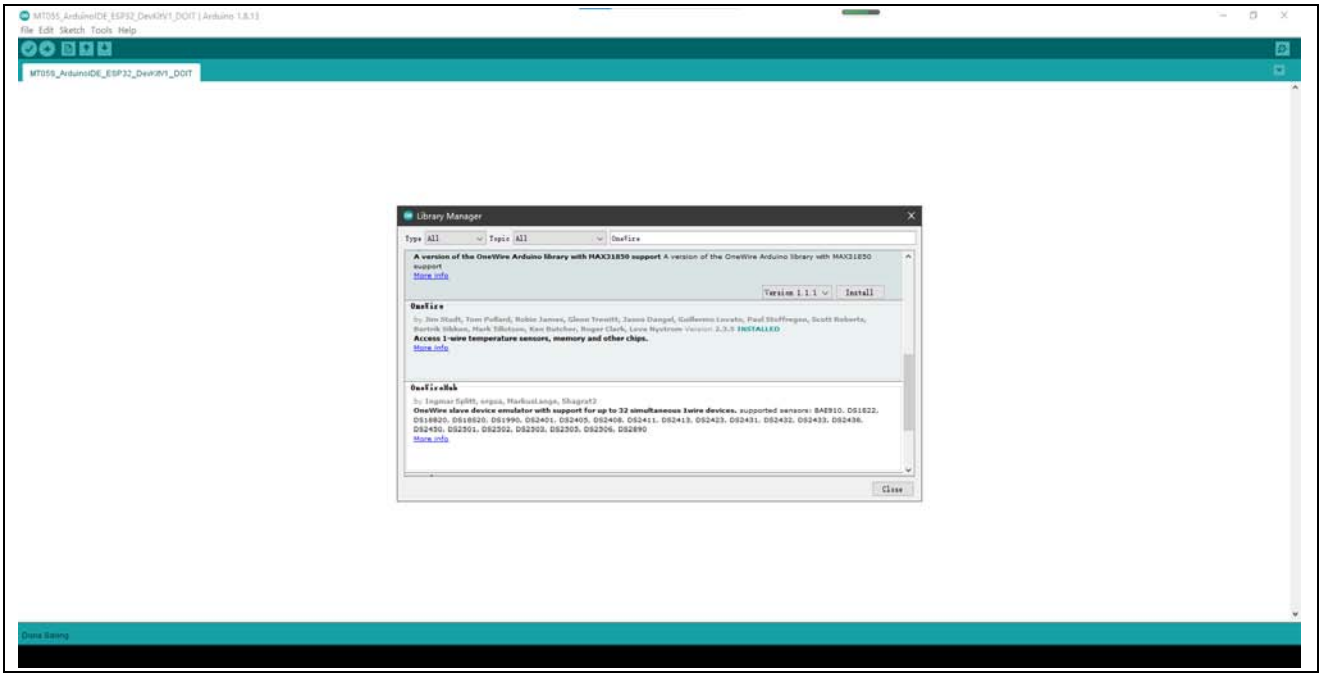

Boards Manager
esp32
by Espressif Systems
Boards included in this package:
ESP32 Dev Module, WEMOS LoLin32, WEMOS D1 MINI ESP32.
More Info
Install
Close


Boards Manager
esp32
by Espressif Systems
Boards included in this package:
ESP32 Dev Module, WEMOS LoLin32, WEMOS D1 MINI ESP32.
More Info
Installing...
Cancel



● Install OneWire support library in Menu>Tools>Manage Libaries, search OneWire library and then install.

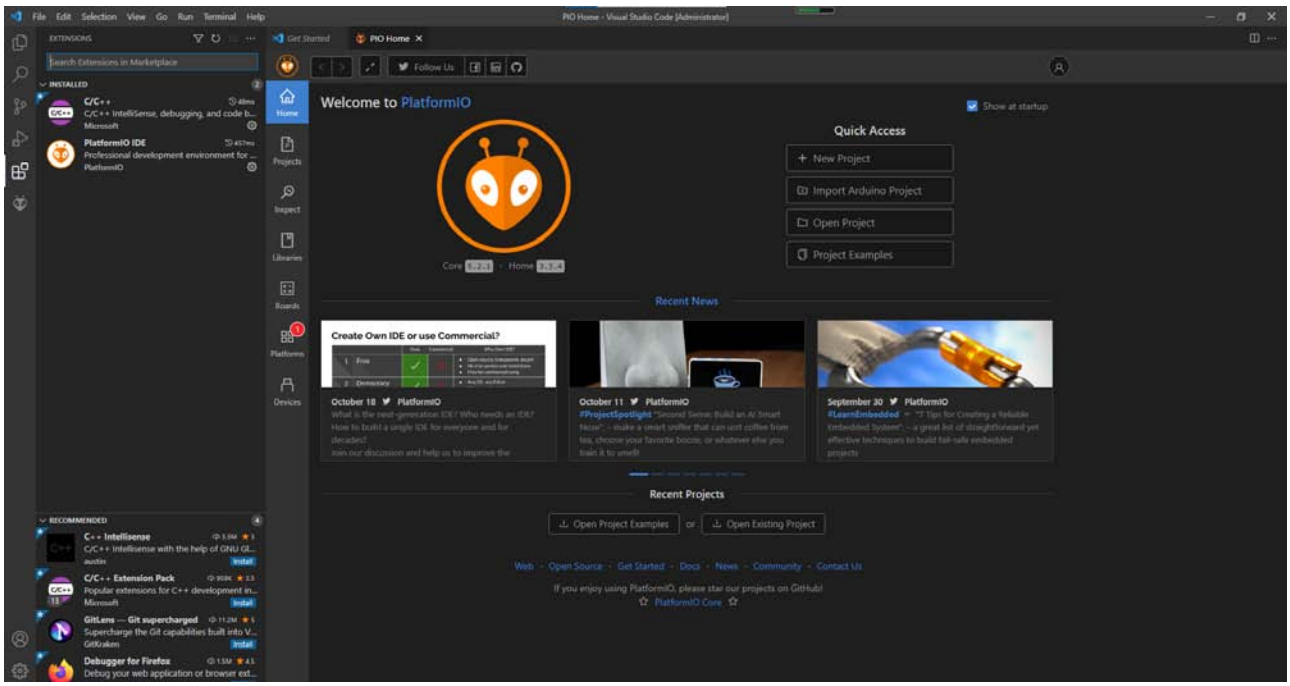




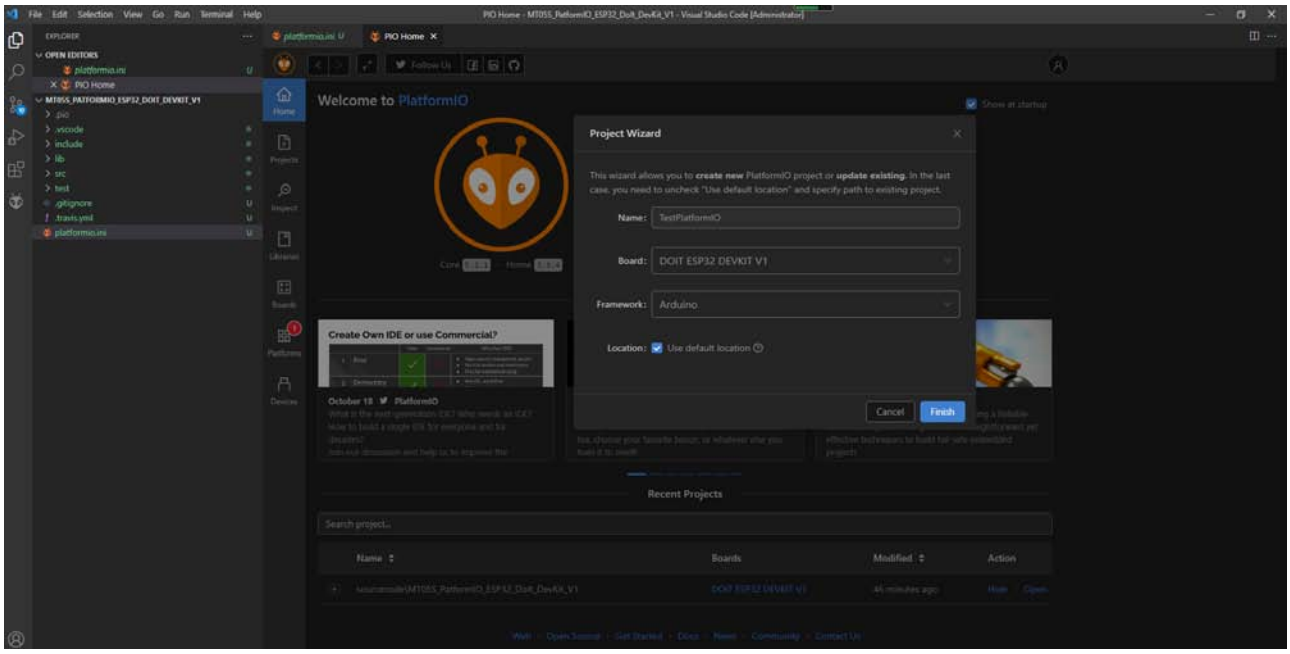
3.3 Visual Studio Code and Platform IO IDE extension

Please Install Visual Studio Code and Platform IO IDE extension.

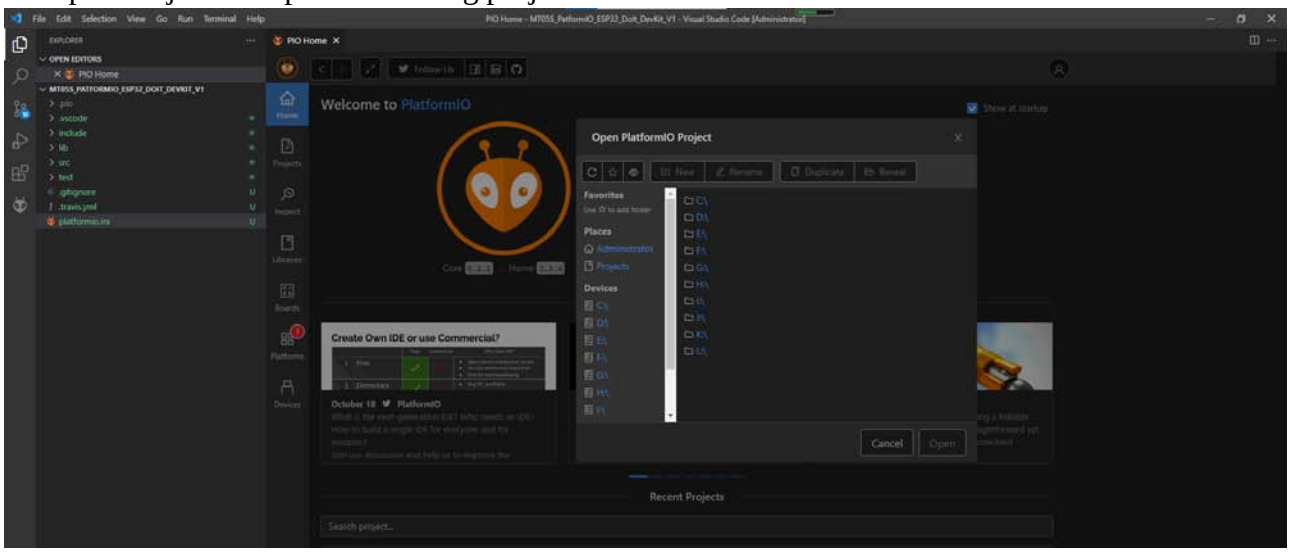
● Startup Visual Studio Source Code and Open Platform IO IDE home.



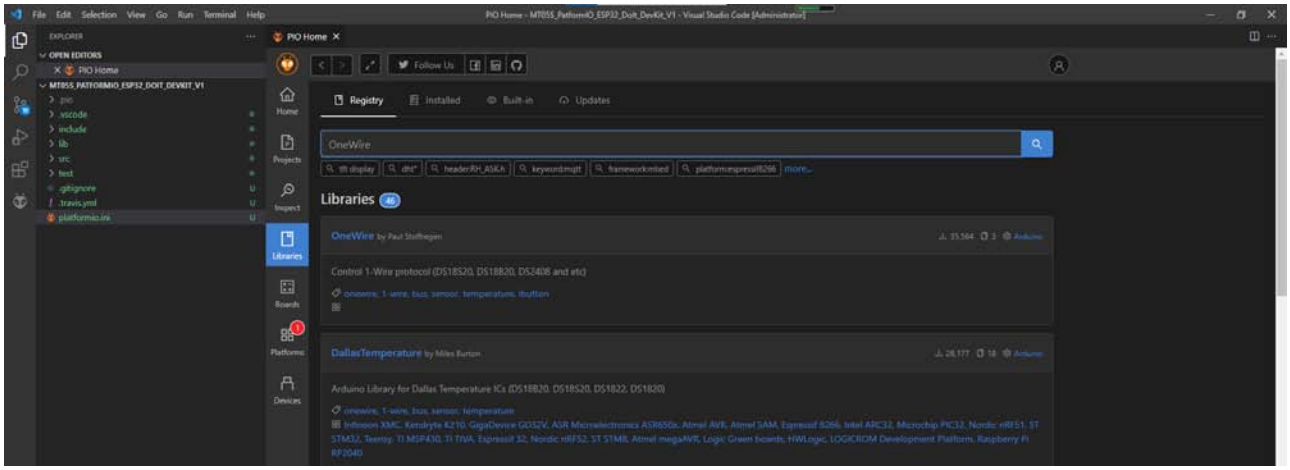
● “New Project” to create a new project and specify the board you use.

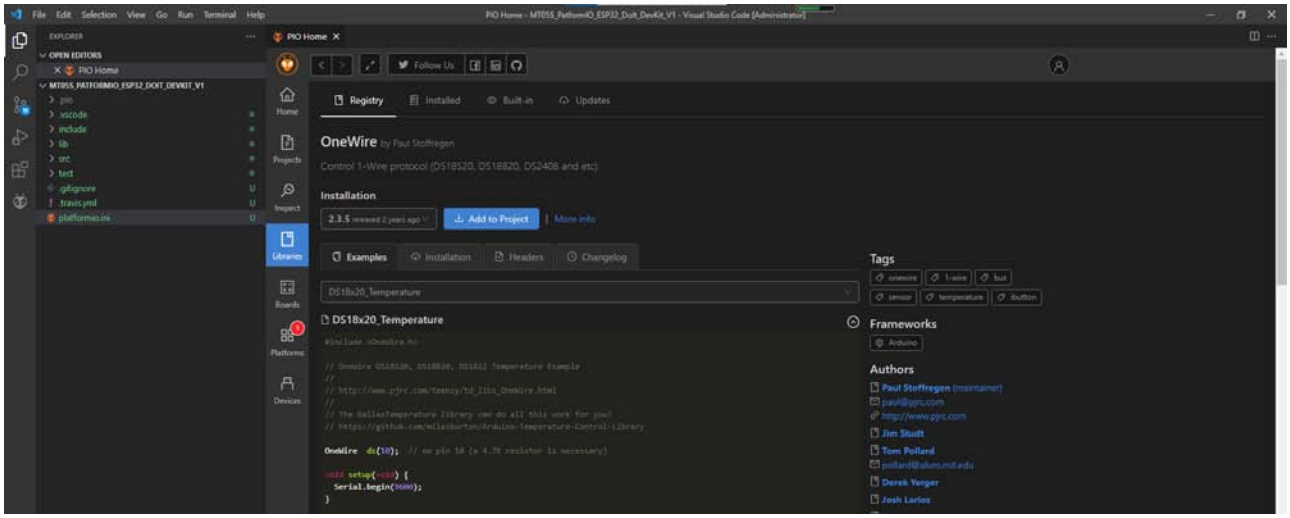


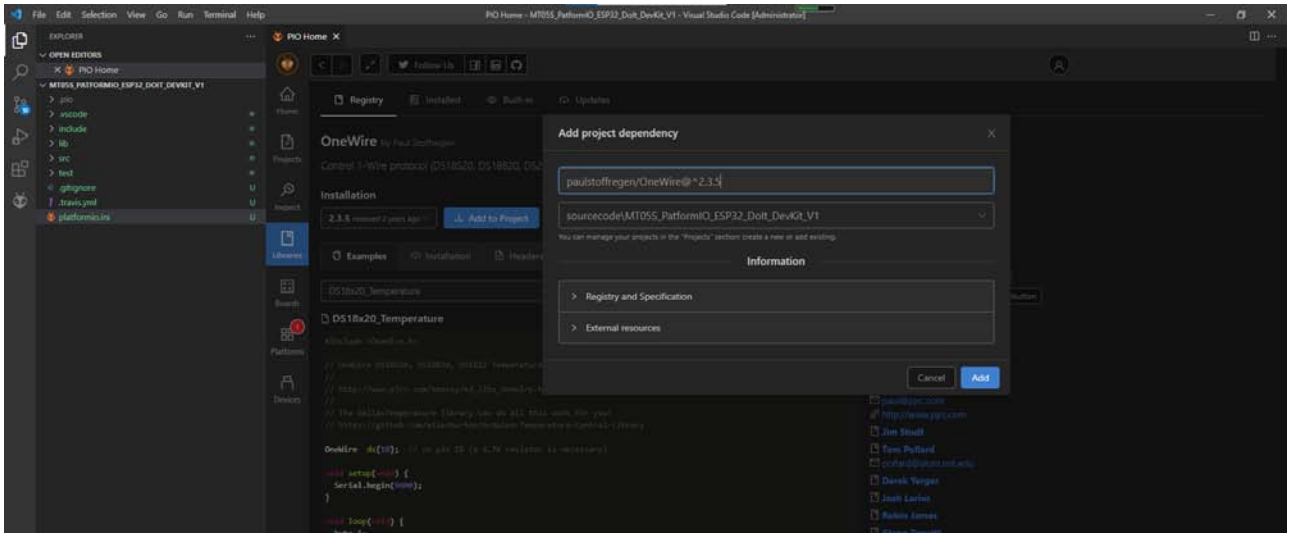
● "Open Project" to open an existing project.



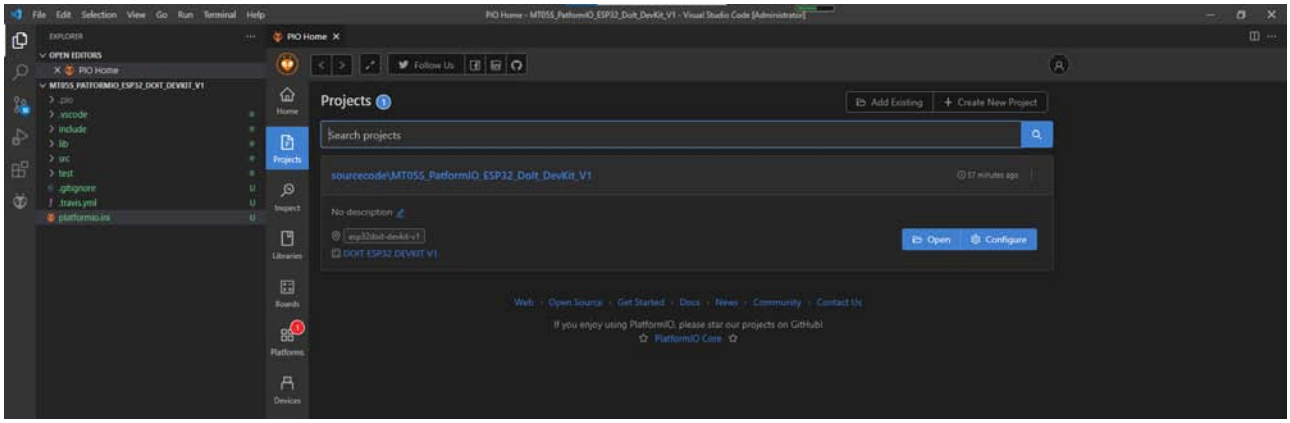
● Install libraries you need after opening a project.

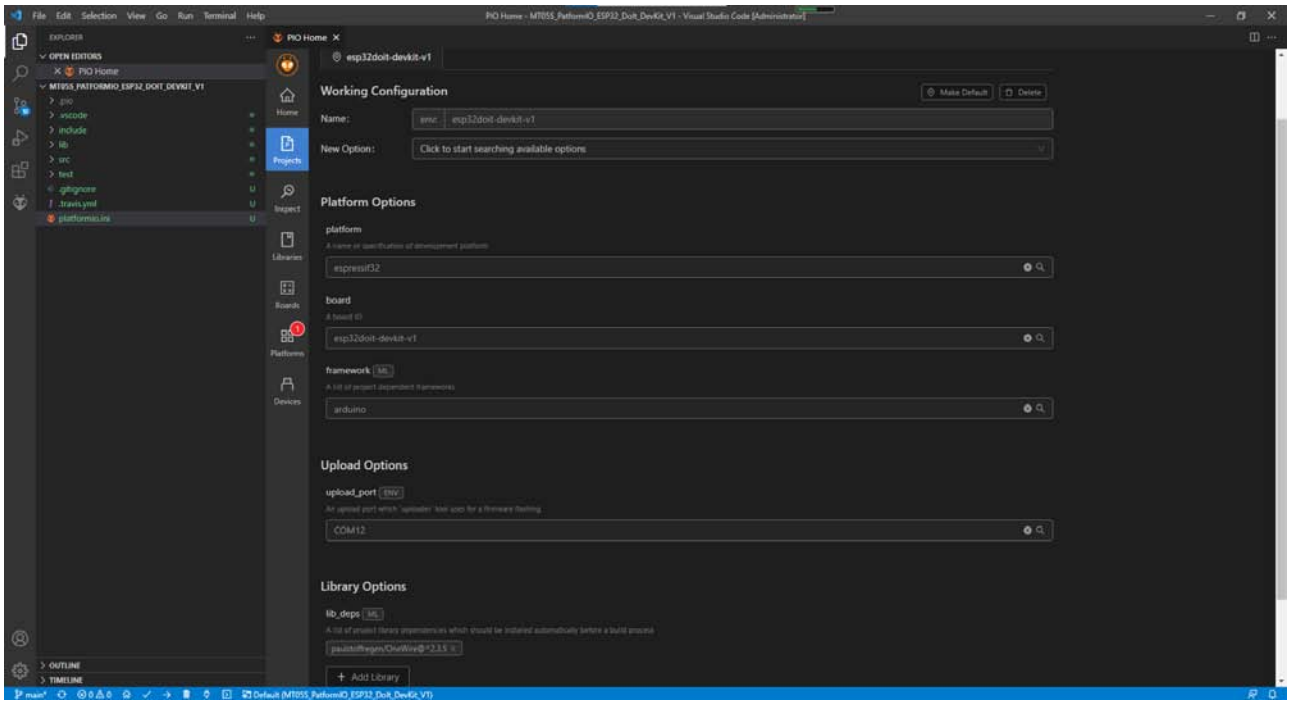




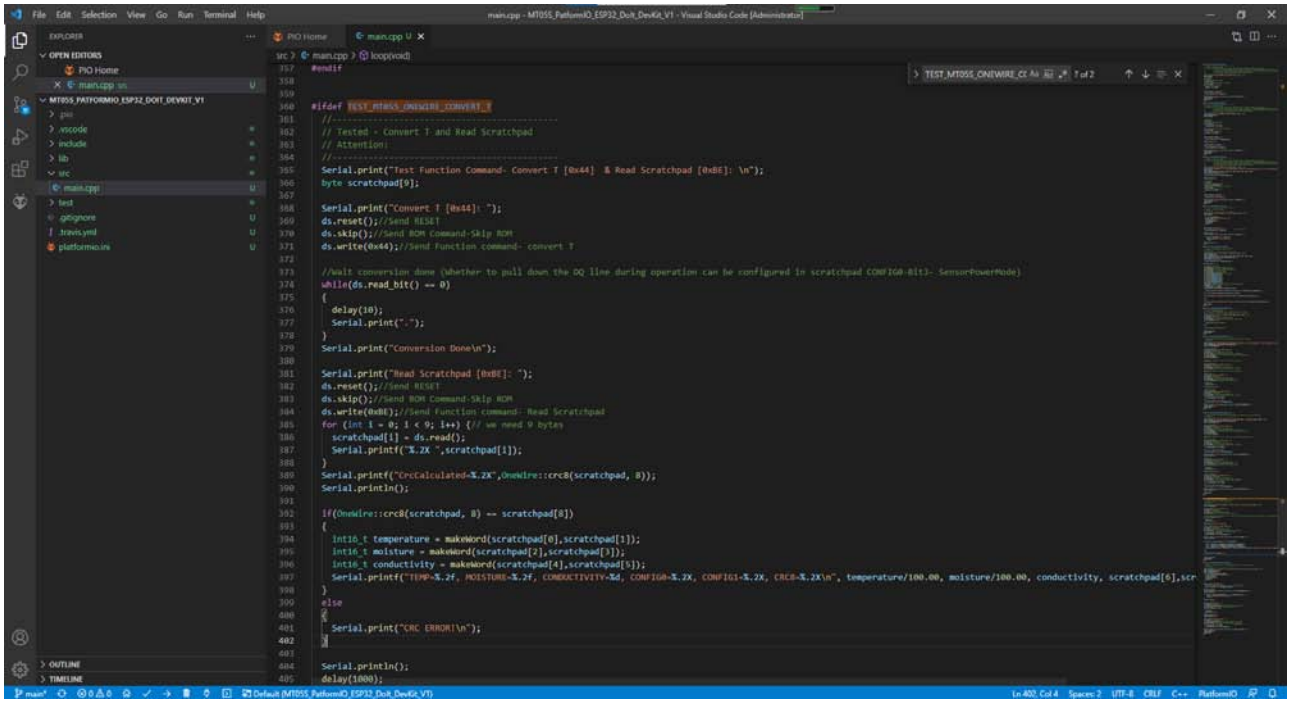


● Configure your project after opening a project. You can configure upload and monitor Port, Board etc here.





● Compile , Upload, and Monitor using icon button listed in bottom toolbox.

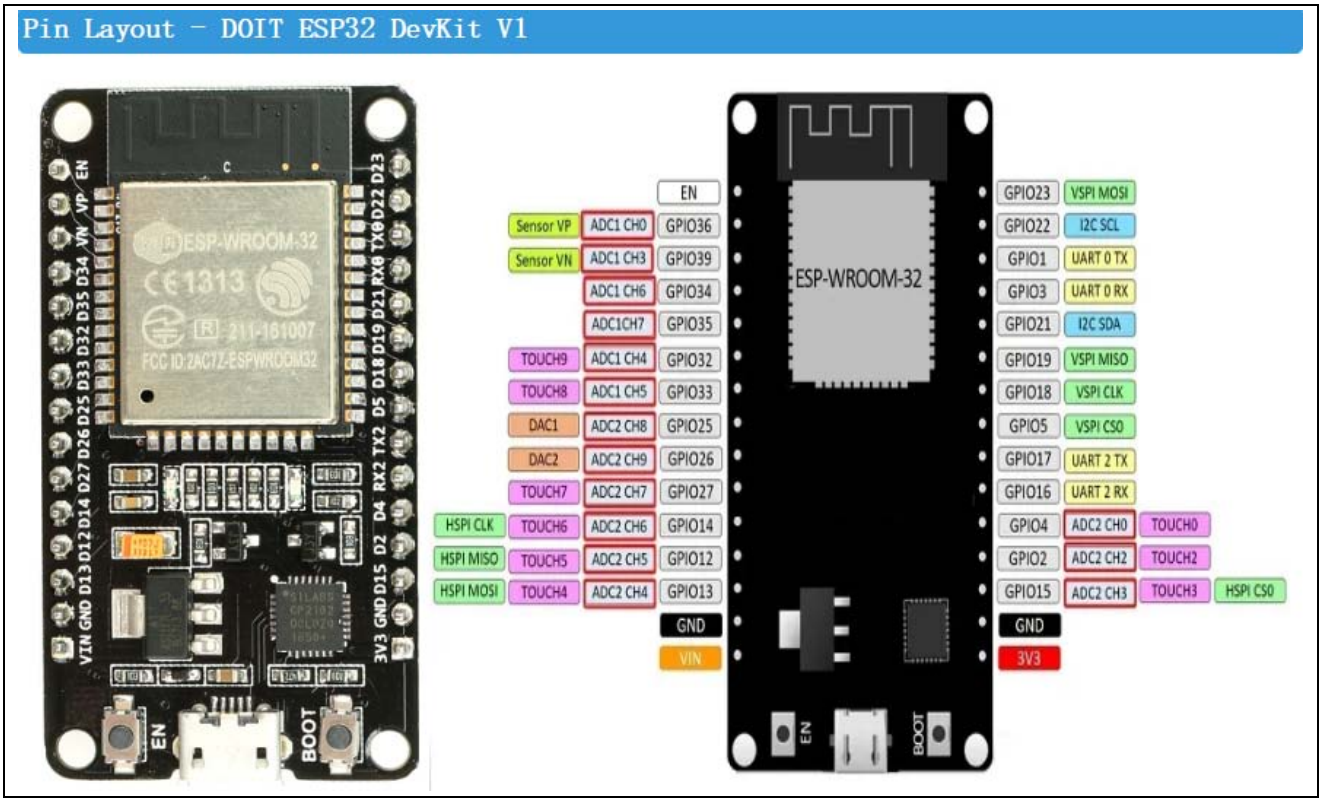


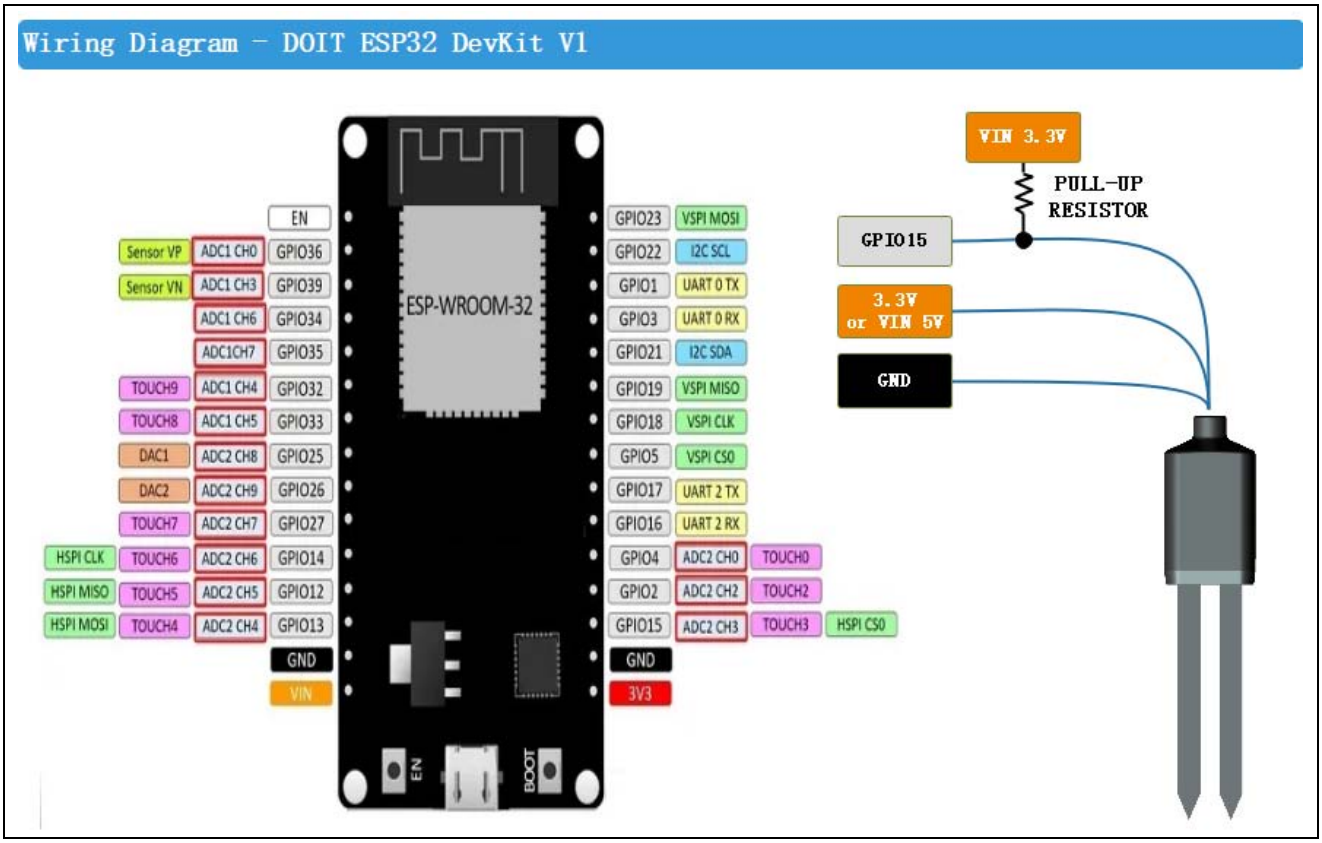
4 Demo on DOIT ESP32 DevKit V1

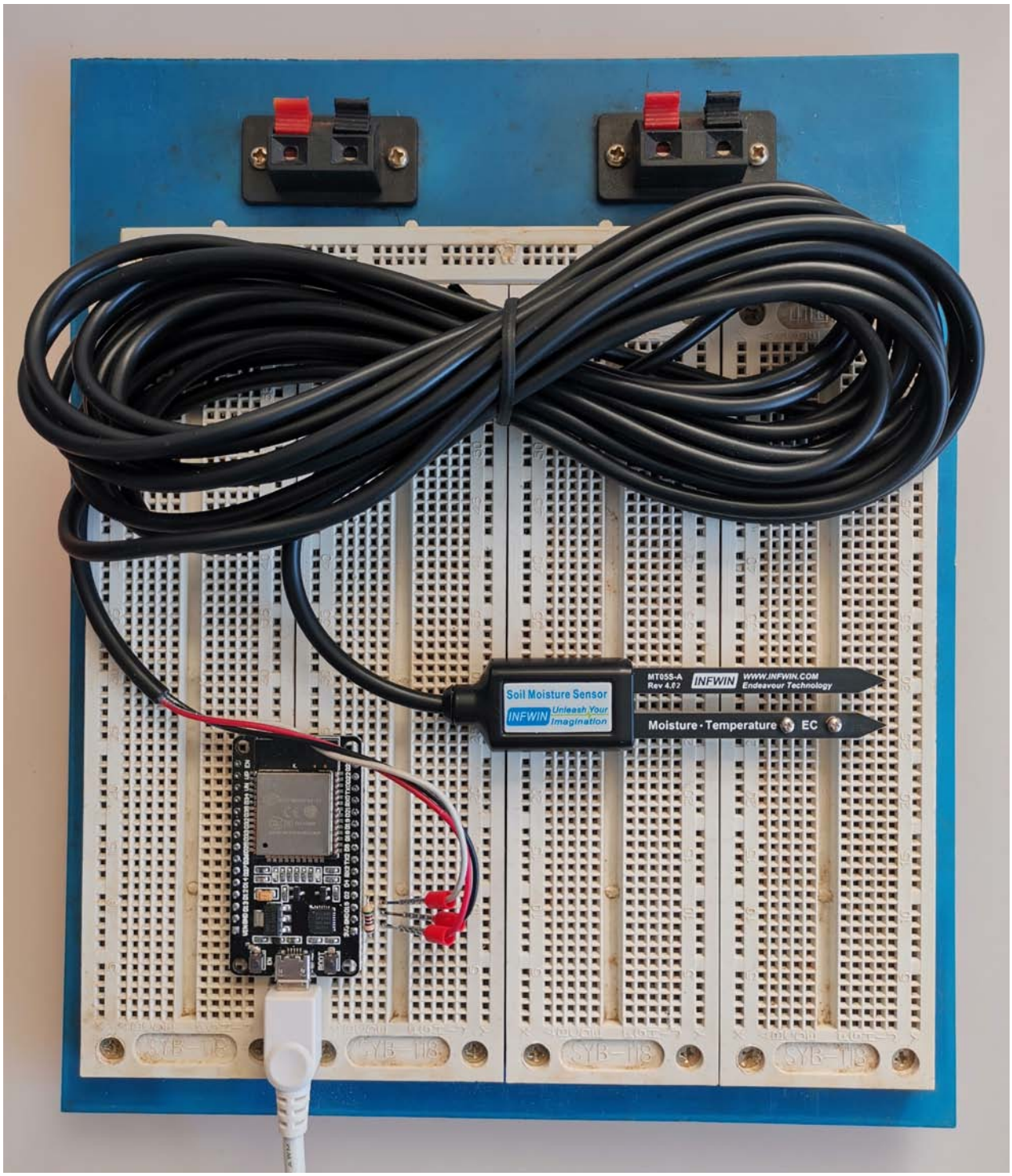
4.1 Preparation

In this demo we use GPIO15 as 1-Wire signal I/O, Please pull up this IO by a resistor range from 2.0~5.1 Kohm to VIN3.3V.

4.2 Wiring and Connection




Wiring Diagram - DOIT ESP32 DevKit V1
ESP-WROOM-32
EN
Sensor VP
ADC1 CH0
GPIO36
Sensor VN
ADC1 CH3
GPIO39
ADC1 CH6
GPIO34
ADC1CH7
GPIO35
TOUCH9
ADC1 CH4
GPIO32
TOUCH8
ADC1 CH5
GPIO33
DAC1
ADC2 CH8
GPIO25
DAC2
ADC2 CH9
GPIO26
TOUCH7
ADC2 CH7
GPIO27
HSPI CLK
TOUCH6
ADC2 CH6
GPIO14
HSPI MISO
TOUCH5
ADC2 CH5
GPIO12
HSPI MOSI
TOUCH4
ADC2 CH4
GPIO13
GND
VIN
GPIO23
VSPI MOSI
GPIO22
I2C SCL
GPIO1
UART 0 TX
GPIO3
UART 0 RX
GPIO21
I2C SDA
GPIO19
VSPI MISO
GPIO18
VSPI CLK
GPIO5
VSPI CS0
GPIO17
UART 2 TX
GPIO16
UART 2 RX
GPIO4
ADC2 CH0
TOUCH0
GPIO2
ADC2 CH2
TOUCH2
GPIO15
ADC2 CH3
TOUCH3
HSPI CS0
GND
3V3
EN
BOOT
VIN 3.3V
PULL-UP
RESISTOR
GPIO15
3.3V
or VIN 5V
GND

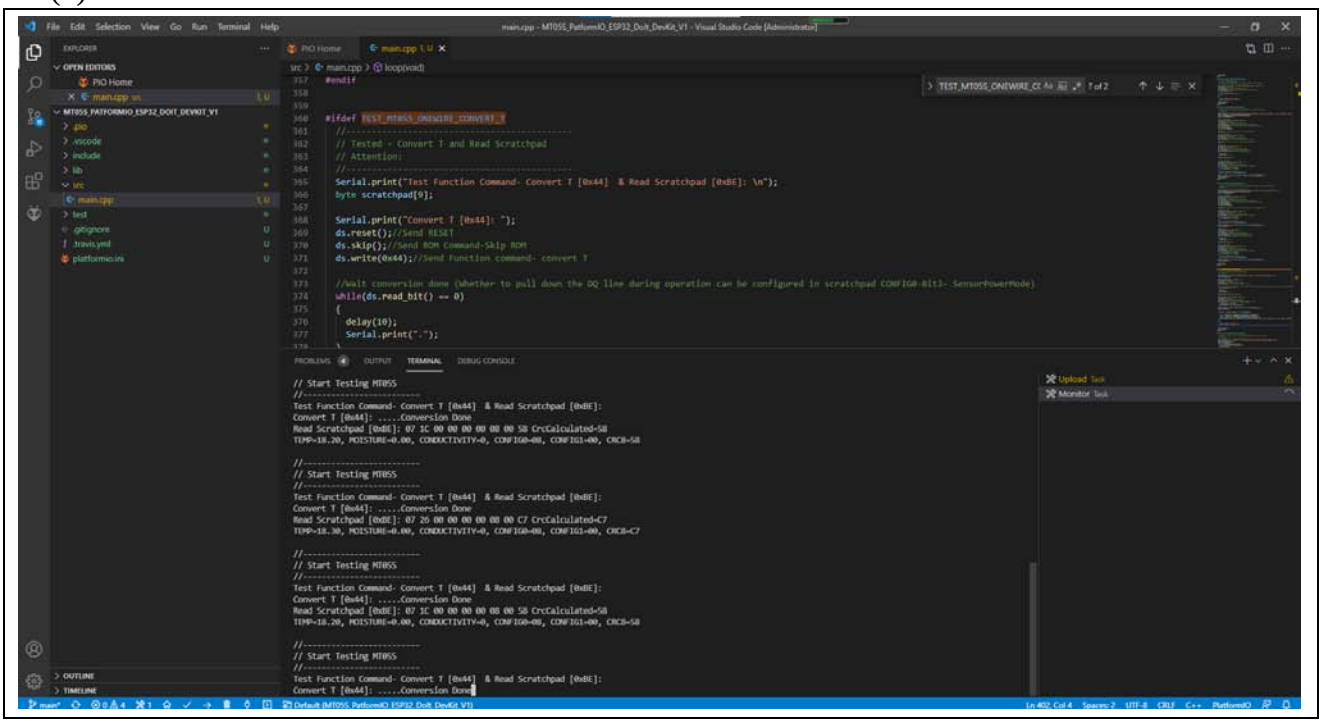


4.3 Platform IO

- Download Platform IO project at : https://github.com/INFWIN/mt05s-demo
- Open Platform IO project in sourcecode folder: MT05S_PatformIO_DOIT_ESP32_DevKit_V1
  (1) Select proper PORT, Board(DOIT ESP32 DevKit V1) in SideBar Projects>Confugure.
  (2) Build

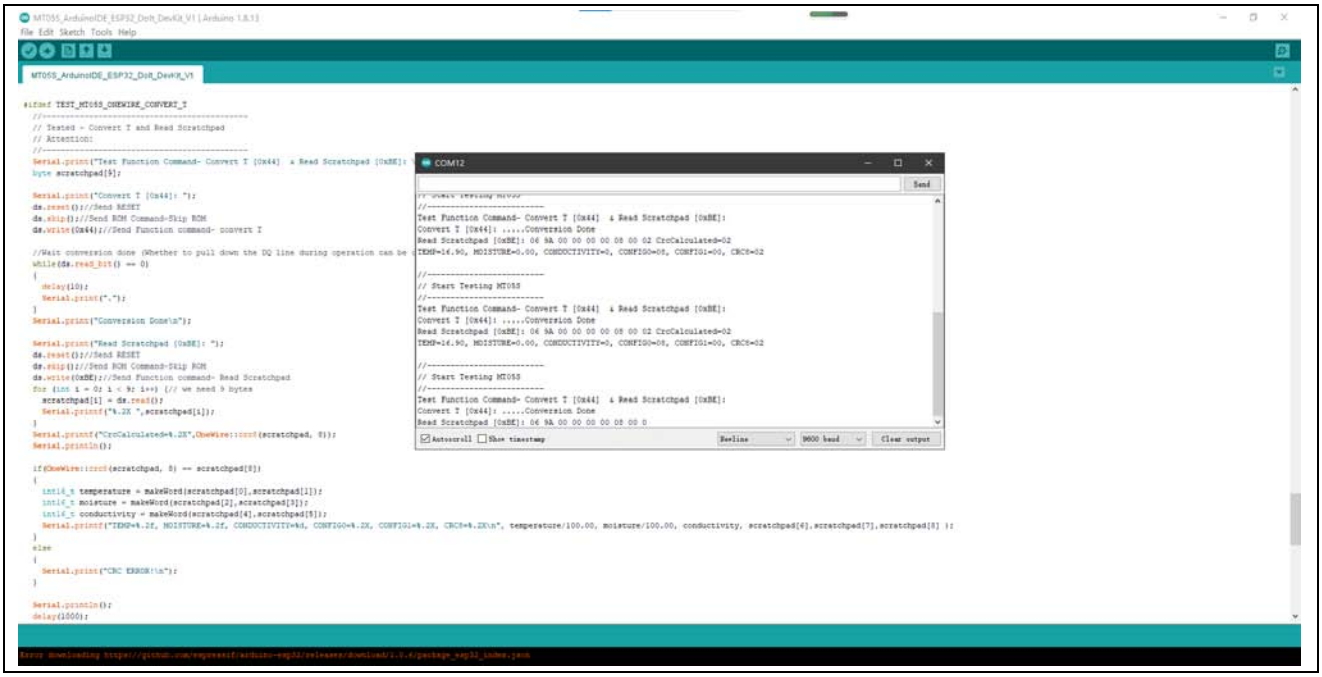
(3) Upload

(4) Monitor



4.4 Arduino IDE

- Download Arduino IDE project: https://github.com/INFWIN/mt05s-demo
- Open Arduino IDE project in sourcecode folder:MT05S_ArduinoIDE_DOIT_ESP32_DevKit_V1
  (1) Select proper PORT: Menu>Tools>Port
  (2) Select Board: Menu>Tools>Board>Arduino ESP32>DOIT ESP32 DevKit V1
  (3) Compile: Menu>Sketch>Verify/Compile
  (4) Upload: Menu>Sketch>Upload
  (5) Monitor: Menu>Tools>Serial Monitor



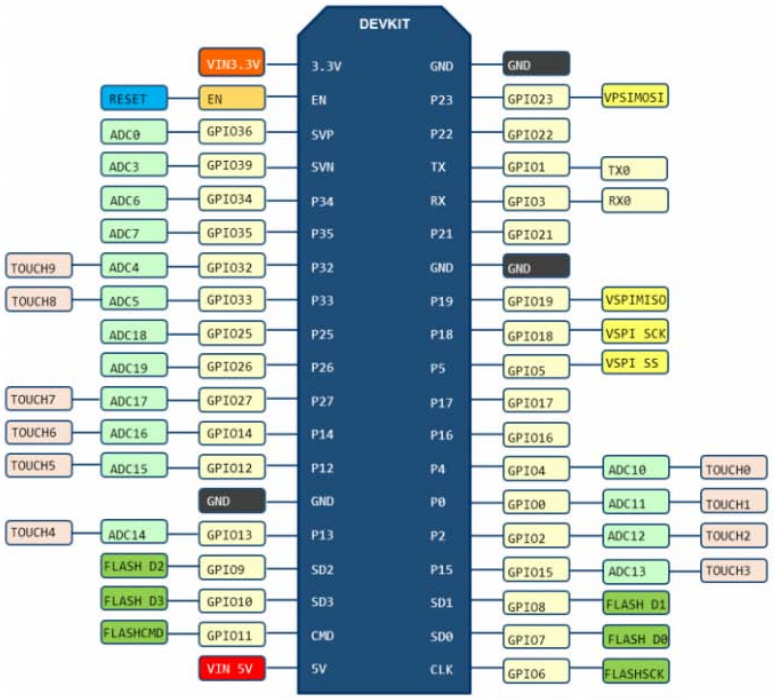
5 Demo on NodeMCU-32S

5.1 Preparation

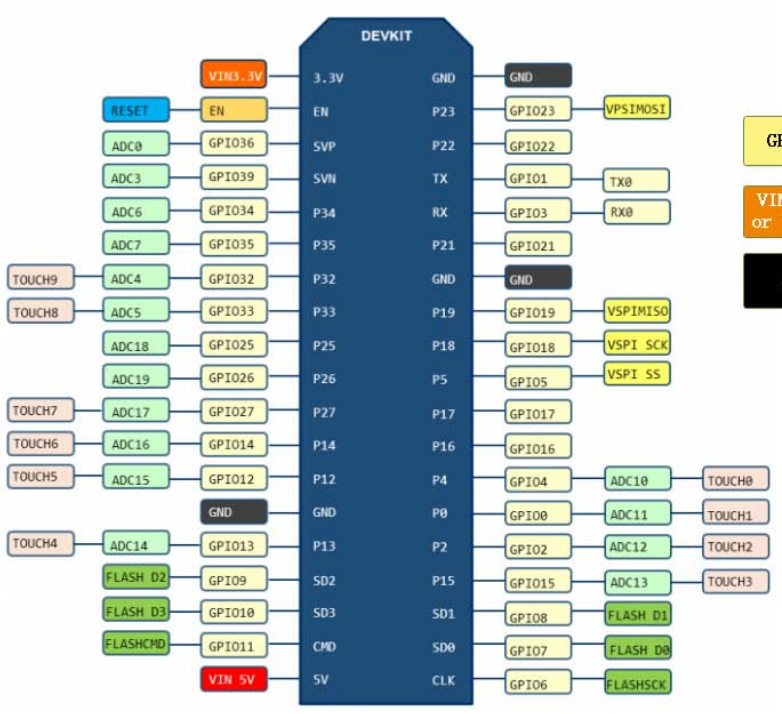
In this demo we use GPIO15 as 1-Wire signal I/O, Please pull up this IO by a resistor range from 2.0~5.1 Kohm to VIN3.3V.

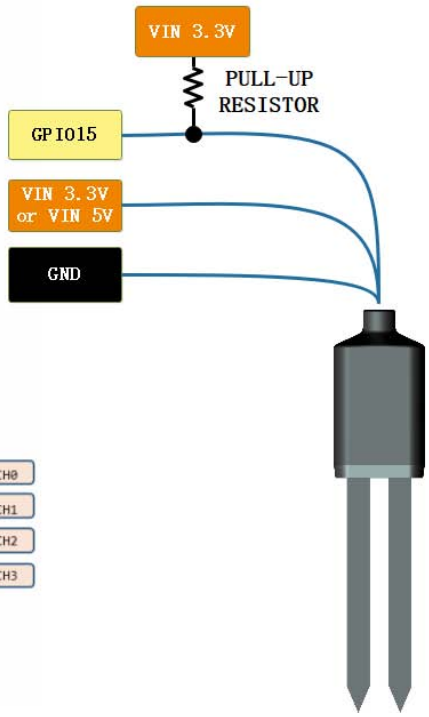
5.2 Wiring and Connection

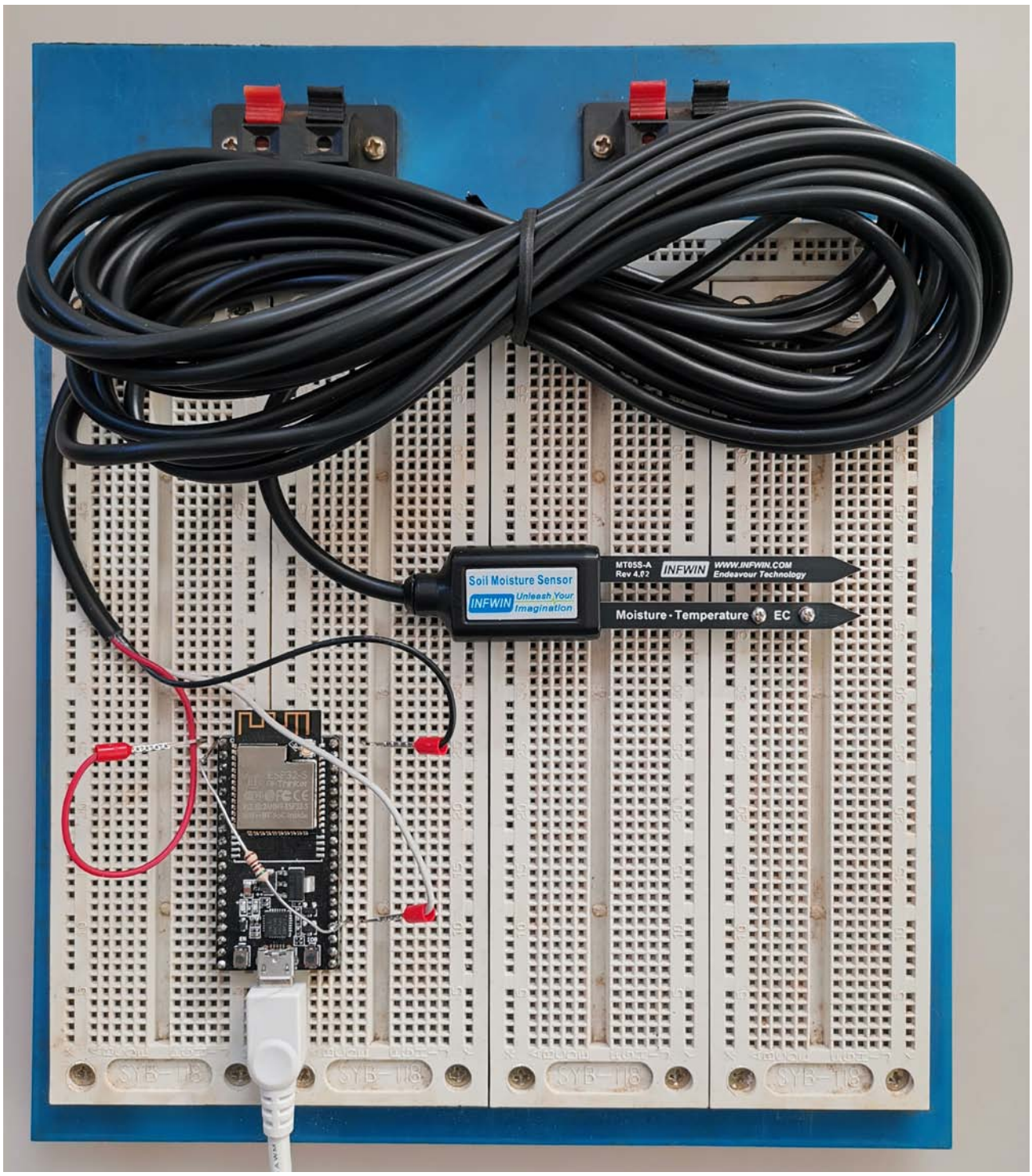
Pin Layout – NodeMCU-32S



Wiring Diagram – NodeMCU-32S





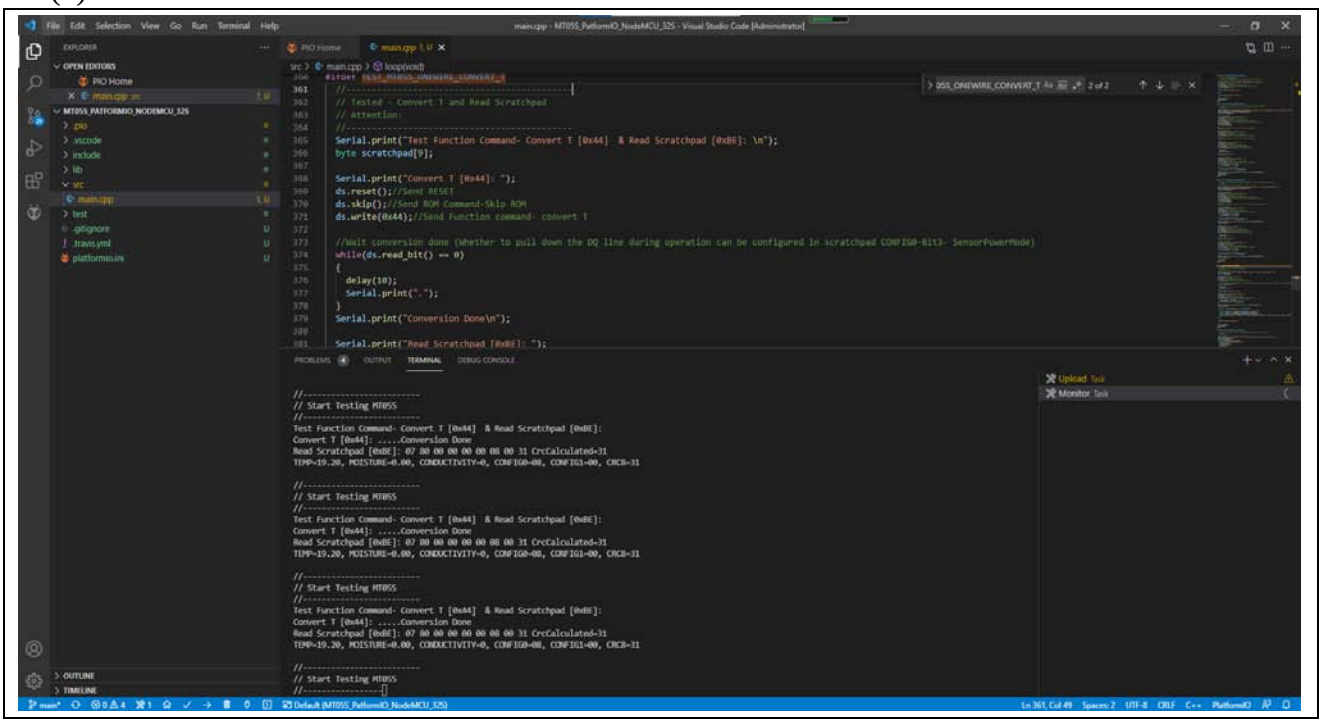


5.3 Platform IO

- Download Platform IO project at : https://github.com/INFWIN/mt05s-demo
- Open Platform IO project in sourcecode folder: MT05S_PatformIO_NodeMCU_32S
  (1) Select proper PORT, Board(NodeMCU-32S) in SideBar Projects>Confugure.
  (2) Build

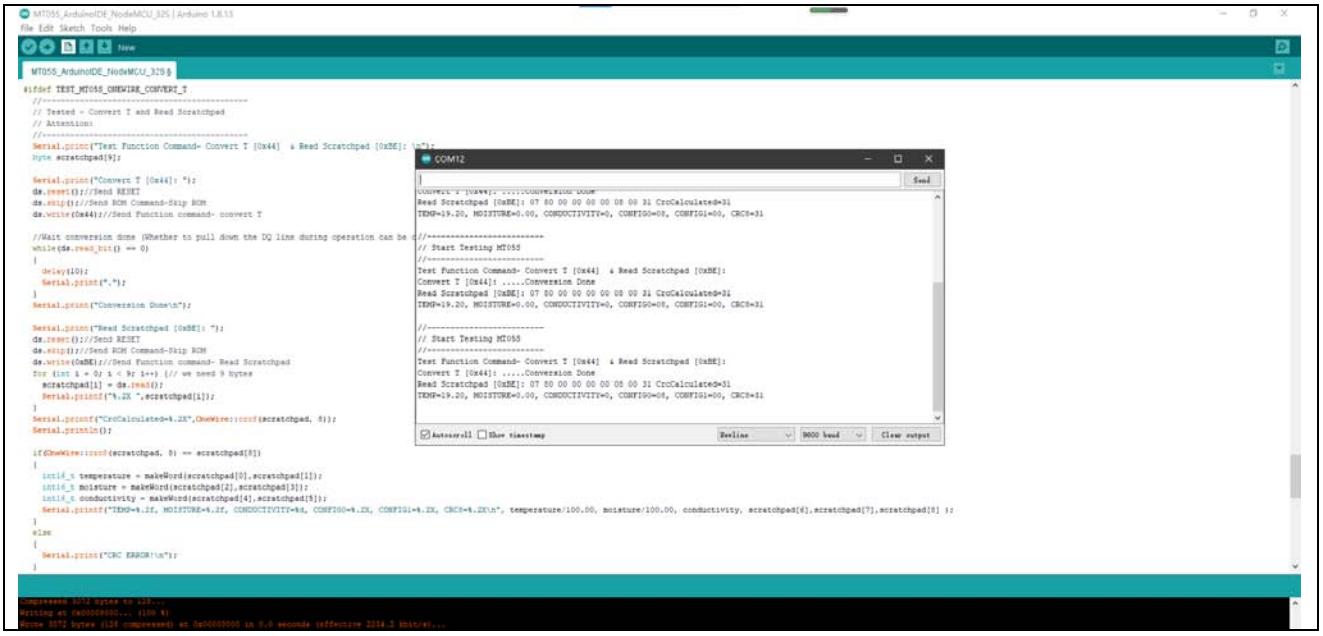
(3) Upload

(4) Monitor



5.4 Arduino IDE

- Download Arduino IDE project: https://github.com/INFWIN/mt05s-demo
- Open Arduino IDE project in sourcecode folder: MT05S_ArduinoIDE_NodeMCU_32S
  (1) Select proper PORT: Menu>Tools>Port
  (2) Select Board: Menu>Tools>Board>Arduino ESP32>NodeMCU-32S
  (3) Compile: Menu>Sketch>Verify/Compile
  (4) Upload: Menu>Sketch>Upload
  (5) Monitor: Menu>Tools>Serial Monitor



6 Demo on RaspberryPI 3 Model B

6.1 Preparation

In this demo we use GPIO4 as 1-Wire signal I/O , Please pull up this IO by a resistor range from 2.0~5.1 Kohm to 3.3V.

Note that in this demo two sensors are connected to the 1-Wire bus, "**28-000005a1cb5b**" is the DS18B20, "**28-060504030201**" is the MT05S.

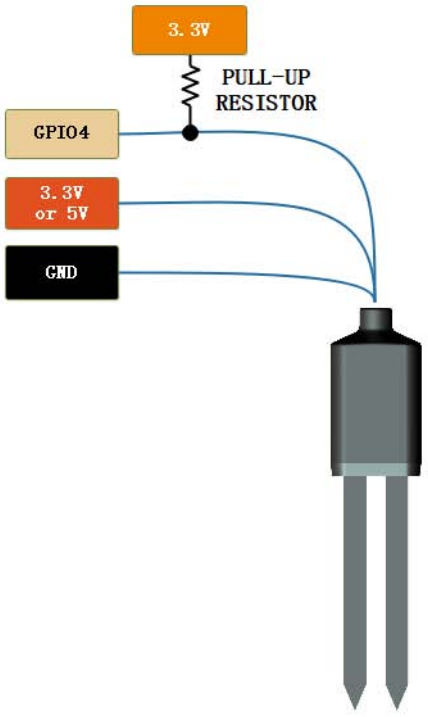
6.2 Wiring and Connection

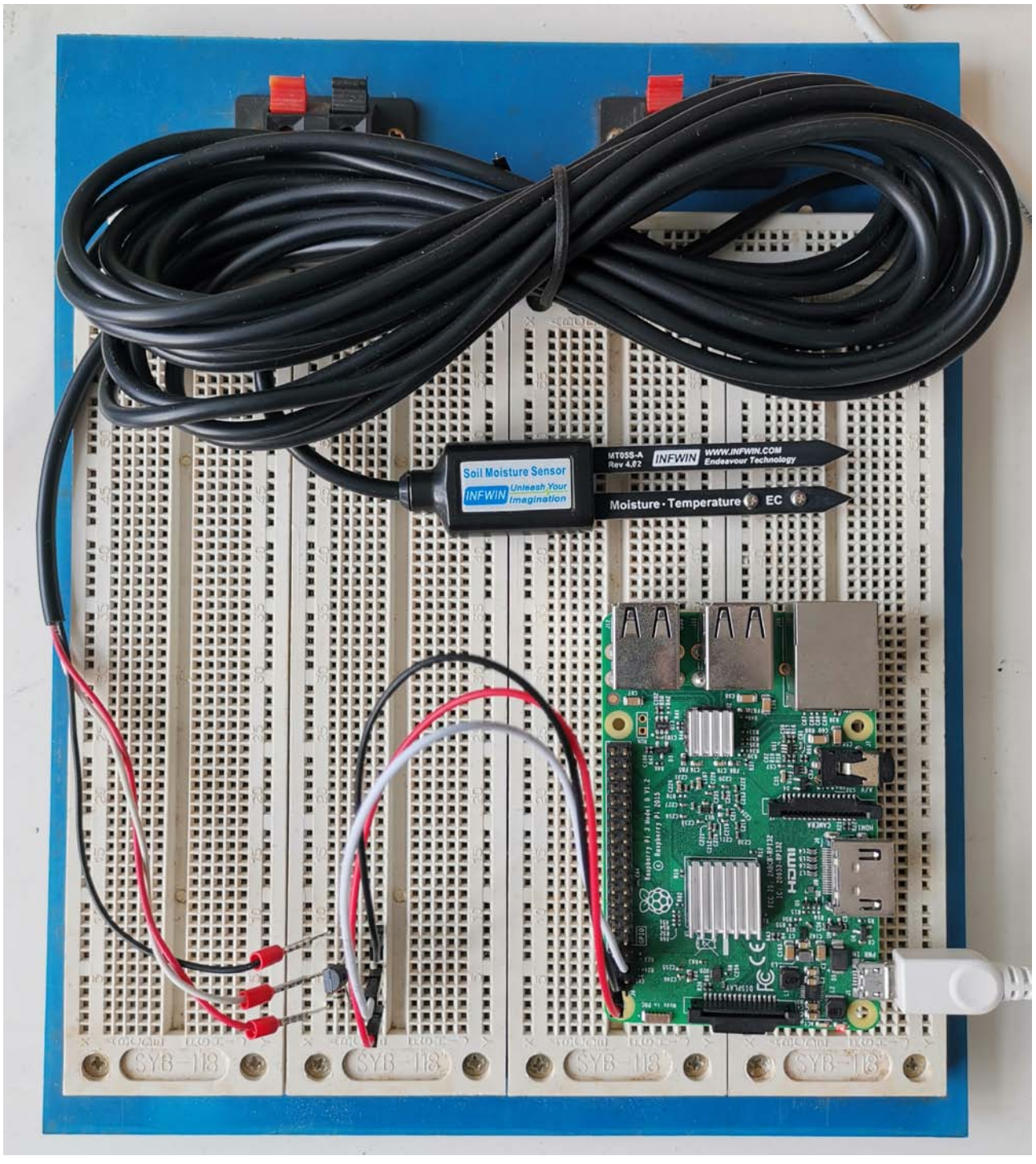
Pin Layout - Raspberry PI Model 3B

	Pin no.		
3.3V	1	2	5V
GPIO 2	3	4	5V
GPIO 3	5	6	GND
GPIO 4	7	8	GPIO 14
GND	9	10	GPIO 15
GPIO 17	11	12	GPIO 18
GPIO 27	13	14	GND
GPIO 22	15	16	GPIO 23
3.3V	17	18	GPIO 24
GPIO 10	19	20	GND
GPIO 9	21	22	GPIO 25
GPIO 11	23	24	GPIO 8
GND	25	26	GPIO 7
DNC	27	28	DNC
GPIO 5	29	30	GND
GPIO 6	31	32	GPIO 12
GPIO 13	33	34	GND
GPIO 19	35	36	GPIO 16
GPIO 26	37	38	GPIO 20
GND	39	40	GPIO 21

Wiring Diagram - Raspberry PI Model 3B

	Pin no.		
3.3V	1	2	5V
GPIO 2	3	4	5V
GPIO 3	5	6	GND
GPIO 4	7	8	GPIO 14
GND	9	10	GPIO 15
GPIO 17	11	12	GPIO 18
GPIO 27	13	14	GND
GPIO 22	15	16	GPIO 23
3.3V	17	18	GPIO 24
GPIO 10	19	20	GND
GPIO 9	21	22	GPIO 25
GPIO 11	23	24	GPIO 8
GND	25	26	GPIO 7
DNC	27	28	DNC
GPIO 5	29	30	GND
GPIO 6	31	32	GPIO 12
GPIO 13	33	34	GND
GPIO 19	35	36	GPIO 16
GPIO 26	37	38	GPIO 20
GND	39	40	GPIO 21



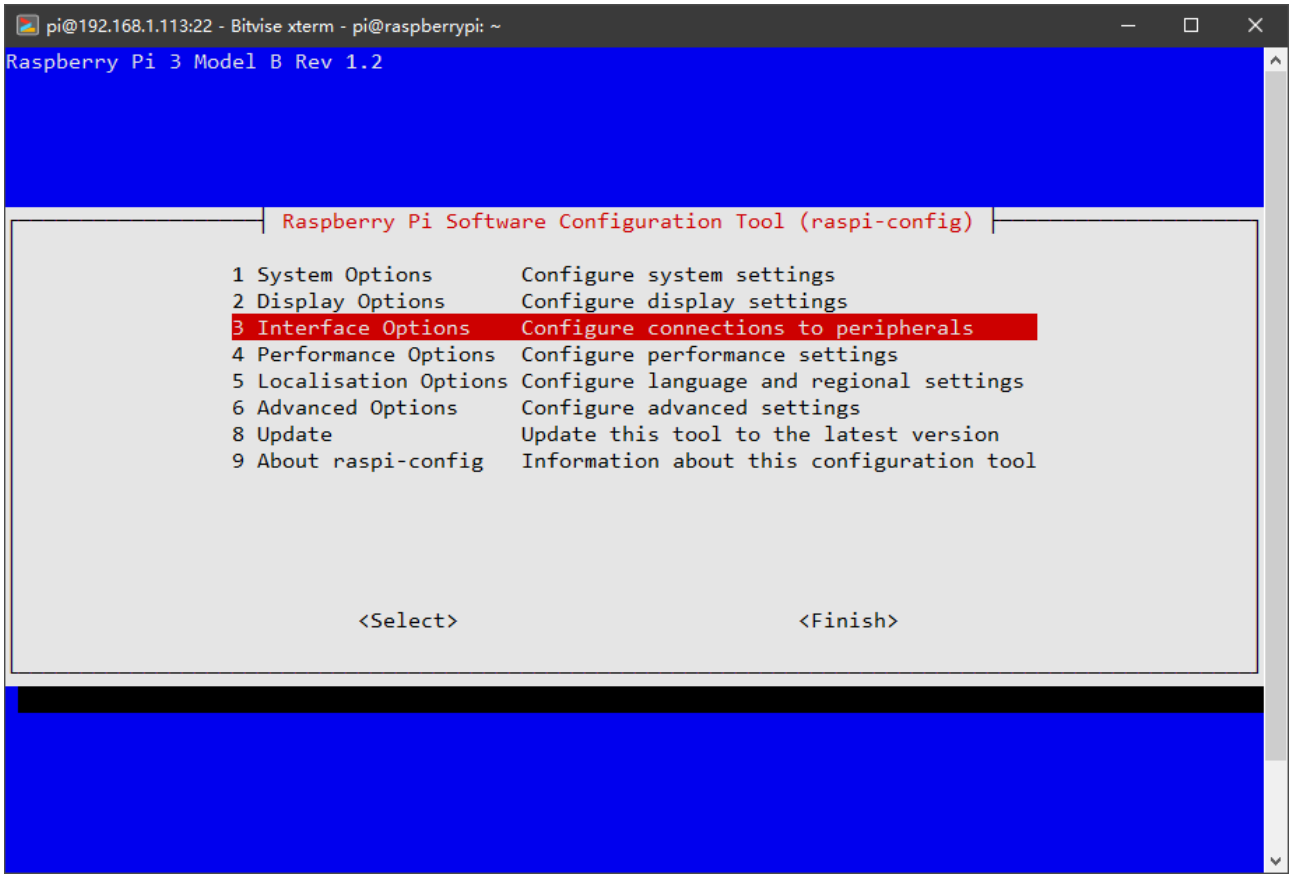


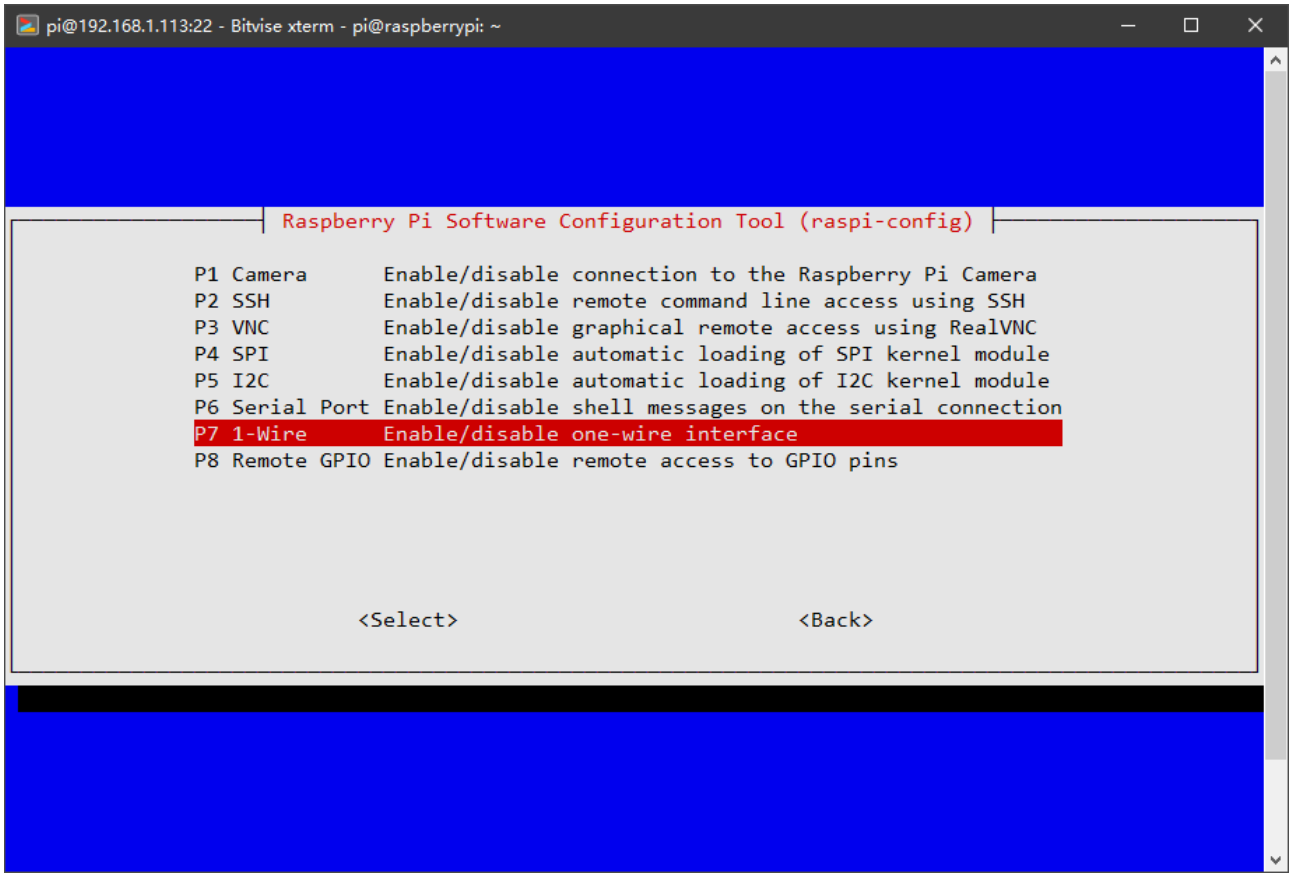
6.3 Program

- Download Arduino IDE project: https://github.com/INFWIN/mt05s-demo
- Open sourcecode folder: MT05S_RaspberryPi_3B
- Login to Raspberry PI
- Enable 1-Wire interface and check sensor:

pi@raspberrypi:~ $ sudo raspi-config

>> Bring up the configuration Tool and then enter into “Interface Options”, and then select “1-Wire” to enable it.





● Check 1-Wire devices:

pi@raspberrypi:~ $ cd /sys/bus/w1/devices/
pi@raspberrypi:/sys/bus/w1/devices $ ls
28-000005a1cb5b 28-060504030201 w1_bus_master1

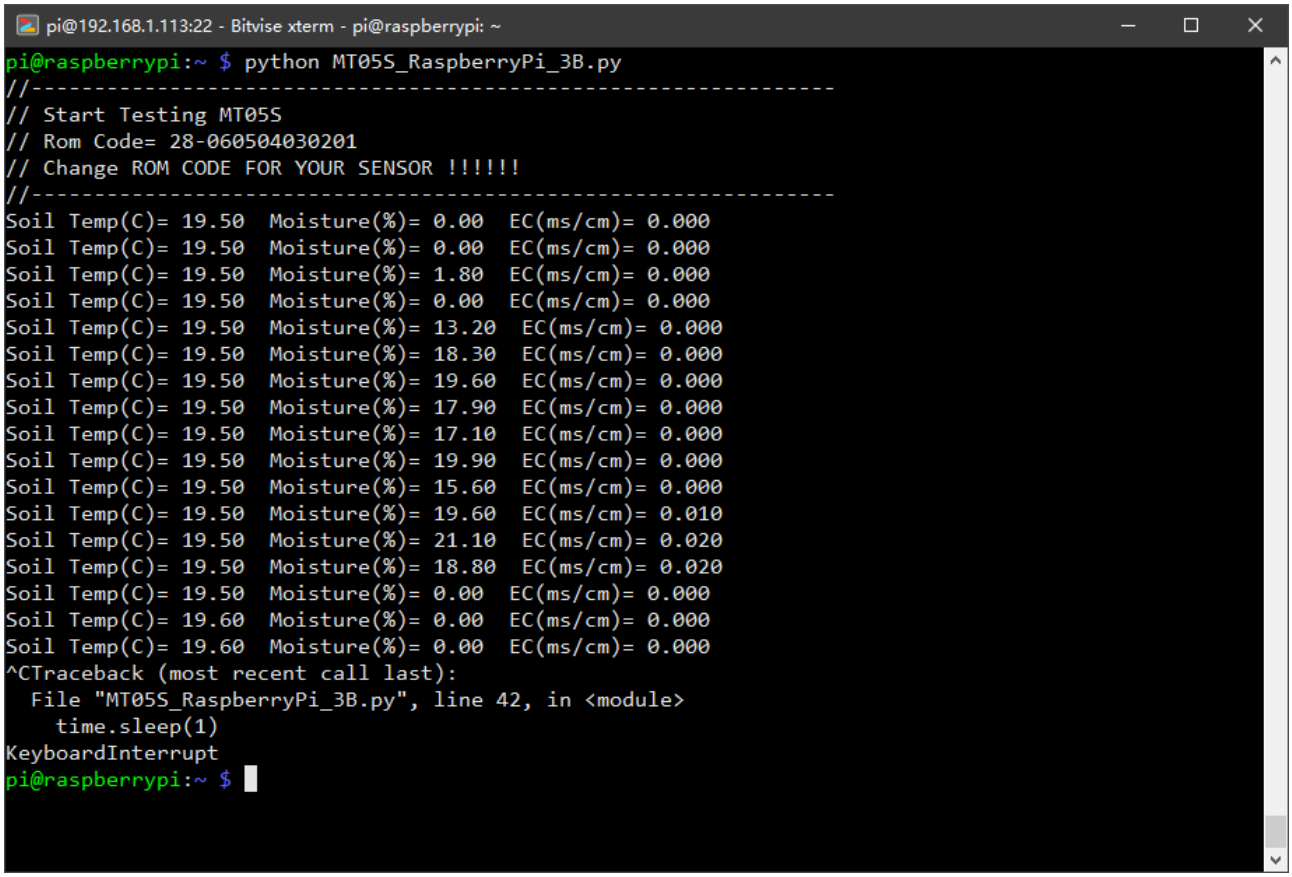
Note that in this demo there are two sensors found, "**28-000005a1cb5b**" is the DS18B20, "**28-060504030201**" is the MT05S

● Check 1-Wire device data:

pi@raspberrypi:/sys/bus/w1/devices $ cd 28-060504030201
pi@raspberrypi:/sys/bus/w1/devices/28-060504030201 $ ls
alarms driver ext_power hwmon name resolution temperature w1_slave
conv_time eeprom features id power subsystem uevent
pi@raspberrypi:/sys/bus/w1/devices/28-060504030201 $ cat w1_slave
07 9e 00 00 00 00 08 00 b5 : crc=b5 YES
07 9e 00 00 00 00 08 00 b5 t=-1567562
pi@raspberrypi:/sys/bus/w1/devices/28-060504030201 $

● Test the python demo code : MT05S_RaspberryPi_3B.py

pi@raspberrypi:~ $ python MT05S_RaspberryPi_3B.py



Copyright and Trademark

Revision

Date	Version	Comment	Updated by
2021-10-25	V1.0	Initial Creation	jz51930