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IoT laboratory

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Project Reference Number: 2016-1-PL01-KA203-026471

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What we will talk about.

- Laboratory development boars
- Software examples

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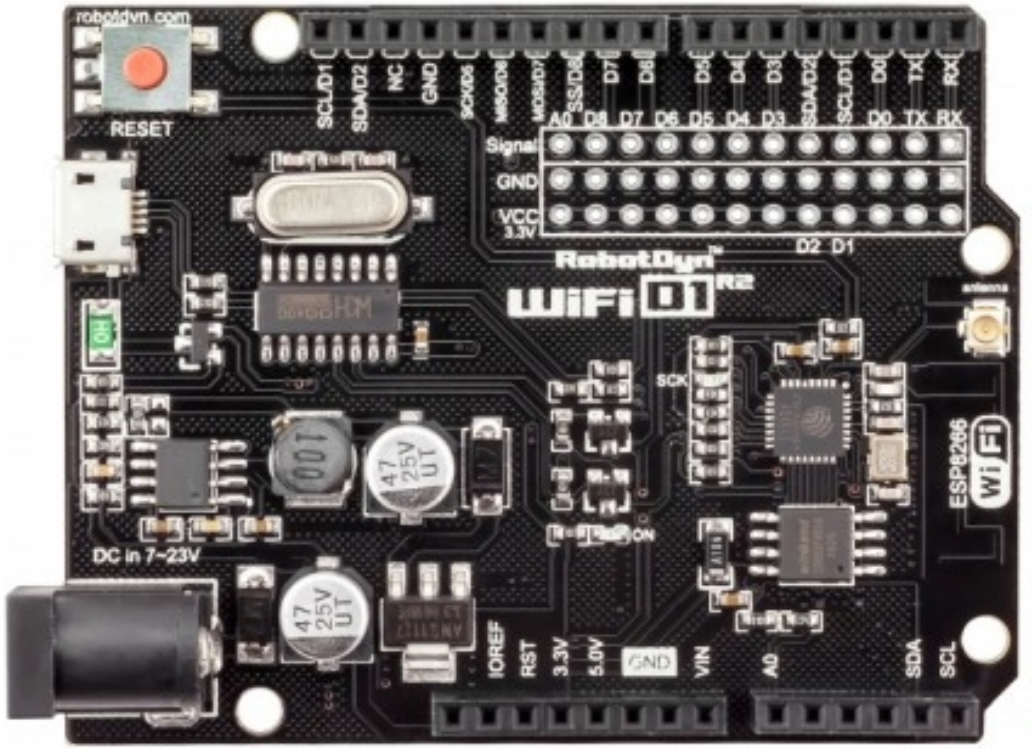
Laboratory development boards

- ESP8266 based
- WeMos D1R2
- Size compatible with Arduino UNO



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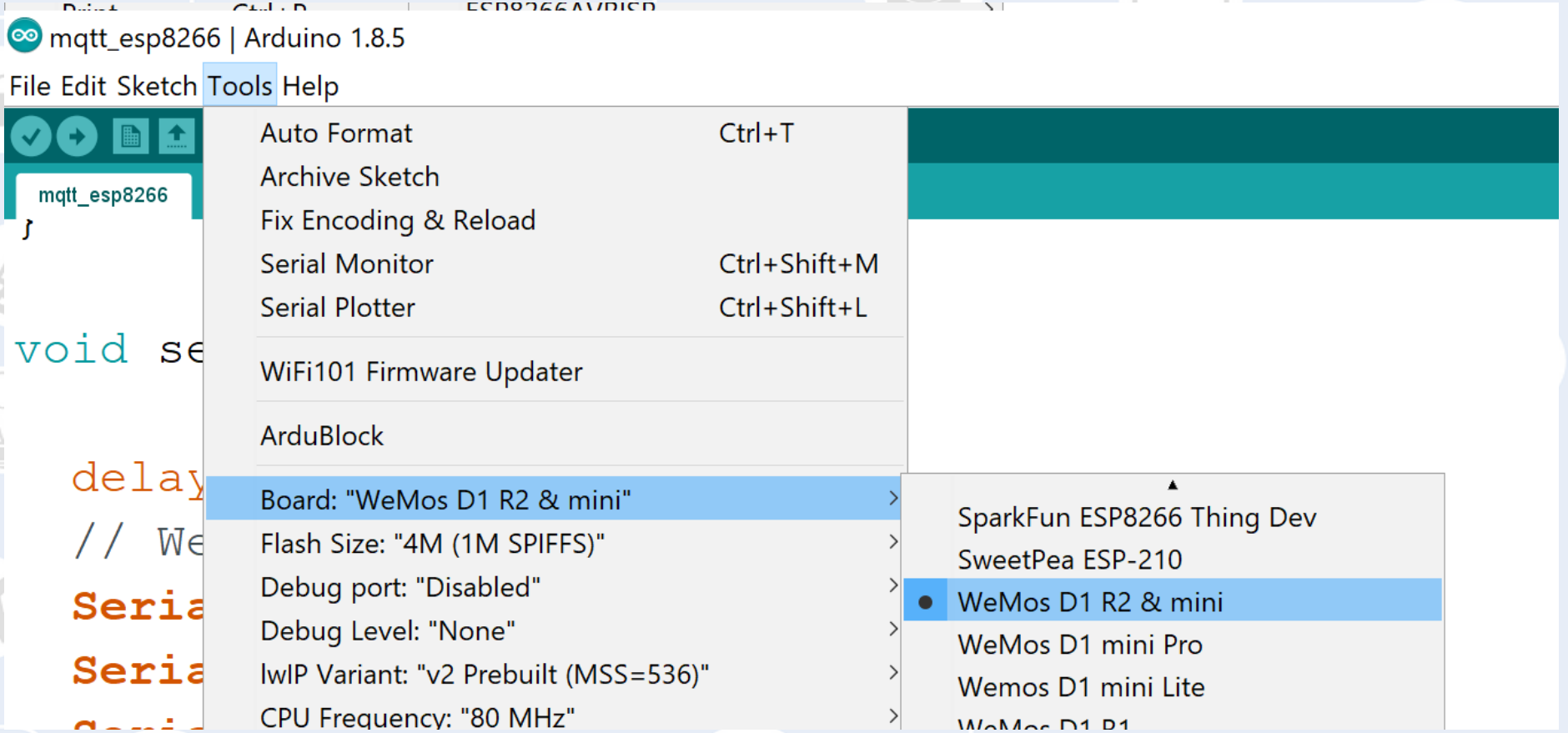
Board selection



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Arduino vs WeMos D1R2 pinout

Arduino-UNO			WeMos-D1R2	
SCL	I2C: SCL	→	GPIO05	I2C: SCL
SDA	I2C: SDA	→	GPIO04	I2C: SDA
AREF		→		
GND		→	GND	
GPIO13	SPI: SCK	→	GPIO14	SCK
GPIO12	SPI: MISO	→	GPIO12	MISO
GPIO11	SPI: MOSI	→	GPIO13	MOSI
GPIO10	SPI: SS	→	GPIO15	SS
GPIO9		→	GPIO13	

Arduino-UNO			WeMos-D1R2	
GPIO8		→	GPIO12	
GPIO7		→	GPIO14	
GPIO6		→	GPIO2	
GPIO5		→	GPIO0	
GPIO4		→	GPIO04	
GPIO3		→	GPIO05	
GPIO2		→	GPIO16	
GPIO1	TX	→	GPIO01	TX0
GPIO0	RX	→	GPIO03	RX0

Difference in pin assignments between Arduino UNO and Wemos-D1R2

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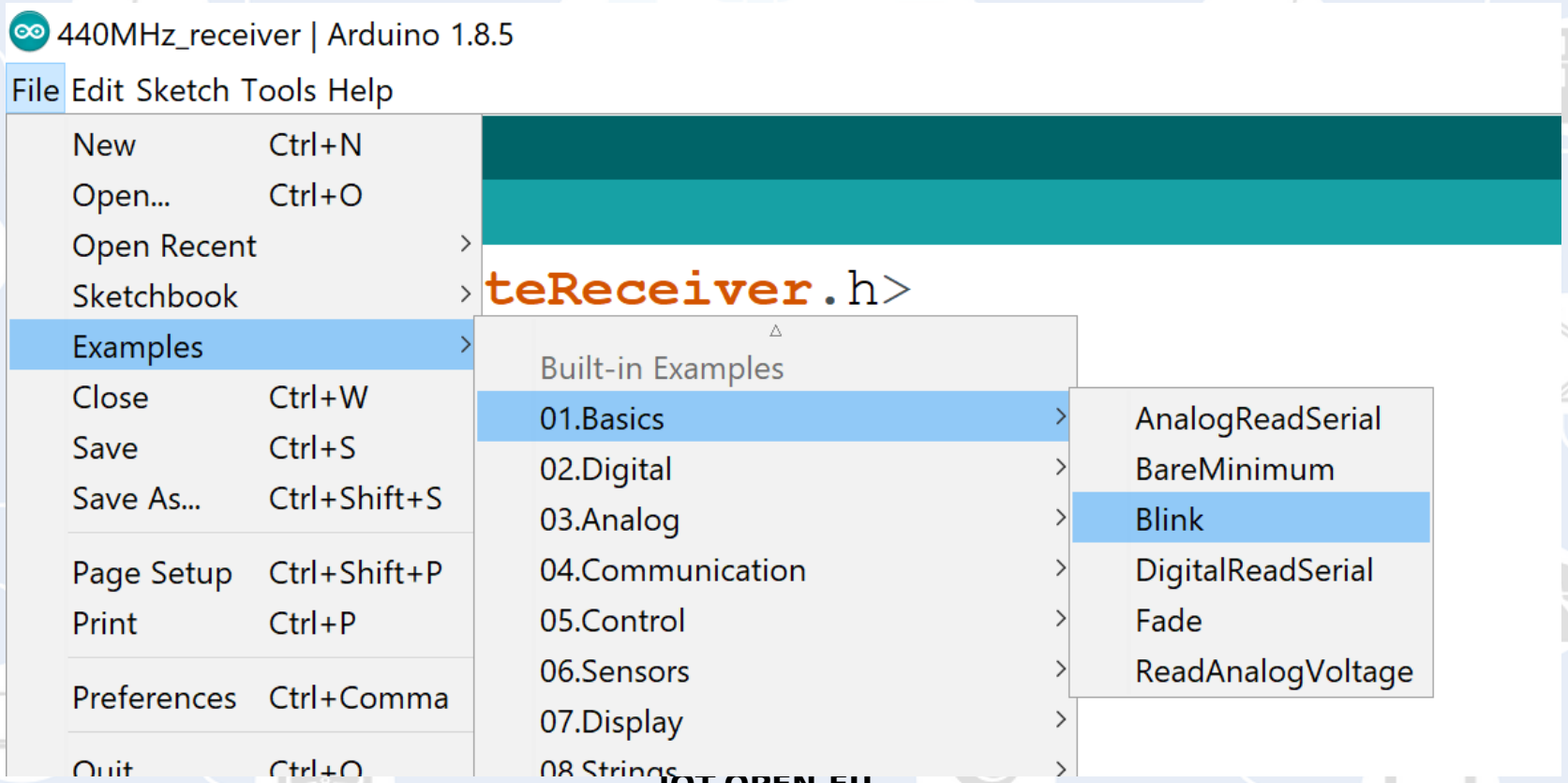
Blink example



PIN used by built-in LED

Board	PIN
Arduino	13
WeMos D1R2	14
ESP8266-12	2

Settings for WeMos D1R2

```
#define LED_BUILTIN 14


void setup() {
  // initialize digital pin LED_BUILTIN as an output.
  pinMode(LED_BUILTIN, OUTPUT);
}
```

Laboratory development boards

- LCD Keypad shield
- HD44780
- Analog input keyboard

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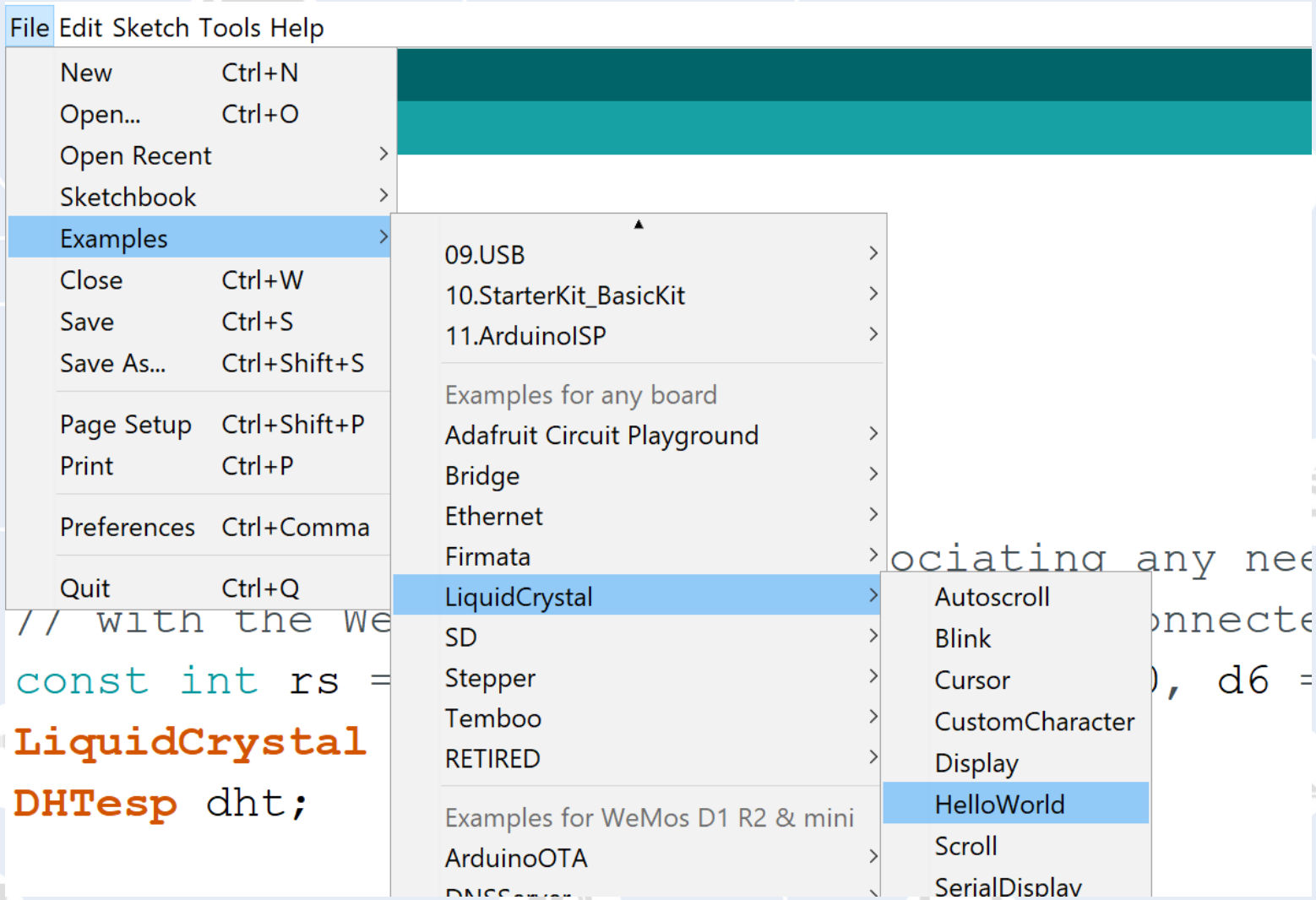
Hello world on LCD example



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PINs used by LCD Keypad shield

Name	Arduino number	ESP number
EN	9	13
RS	8	12
DB7	7	14
DB6	6	2
DB5	5	0
DB4	4	4
W	GND	

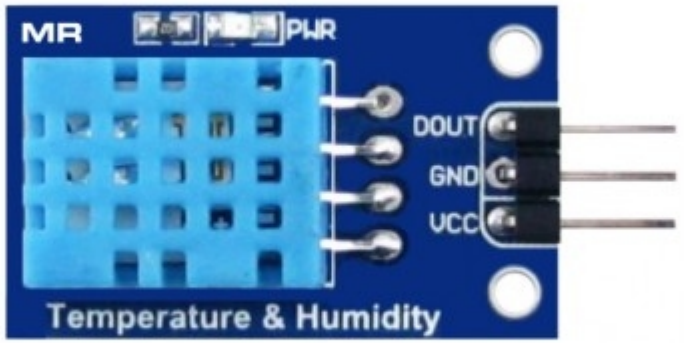
Settings for WeMos R1D2

```
#include <LiquidCrystal.h>
const int rs = 8, en = 9, d4 = 4, d5 = 5, d6 = 6, d7 = 7;
LiquidCrystal lcd(rs, en, d4, d5, d6, d7);

const int rs = 12, en = 13, d4 = 4, d5 = 0, d6 = 2, d7 = 14;
LiquidCrystal lcd(rs, en, d4, d5, d6, d7);
```

Laboratory development boards

- DHT11 sensor
- Temperature
- Humidity



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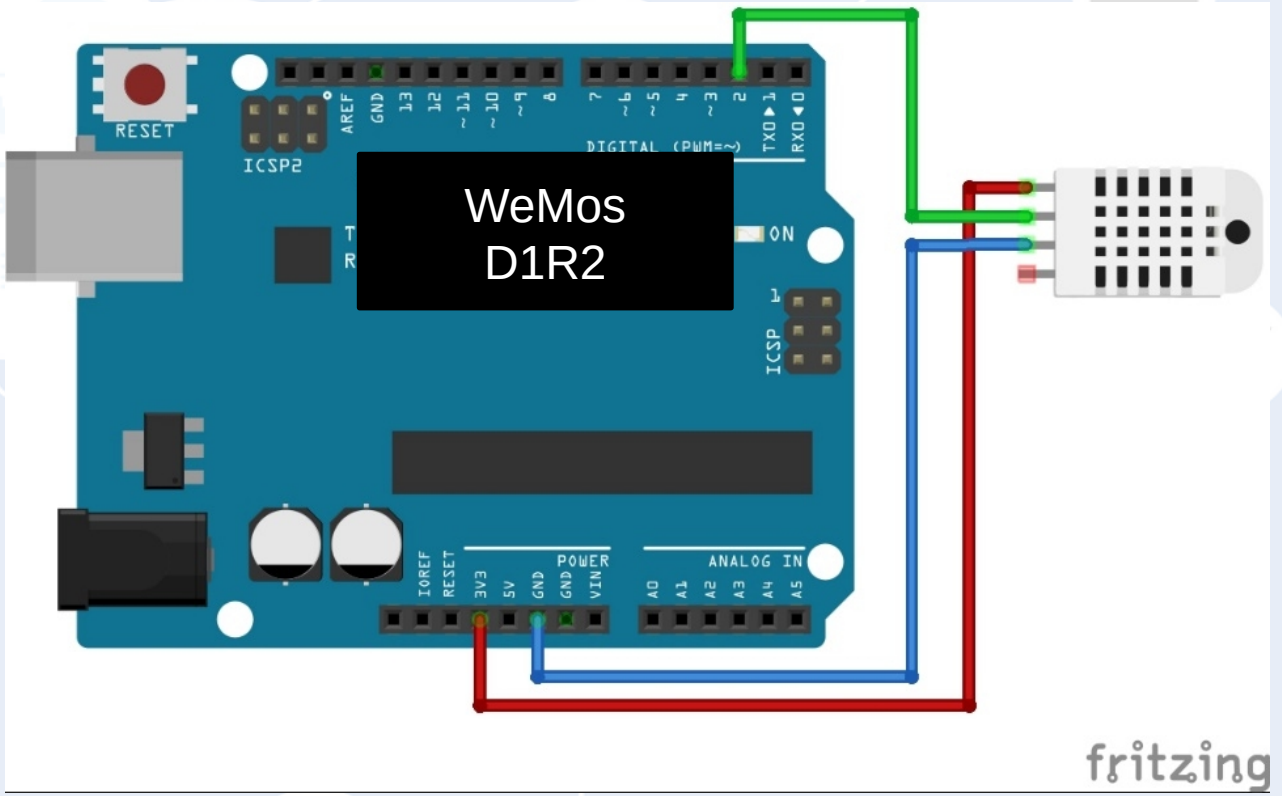
DHT11 connection

- Connect GND to GND
- Connect Vcc to 3V3 !
- Connect Dout to D16 (Arduino PIN D2)



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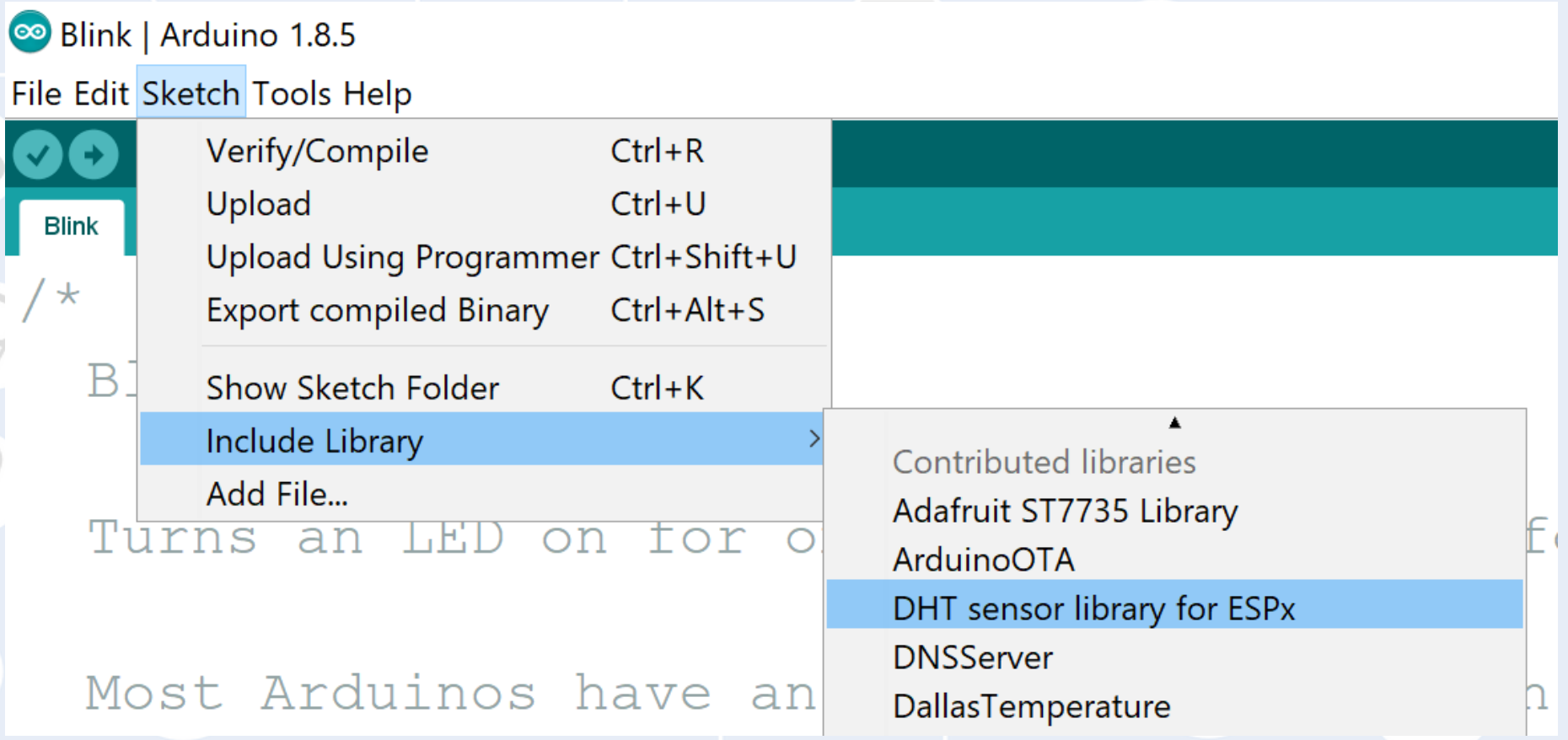
DHT11 library



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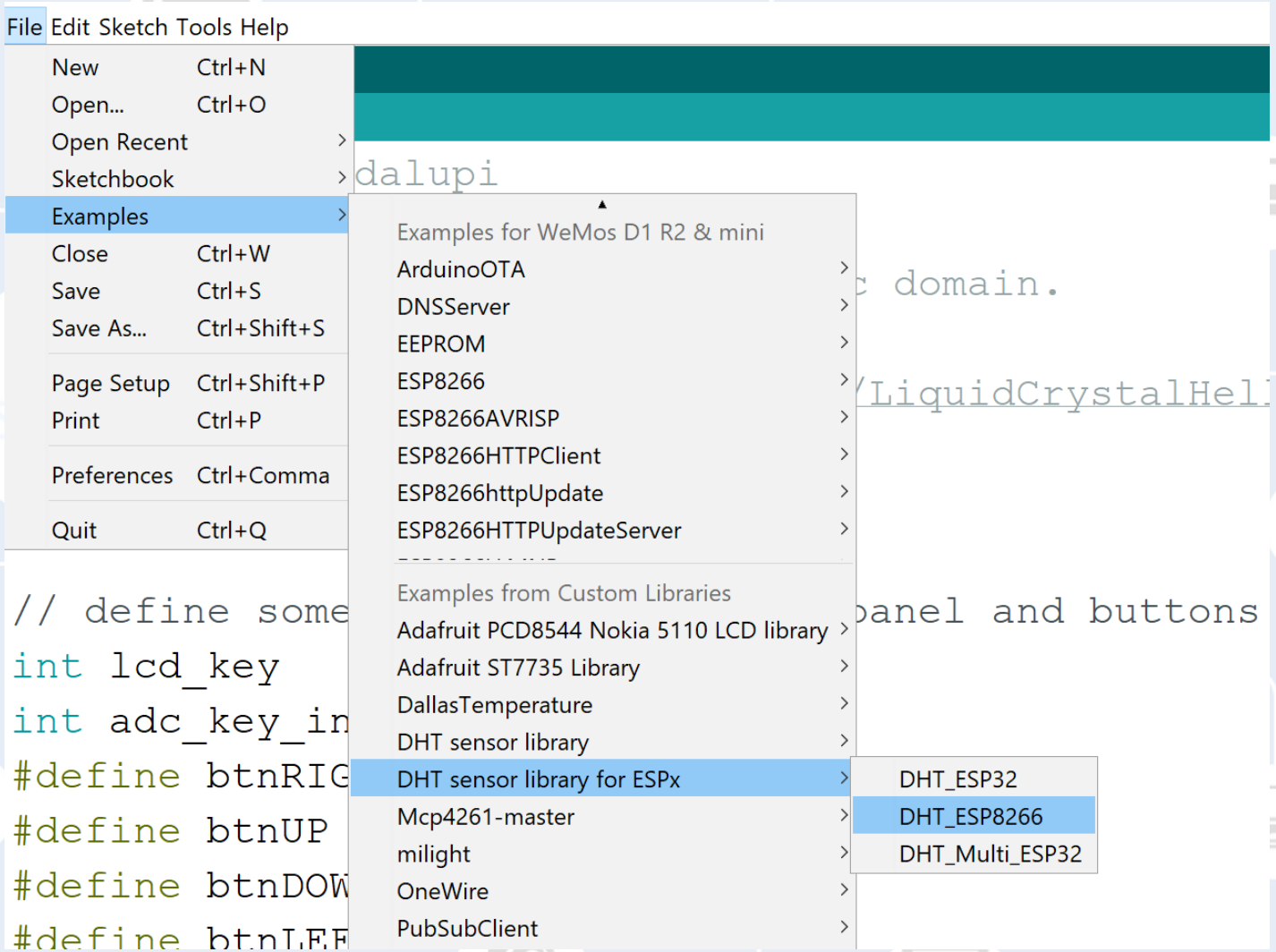
DHT11 example



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DHT for WeMos

```
void setup()
{
  dht.setup(16, DHTesp::DHT11);
}
```

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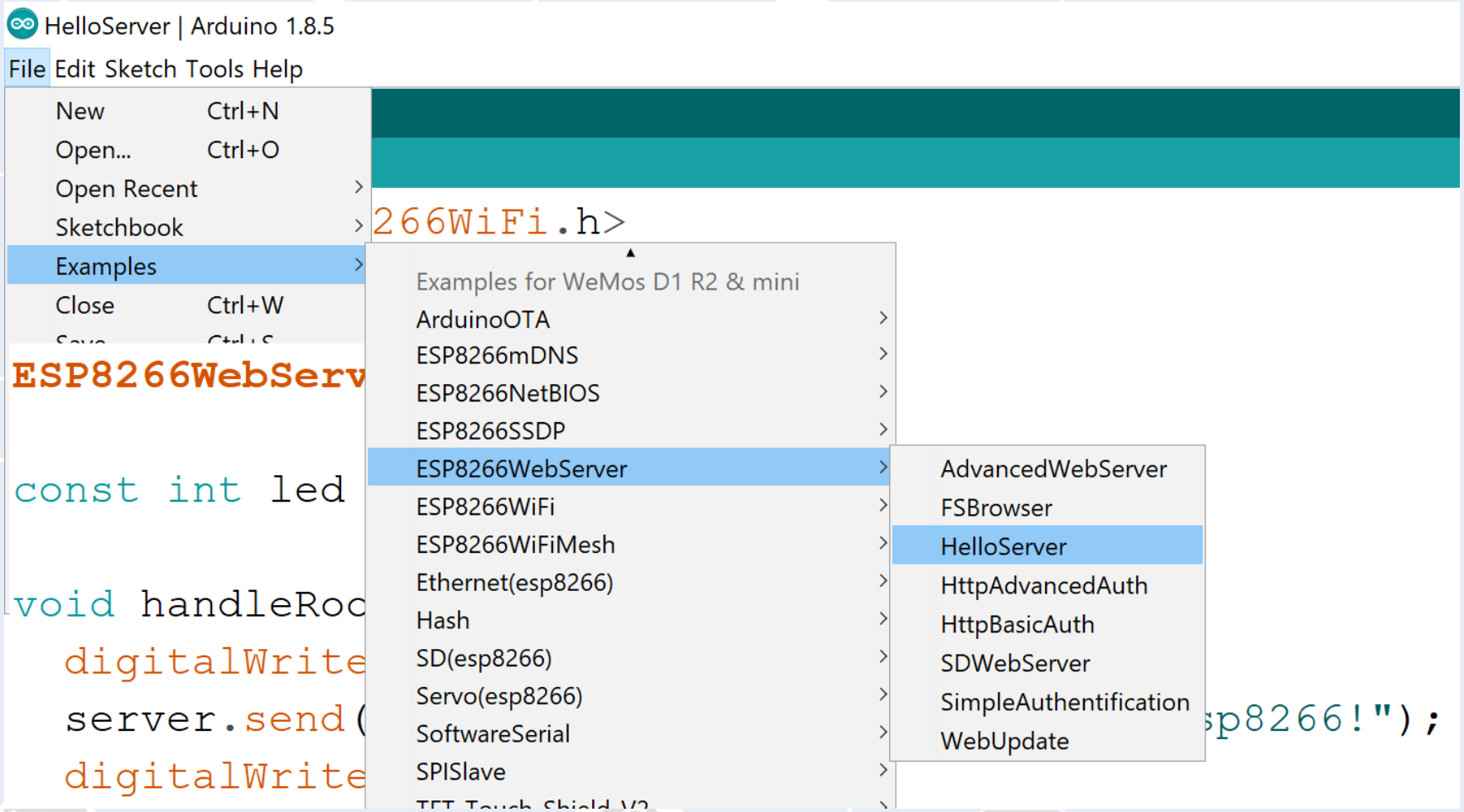
Simple Web server: „HelloServer”



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Web Server

```
const char* ssid = "internal.IOT";
const char* password = "IoTlab32768";
```

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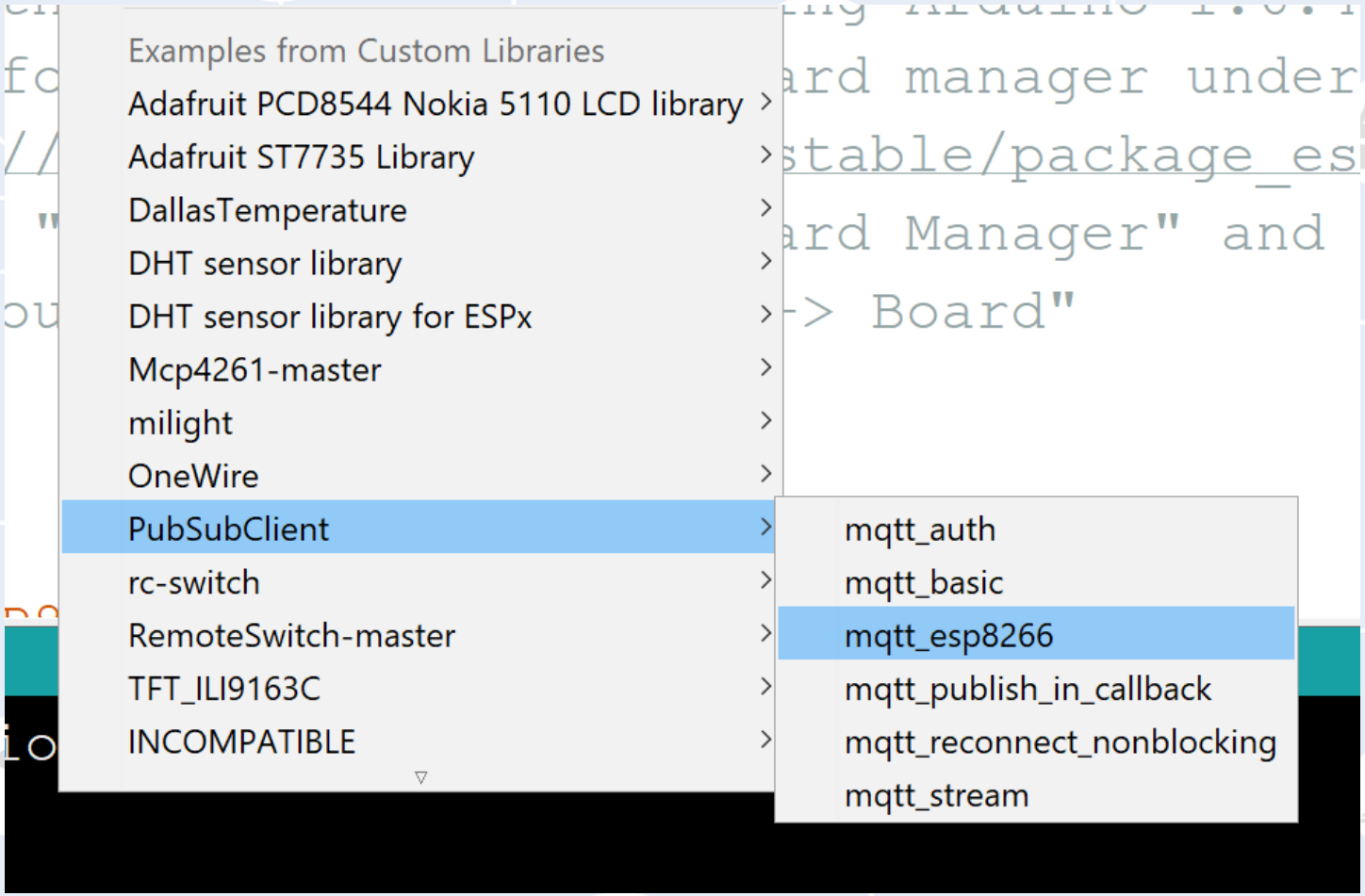
MQTT publish/ subscribe

library PubSubClient



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MQTT publish/subscribe

```
// Update these with values suitable for your network.


const char* ssid = "internal.IOT";
const char* password = "IoTlab32768";
const char* mqtt_server = "192.168.90.5"; //internally
const char* mqtt_server = "157.158.56.54"; //from external
```

MQTT publish/subscribe

MQTT server login credentials
Username: vrel
Password: vrel2018

```
// Attempt to connect
    if
(client.connect("ESP8266Client","vrel","vrel2018"))
```

Thank you!
Enjoy the labs ;)

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