Internet Of Things (IoT)

IT KMITL Mini Workshop
@L306 Monday 19th August 2019

Contents

What is? Why? IoT

In the world of Everything is Connected we trust.

IoT

an abbreviated form stand for internet of things.


优酷
Door open, light on
打开门，灯光点亮房间

What

we gonna do NEXT..?

Coding with
Arduino IDE
and compile to
NodeMCU

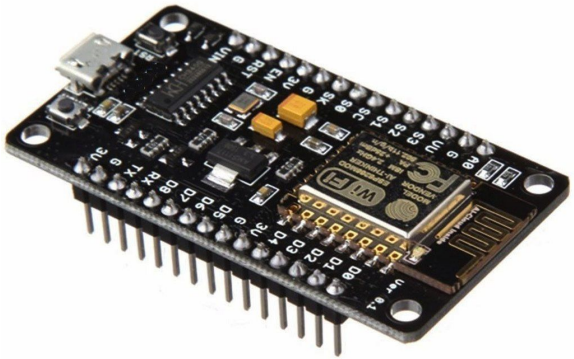
Make it bright by LED
Make it more interesting
with RGB

Deal with
Ultrasonic Sensor

Control it
via The Internet.

Introduction to NodeMCU

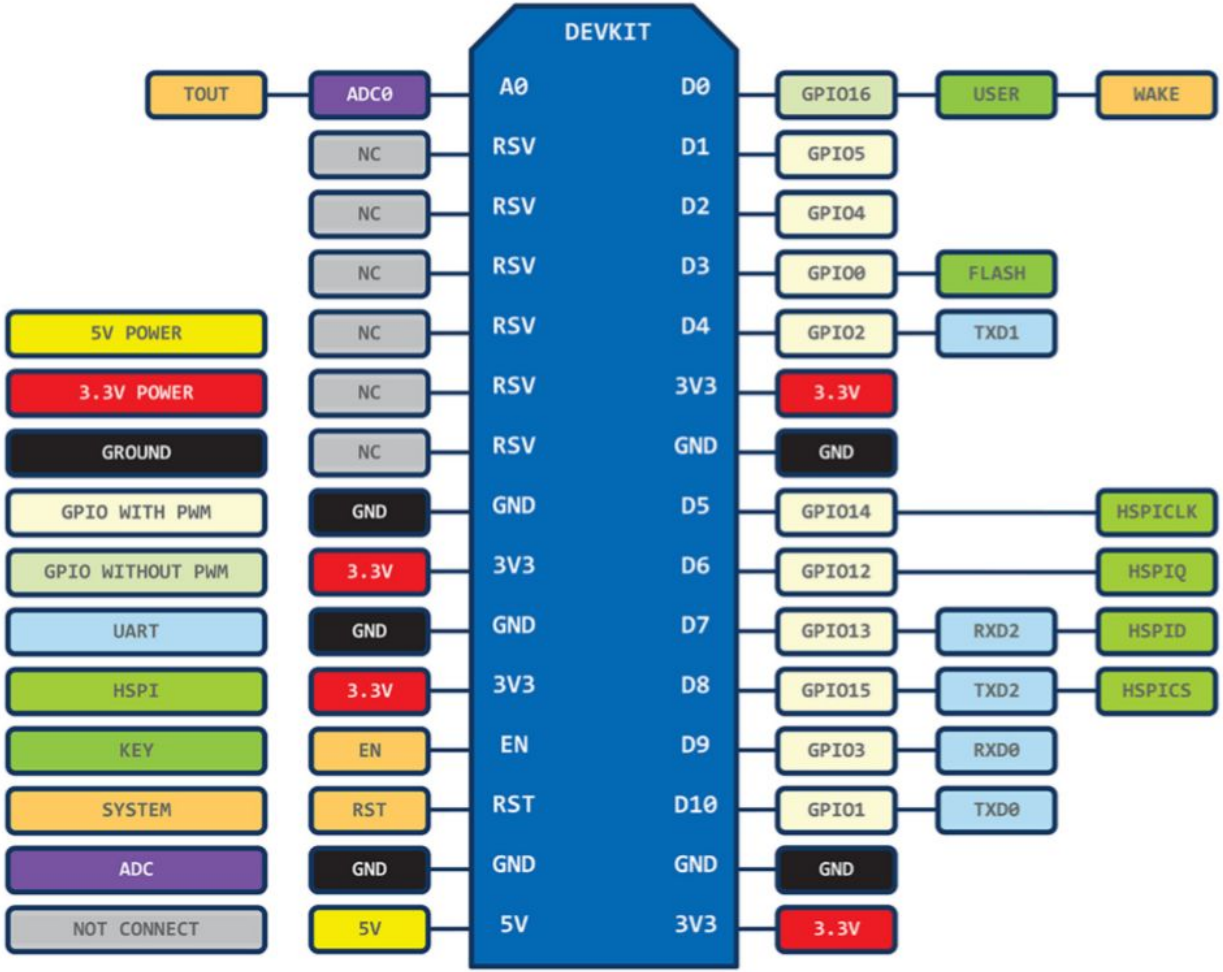
What is NodeMCU?



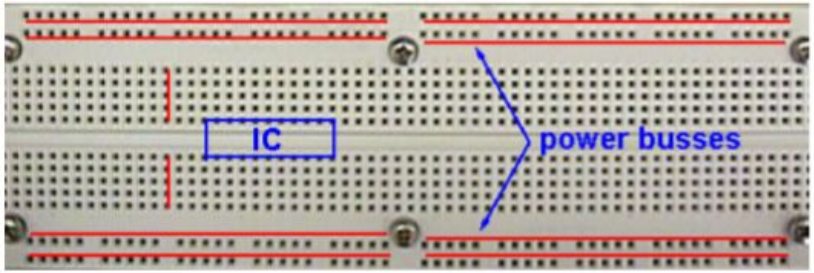
An open-source firmware and development kit that helps you to prototype your IOT

--> Open-source
--> Interactive
--> Programmable
--> Low cost
--> Simple
--> Smart
--> WI-FI enabled

ARDUINO


DEVKIT
TOUT
ADC0
A0
D0
GPIO16
USER
WAKE
NC
RSV
D1
GPIO5
NC
RSV
D2
GPIO4
NC
RSV
D3
GPIO0
FLASH
5V POWER
NC
RSV
D4
GPIO2
TXD1
3.3V POWER
NC
RSV
3V3
3.3V
GROUND
NC
RSV
GND
GND
GPIO WITH PWM
GND
GND
D5
GPIO14
HSPICLK
GPIO WITHOUT PWM
3.3V
3V3
D6
GPIO12
HSPIQ
UART
GND
GND
D7
GPIO13
RXD2
HSPID
HSPI
3.3V
3V3
D8
GPIO15
TXD2
HSPICS
KEY
EN
EN
D9
GPIO3
RXD0
SYSTEM
RST
RST
D10
GPIO1
TXD0
ADC
GND
GND
GND
GND
NOT CONNECT
5V
5V
3V3
3.3V

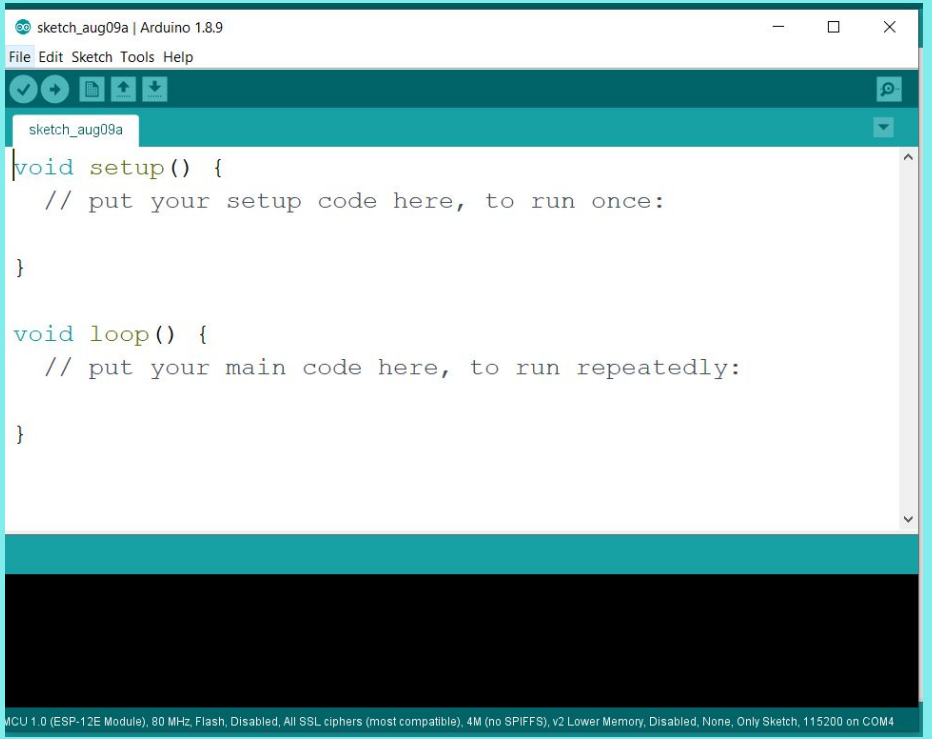
How does a breadboard work?

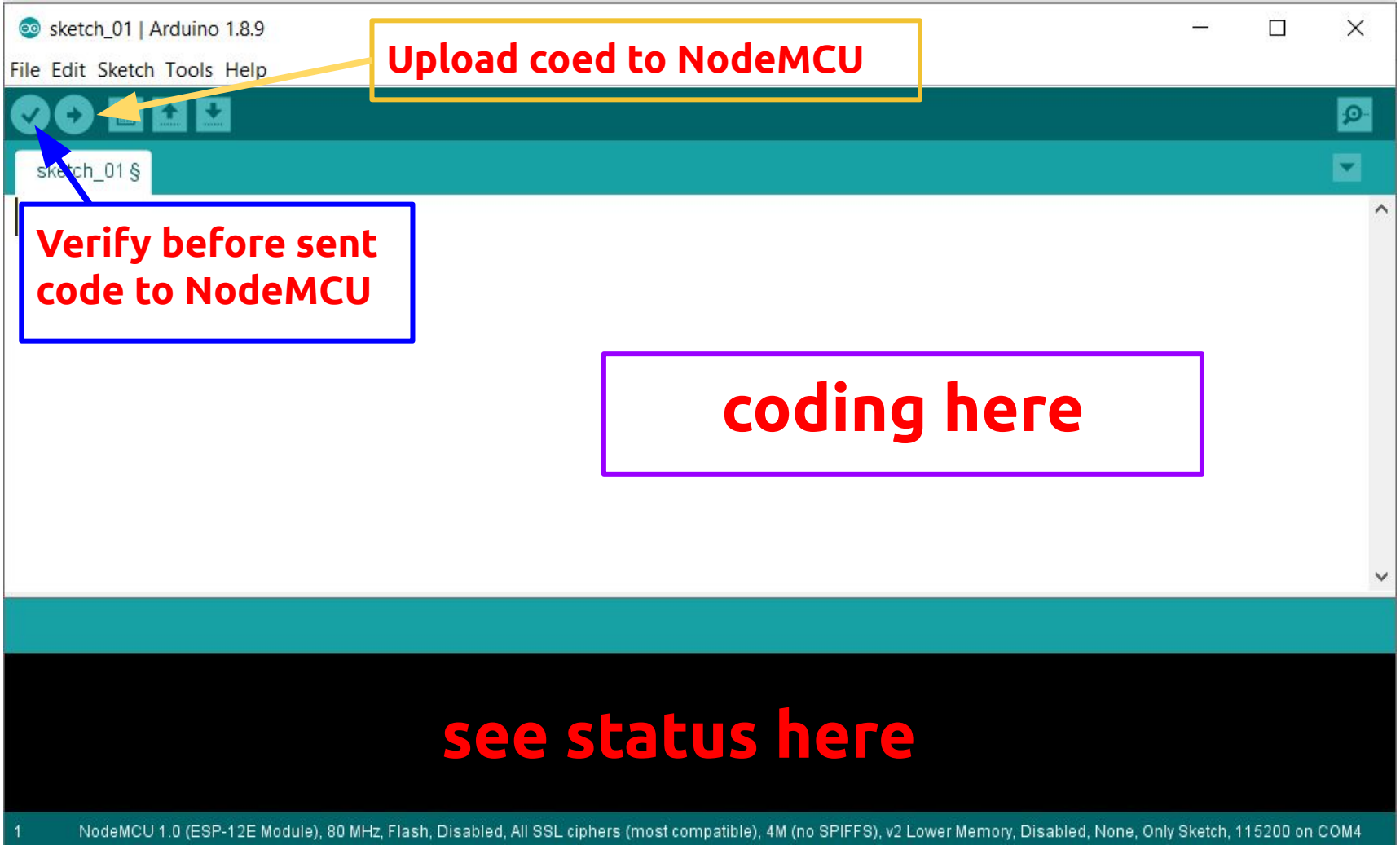


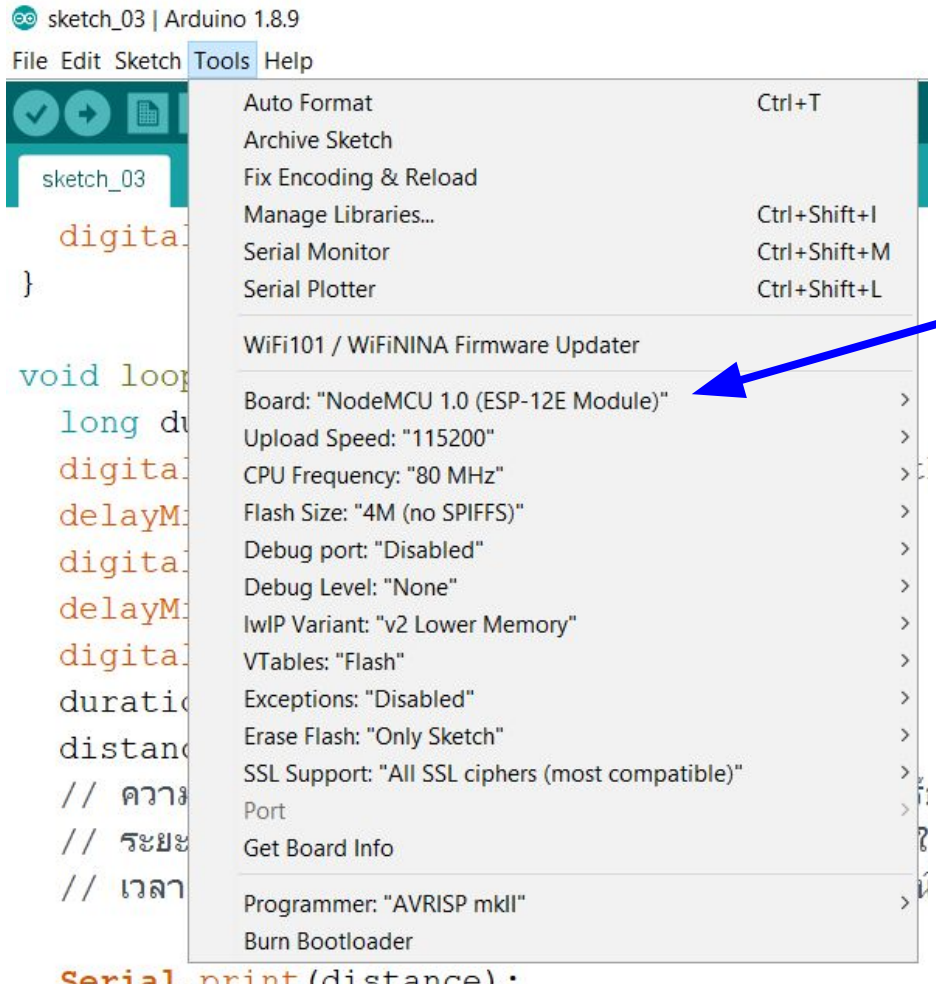
Arduino IDE

The language used to write code is C/C++ Each Arduino program is called a SKETCH

- ***setup()*** – run ONCE at beginning, set pins
- ***loop()*** – run repeatedly. All of the code within the curly braces will be run again, and again, until the power is removed




sketch_01 | Arduino 1.8.9
File Edit Sketch Tools Help
Upload coed to NodeMCU
sketch_01 §
Verify before sent code to NodeMCU
coding here
see status here
1
NodeMCU 1.0 (ESP-12E Module), 80 MHz, Flash, Disabled, All SSL ciphers (most compatible), 4M (no SPIFFS), v2 Lower Memory, Disabled, None, Only Sketch, 115200 on COM4

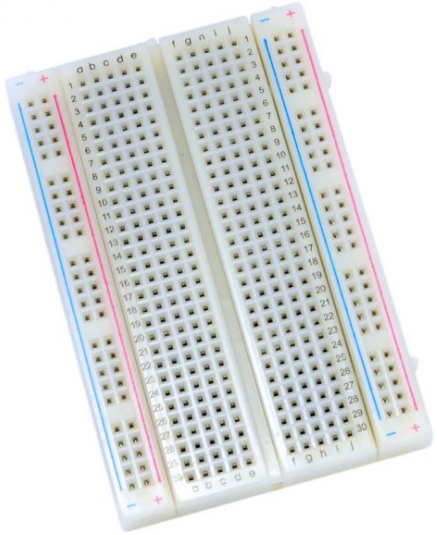


NodeMCU 1.0 (ESP-12E Module)

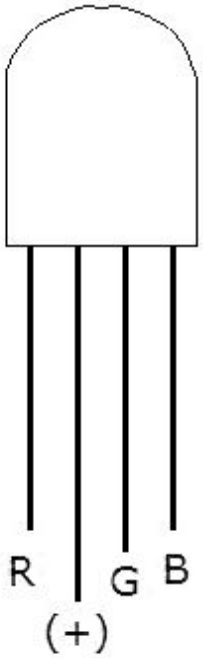
Example Functions

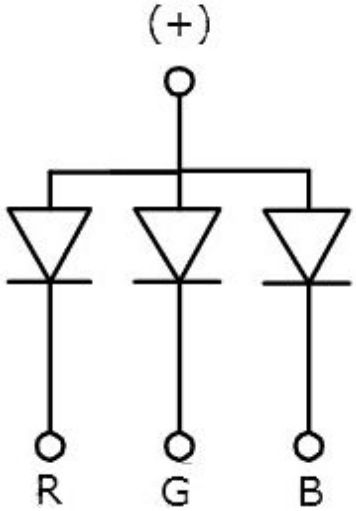
- **pinMode()** – set a pin as input or output
- **digitalWrite()** – set a digital pin high/low
- **digitalRead()** – read a digital pin state
- **analogRead()** – read an analog pin
- **analogWrite()** – write an “analog” value
- **delay()** – wait an amount of time

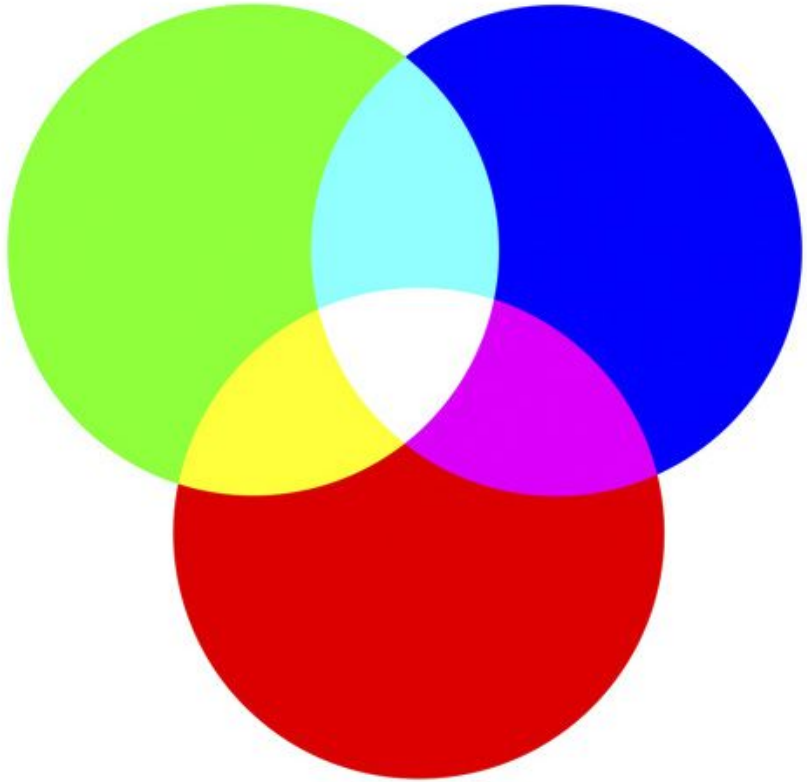
Workshop #1



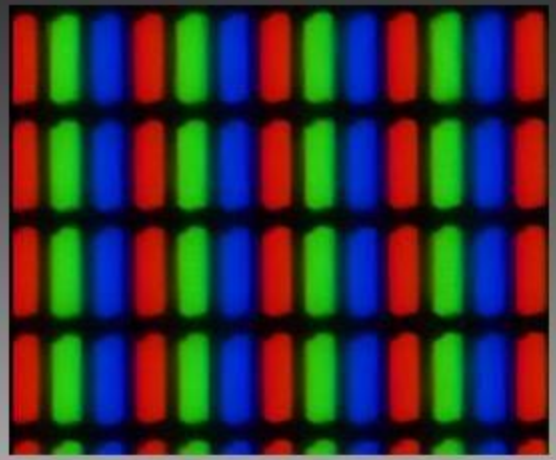
Common
Anode (+)



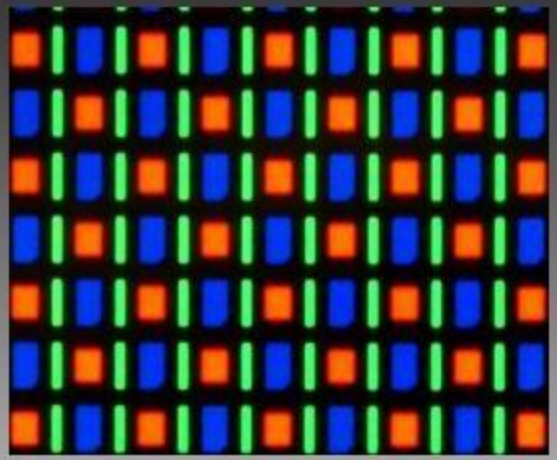




LCD

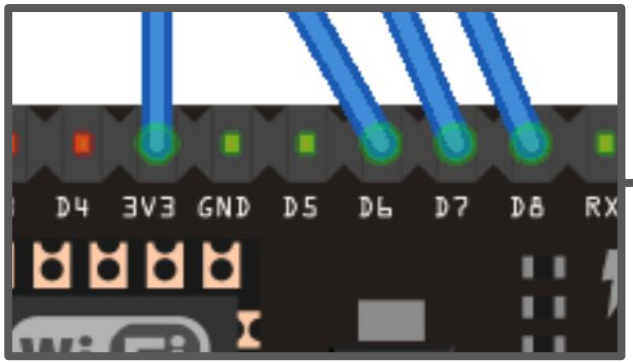


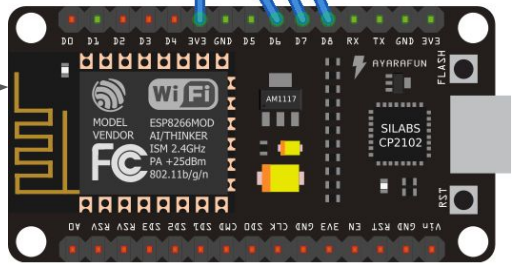
AMOLED



LED RGB		***NodeMCU***
R	**--->**	**D6**
(+)	**--->**	**3V3**
G	**--->**	**D7**
B	**--->**	**D8**

Zoom





fritzing

```
int red = D6;
int green = D7;
int blue = D8;

pinMode(red, OUTPUT);
pinMode(green, OUTPUT);
pinMode(blue, OUTPUT);
digitalWrite(red, HIGH);
digitalWrite(green, HIGH);
digitalWrite(blue, HIGH);
}

void loop() {
  digitalWrite(red, LOW);
  digitalWrite(green, HIGH);
  digitalWrite(blue, HIGH);
}
```

Common Anode

Common Anode displays have all the LED Anodes connected together and need a display driver with outputs which become low to turn each segment on

Have you tried..?

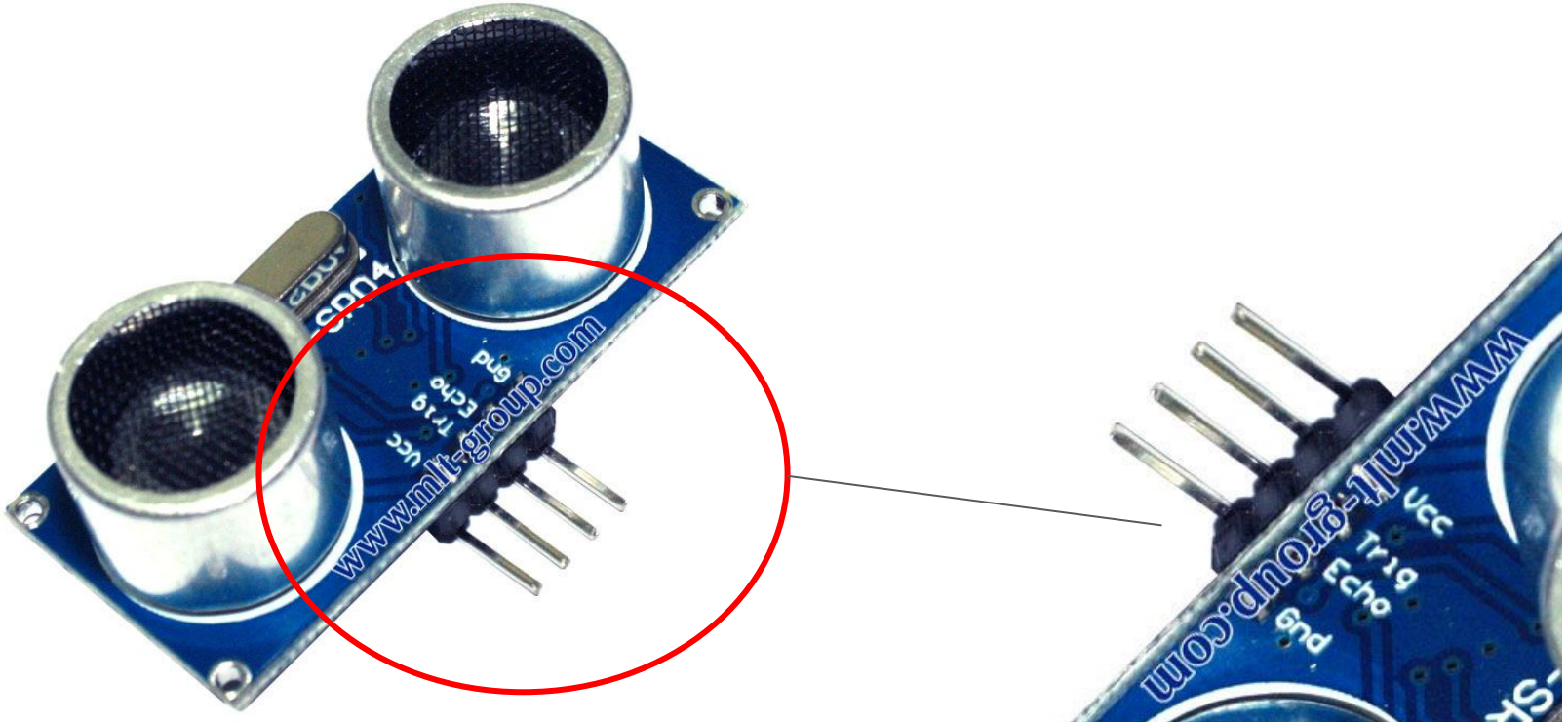
→ เปลี่ยนสีของไฟให้เป็น สีฟ้า

→ เปลี่ยนสีของไฟให้เป็น สีขาว

→ ลองทำไฟให้กระพริบ

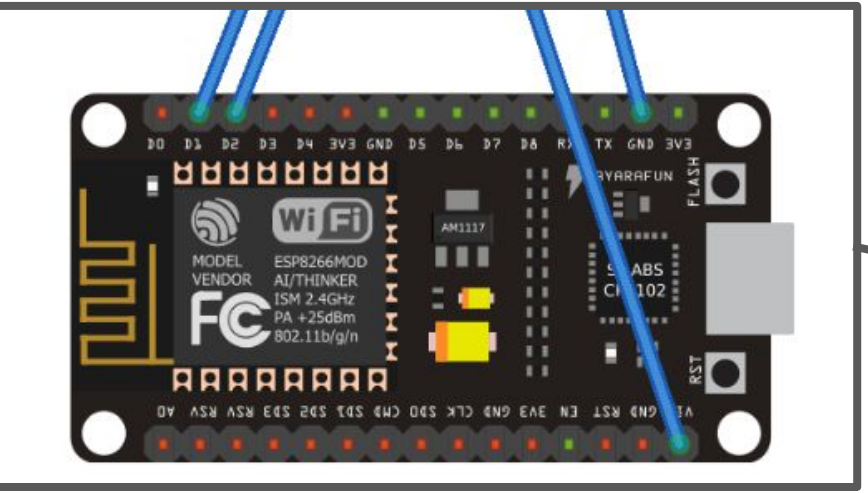
Workshop #2

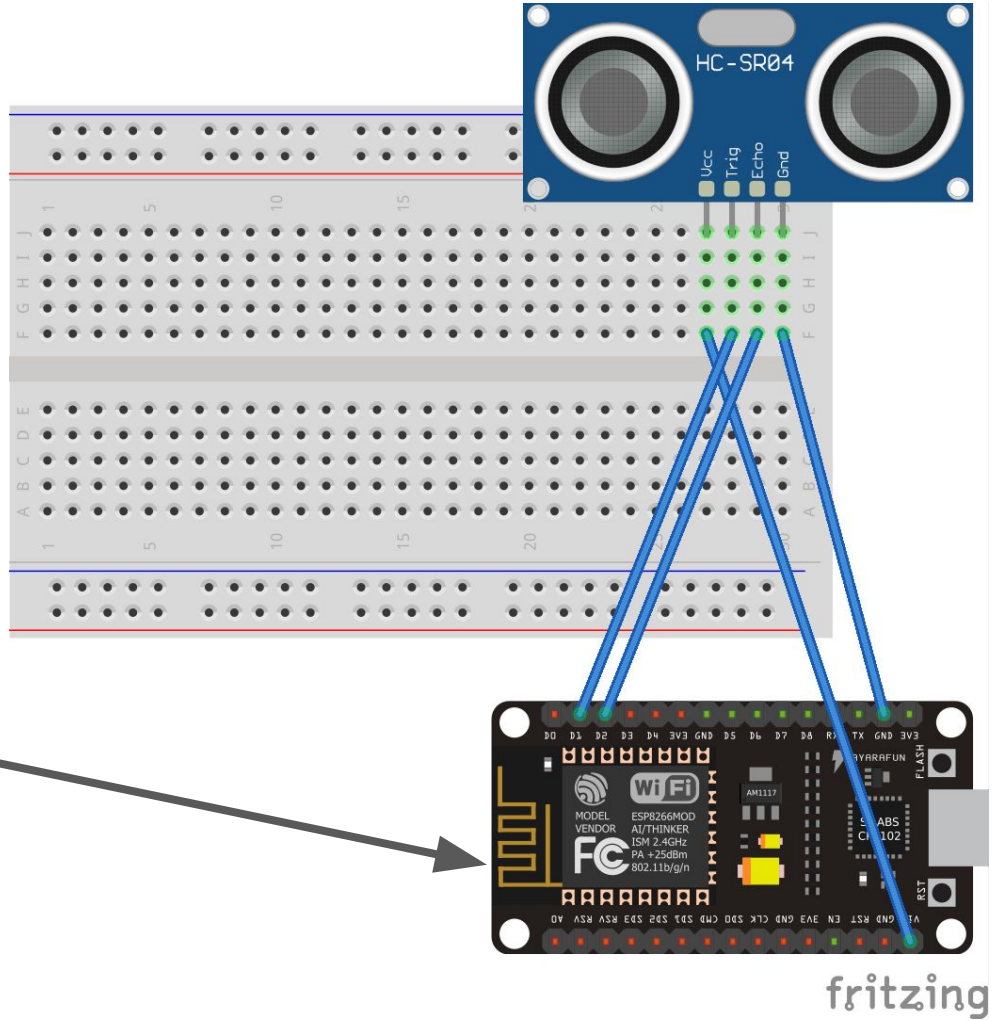
Ultrasonic Sensor Module

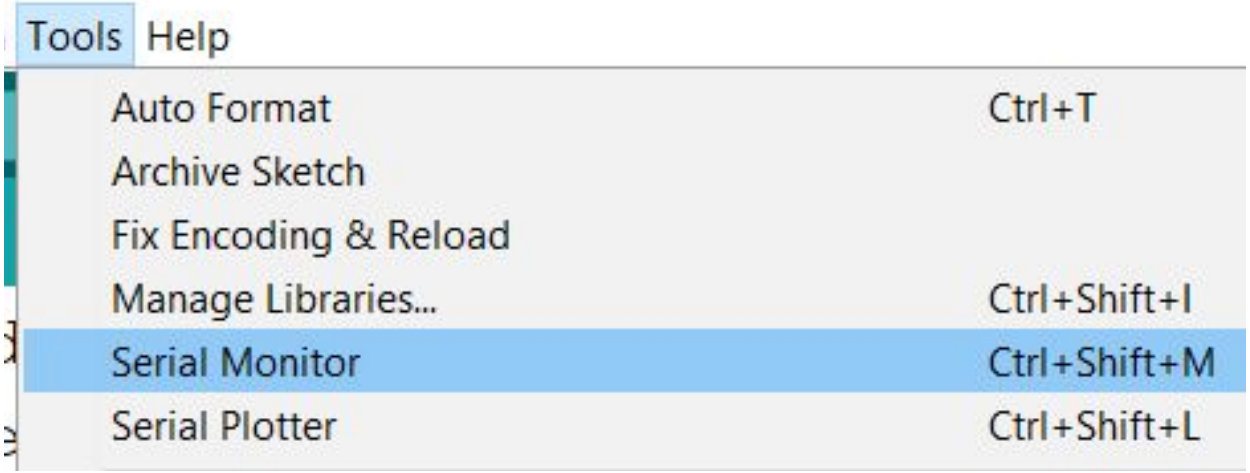


HS-SR04		NodeMCU
VCC	--->	VIN
TRIG	--->	D1
ECHO	--->	D2
GND	--->	GND

Zoom






Tools
Help
Auto Format
Ctrl+T
Archive Sketch
Fix Encoding & Reload
Manage Libraries...
Ctrl+Shift+I
Serial Monitor
Ctrl+Shift+M
Serial Plotter
Ctrl+Shift+L

```
void setup() {
  Serial.begin (9600);
  pinMode(TRIGGER_PIN, OUTPUT);
  pinMode(ECHO_PIN, INPUT);
  pinMode(BUILTIN_LED, OUTPUT);
}

void loop() {
  long duration, distance;
  digitalWrite(TRIGGER_PIN, LOW);  // Added this line
  delayMicroseconds(2); // Added this line
  digitalWrite(TRIGGER_PIN, HIGH);
  delayMicroseconds(10); // Added this line
  digitalWrite(TRIGGER_PIN, LOW);
  duration = pulseIn(ECHO_PIN, HIGH);
  distance = (duration/2) / 29.1;
  // ความเร็วเสียงในอากาศประมาณ 340 เมตร/วินาที หรือ 29 ไมโครวินาที/เซนติเมตร
  // ระยะทางที่ส่งเสียงออกไปจนเสียงสะท้อนกลับมาสามารถใช้หาระยะทางของวัตถุได้
  // เวลาที่ใช้คือ ระยะทางไปกลับ ดังนั้นระยะทางคือ ครึ่งหนึ่งของที่วัดได้

  Serial.print(distance);
  Serial.println(" cm");
  delay(1000);
```

Have you tried..?

→ ลองให้เมื่อระยะห่างต่ำกว่า 5 เซนติเมตร ให้แสดงผล “Hello It’s me!” ถ้ามากกว่า 5 เซนติเมตร “Hello World!”

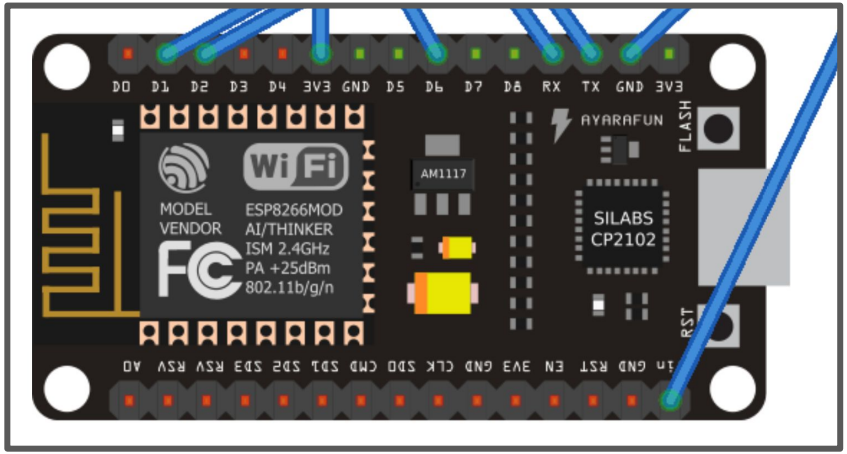
Workshop 1+2

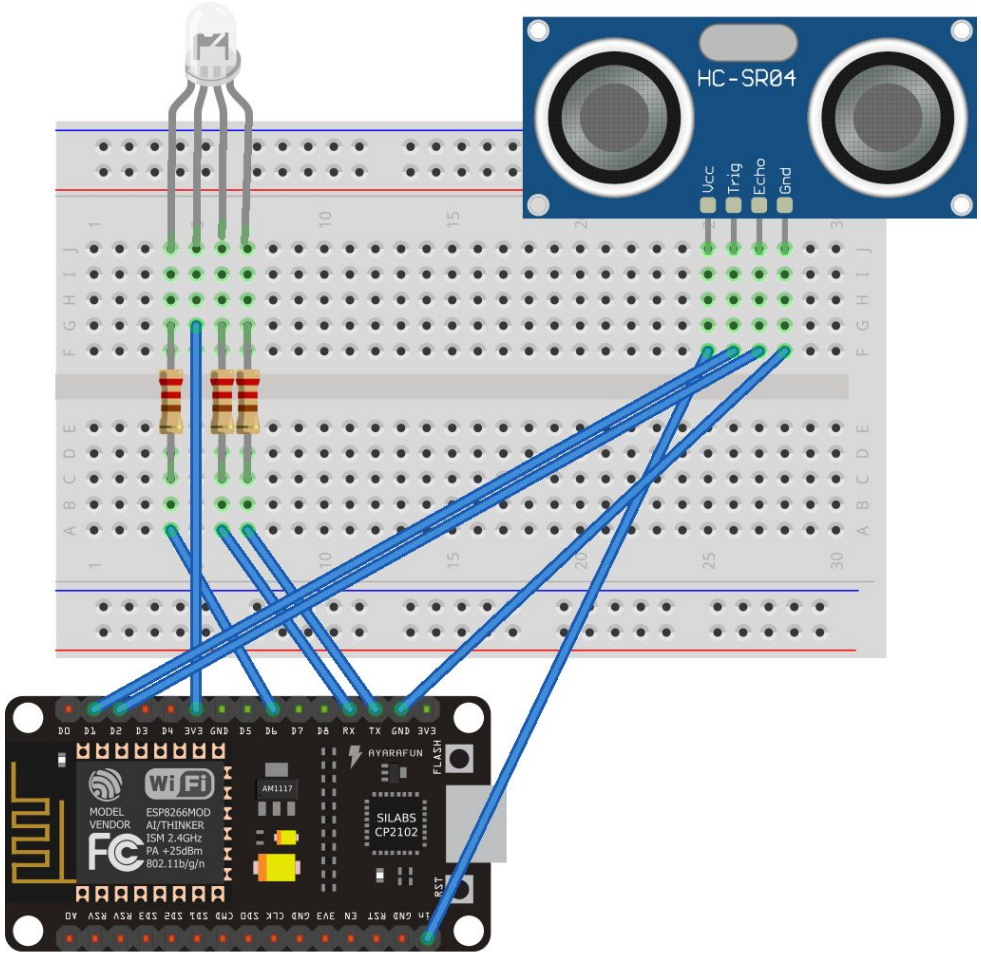
เครื่องมือตรวจจับวัตถุโดยแสดงสถานะผ่านหลอดไฟ RGB

HS-SR04		***NodeMCU***
VCC	--->	VIN
TRIG	--->	D1
ECHO	--->	D2
GND	--->	GND

LED RGB		***NodeMCU***
R	--->	D6
(+)	--->	3V3
G	--->	D7
B	--->	D8

Zoom



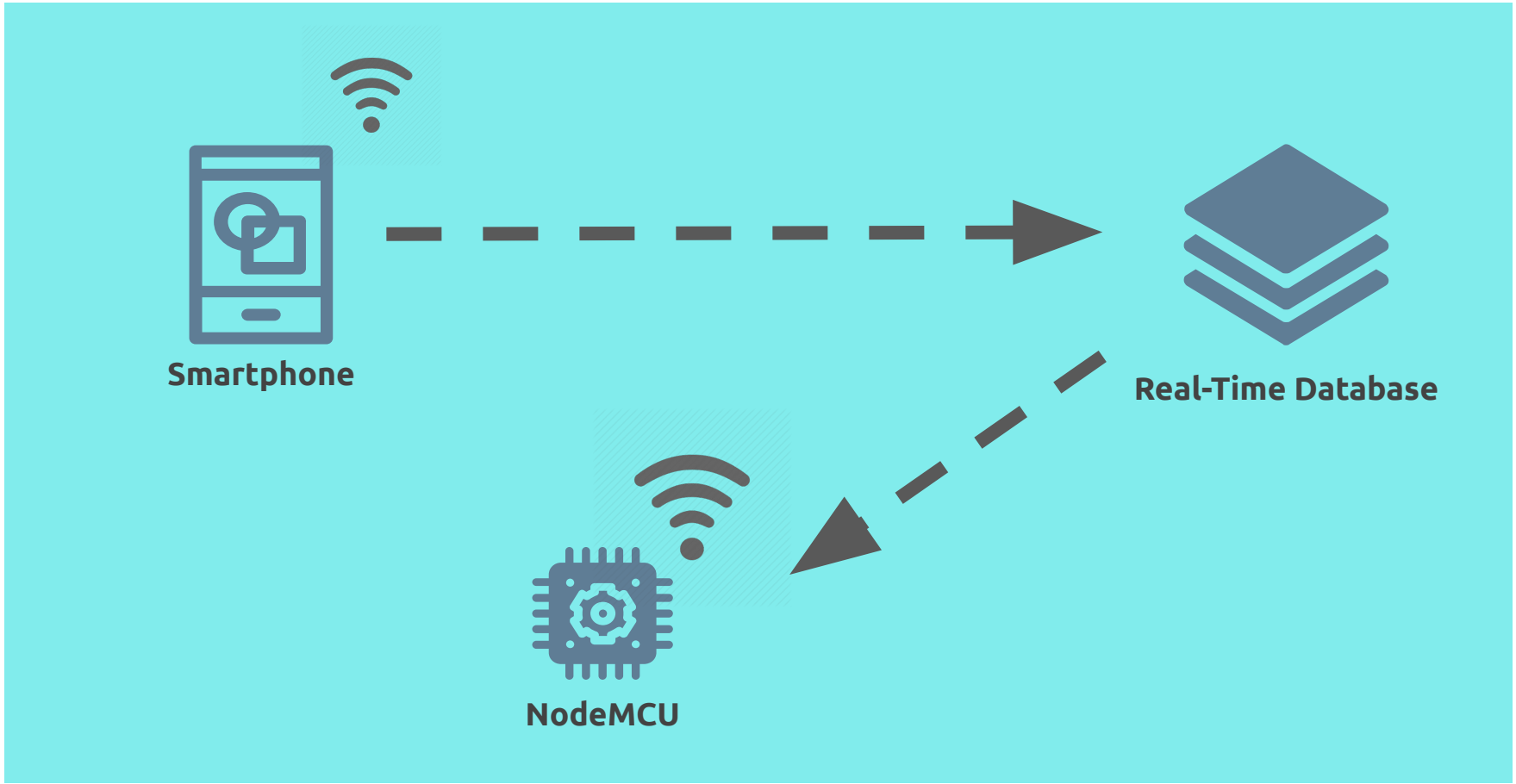


fritzing

IoT with NodeMCU


Firebase

Database


Smartphone
Real-Time Database
NodeMCU

Thanks!