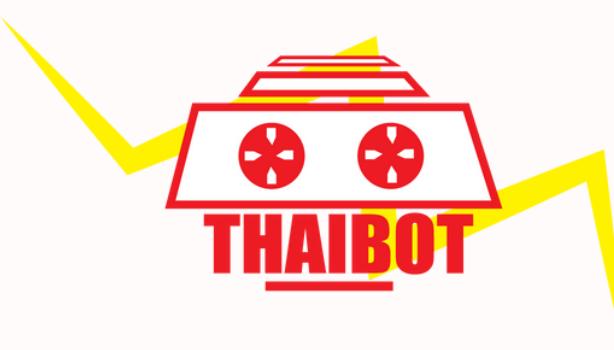
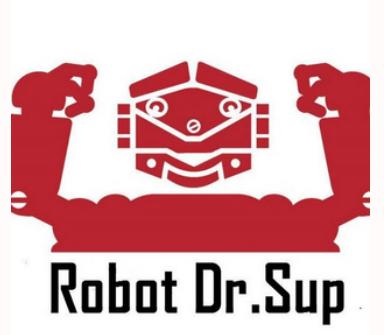
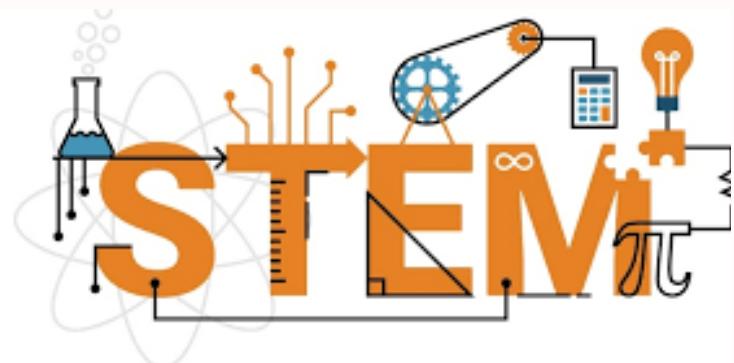


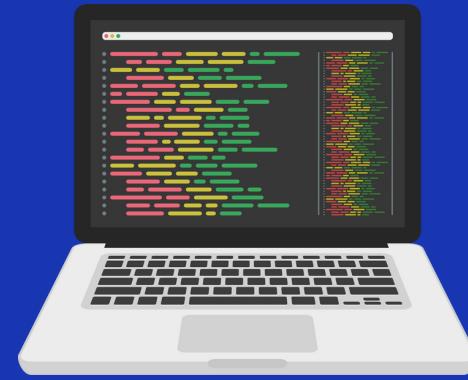
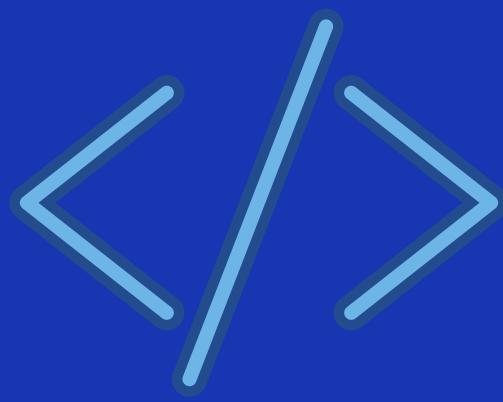


ARDUINO & ROBOTICS



Path 4

Programming 2 Fundamental



C++ / Control Statement IF

1st Condition is true

```
int number = 2;  
if (number > 0) {  
    // code  
}  
else if (number == 0){  
    // code  
}  
else {  
    //code  
}  
//code after if
```

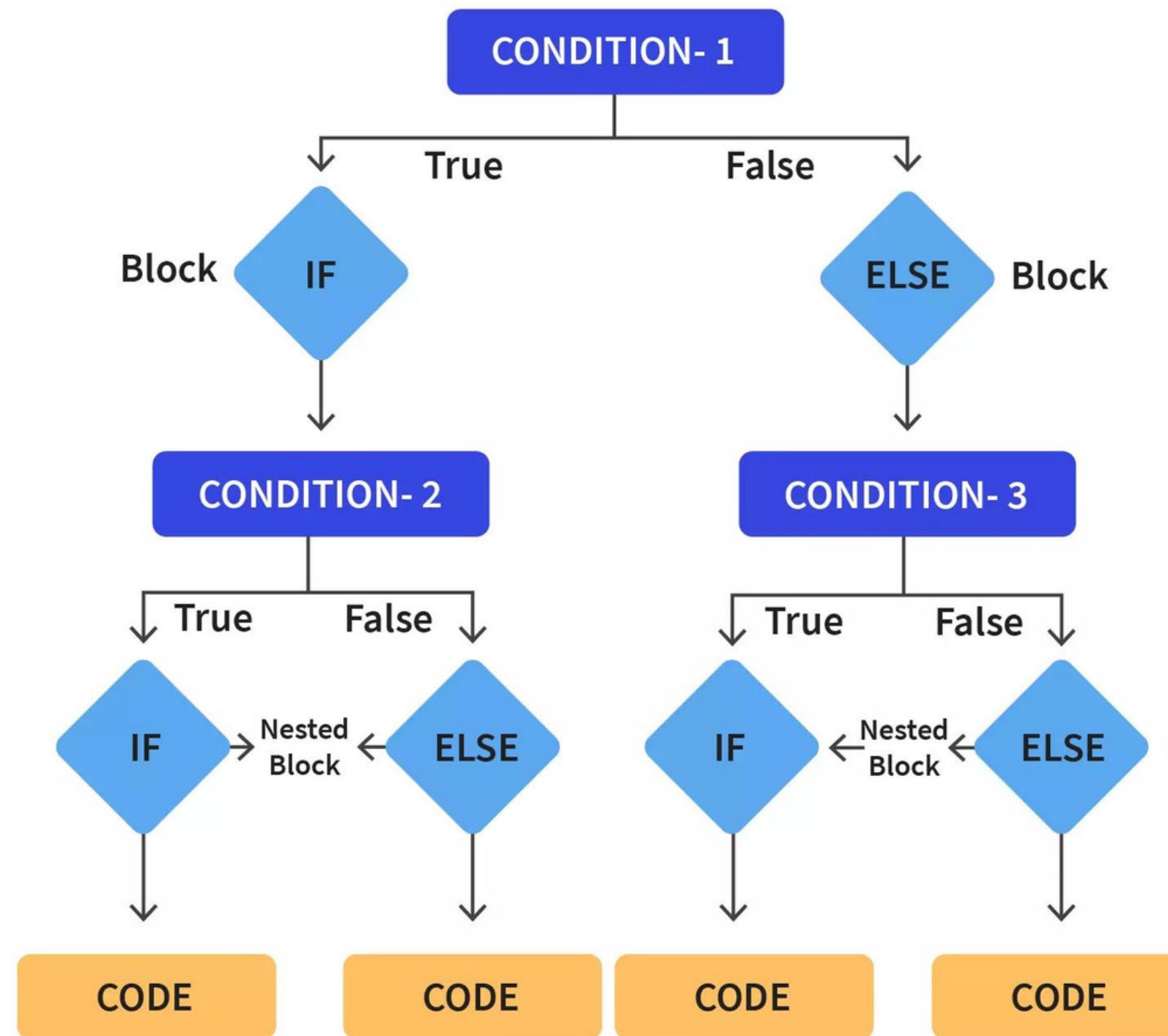
2nd Condition is true

```
int number = 0;  
if (number > 0) {  
    // code  
}  
else if (number == 0){  
    // code  
}  
else {  
    //code  
}  
//code after if
```

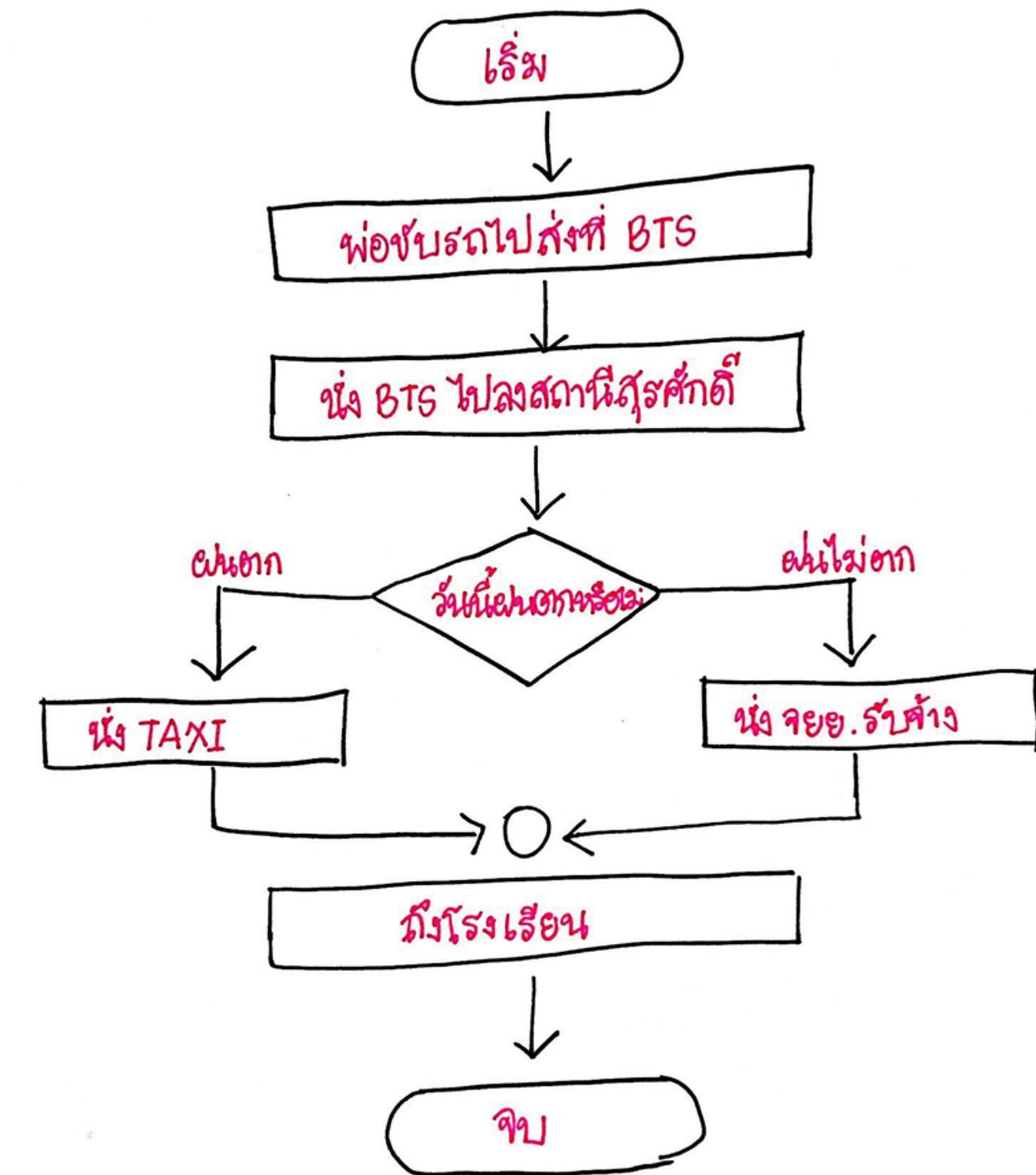
All Conditions are false

```
int number = -2;  
if (number > 0) {  
    // code  
}  
else if (number == 0){  
    // code  
}  
else {  
    //code  
}  
//code after if
```

C++ / Control Statement IF



SCALER
Topics



C++ /Operator Comparison

เครื่องหมาย	การกระทำ	ตัวอย่าง	คำอธิบาย
>	มากกว่า	<code>if(x>10)</code>	x มากกว่า 10 ใช่หรือไม่
<	น้อยกว่า	<code>if(x<10)</code>	x น้อยกว่า 10 ใช่หรือไม่
>=	มากกว่าหรือเท่ากับ	<code>if(x>=10)</code>	x มากกว่าหรือเท่ากับ 10 ใช่หรือไม่
<=	น้อยกว่าหรือเท่ากับ	<code>if(x<=10)</code>	x น้อยกว่าหรือเท่ากับ 10 ใช่หรือไม่
= =	เท่ากับ	<code>if(x==10)</code>	x เท่ากับ 10 ใช่หรือไม่
!=	ไม่เท่ากับ	<code>if(x!=10)</code>	x ไม่เท่ากับ 10 ใช่หรือไม่

เครื่องหมาย	การกระทำ	คำอธิบาย
<code>&&</code>	แอนด์	เชื่อมเงื่อนไขระหว่าง 2 เงื่อนไขด้วยคำว่า “และ”
<code> </code>	ออร์	เชื่อมเงื่อนไขระหว่าง 2 เงื่อนไขด้วยคำว่า “หรือ”
!	อินเวิร์ส	ใส่ไว้หน้าตัวแปร จะทำให้ได้ค่าลожจิกตรงข้าม เช่น <code>!x</code>

Example Operator Comparison

```
void setup() {  
  
    Serial.begin(9600);  
  
    int a = 5;  
    int b = 5;  
  
    Serial.println( a == b );  
    Serial.println( a > b );  
    Serial.println( a >= b );  
    Serial.println( a != b );  
  
    Serial.println( "-----" );  
  
    Serial.println( a == b && a == 10 );  
    Serial.println( a == b || a < 10 );  
  
}
```

```
1  
0  
1  
0  
-----  
0  
1
```

Example Operator Comparison

```
void setup() {  
  
    Serial.begin(9600);  
  
    int a = 5;  
    int b = 5;  
  
    if( a == b ){  
        Serial.println("A = B");  
    }else{  
        Serial.println("A != B");  
    }  
}
```

A = B

Build-in function < pinMode() >

Syntax

```
pinMode(pin, mode)
```

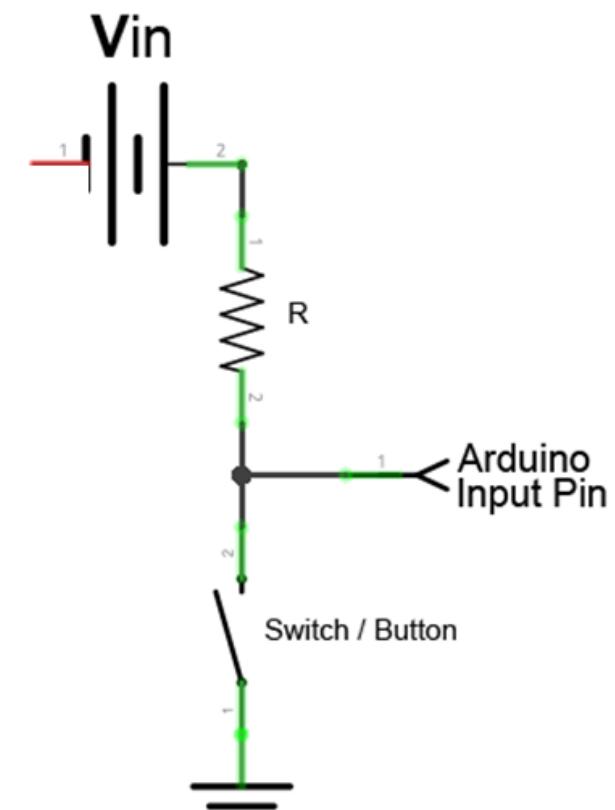
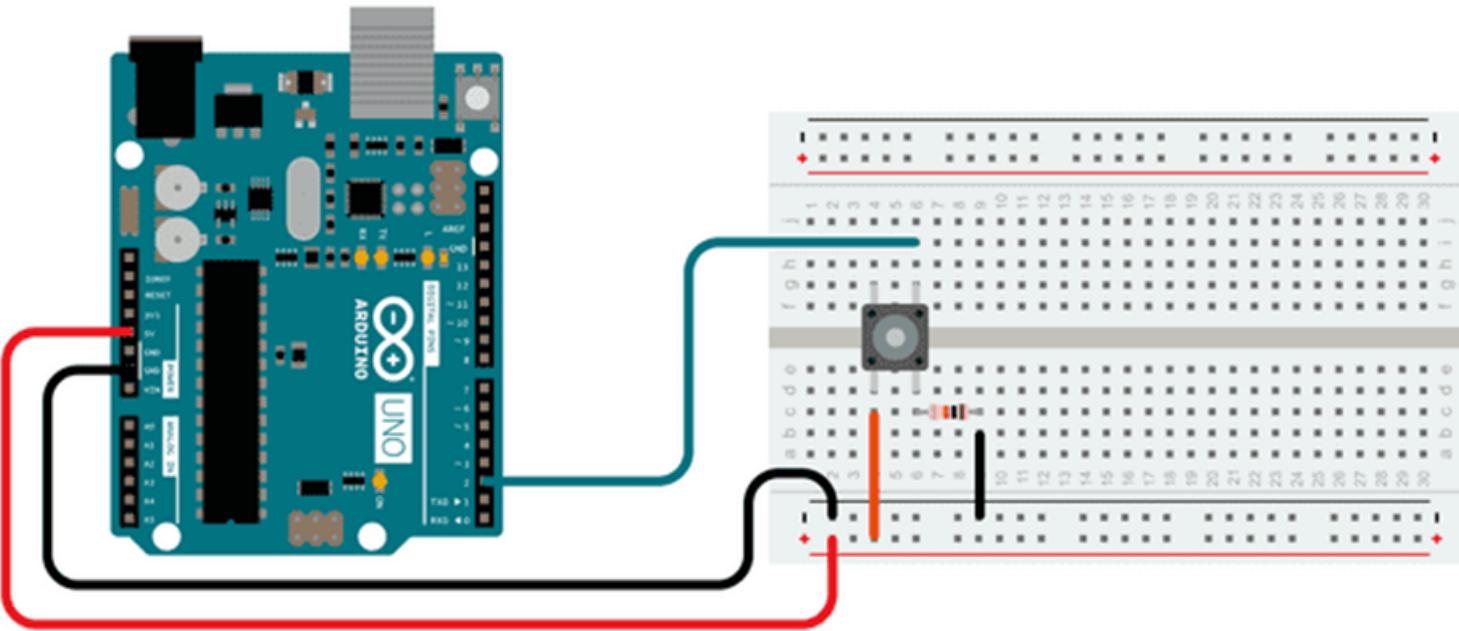
Parameters

pin: the Arduino pin number to set the mode of.

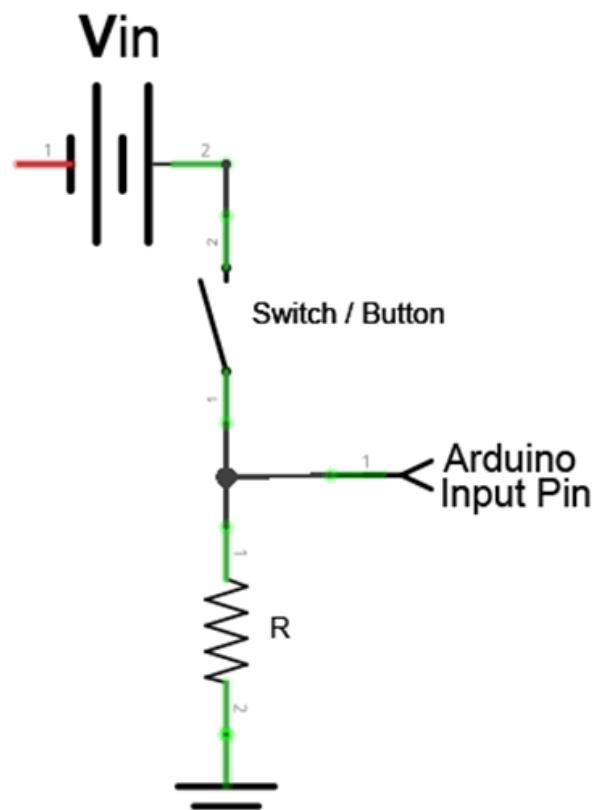
mode: INPUT, OUTPUT, or INPUT_PULLUP. See the [Digital Pins](#) page for a more complete description of the functionality.

```
void setup() {  
  pinMode(13, OUTPUT);    // sets the digital pin 13 as output  
}  
  
void loop() {  
  digitalWrite(13, HIGH); // sets the digital pin 13 on  
  delay(1000);           // waits for a second  
  digitalWrite(13, LOW);  // sets the digital pin 13 off  
  delay(1000);           // waits for a second  
}
```

Input vs Input_pullup



Pull-UP



Pull-DOWN

Build-in function < digitalRead() >

Description

Reads the value from a specified digital pin, either HIGH or LOW.

Syntax

```
digitalRead(pin)
```

Parameters

pin: the Arduino pin number you want to read

Returns

HIGH OR LOW

Example Code

Sets pin 13 to the same value as pin 7, declared as an input.

```
int ledPin = 13; // LED connected to digital pin 13
int inPin = 7; // pushbutton connected to digital pin 7
int val = 0; // variable to store the read value

void setup() {
    pinMode(ledPin, OUTPUT); // sets the digital pin 13 as output
    pinMode(inPin, INPUT); // sets the digital pin 7 as input
}

void loop() {
    val = digitalRead(inPin); // read the input pin
    digitalWrite(ledPin, val); // sets the LED to the button's value
}
```

Build-in function <analogRead()>

BOARD	OPERATING VOLTAGE	USABLE PINS	MAX RESOLUTION
Uno	5 Volts	A0 to A5	10 bits

Syntax

```
analogRead(pin)
```

Parameters

pin: the name of the analog input pin to read from (A0 to A5 on most boards, A0 to A6 on MKR boards, A0 to A7 on the Mini and Nano, A0 to A15 on the Mega).

Returns

The analog reading on the pin. Although it is limited to the resolution of the analog to digital converter (0-1023 for 10 bits or 0-4095 for 12 bits). Data type: int.

Build-in function <analogRead()>

Example Code

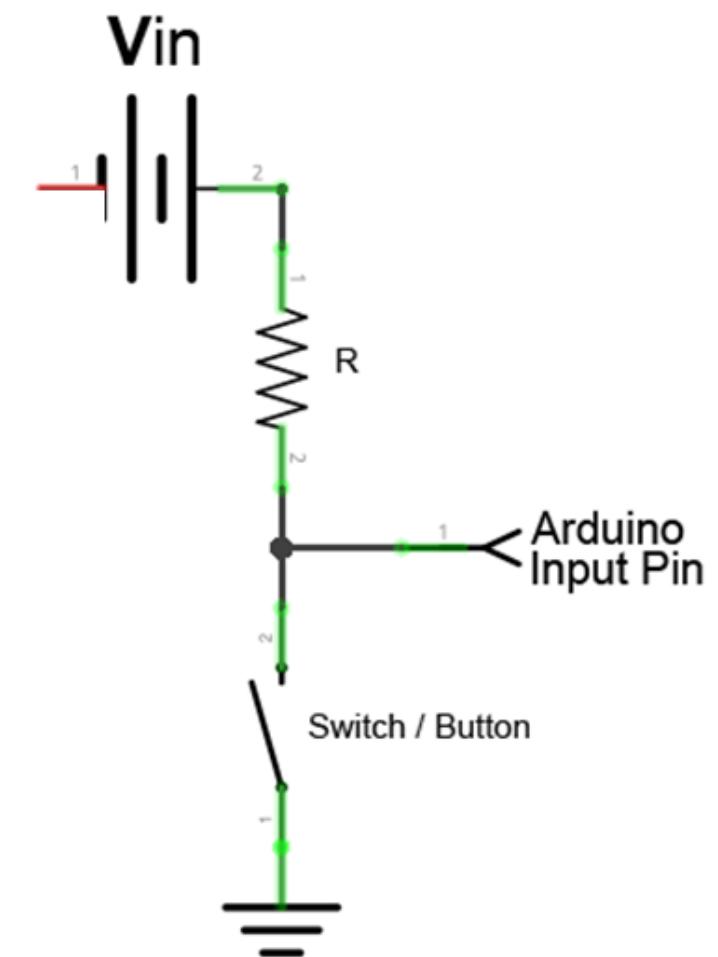
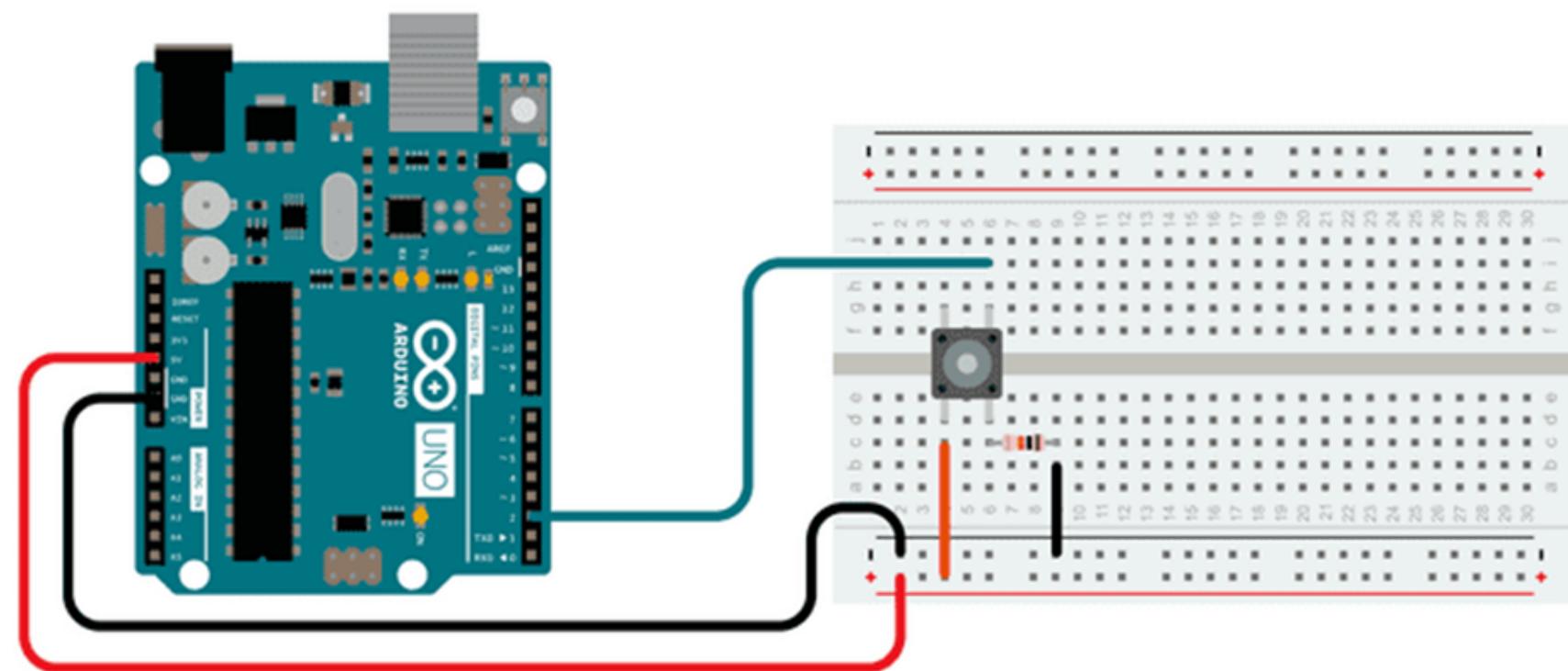
The code reads the voltage on analogPin and displays it.

```
int analogPin = A3; // potentiometer wiper (middle terminal) connected to analog pin 3
                    // outside leads to ground and +5V
int val = 0; // variable to store the value read

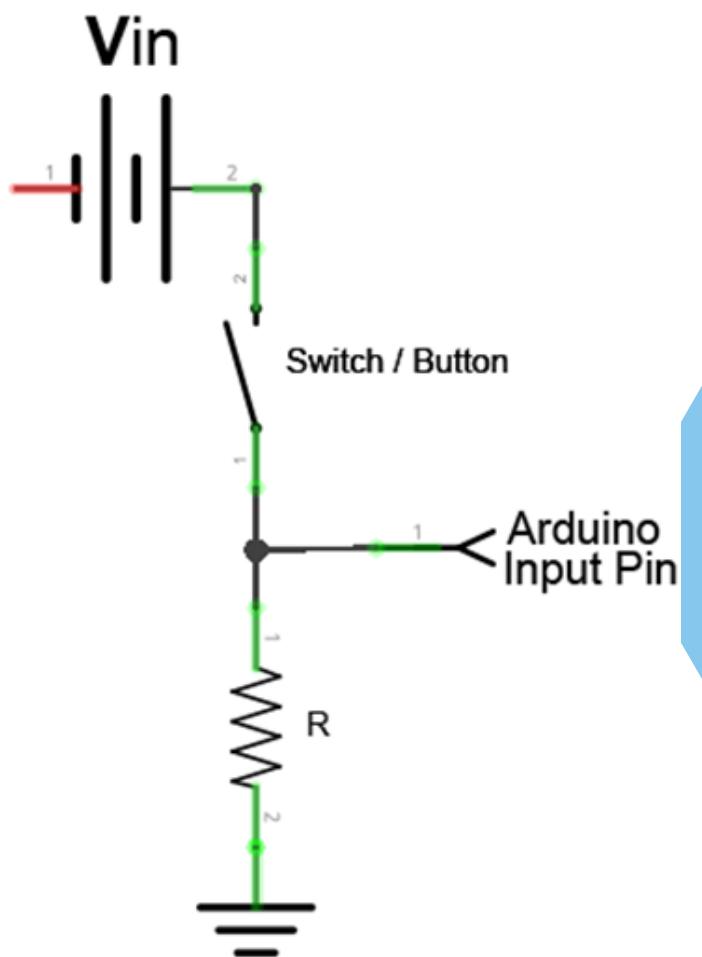
void setup() {
    Serial.begin(9600); // setup serial
}

void loop() {
    val = analogRead(analogPin); // read the input pin
    Serial.println(val); // debug value
}
```

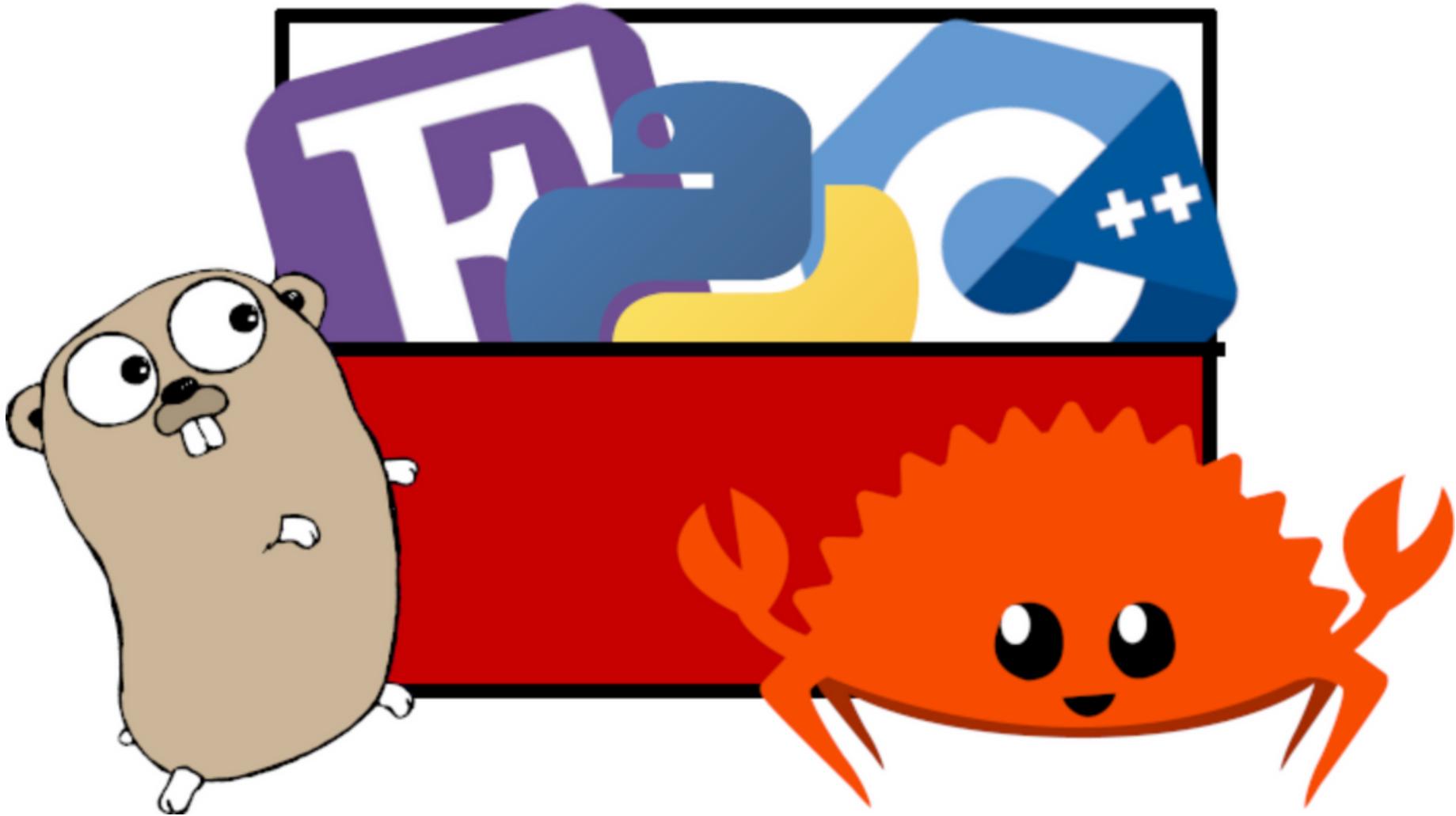
Input equipment / Switch



Pull-UP



Pull-DOWN



TRY 1 Switch

เมื่อ กด sw1 ให้แสดงข้อความว่า “Switch 1”
เมื่อ กด sw2 ให้แสดงข้อความว่า “Switch 2”

Answer.

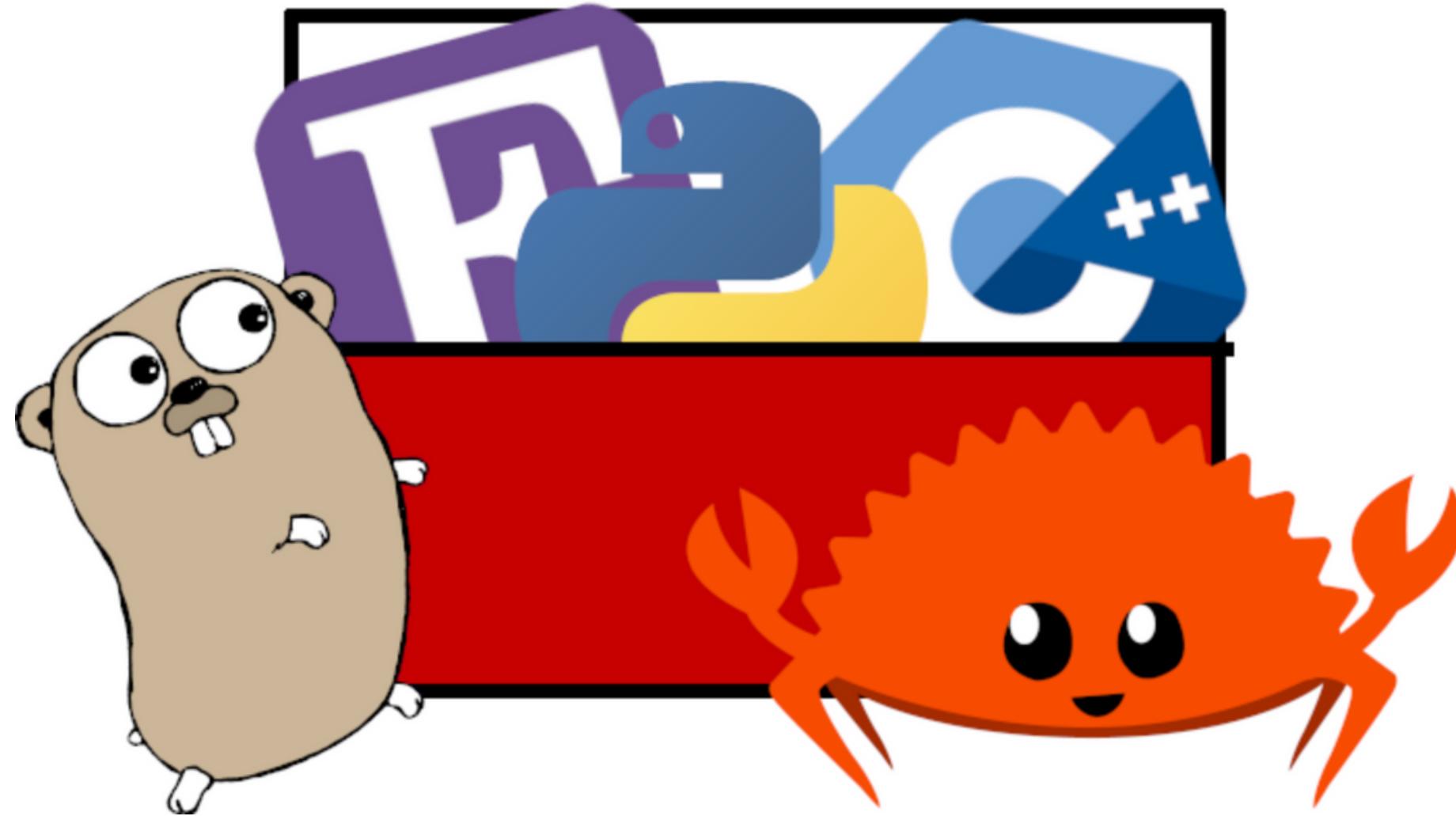
```
#define pinSw1 2
#define pinSw2 5

void setup() {
    Serial.begin(9600);
    pinMode(pinSw1, INPUT_PULLUP);
    pinMode(pinSw2, INPUT_PULLUP);
}

void loop() {
    int readSW1 = digitalRead(pinSw1);
    int readSW2 = digitalRead(pinSw2);

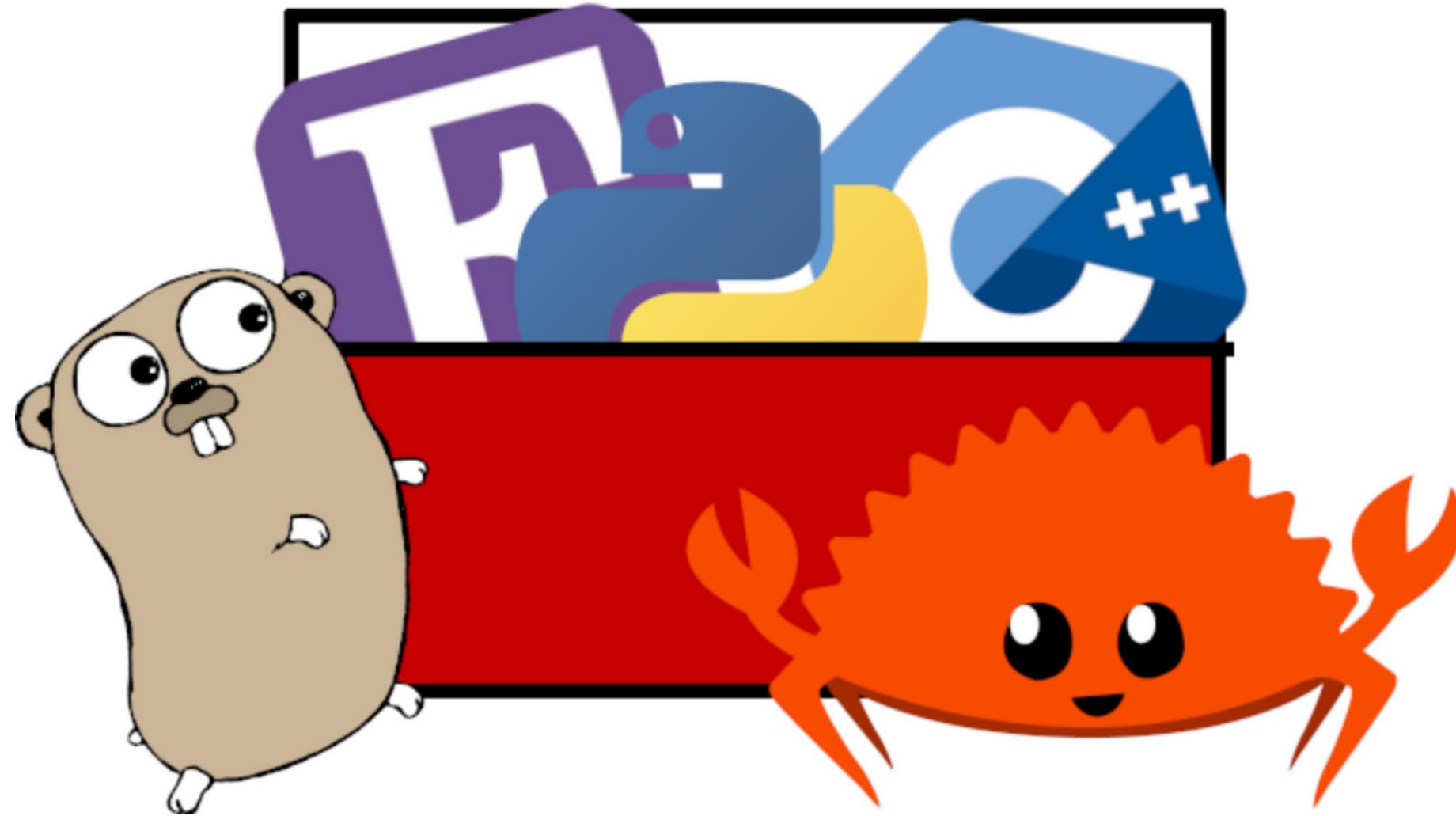
    if( readSW1 == 0 ){
        Serial.println("Switch 1");
    }else if( readSW2 == 0 ){
        Serial.println("Switch 2");
    }
}
```

```
16:07:54.973 -> Switch 2
16:07:54.973 -> Switch 2
16:07:54.973 -> Switch 2
16:07:55.018 -> Switch 2
16:07:55.019 -> Switch 2
16:07:55.519 -> Switch 1
16:07:55.519 -> Switch 1
16:07:55.519 -> Switch 1
16:07:55.519 -> Switch 1
16:07:55.556 -> Switch 1
16:07:55.556 -> Switch 1
16:07:55.556 -> Switch 1
16:07:55.589 -> Switch 1
```



TRY 2 Switch

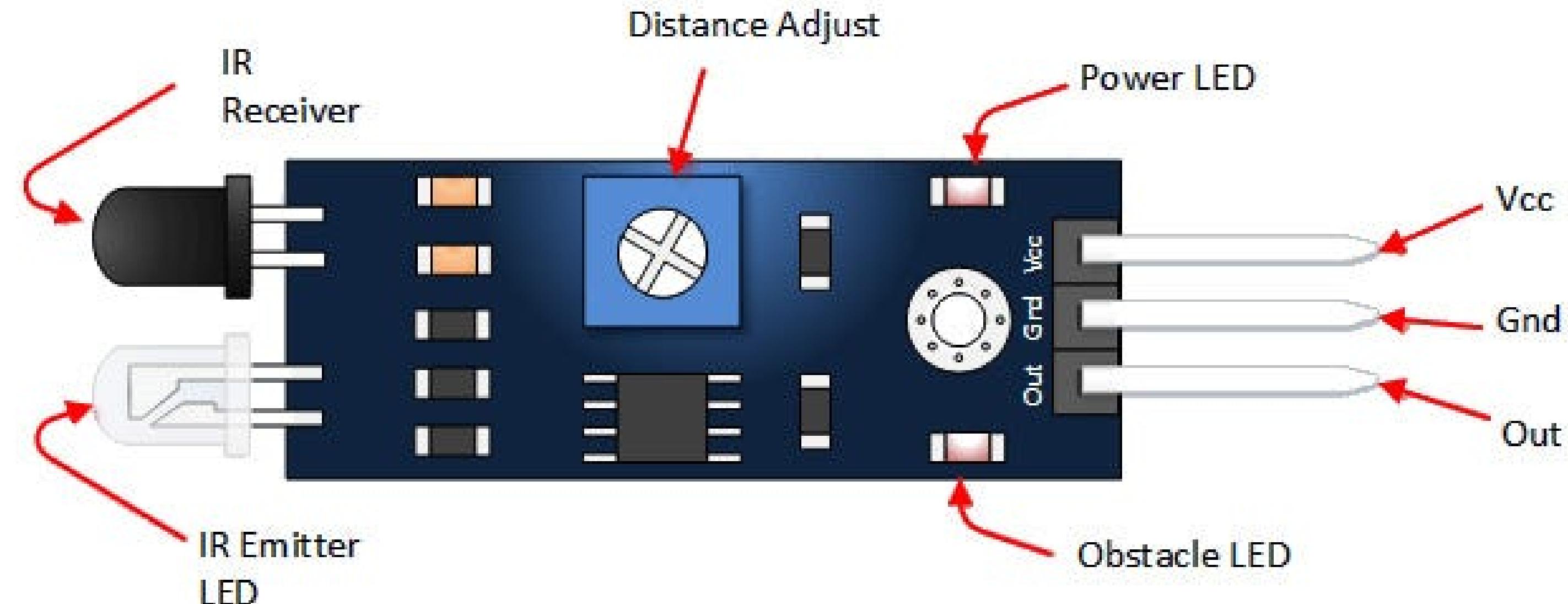
เมื่อกด sw 1 ให้ LED 1 ติด
เมื่อปล่อยให้ LED 1 ดับ

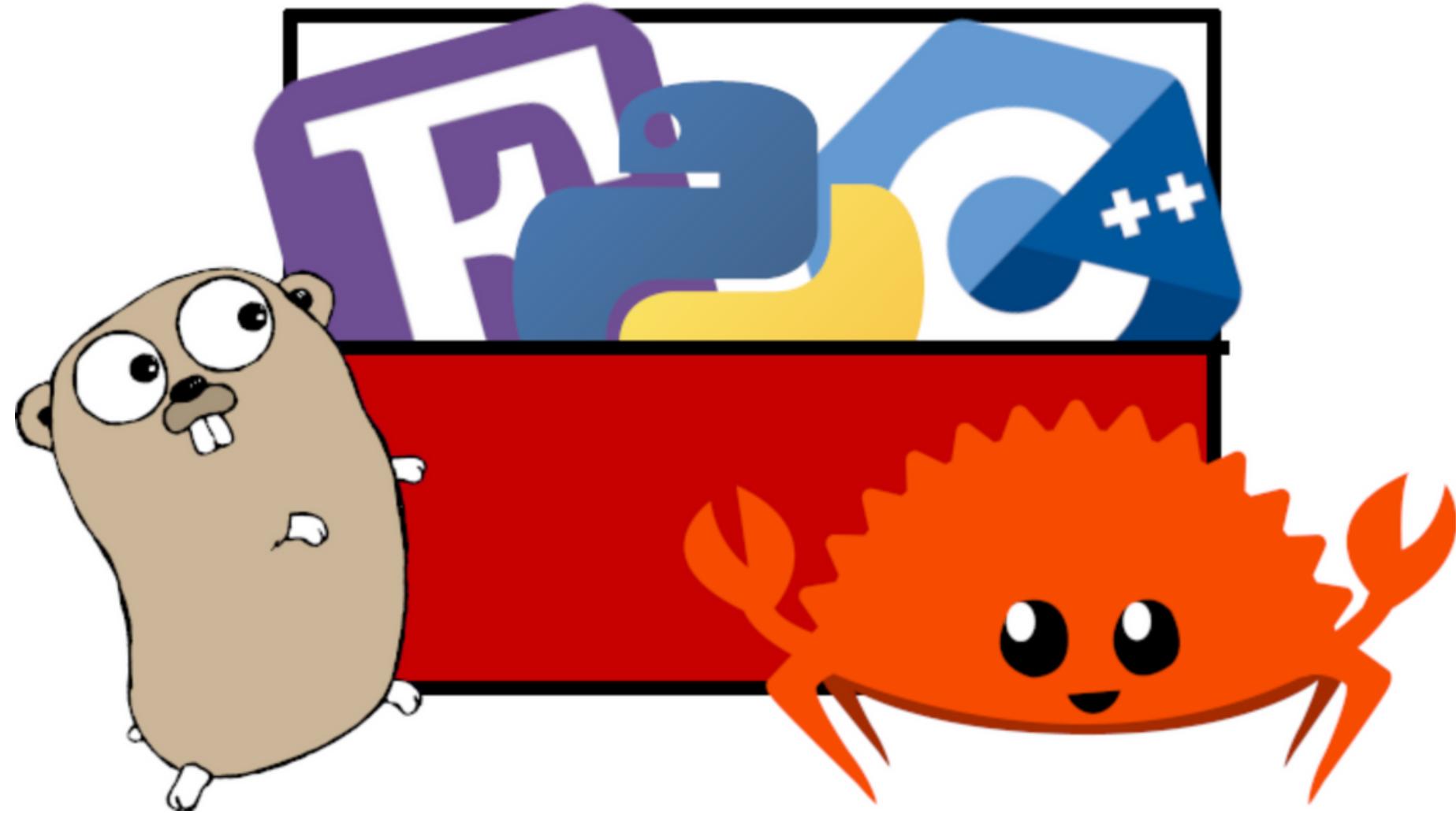


TRY 3 Switch

เมื่อกด sw 1 ให้ Servo หมุนไปที่ 90 องศา
เมื่อกด sw 2 ให้ Servo หมุนไปที่ 0 องศา

Input equipment / Sensor IR





TRY 1 Sensor IR

ถ้า ทดลองแปลงค่า Analog เป็น Digital

```
#define pinSensor1 A4
```

```
int max = 810;           1  
int min = 53;  
int mid = ((max - min) / 2) + min;
```

```
int digital_sensor1 = 0;  
void setup() {  
    Serial.begin(9600);  
    pinMode(pinSensor1, INPUT);  
}
```

```
void loop() {  
    int analog_sensor1 = analogRead(pinSensor1);  
    if (analog_sensor1 > mid) {  
        digital_sensor1 = 0;  
    } else if (analog_sensor1 < mid ) {  
        digital_sensor1 = 1;          2  
    }  
    Serial.print(analog_sensor1);  
    Serial.print(" ");  
    Serial.println(digital_sensor1);  
}
```

STEP 1 Find median STEP 2 Condition IF

C++ / Array

Description

An array is a collection of variables that are accessed with an index number. Arrays in the C++ programming language Arduino sketches are written in can be complicated, but using simple arrays is relatively straightforward.

Creating (Declaring) an Array

All of the methods below are valid ways to create (declare) an array.

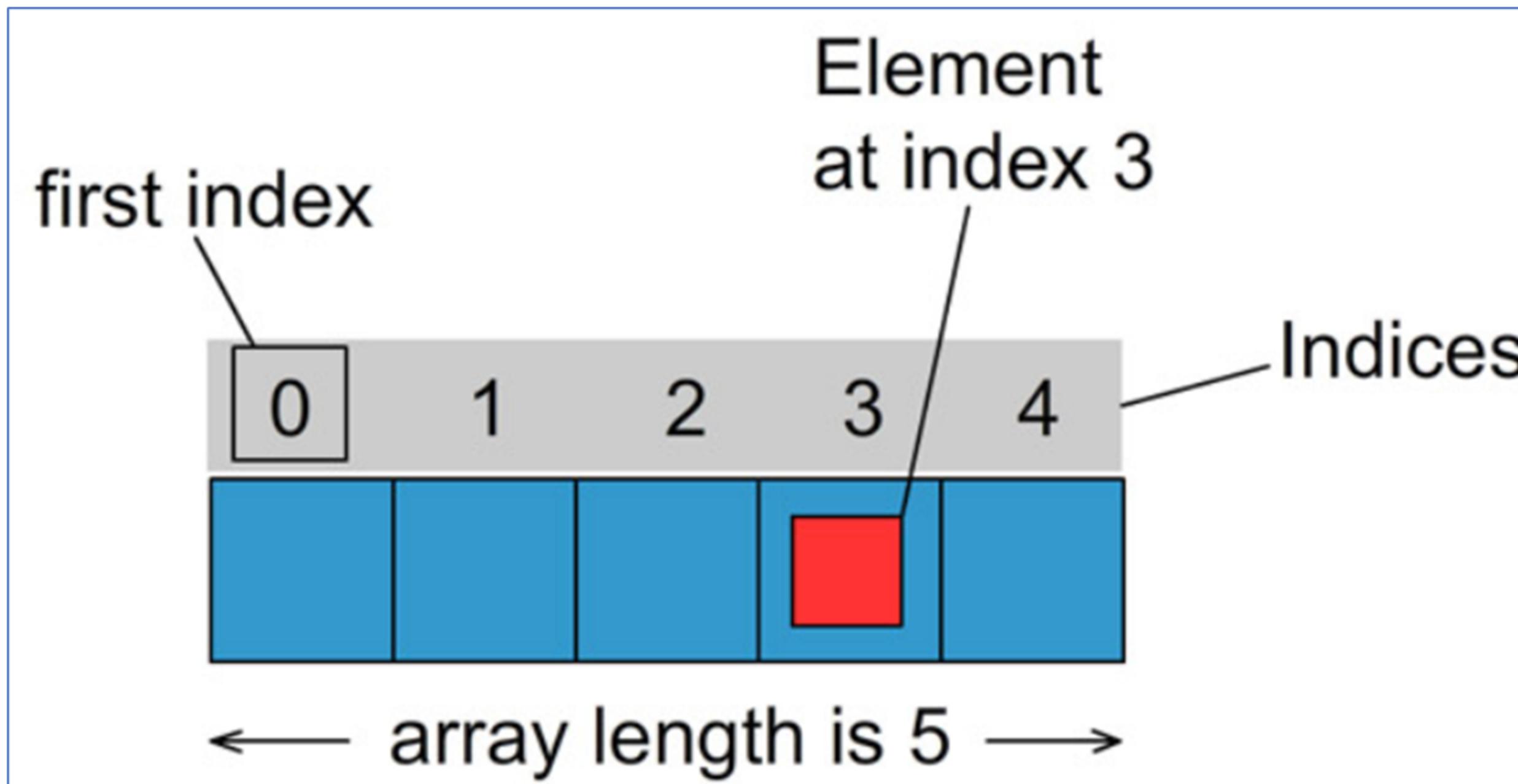
```
int myInts[6];
int myPins[] = {2, 4, 8, 3, 6};
int mySensVals[5] = {2, 4, -8, 3, 2};
char message[6] = "hello";
```

Arrays and FOR Loops

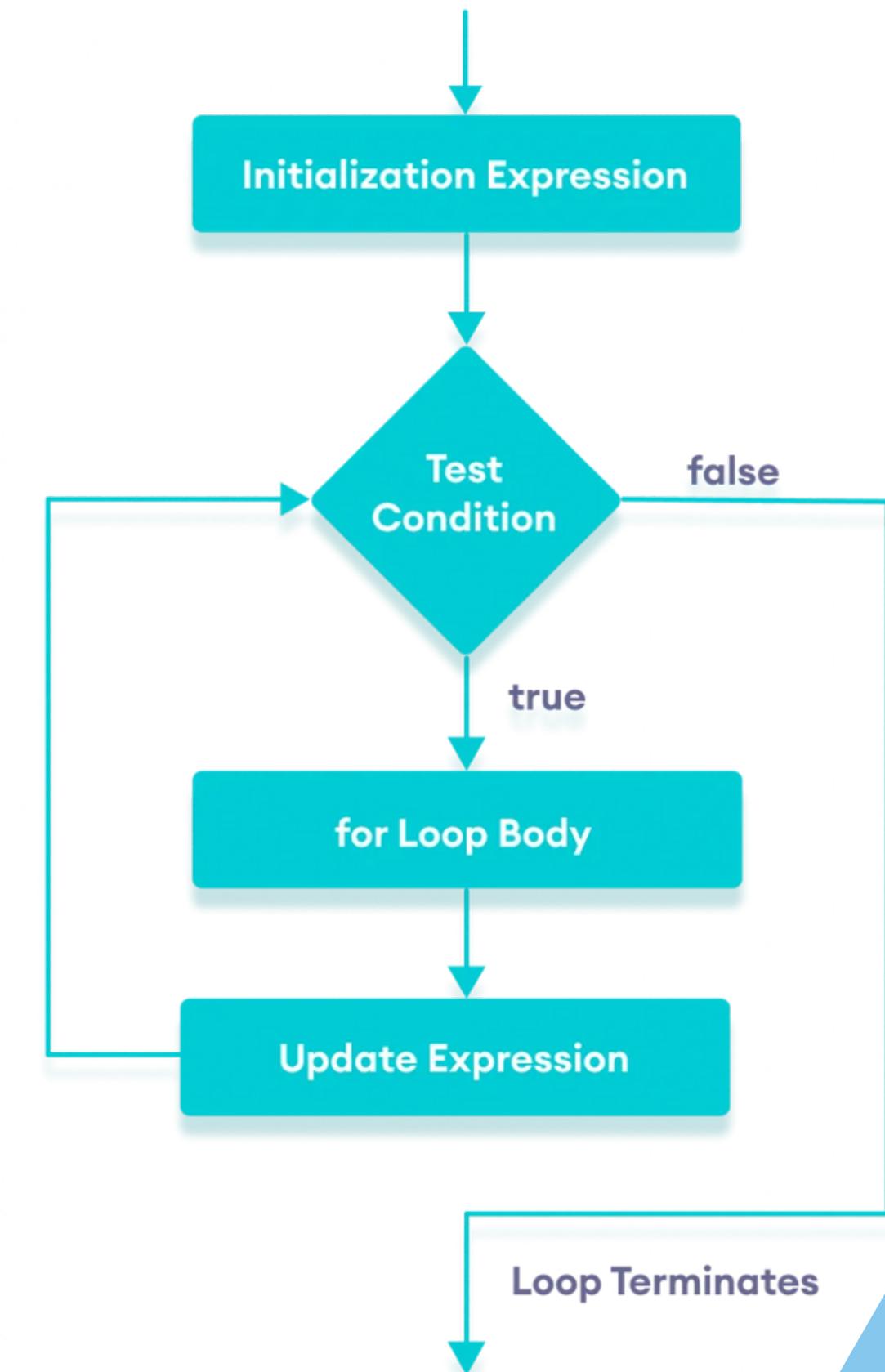
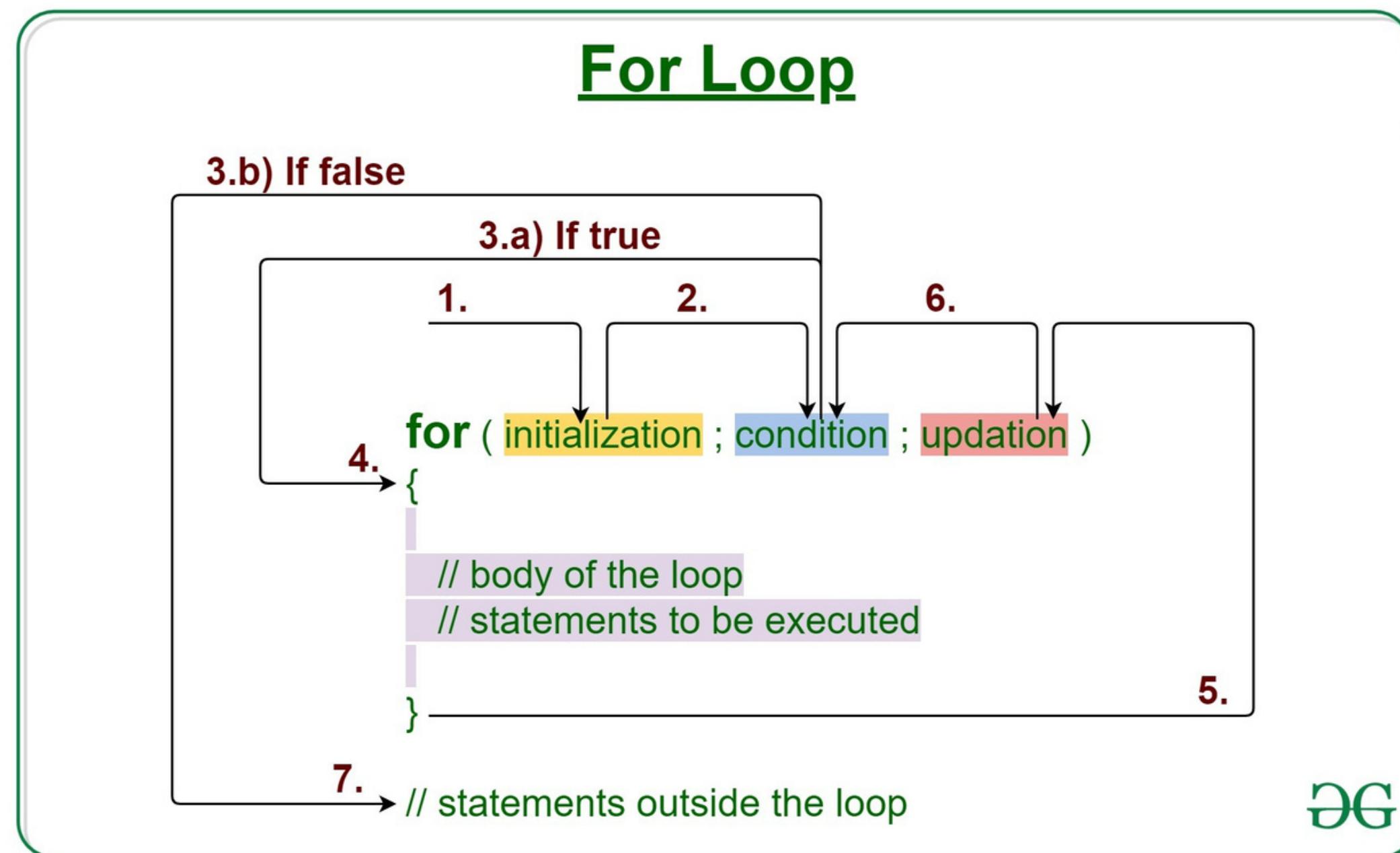
Arrays are often manipulated inside for loops, where the loop counter is used as the index for each array element. For example, to print the elements of an array over the serial port, you could do something like this:

```
for (byte i = 0; i < 5; i = i + 1) {
    Serial.println(myPins[i]);
}
```

C++ / Array



C++ / For Loop



Example For Loop with Array

The image shows a software interface for writing code, likely an IDE for Arduino. On the left, there's a vertical toolbar with icons for file operations, a search function, and other development tools. The main area is a code editor with a light gray background and a dark gray header bar. The code itself is written in C++/Arduino syntax. It defines an array of pins and sets up pins 8 through 13 as outputs. The `loop()` function contains two nested loops that cycle through pins 0 to 5, turning them on and off with a 100ms delay between each pin.

```
sssww.ino • 1  
2  
3 int pin[] = { 8, 7, 11, 12, 4, 13 };  
4  
5 void setup() {  
6     Serial.begin(9600);  
7     for (int i = 0; i < 6; i++) {  
8         pinMode(pin[i], OUTPUT);  
9     }  
10 }  
11  
12 void loop() {  
13     for (int i = 0; i < 6; i++) {  
14         digitalWrite(pin[i],HIGH);  
15         delay(100);  
16     }  
17     for (int i = 0; i < 6; i++) {  
18         digitalWrite(pin[i],LOW);  
19         delay(100);  
20     }  
21 }  
22  
23  
24  
25
```

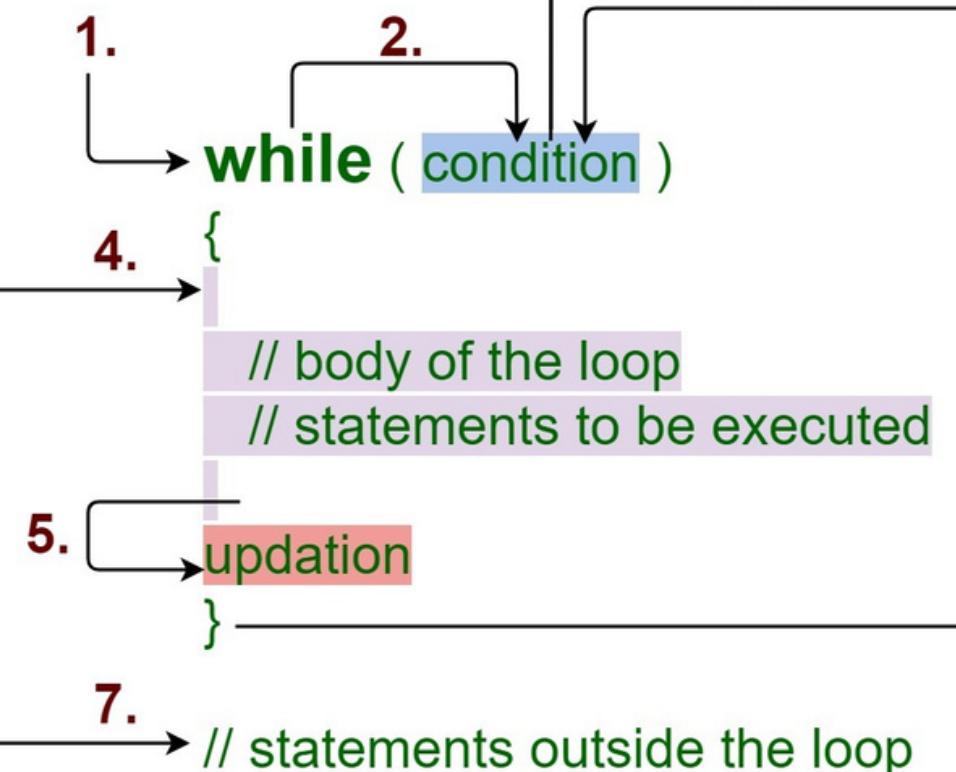
ควบคุม LED ให้ติดกีล่าด้วย

C++ / While Loop

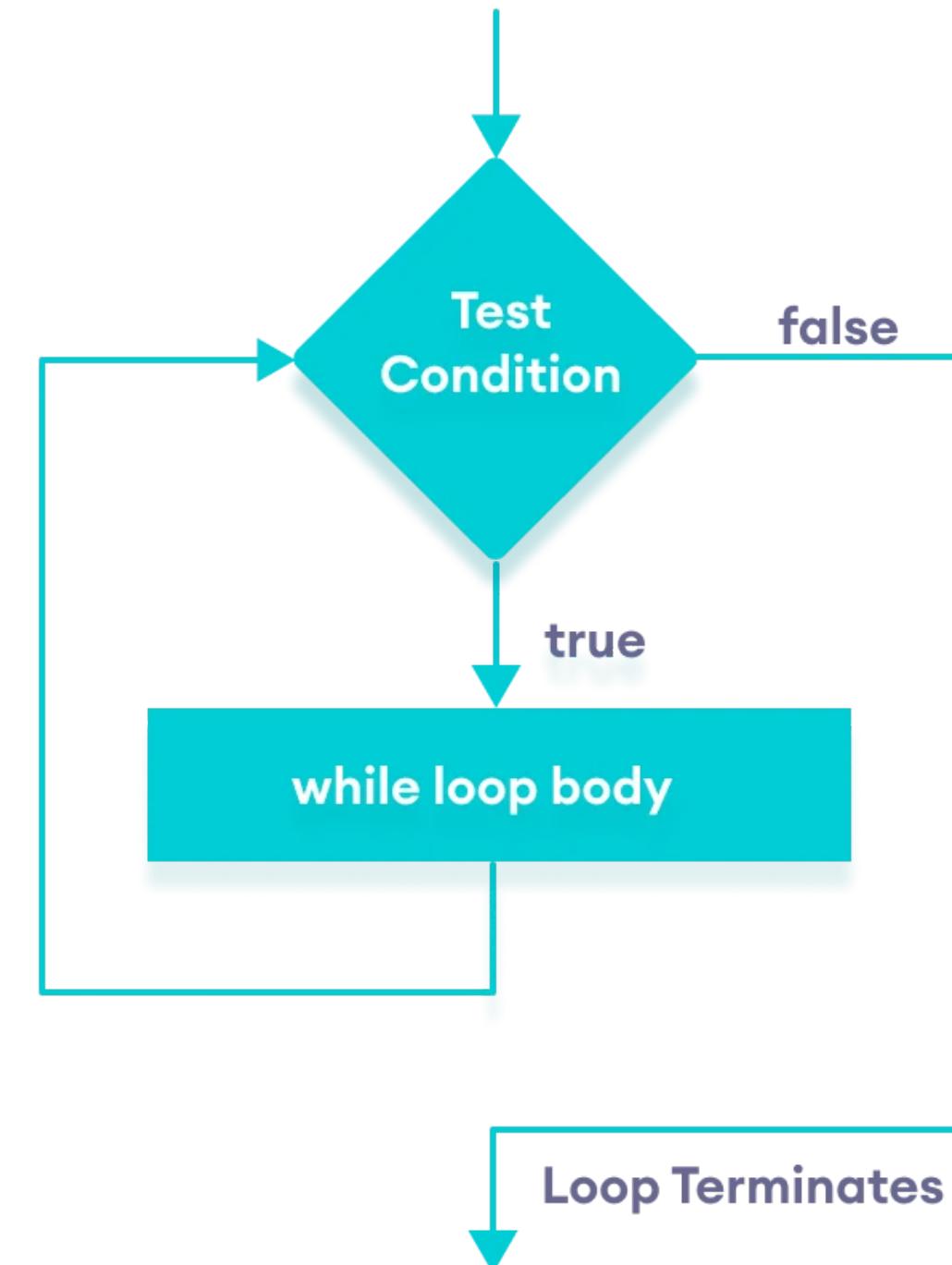
While Loop

3.b) If false

3.a) If true



DG





THANK YOU

