

Tổng hợp các bài Lab (1 -> 6)
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LAB 1: Hiệu ứng dãy led

<https://www.tinkercad.com/things/iQk99FNgFdi-bt-1/editel?sharecode=gsKs3omtv-P4d5k-ZfRSFBKZdXKnKEirLOMl0EIwVjs>

```
int timer=500;
void setup() {
  for(int i=2; i<=9; i++) pinMode(i,OUTPUT);
}
void loop() {
  // sáng dần
  for (int thisPin = 2; thisPin < 10; thisPin++) {
    // turn the pin on:
    digitalWrite(thisPin, HIGH);
    delay(timer);
  }
  // nhấp nháy 10 lần
  for (int repeat = 0; repeat < 10; repeat++){
    for (int thisPin = 2; thisPin < 10; thisPin ++){
      digitalWrite(thisPin, LOW);
      delay(timer);
    }
    for (int thisPin = 2; thisPin < 10; thisPin ++){
      digitalWrite(thisPin, HIGH);
      delay(timer);
    }
  }
  // Tắt dần
  for (int thisPin = 10; thisPin > 2; thisPin--) {
    // turn the pin on:
    digitalWrite(thisPin, LOW);
    delay(timer);
  }
}
```

LAB 2: Điều khiển 8 led bằng biến trở

<https://www.tinkercad.com/things/d1nZ1SiETiV-bt2/editel?sharecode=ikeYGhm8qQAthjgEmuChKjYX91YdHqfaSfhOIeMq24U>

```
int numberLeds = 8;
```

```

int ledPins[] = { 4, 5, 6, 7, 8, 9, 10, 11};
int analogInPin = 2;

int sensorValue = 0;
int ledLevel = 0;

void setup() {
  for (int led = 0; led < numberLeds; led++)
  {
    pinMode(ledPins[led], OUTPUT);
  }
}

void loop() {
  sensorValue = analogRead(analogInPin);
  ledLevel = map(sensorValue, 0, 1023, 0, numberLeds);
  for (int led = 0; led < numberLeds; led++)
  {
    if (led < ledLevel ) {
      digitalWrite(ledPins[led], LOW);
    }
    else {
      digitalWrite(ledPins[led], HIGH);
    }
  }
}

```

LAB 3: Hiển thị 2 led chạy từ 00 - 59 và lặp lại

<https://www.tinkercad.com/things/cNSt3cl7ekA-b3/editel?sharecode=7eXwkTQFh-IL7l1zz85uevUyDb9SyFuCMOV5kU3ED80>

```

//a,b,c,d,e,f,g
byte segValue[10][7] = {
  {0,0,0,0,0,0,1}, //0
  {1,0,0,1,1,1,1}, //1
  {0,0,1,0,0,1,0}, //2
  {0,0,0,0,1,1,0}, //3
  {1,0,0,1,1,0,0}, //4
  {0,1,0,0,1,0,0}, //5
  {0,1,0,0,0,0,0}, //6

```

```

    {0,0,0,1,1,1,1}, //7
    {0,0,0,0,0,0,0}, //8
    {0,0,0,0,1,0,0} //9
};

byte segPin[8]={2,3,4,5,6,7,8,9}; //{a,b,c,d,e,f,g,dp}
byte digitPin[2] = {A0,A1}; //segment

void setup() {
    for(int i=0;i<10;i++){
        pinMode(segPin[i], OUTPUT);
    }
    pinMode(digitPin[0], OUTPUT);
    pinMode(digitPin[1], OUTPUT);
    digitalWrite(digitPin[0], LOW);
    digitalWrite(digitPin[1], LOW);
}

void loop()
{
    for (int i = 0; i<60; i++)
    {
        display_N(i);
        delay(1);
    }
}

void display_N(int num){
    int und = num % 10;
    int dec = num / 10;
    for(int i=0; i<100; i++){
        segOutput(1, und, 1);
        segOutput(0, dec, 1);
        delay(2);
    }

    Serial.print(dec);
    Serial.println(und);
}

//LED
void segClear(){
    for(int i=0;i<8;i++){
        digitalWrite(segPin[i], HIGH);
    }
}

```

```
//LED
void segOutput(int d, int Number, int dp){
    segClear();
    digitalWrite(digitPin[d], HIGH);
    for(int i=0;i<7;i++){
        digitalWrite(segPin[i], segValue[Number][i]);
    }
    digitalWrite(segPin[7], dp);
    delayMicroseconds(1000);
    digitalWrite(digitPin[d], LOW);
}
```

LAB 4: 2 leds and 1 push button

<https://www.tinkercad.com/things/brXC4W1bqD0-b4-2-leds-and-1-push-button/editel?sharecode=ikGhLLJbC2Oe8ZGUaS0G-nkvjUXMvPVW4Otr9jyEdOE>

```
const int button = 4;
const int led1 = 2;
const int led2 = 7;
```

```
int oldstate = LOW;
int ledstate = HIGH;
```

```
void setup() {
    pinMode(button, INPUT);
    pinMode(led1, OUTPUT);
    pinMode(led2, OUTPUT);
}
```

```
void loop() {

    int buttonstate = digitalRead(button);
    if (buttonstate != oldstate && buttonstate ==HIGH){
        if (ledstate == 1){
            digitalWrite(led1,HIGH);
            digitalWrite(led2,LOW);
        }

        if (ledstate == 2){
            digitalWrite(led1,HIGH);
            digitalWrite(led2,HIGH);
        }
    }
}
```

```

    if (ledstate == 3){
        digitalWrite(led1,LOW);
        digitalWrite(led2,HIGH);
    }

    if (ledstate == 4){
        digitalWrite(led1,LOW);
        digitalWrite(led2,LOW);
    }
    if (ledstate < 4)
        ledstate++;
    else
        ledstate = 1;
    delay(50);
}
    oldstate = buttonstate;
}

```

LAB 5: Smart Traffic Light

https://www.tinkercad.com/things/dUwi6EkLLQw-bt-5/editel?sharecode=Mb9afvx5yTrRqZjj1mwetdDoORoDSlq8C0kzmy_LZuw

```

const int trig = 4;
const int echo = 3;

```

```

const int ledRed_1 = 10;
const int ledYellow_1 = 9;
const int ledGreen_1 = 8;
const int ledRed_2 = 7;
const int ledYellow_2 = 6;
const int ledGreen_2 = 5;

```

```

int duration = 0;
int distance = 0;

```

```

void setup() {
    pinMode(trig, OUTPUT);
    pinMode(echo, INPUT);

    pinMode(ledRed_1, OUTPUT);
    pinMode(ledYellow_1, OUTPUT);
    pinMode(ledGreen_1, OUTPUT);
    pinMode(ledRed_2, OUTPUT);
    pinMode(ledYellow_2, OUTPUT);
}

```

```

pinMode(ledGreen_2, OUTPUT);
Serial.begin(9600);
}

void loop(){
  digitalWrite(trig , HIGH);
  delayMicroseconds(100);
  digitalWrite(trig , LOW);

  digitalWrite(ledRed_1,LOW);
  digitalWrite(ledYellow_1,LOW);
  digitalWrite(ledGreen_1, HIGH);
  digitalWrite(ledRed_2,HIGH);
  digitalWrite(ledYellow_2,LOW);
  digitalWrite(ledGreen_2, LOW);

  duration = pulseIn(echo , HIGH);
  distance = (duration/2) / 29.412 ;

  Serial.println(distance);

  if(distance<200){
    //ledYellow_1 - ledRed_2 : ON
    digitalWrite(ledRed_1, LOW);
    digitalWrite(ledYellow_1, HIGH);
    digitalWrite(ledGreen_1, LOW);
    digitalWrite(ledRed_2, HIGH);
    digitalWrite(ledYellow_2, LOW);
    digitalWrite(ledGreen_2, LOW);
    delay(2000);

    //ledRed_1 - ledGreen_2 : ON
    digitalWrite(ledRed_1, HIGH);
    digitalWrite(ledYellow_1, LOW);
    digitalWrite(ledGreen_1, LOW);
    digitalWrite(ledRed_2, LOW);
    digitalWrite(ledYellow_2, LOW);
    digitalWrite(ledGreen_2, HIGH);
    delay(6000);

    //ledRed_1 - y2 : ON
    digitalWrite(ledRed_1, HIGH);
    digitalWrite(ledYellow_1, LOW);
    digitalWrite(ledGreen_1, LOW);
    digitalWrite(ledRed_2, LOW);
    digitalWrite(ledYellow_2, HIGH);
  }
}

```

```

        digitalWrite(ledGreen_2, LOW);
        delay(2000);

//ledGreen_1 - ledRed_2 : ON
        digitalWrite(ledRed_1, LOW);
        digitalWrite(ledYellow_1, LOW);
        digitalWrite(ledGreen_1, HIGH);
        digitalWrite(ledRed_2, HIGH);
        digitalWrite(ledYellow_2, LOW);
        digitalWrite(ledGreen_2, LOW);
        delay(6000);
    }
}

```

LAB 6: IR Remote + Servo

<https://www.tinkercad.com/things/9fxHrtTdWuM-b6/editel?sharecode=i17PtJxMtxuZW4A99MilwgutinFVKSMdcGVCYGYWmWI>

```

#include <IRremote.h>
#include <Servo.h>

const int redPin = 10;
const int greenPin = 11;
const int RECV_PIN = 7;
IRrecv irrecv(RECV_PIN);
decode_results results;
Servo myservo;
int potpin=0;

void setup(){
    Serial.begin(9600);
    irrecv.enableIRIn();
    irrecv.blink13(true);
    myservo.attach(9);
}

void loop(){

    if (irrecv.decode(&results)){
        Serial.println(results.value,HEX);
        switch(results.value){
            case 0xFD30CF: //Keypad button "0"
                delay(500);
                potpin = potpin*10+0;
                break;

```

```

case 0xFD08F7: //Keypad button "1"
    delay(500);
    potpin = potpin*10+1;
    break;
case 0xFD8877: //Keypad button "2"
    delay(500);
    potpin = potpin*10+2;
    break;
case 0xFD48B7: //Keypad button "3"
    delay(500);
    potpin = potpin*10+3;
    break;
case 0xFD28D7: //Keypad button "4"
    delay(500);
    potpin = potpin*10+4;
    break;
case 0xFDA857: //Keypad button "5"
    delay(500);
    potpin = potpin*10+5;
    break;
case 0xFD6897: //Keypad button "6"
    delay(500);
    potpin = potpin*10+6;
    break;
case 0xFD18E7: //Keypad button "7"
    delay(500);
    potpin = potpin*10+7;
    break;
case 0xFD9867: //Keypad button "8"
    delay(500);
    potpin = potpin*10+8;
    break;
case 0xFD58A7: //Keypad button "9"
    delay(500);
    potpin = potpin*10+9;
    break;
case 0xFDA05F: //Keypad button "Play"
    myservo.write(potpin);
    potpin=0;
    break;
}
switch(results.value){
case 0xFDA857: //Keypad button "5"
    digitalWrite(redPin, HIGH);
    delay(2000);
    digitalWrite(redPin, LOW);

```



```
    }  
    switch(results.value){  
        case 0xFD8877: //Keypad button "2"  
            digitalWrite(greenPin, HIGH);  
            delay(2000);  
            digitalWrite(greenPin, LOW);  
        }  
    irrecv.resume();  
    }  
}
```