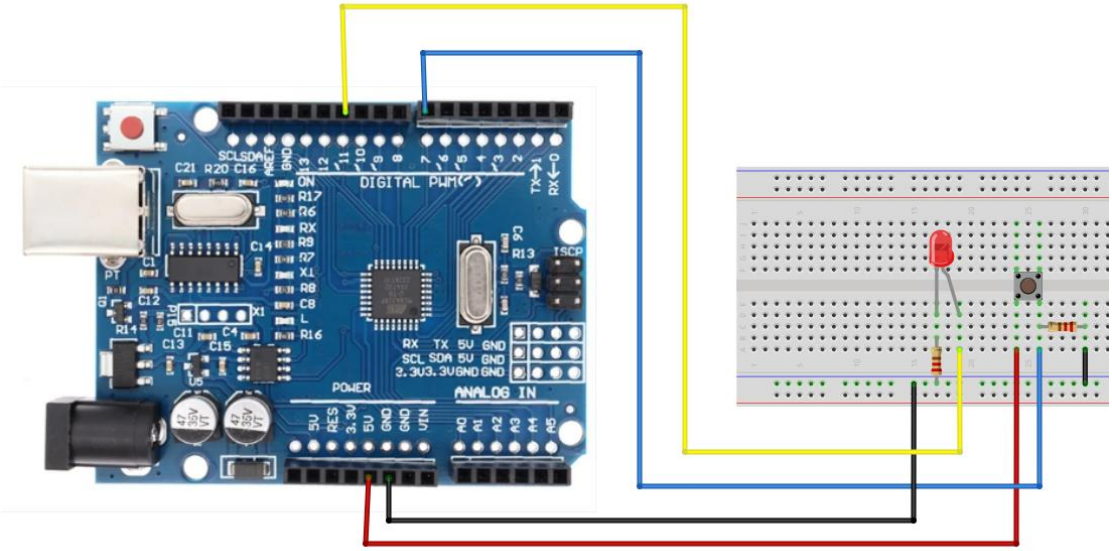
Project 1 Button Controlled LED

Introduction

I/O port means interface for INPUT and OUTPUT. Up until now, we have only used its OUTPUT function. In this experiment, we will try to use the input function, which is to read the output value of device connecting to it. We use 1 button and 1 LED using both input and output to give you a better understanding of the I/O function. Push Buttons, familiar to most of us, are a switch value (digital value) component. When it's pressed, the circuit is in closed (conducting) state.

Circuit Connection



Sample Program

Now, let's begin the compiling.

```
//////////////////////////////////////////////////////////

int Redled=11;// initialize Redled 11

int inpin=7;// initialize pin 7

boolean change=false;// define val

void setup()

{

    pinMode(Redled,OUTPUT);// set LED pin as  “output”

    pinMode(inpin,INPUT);// set button pin as  “input”

}
```

```
void loop()
{
   while(digitalRead(inpin)==HIGH)
   {
      delay(500);
      if(change==true)
      {
         digitalWrite(Redled,LOW);
         change=!change;
      }
      else
      {
         digitalWrite(Redled,HIGH);
         change=!change;
      }
   }
}
//////////////////////////////////////////////////////////
```

Result

Firstly, in the while() function, use delay to prevent button shaking. When the button is pressed for the first time, the LED will be lit up, and when

pressed for the second time, the LED will go out. After the above process, the button controlled LED experiment is completed. The simple principle of this experiment is widely used in a variety of circuit and electric appliances. You can easily come across it in your every day life. One typical example is when you press a certain key of your phone, the backlight will be on.

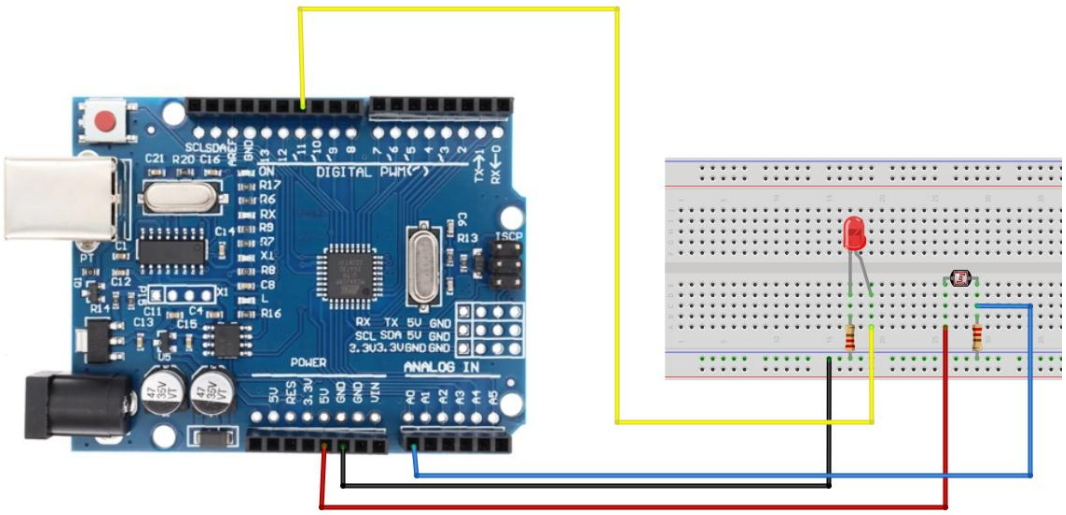
Project 2 Photo Resistor

Introduction

After completing all the previous experiments, we acquired some basic understanding and knowledge about Arduino application. We have learned digital input and output, analog input and PWM. Now, we can begin the learning of sensors applications. Photo resistor (Photovaristor) is a resistor whose resistance varies according to different incident light strength. It's made based on the photoelectric effect of semiconductor. If the incident light is intense, its resistance reduces; if the incident light is weak, the resistance increases.

Photovaristor is commonly applied in the measurement of light, light control and photovoltaic conversion (convert the change of light into the change of electricity). Photo resistor is also being widely applied to various light control circuit, such as light control and adjustment, optical switches etc. We will start with a relatively simple experiment regarding photovaristor application. Photovaristor is an element that changes its resistance as light strenth changes. So we will need to read the analog values. We can refer to the PWM experiment, replacing the potentiometer with photovaristor. When there is change in light strength, there will be corresponding change on the LED.

Circuit Connection



Sample Program

After the connection, let's begin the program compiling. The program is similar to the one of PWM. For change detail, please refer to the Sample

Program below.

```
//////////////////////////////////////////////////////
int potpin=0;// initialize analog pin A0, connected with photovaristor
int ledpin=11;// initialize digital pin 11, output regulating the brightness
of LED
int val=0;// initialize variable val
void setup()
{
pinMode(ledpin,OUTPUT);// set digital pin 11 as “output”
Serial.begin(9600);// set baud rate at “9600”
}
void loop()
{
val=map ( analogRead(potpin) , 0 , 1023 , 0 , 255);
// read the analog value of the sensor and assign it to val
Serial.println(val);// display the value of val
analogWrite(ledpin,val);
// turn on the LED and set up brightness（maximum output value 255）
delay(10);// wait for 0.01
}
//////////////////////////////////////////////////////
```

Result

After downloading the program, you can change the light strength around the photovaristor and see corresponding brightness change of the LED. Photovaristors has various applications in our everyday life. You can make other interesting interactive projects base on this one.