

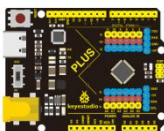
# Project11: Digital Hourglass



## 1. Project Introduction

Once upon a time, people used hourglasses to measure time. Today, we DIY a digital hourglass by using a hourglass Paper Card, a Plus Development Board, 5 Red M5 LEDs, a Ball switch.

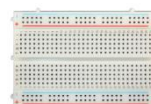
## 2. Project Hardware



Plus  
Development



Plus Board  
Holder



400-Hole  
Breadboard



USB Cable\*1

Board\*1



Ball switch\*1

Red M5 LED

10KΩ

220Ω

\*5

Resistor\*1

Resistor\*5



Jumper

hourglass

Wire\*12

Paper Card\*1

### 3.Working Principle



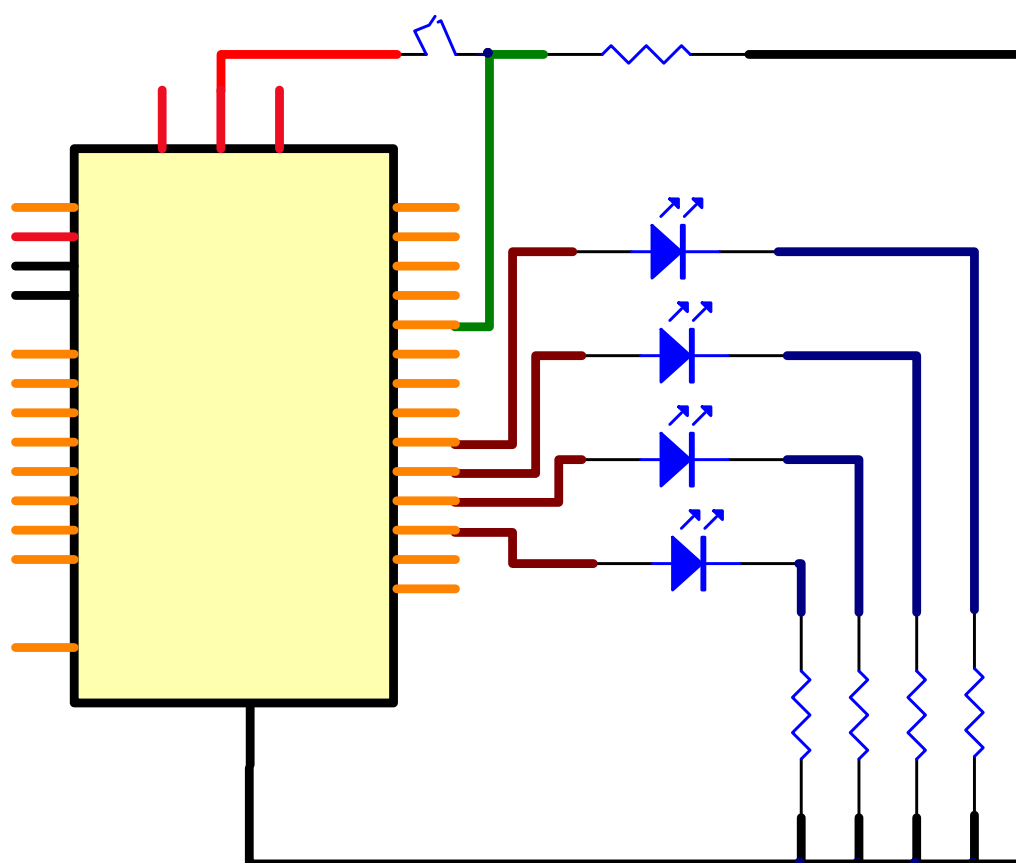
The ball switch is a digital switch. There is a metal ball inside it that can roll. The principle of the metal ball rolling and contacting the guide pin is used to control the on or off of the circuit.

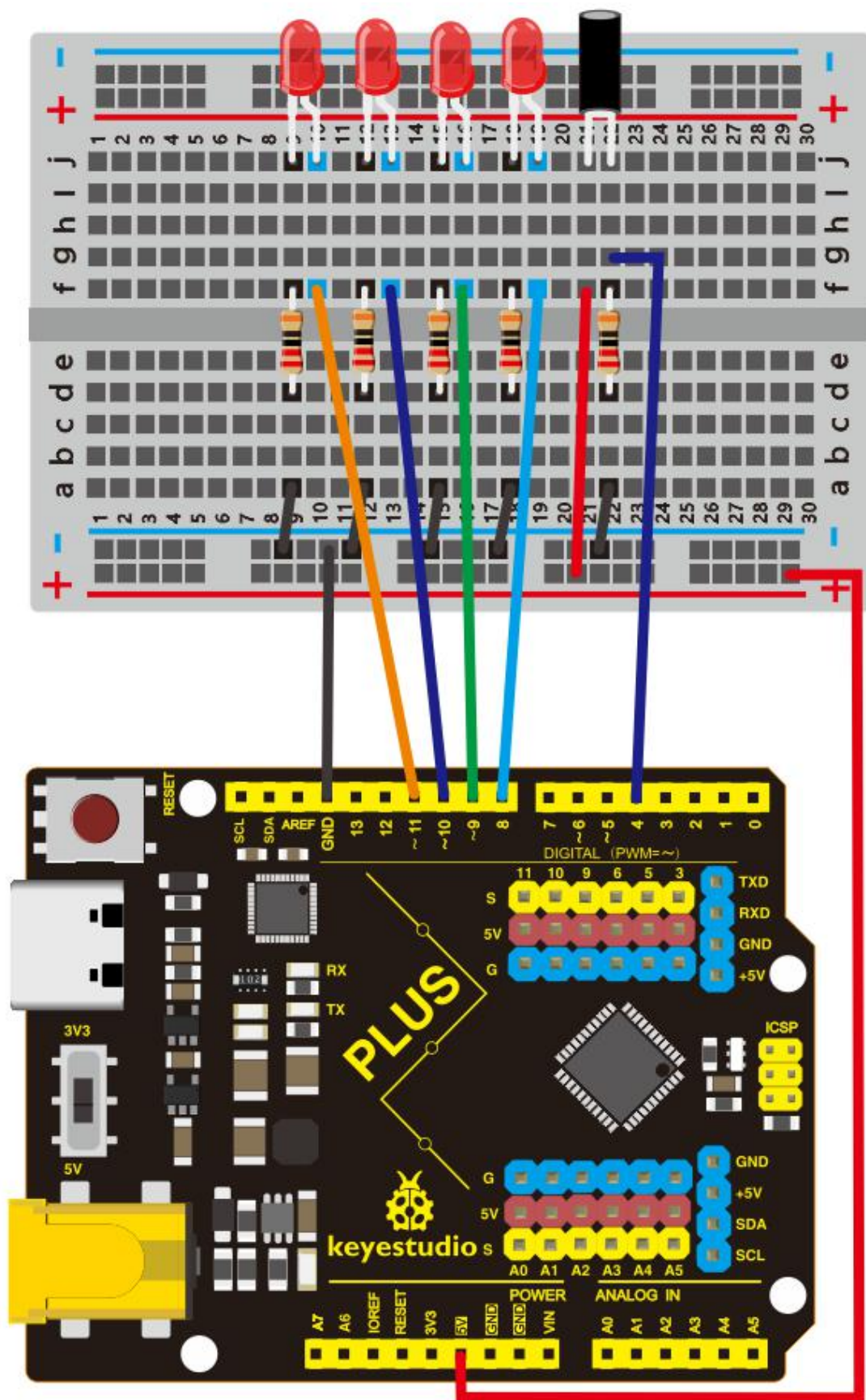
When one end of the switch is below horizontal position, the switch is on. The voltage of the analog port is about 5V (1023 in binary). The LED will be on.

When the other end of the switch is below horizontal position, the switch is off. The voltage of the analog port is about 0V (0 in binary). The LED will be off.

In the program, we determine whether the switch is on or off according to the voltage value of the analog port, whether it's above 2.5V (512 in binary) or not.

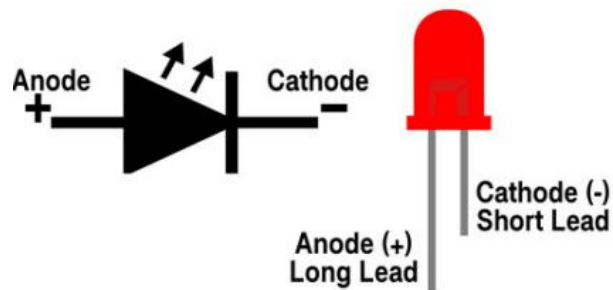
#### **4.Circuit Connection**



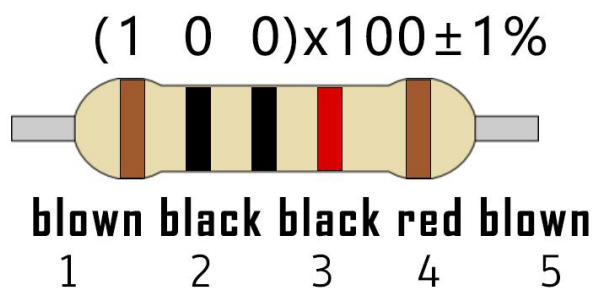
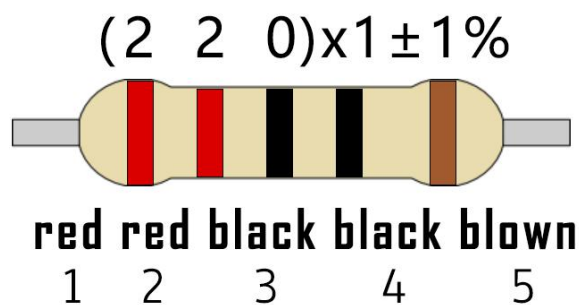


## NOTE:

How to connect an LED



How to identify 5 band 220Ω Resistor and a 5 band 10KΩ Resistor



## 5.Project Code

/\*

keystudio STEM Starter Kit

Project 11

## Digital Hourglass

<http://www.keyestudio.com>

```
*/  
  
const byte SWITCH_PIN = 4; // connect tilt switch to D4  
byte switch_state = 0;  
void setup()  
{  
    for(int i=8;i<12;i++)  
    {  
        pinMode(i, OUTPUT);  
    }  
    pinMode(SWITCH_PIN, INPUT);  
    for(int i=8;i<12;i++)  
    {  
        digitalWrite(i,0);  
    }  
    Serial.begin(9600);  
}  
void loop()  
{  
    switch_state = digitalRead(SWITCH_PIN);  
    Serial.println(switch_state);
```

```

if (switch_state == 0)
{
for(int i=8;i<12;i++)
{
digitalWrite(i,1);
delay(1000);
}
}

if (switch_state == 1)
{
for(int i=11;i>7;i--)
{
digitalWrite(i,0);
delay(1000);
}
}

}//////////////////////////////////////
//

```

1.Open up the Arduino IDE and copy the above code into a new sketch.

2.Select the correct Board type and COM port for the Arduino



IDE.

3. Click Upload button to upload the code.

## 6. Project Result

Hold the breadboard with your hands. Tilt to a certain angle, the LEDs will light up one by one. When returning to the previous angle, the LEDs will turn off one by one. Just like an hourglass, the sand leaked out over time.

