Introduction of Hall switch

When a piece of metal or semiconductor with an electric current is placed vertically in a magnetic field, a potential difference occurs between the two ends of the sheet, a phenomenon known as the hall effect. The difference between the two ends is called the hall potential U, which is expressed as U=Kk • I • B/d. The hall switch USES this principle. 3144 series hall open light is a magnetic sensing circuit composed of voltage regulator, hall voltage generator, check amplifier, schmidt trigger, temperature compensator, etc. Its input is magnetic induction intensity, output is a digital voltage signal. It is characterized by small volume, high sensitivity, fast response speed and good temperature performance. Typical applications include: safety alarm device, contactless switch, etc.

Hall switch classification

1. Unipolar hall effect switch (digital output)

The monopole hall effect switch has magnetic working threshold (Bop). If the flux density borne by the hall cell is greater than the operating threshold, the output transistor will be turned on. When the flux density falls below the operating threshold (Brp), the transistor shuts down. Lag (Bhys) is the difference between two thresholds (bop-brp). This built-in lag page allows for net switching of output, even in the presence of external mechanical vibration and electrical noise. The digital output of unipolar hall effect can adapt to various

logic systems. These devices are ideal for use with simple magnetic bars or poles. The unipolar hall switch will specify a magnetic pole induction on the front and back of the switch will have a role, in the specific application should pay attention to the magnetic pole installation of the magnet, the reverse will cause unipolar induction output.

2. Bipolar hall effect switch (digital output)

Bipolar hall can be divided into two types: bipolar hall switch without latches and bipolar hall switch with latches.

The bipolar hall switch usually opens when the magnetic field at the South Pole is strong enough and closes when the magnetic field at the North Pole is strong enough, but if the magnetic field is removed, the output is random, either on or off. The bipolar latch-on hall effect switch usually opens when the magnetic field at the South Pole is strong enough and closes when the magnetic field at the North Pole is strong enough, but does not change the output state if the magnetic field is removed. These hall effect switches can be magnetically driven by alternating north-south magnetic fields and multipole ring magnets.

3. Bipolar latch hall effect switch (digital output)

When placed at the n pole (or s pole), the magnetic field remains open after removal; When the magnetic field is removed, it will remain open or closed until the next time the magnetic field is changed. This property of holding the last state is the latch-on property, and this type of hall benefit switch is the bipolar latch-on hall effect switch.

4. All-pole hall effect switch (digital output)

Unlike other hall effect switches, these devices can be turned on by a strong north or South Pole magnetic field; In the absence of a magnetic field, the output shuts down.

5. Linear hall effect sensor IC(analog output)

The voltage output of the linear hall effect sensor IC will accurately track the flux density changes. At static (no magnetic field), the output should theoretically be equal to half of the supply voltage within the operating voltage and operating temperature range. Increasing the South Pole magnetic field will increase the voltage from its static voltage. Instead, increasing the North Pole's magnetic field will increase the voltage from its static voltage. These components measure the Angle, proximity, movement, and magnetic flux of the current. They can reflect mechanical events in a magnetically driven manner.

6. Hall effect switch with micro-power consumption (digital output)

With the popularization of mobile phones, laptops, DV and other portable devices, the power consumption of hall IC is required, thus a new category of hall IC is generated. It is a kind of digital hall IC separated by power consumption, and its internal dormancy mechanism reduces power consumption, and the average power consumption can reach uA

level. It can also be divided into single-class hall IC, lock type hall IC, and the whole class hall IC. Such systems are commonly used for long - term battery power.

Experimental purpose

Use hall switch to control LED lights on and off.

Experimental principle

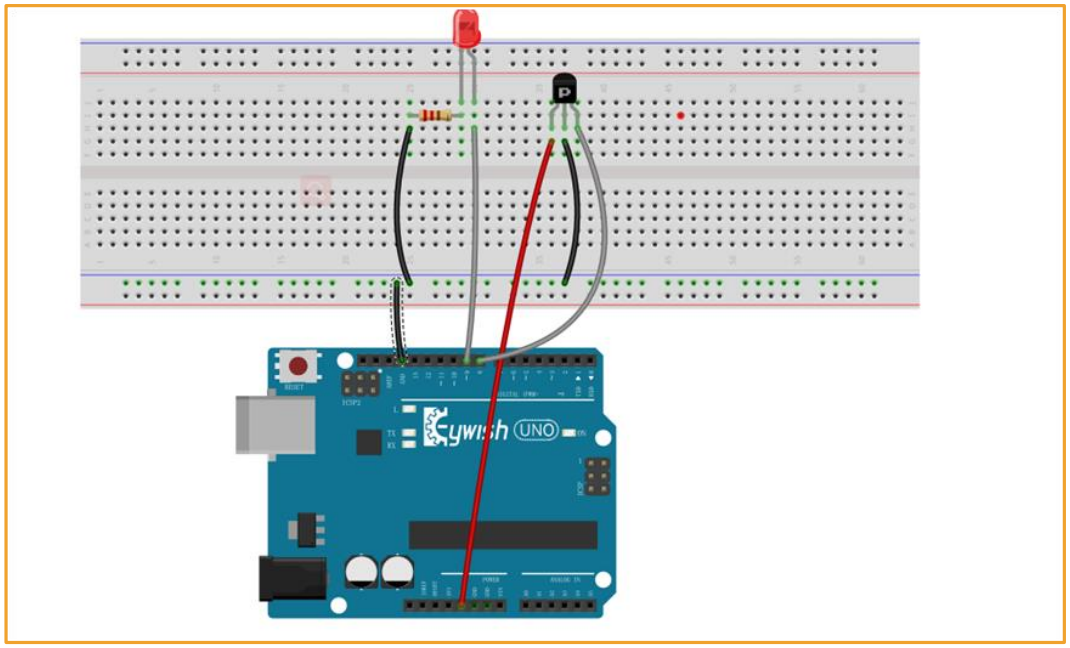
When the hall switch is energized, when no magnetic flux passes through the hall switch, the switch is in the state of disconnection. When the object with magnetic sensing line, such as a magnet, approaches the hall switch, the magnetic flux is generated to make the hall switch open and make the LED lamp light up.

The component list

- Keywish Arduino Uno R3 motherboard *1
- Breadboard
- USB cable *1
- Hall Switch*1
- 10kΩ resistor*1
- LED*1
- Jumer wires

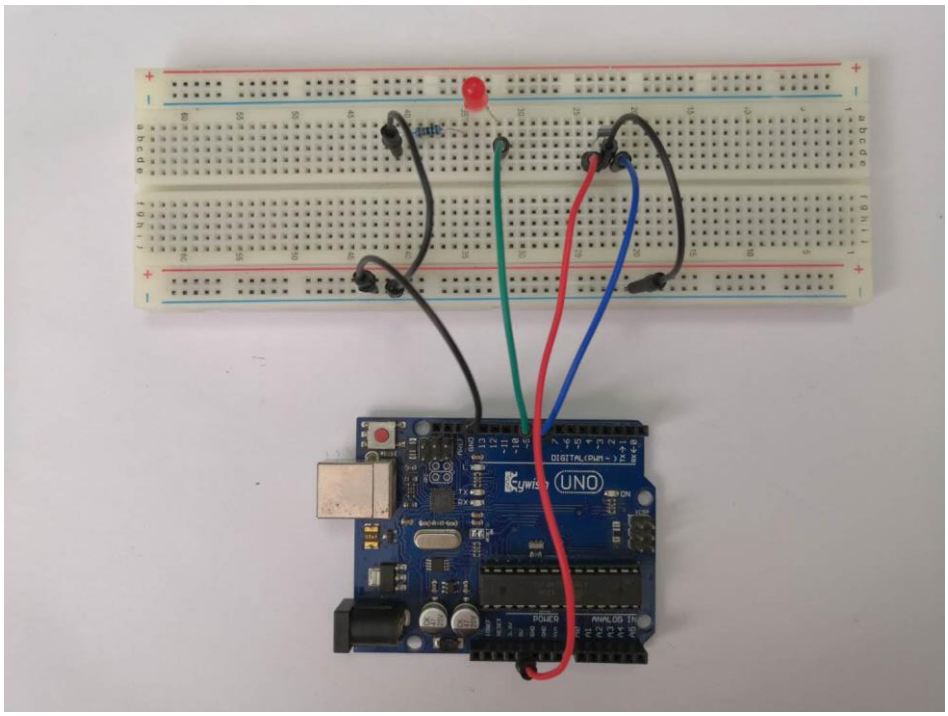
Wiring

Arduino UNO	Hall Switch
5V	VCC（R）
GND	GND(G)
9	OUT(Y)
Arduino UNO	LED Module
8	+
GND	—



The experimental conclusion

After successful wiring, power the main control board, then use a magnet to get close to the hall switch. When the hall switch is switched on, the LED lights come on. Move the magnet away and the LED lights go out again.

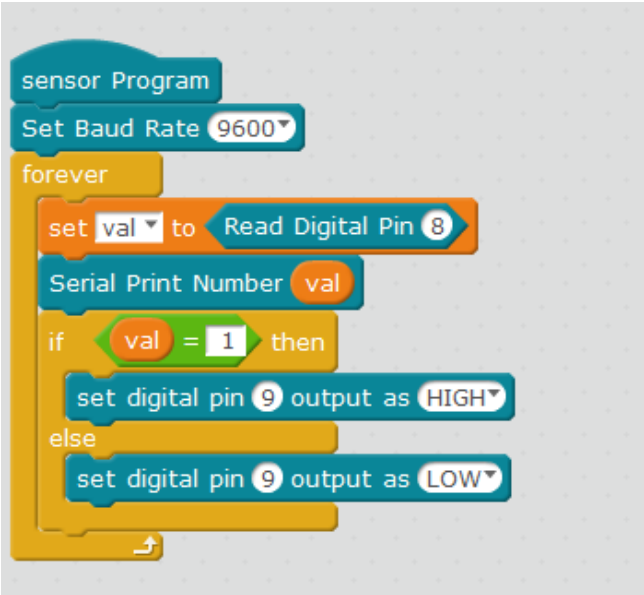


Code

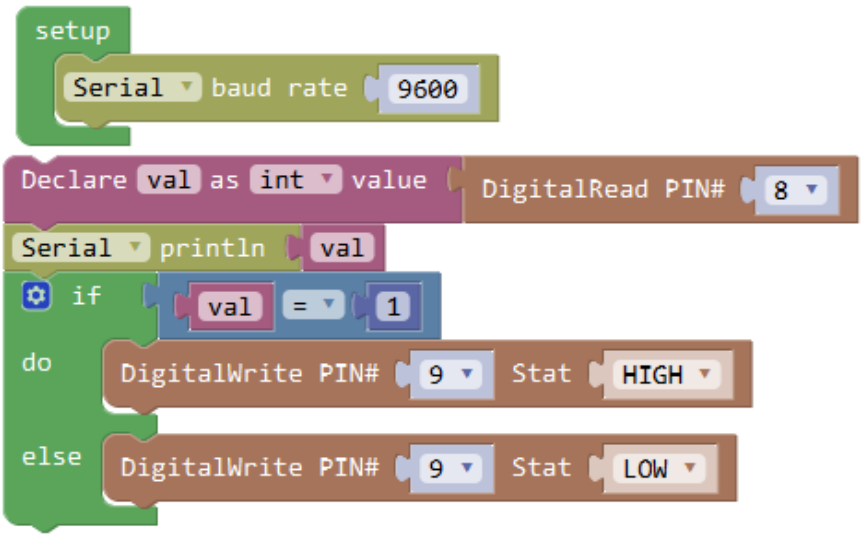
```
int Led=9;
int Hall_Pin= 8;
int val=0;
void setup()
{
  pinMode(Led,OUTPUT);
  pinMode(Hall_Pin,INPUT);
  Serial.begin(9600);
}
void loop()
{
   val=digitalRead(Hall_Pin);
  Serial.println(val);
  if(val==HIGH)
     {  digitalWrite(Led,HIGH);
     }
  else
     {
       digitalWrite(Led,LOW);
     }
}
```

MBlock programming program

MBlock writes hall switch program as shown in the figure below:



Mixly programming program



MagicBlock programming program