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US1881 Hall Effect Sensor

Introduction

The US1881 is an integrated Hall effect latched sensor. That's nice but what does it do? Holding a magnet near the sensor will cause the output pin to toggle. This makes for a robust presence sensor. A reed sensor also works nicely, but can be limited by the glass encapsulation and size. A hall effect sensor is much smaller, but can handle less current than a reed switch.

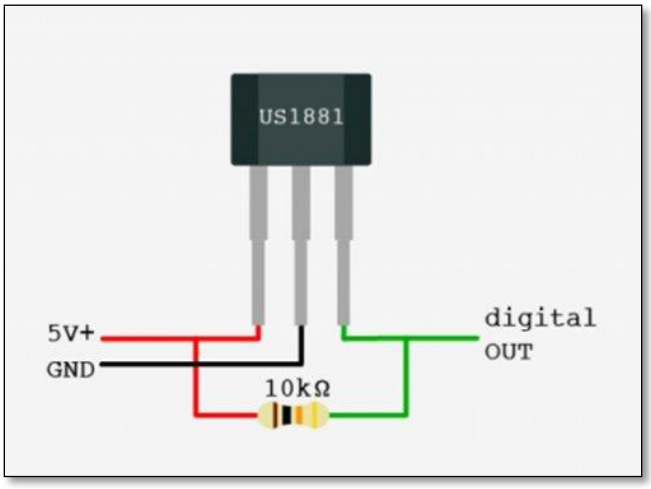
The device includes an on-chip Hall voltage generator for magnetic sensing, a comparator that amplifies the Hall voltage, and a Schmitt trigger to provide switching hysteresis for noise rejection, and open-collector output. An internal bandgap regulator is used to provide temperature compensated supply voltage for internal circuits and allows a wide operating supply range.

If a magnetic flux density larger than threshold Bop, DO is turned on (low). The output state is held until a magnetic flux density reversal falls below Brp causing DO to be turned off (high).

Specification

- 3.5V to 24V DC operation voltage
- Low current consumption
- Temperature compensation
- Wide operating voltage range
- Open-Collector pre-driver
- 50mA maximum sinking output current
- Reverse polarity protection
- Lead Free Package: TO-226-3

IMAGES



Packing List

- US1881 Hall Effect Sensor

Requirements

It can be interface with any microcontroller such as PIC, SK40C, SK28A, SKds40A, Arduino series.

Necessary hardware to follow this guide:

1. Arduino UNO
2. Hall effect sensor US1881.
3. 10K resistor.
4. Connecting wires and breadboard.

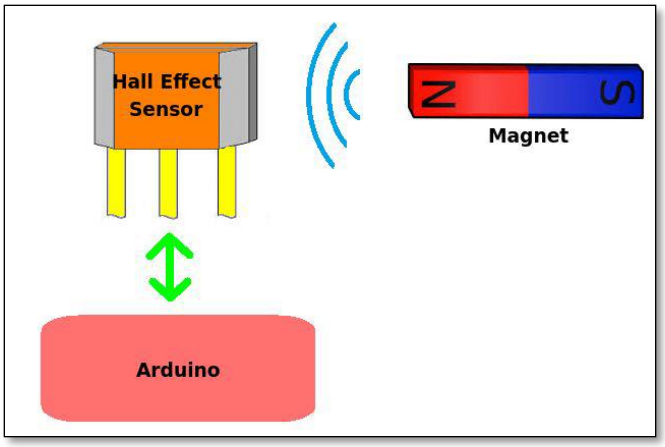
Pin Assignment

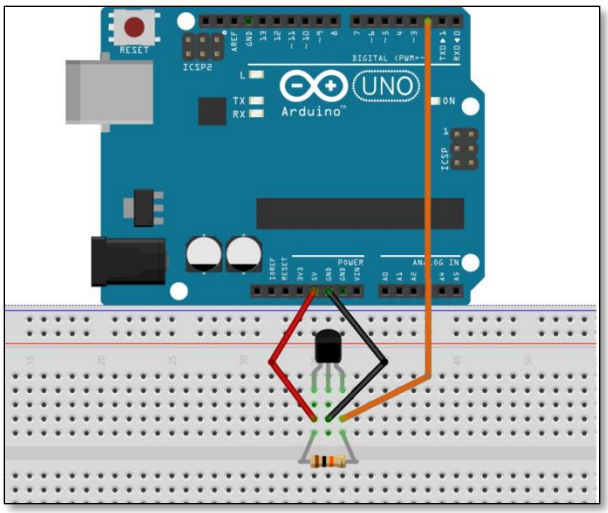
There are 3 pins used to interface US1881 Hall Effect Sensor.

1. GND
2. Digital Output (DO)
3. VCC

Hardware Interface/Setup

The Hall Effect sensor works on the principle of the Hall Effect, which states that whenever a magnetic field is applied in a direction perpendicular to the flow of electric current in a conductor, a potential difference is induced. This voltage can be used to detect whether the sensor is in the proximity of a magnet or not. The Arduino can detect this voltage change through its interrupt pin and determine whether the magnet is near the sensor or not. The basic working of the Arduino Hall Effect sensor is shown in the picture below.





Interfacing the Hall Effect sensor with Arduino is really simple. The VCC of the sensor is connected to Arduino's 5V power pin. The GND of the sensor is connected to the GND pin on the Arduino. The Vout or Signal pin of the Hall Effect sensor is connected to the Arduino's interrupt pin (digital pin 2). Furthermore, a 10K resistor is connected between the VCC and Vout pins of the Hall Effect sensor. This is done to pull the output of the Hall Effect sensor to 5V.

After you finish hooking up the Hall Effect sensor to your Arduino, you need to upload the code to the board and test it. The Arduino Hall Effect Sensor code can be used to detect a magnet and count the number of times it detects it. This is a very simple Arduino code which utilizes the interrupt pin 0 (digital pin 2) of the Arduino.

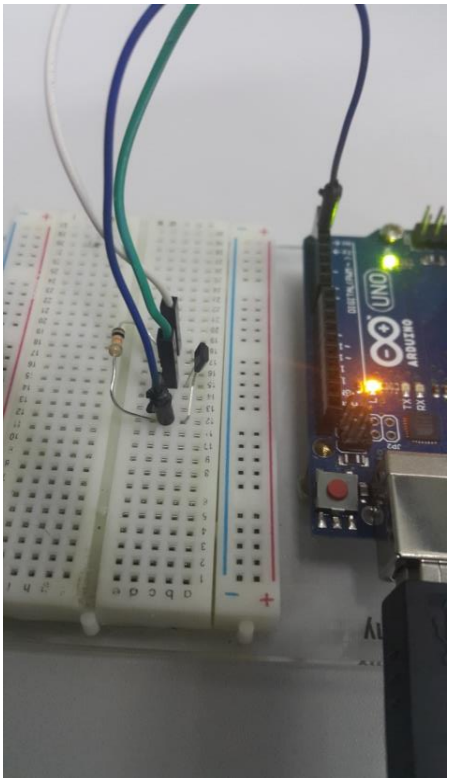
Example Code

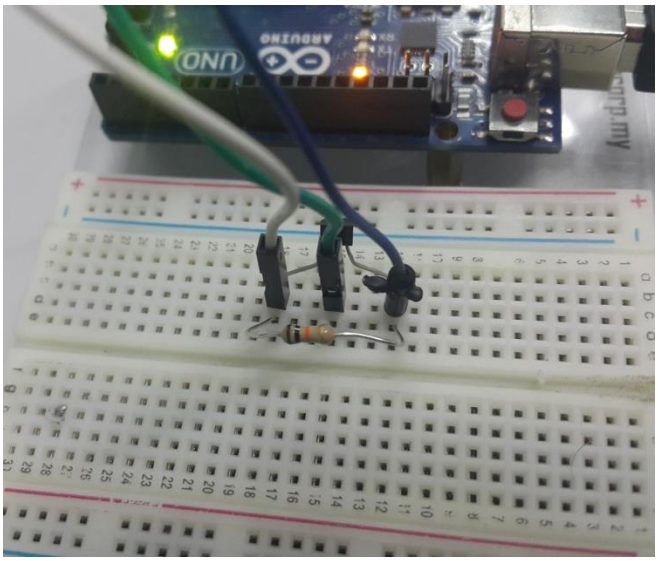
This is example code for US1881 Hall Effect Sensor . The full code can be download at

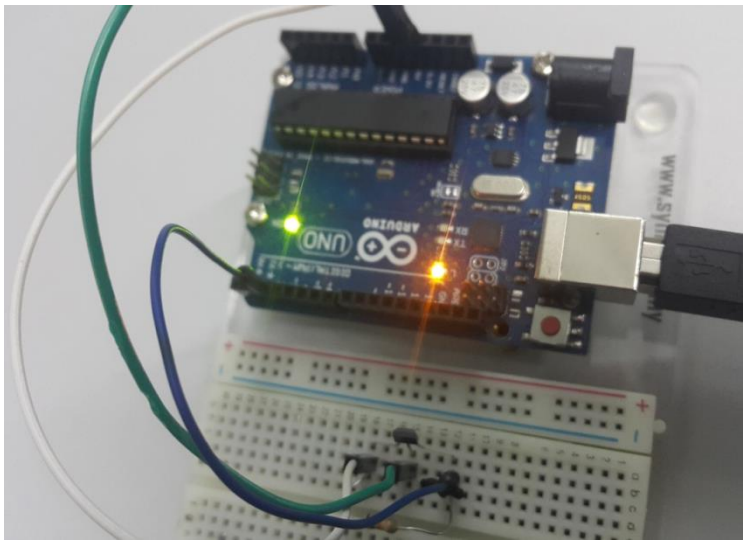
```
/*
Arduino Hall Effect Sensor Project
by Arvind Sanjeev
Please check out  http://diyhacking.com for the tutorial of this project.
DIY Hacking
*/


 volatile byte half_revolutions;
 unsigned int rpm;
 unsigned long timeold;
 void setup()
 {
  Serial.begin(115200);
  attachInterrupt(0, magnet_detect, RISING);//Initialize the intterrupt pin (Arduino digital pin 2)
  half_revolutions = 0;
  rpm = 0;
  timeold = 0;
 }
 void loop()//Measure RPM
 {
  if (half_revolutions >= 20) {
    rpm = 30*1000/(millis() - timeold)*half_revolutions;
    timeold = millis();
    half_revolutions = 0;
    //Serial.println(rpm,DEC);
  }
```

```
}
void magnet_detect()//This function is called whenever a magnet/interrupt is detected by the
arduino
{
  half_revolutions++;
  Serial.println("detect");
}
```

Connection







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Applications

- Solid state switch
- Brushless DC motor commutation
- Speed sensing
- Linear position sensing
- Angular position sensing
- Current sensing
- Flow Meter
- Wiper Systems