



# Arduino

Sensor setup

**AURIGA**  
the banking e-volution

THE **#NEXTGENBANK**



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# Auriga IoT – Security scenario

## ATM Jackpotting

The sensors located on ATM detect that an attacker is trying to open the front panel of the ATM. The server send a command to power off the cash dispenser. The attacker cannot dispense notes form the cash dispenser.

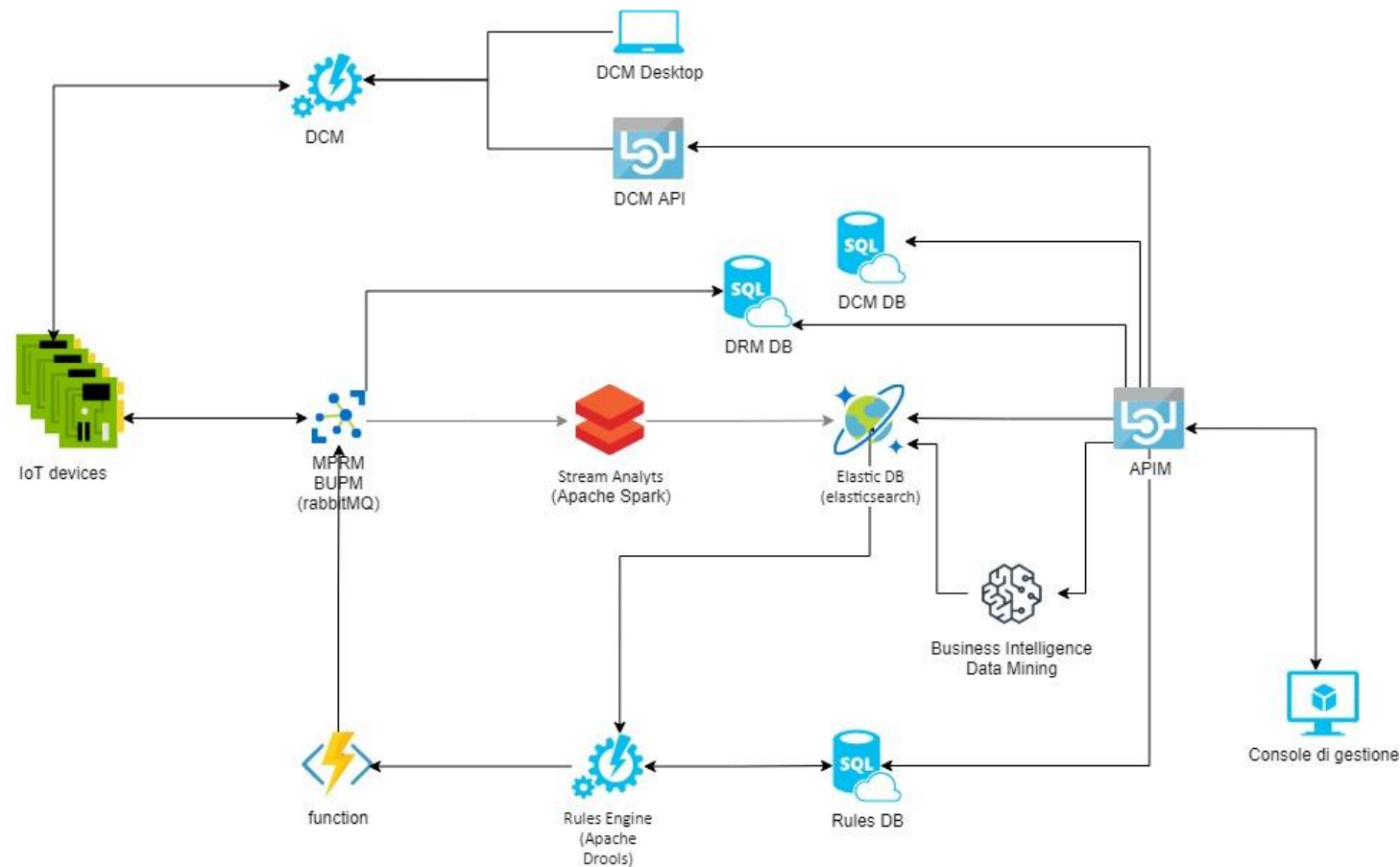
## Physical attacks

An attacker removes the ATM safe and take it away. The GPS tracker device integrated in it will start sending, directly to the server, the position of the safe within 0.1 seconds from the first movement.

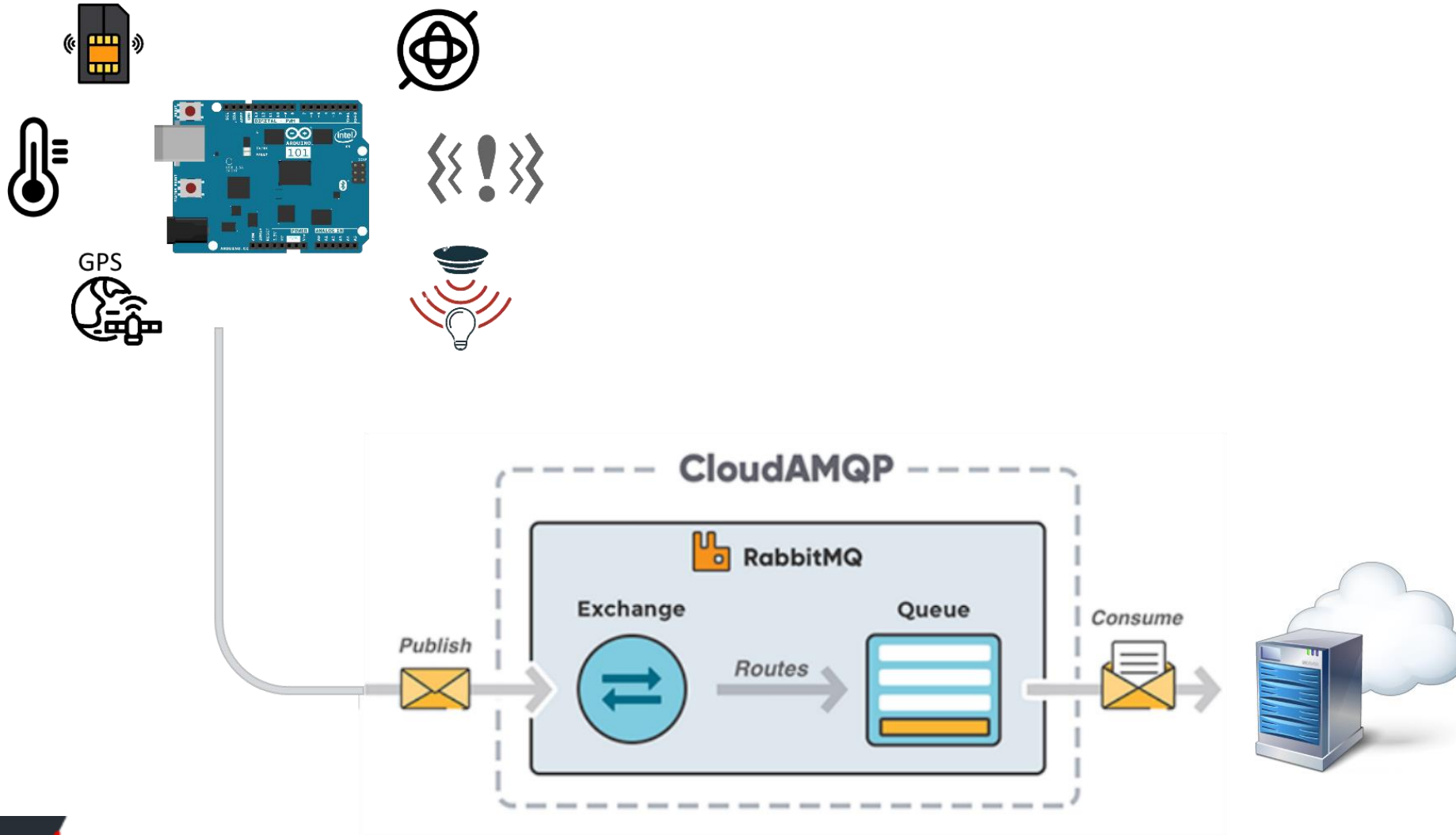
# Auriga IoT - ATM Security



# IoT Architecture in detail



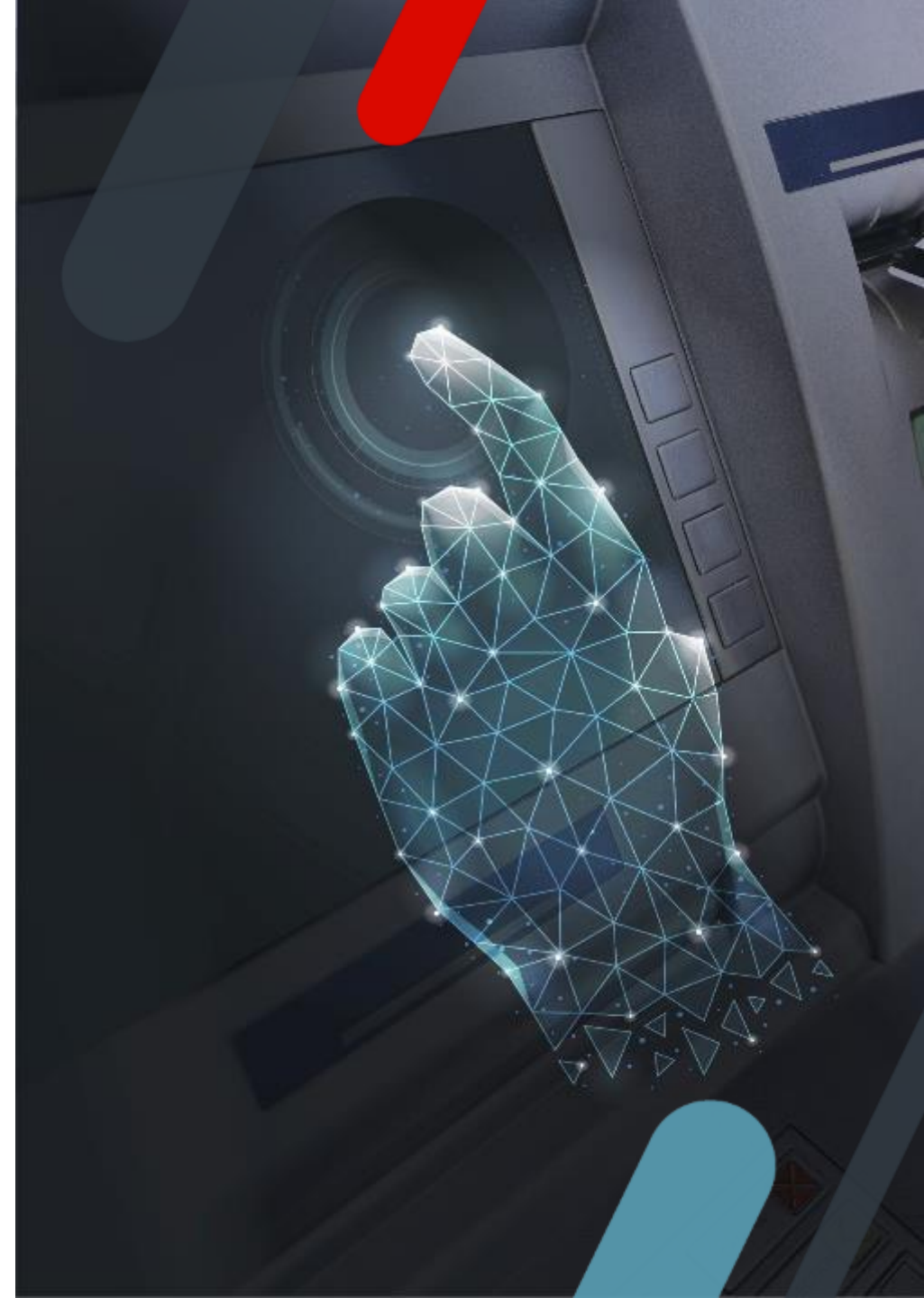
# IoT device



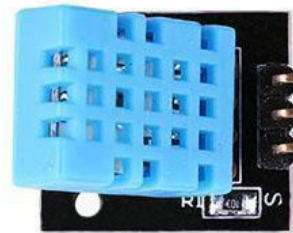


# Sensors

- Temperature and Humidity – DHT11
- Linear magnetic hall sensor module - Linear Hall
- Brightness sensor – Photoresistor
- Vibration and noise sensor – Small sound
- Movement sensor – GY-521
- Relay
- GPS module – gps6mv2
- GSM module - SIM800L evb



# Temperature and Humidity – DHT11



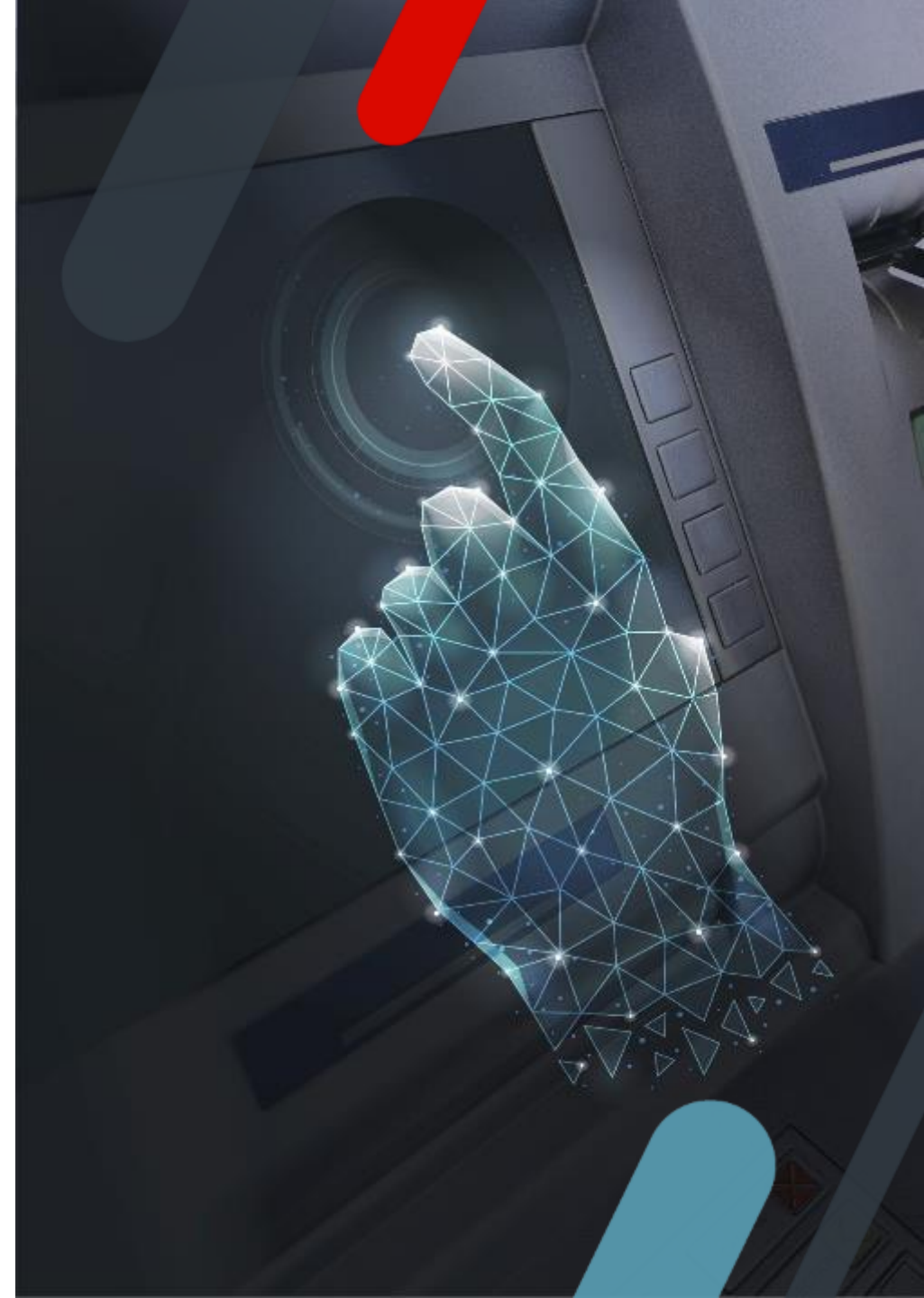
①  
②  
③

1.GND:ground  
2.VCC: 3.3V-5V DC  
3.OUTPUT

A module with a temperature/humidity sensor type DHT11, Temperature range: -20 - 60°C (+/-1°C),

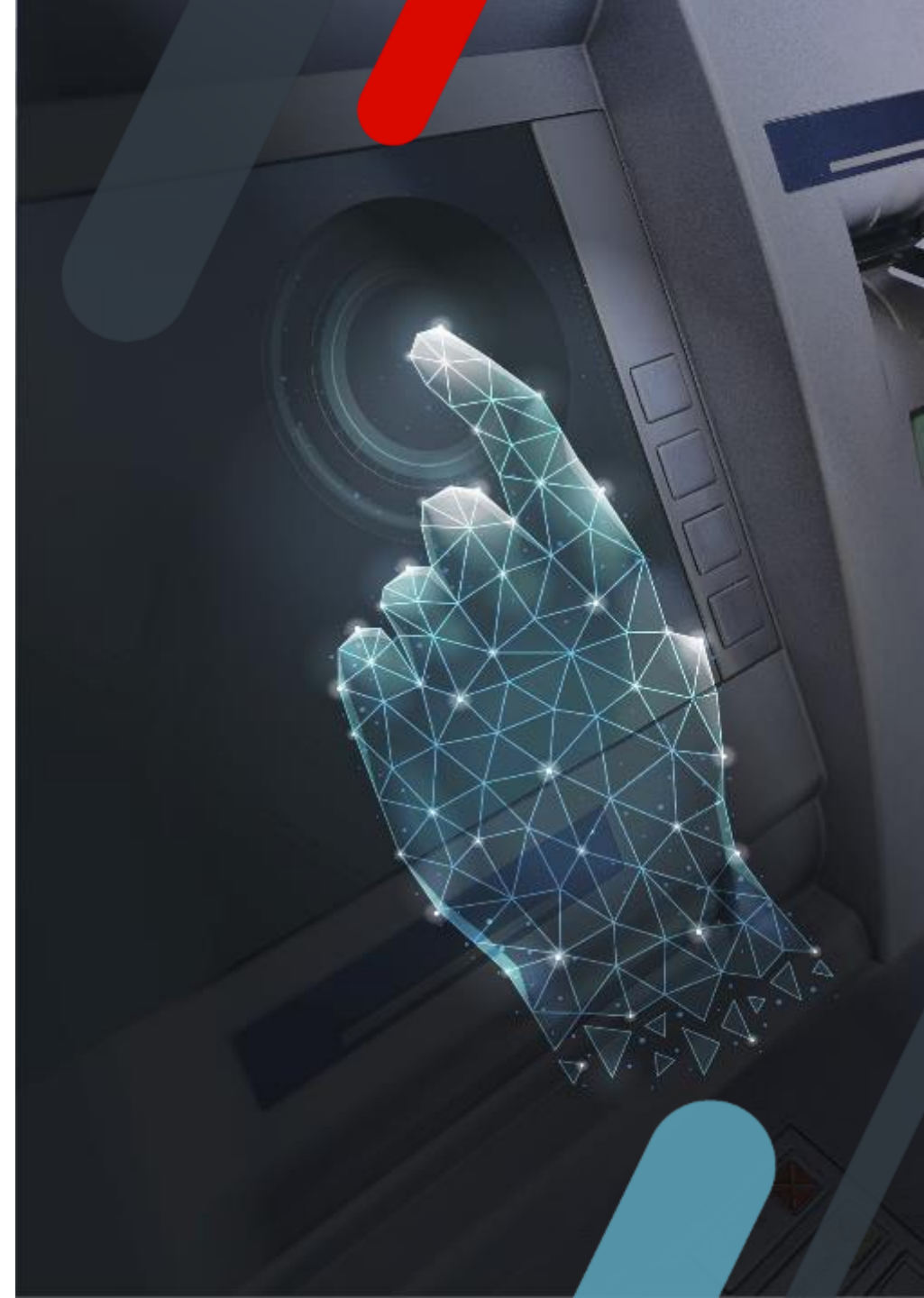
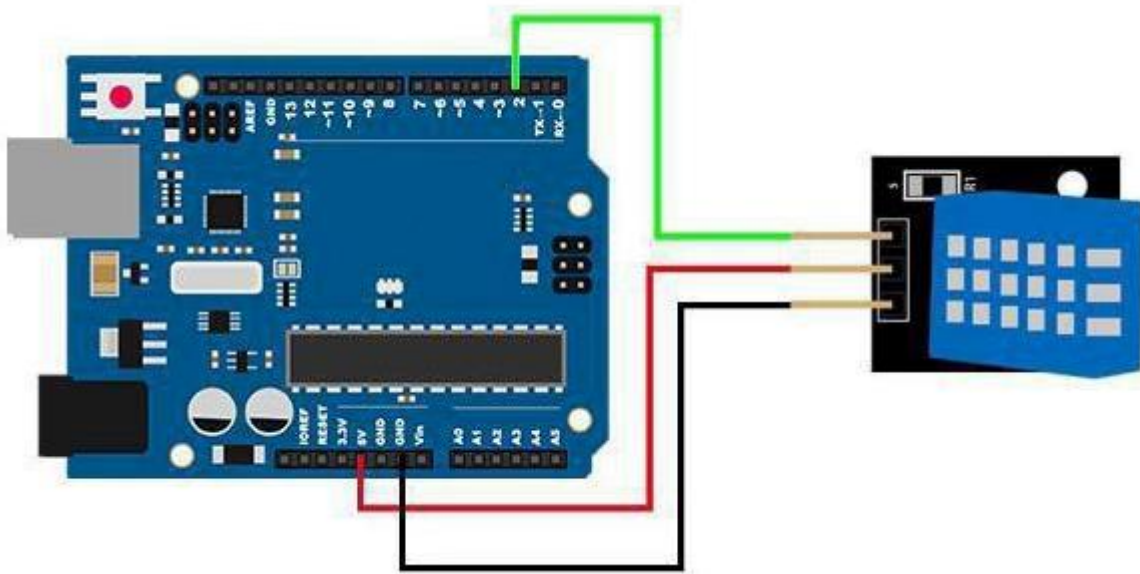
Rel. humidity: 5-95% (+/5%), Supply voltage: 3 to 5.5V. With a built-in 10 K ohm pull up resistor.

DHT library gives methods for retrieving temperature and humidity in easy way.



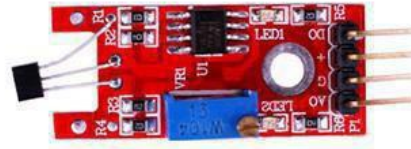
# Temperature and Humidity – DHT11

## Wiring





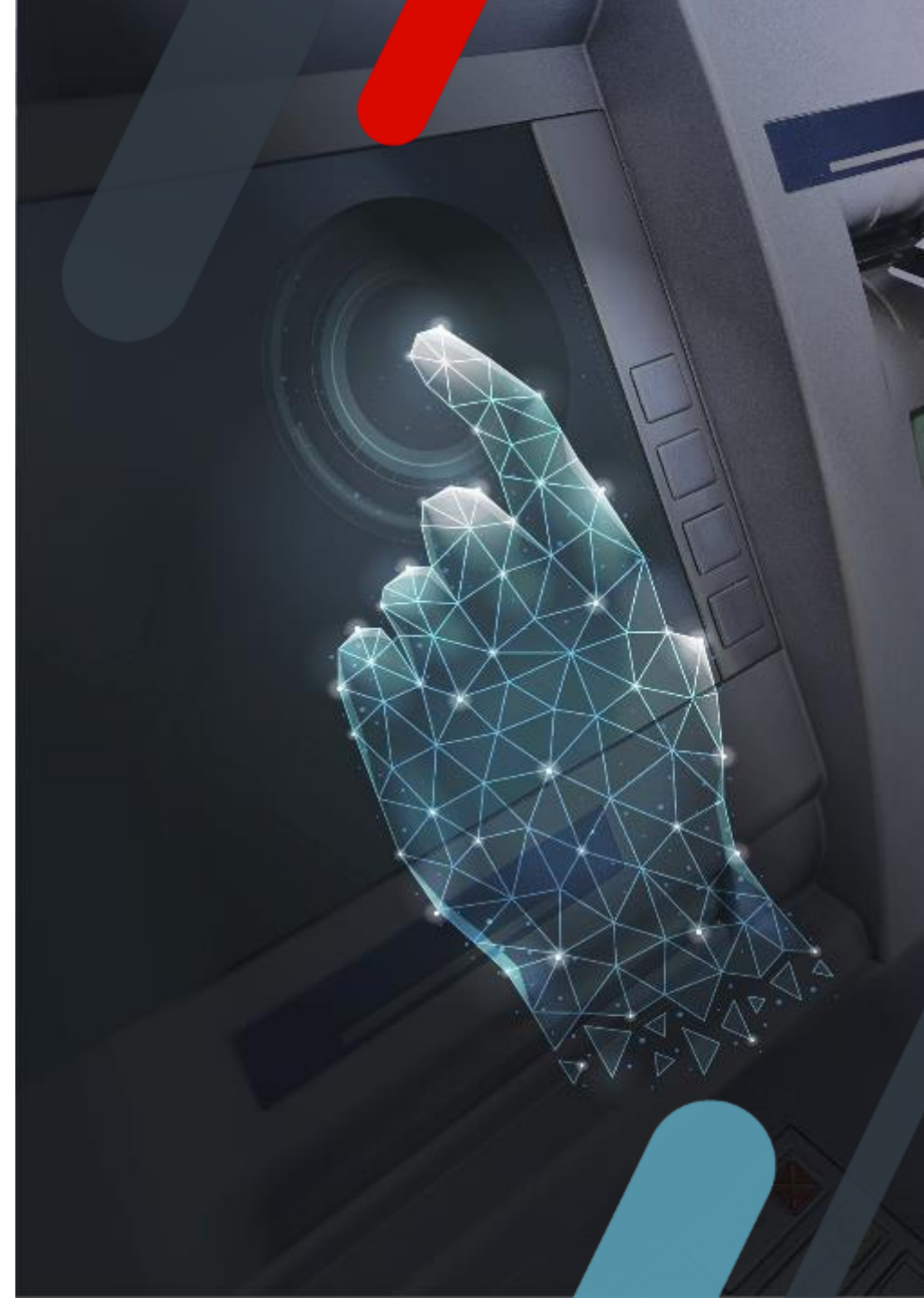
# Linear magnetic hall sensor module - Linear Hall



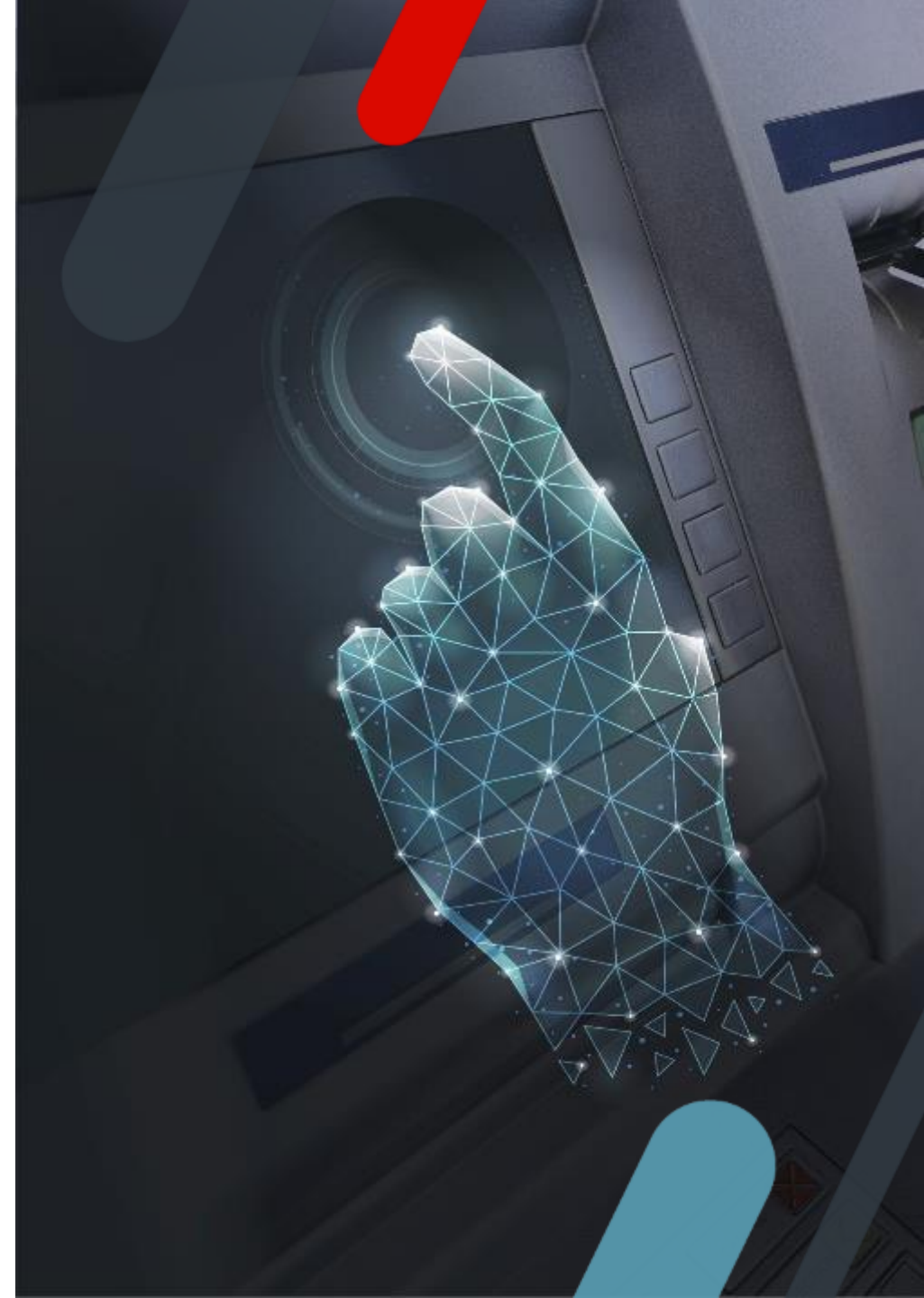
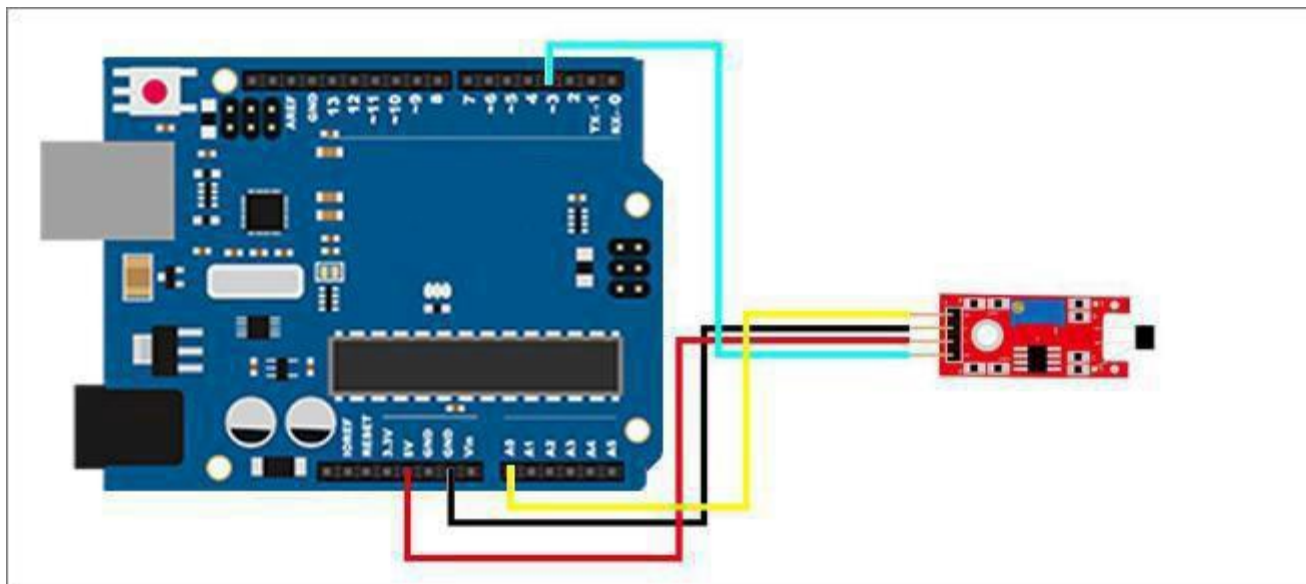
- ①
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1.DO:digital output  
2.VCC: 3.3V-5V DC  
3.GND:ground  
4.AO:analog output

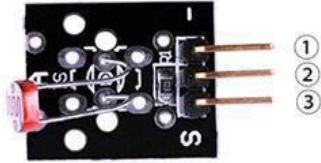
Linear Hall Sensor module to detect the presence of a magnetic field near the sensor. Variables such as field strength, polarity and position of the magnet relative to the sensor will affect point at which the 'DO' output switches to a high level (i.e. active high). The circuit sensitivity can be adjusted with a pot.



# Linear magnetic hall sensor module - Linear Hall



# Brightness sensor – Photoresistor

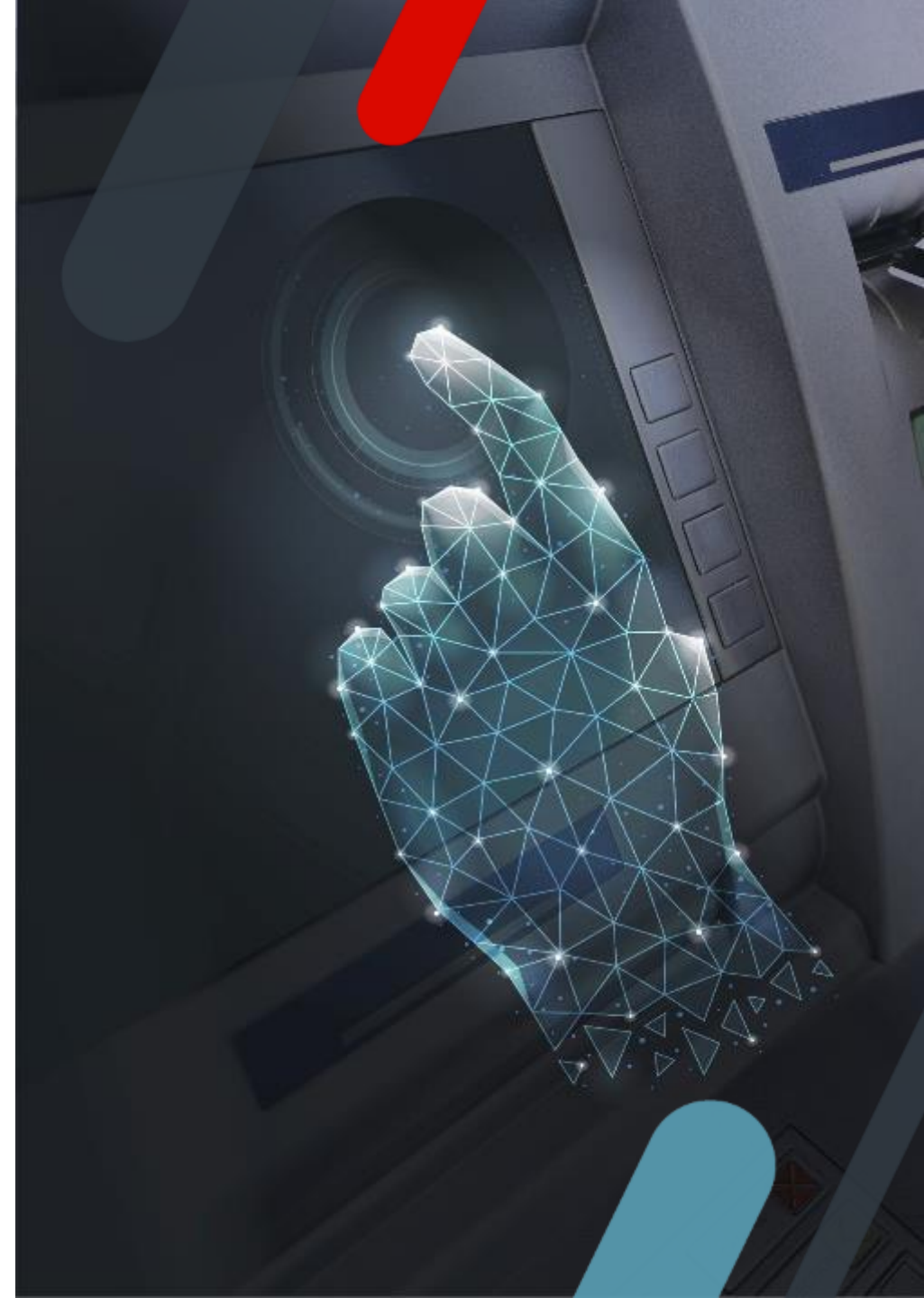


- 1.GND:ground
- 2.VCC:3.3V-5V DC
- 3.OUTPUT

The photocell used is of a type called a light dependent resistor, sometimes called an LDR.

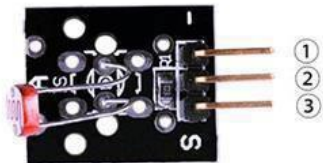
As the name suggests, these components act just like a resistor, except that the resistance changes in response to how much light is falling on them.

This one has a resistance of about 50 k $\Omega$  in near darkness and 500  $\Omega$  in bright light. To convert this varying value of resistance into something we can measure on an Arduino's analog input.

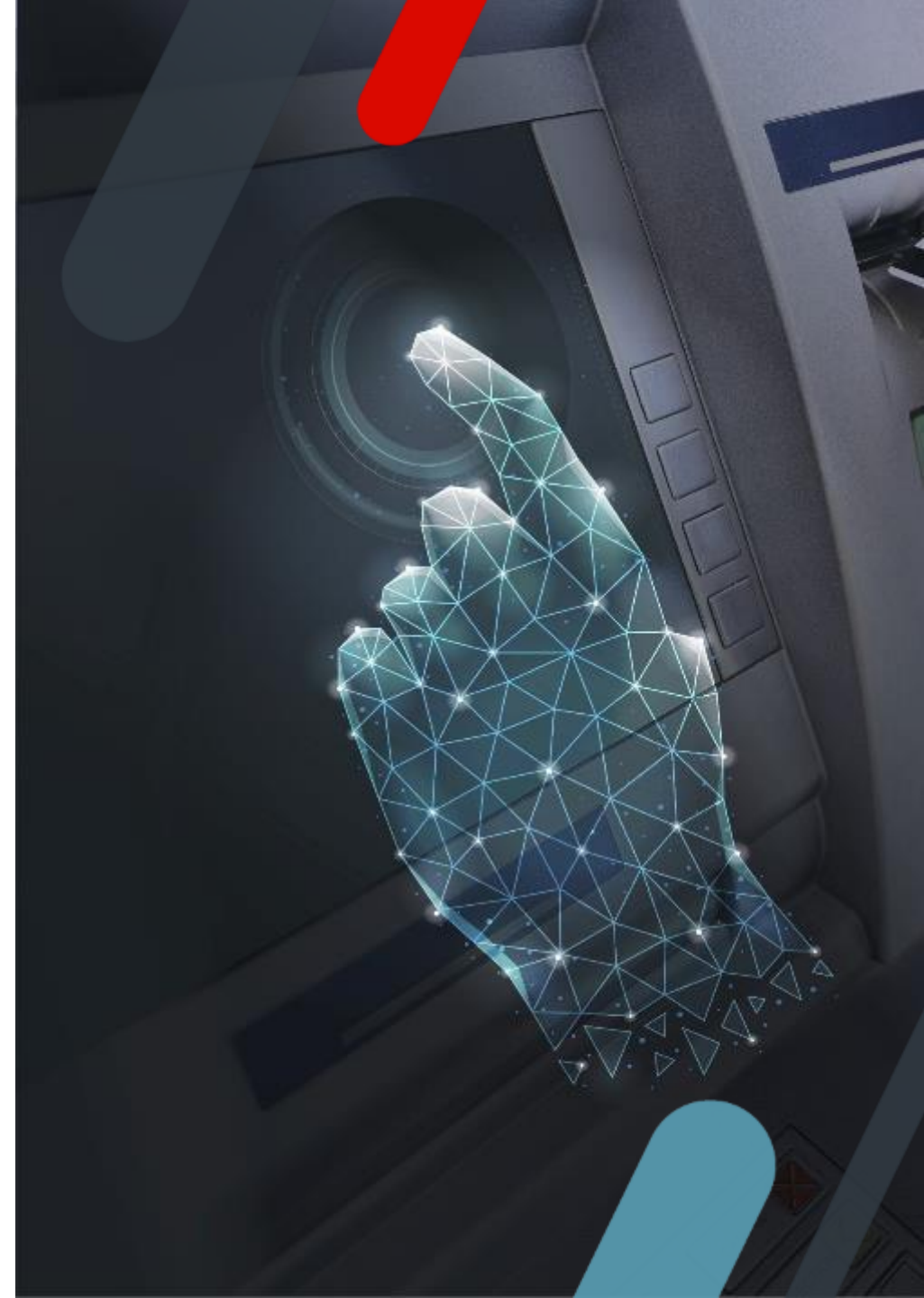
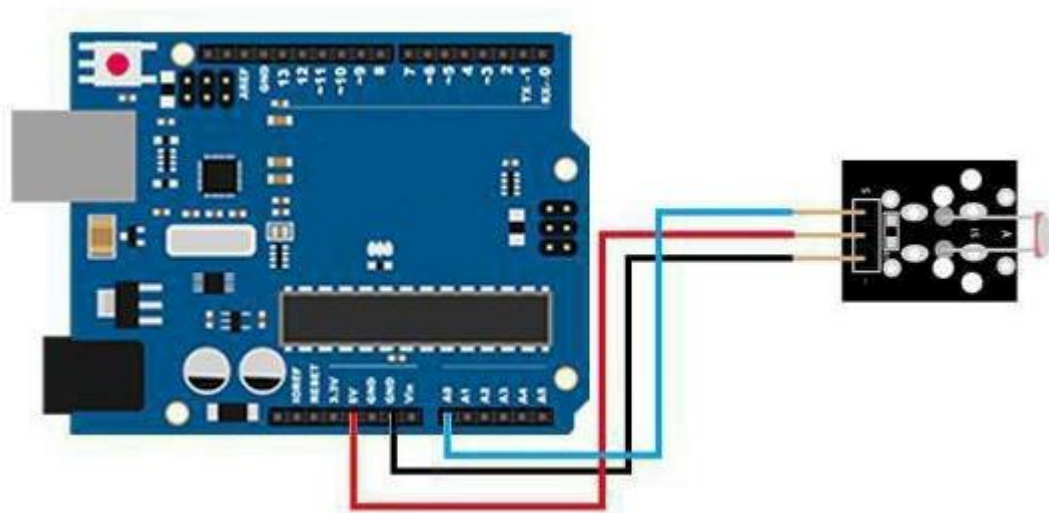




# Brightness sensor – Photoresistor



- 1.GND:ground
- 2.VCC:3.3V-5V DC
- 3.OUTPUT





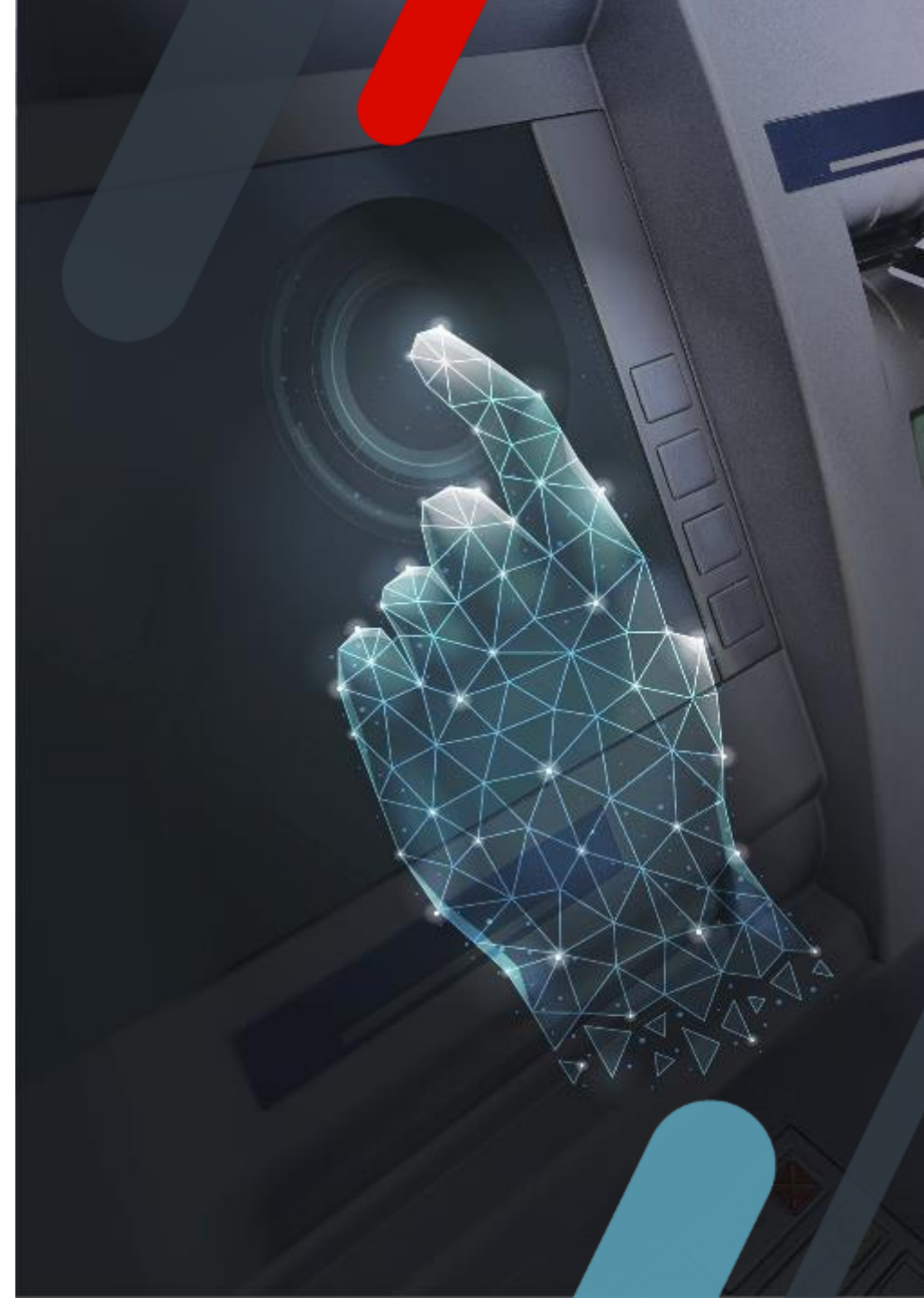
## Vibration and noise sensor – Small sound



- ① 1.DO:digital output
- ② 2.VCC: 3.3V-5V DC
- ③ 3.GND:ground
- ④ 4.AO:analog output

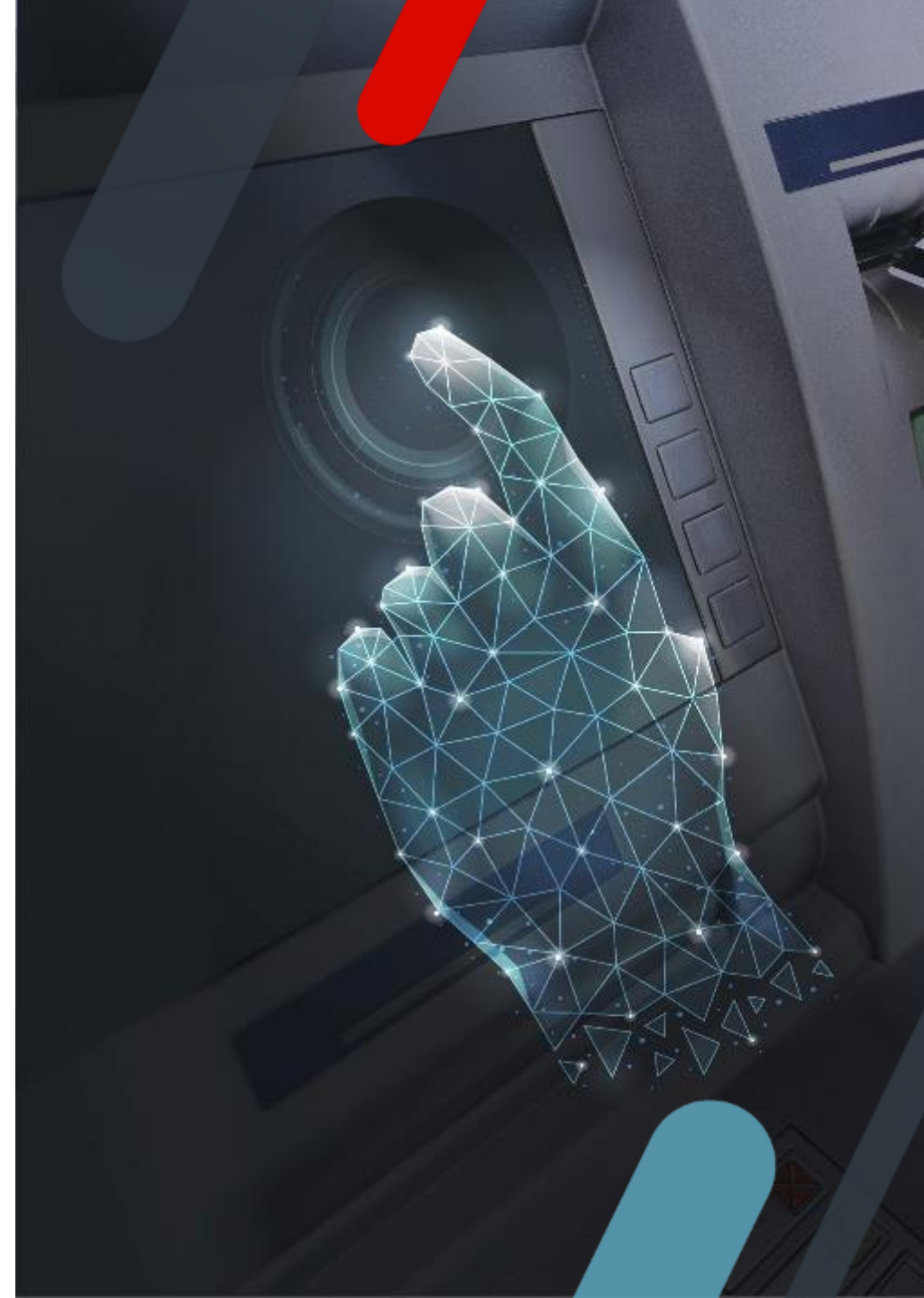
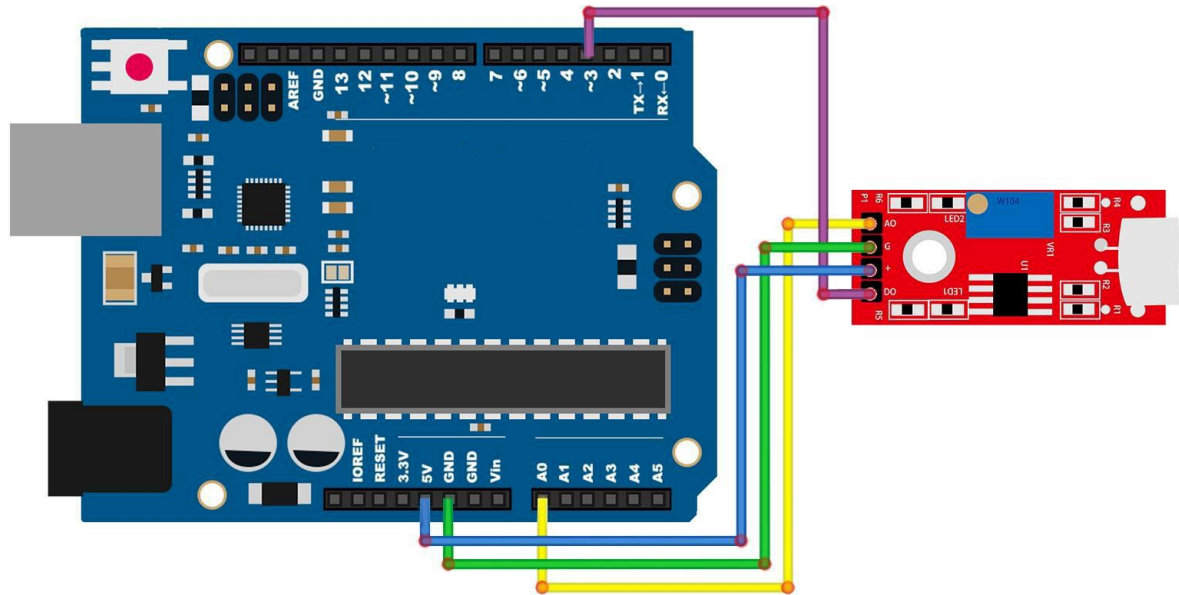
A microphone module with a small electret capsule. Output 'DO' (active high) is switched when the sound level exceeds a preset level. A potentiometer allows adjustment of the level.

Except for the smaller size of the capsule and its lower sensitivity the module is identical to the 'Big Sound' module.

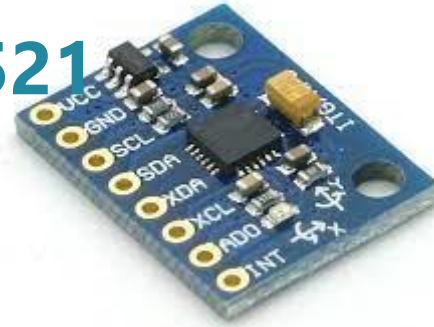


# Vibration and noise sensor – Small sound

There are two model that you can use: KY-037 or KY-038. They are very similar

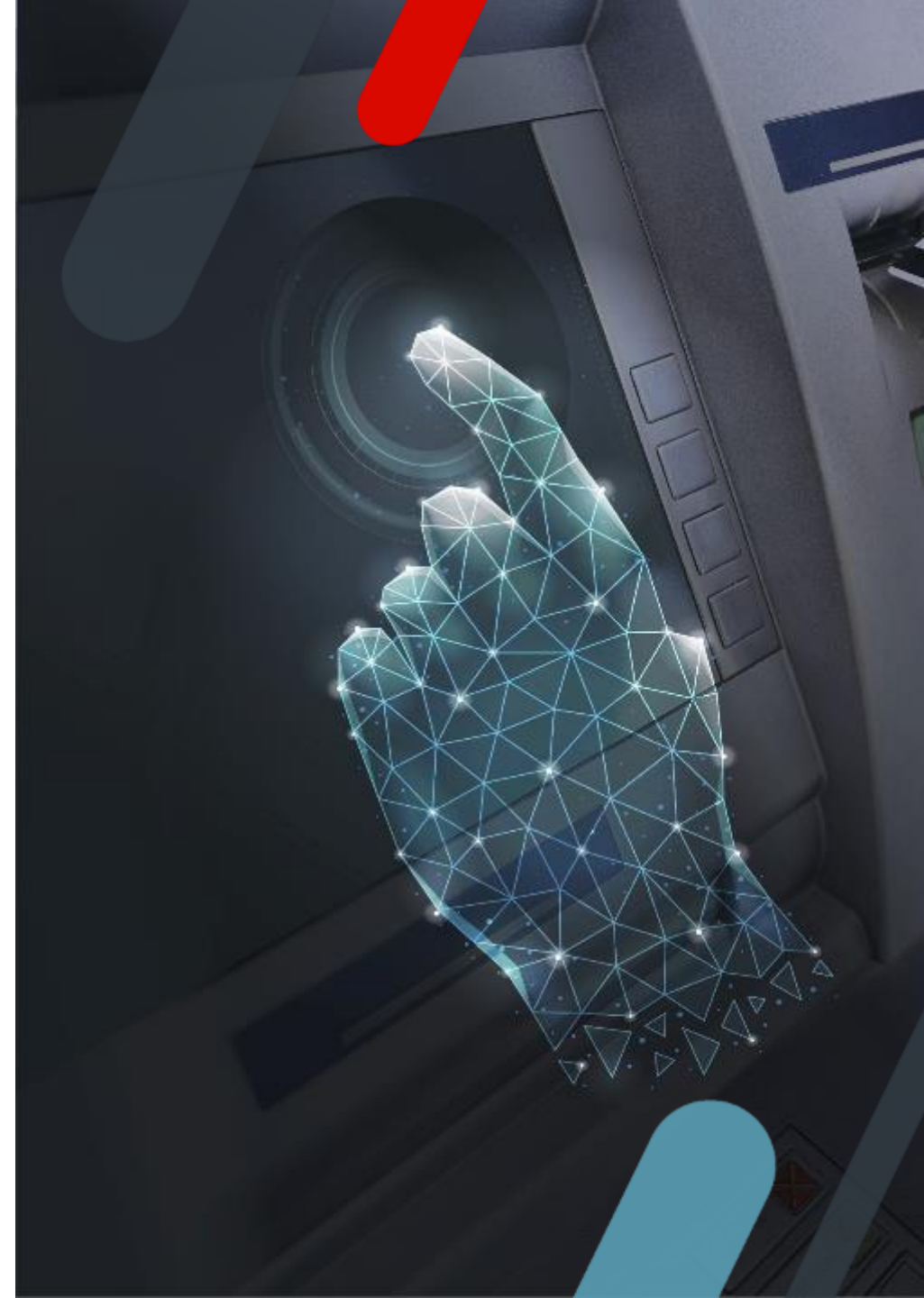


## Movement sensor – GY-521



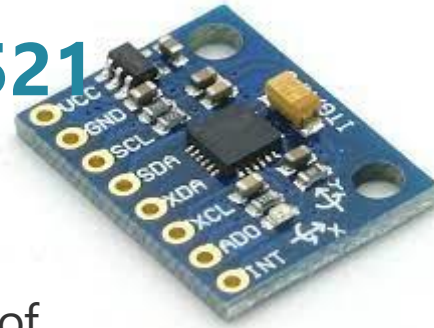
The InvenSense GY-521 sensor contains a MEMS accelerometer and a MEMS gyro in a single chip.

It captures the x, y, and z channel at the same time.





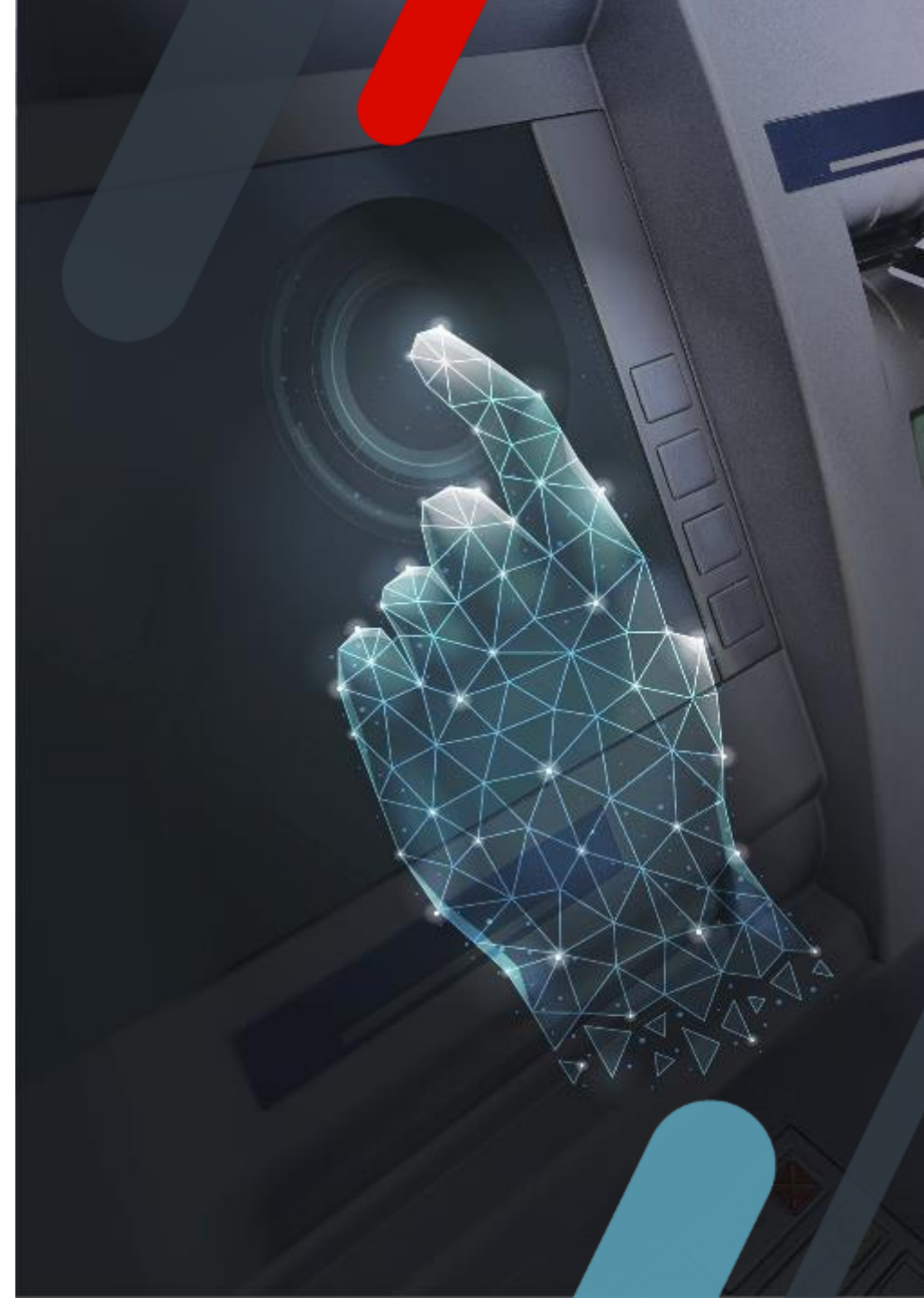
## Movement sensor – GY-521



An accelerometer works on the principle of piezo electric effect. Here, imagine a cuboidal box, having a small ball inside it

The walls of this box are made with piezo electric crystals. Whenever you tilt the box, the ball is forced to move in the direction of the inclination, due to gravity.

The wall with which the ball collides, creates tiny piezo electric currents. There are totally, three pairs of opposite walls in a cuboid. Each pair corresponds to an axis in 3D space: X, Y and Z axes.





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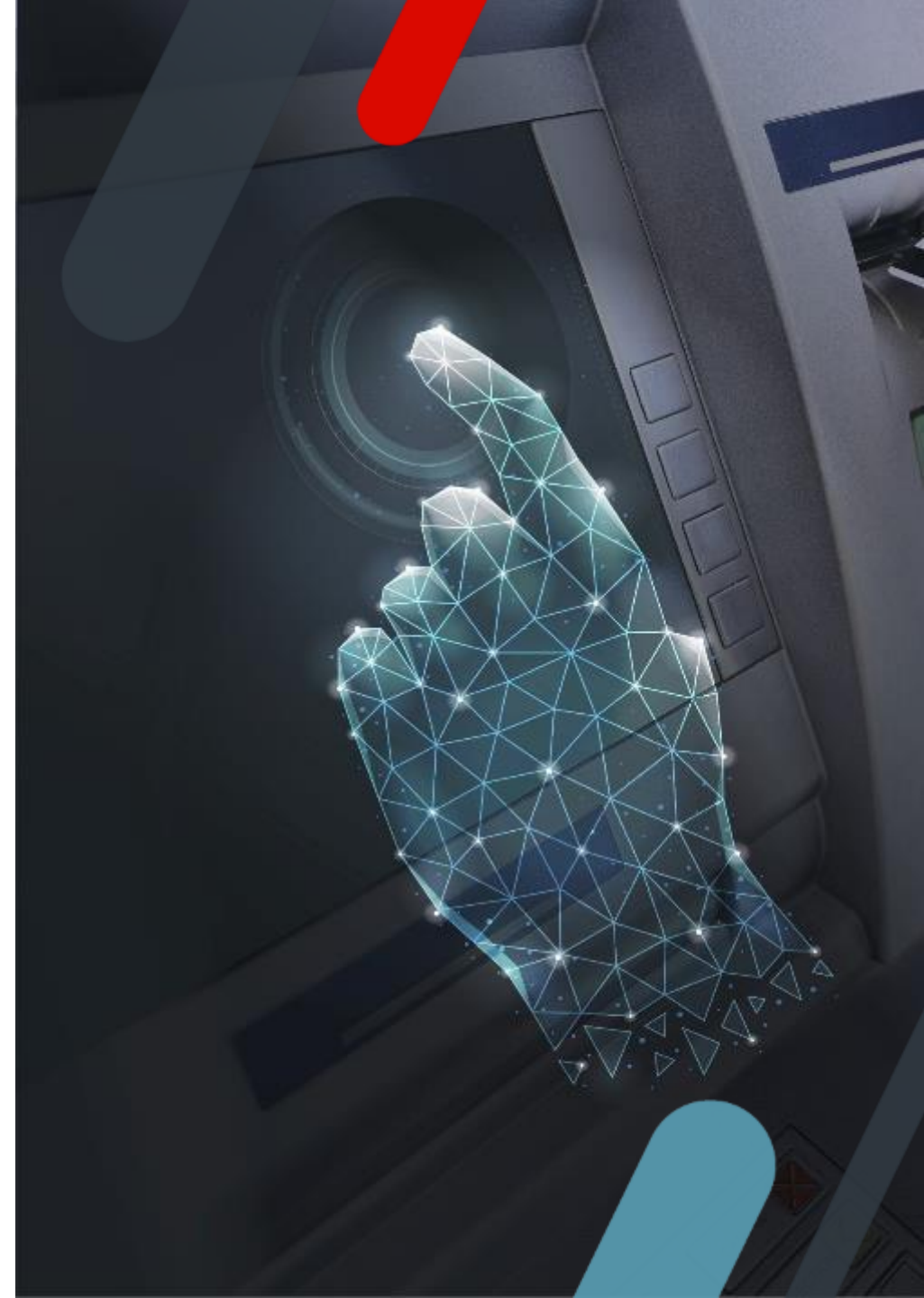


# Relay

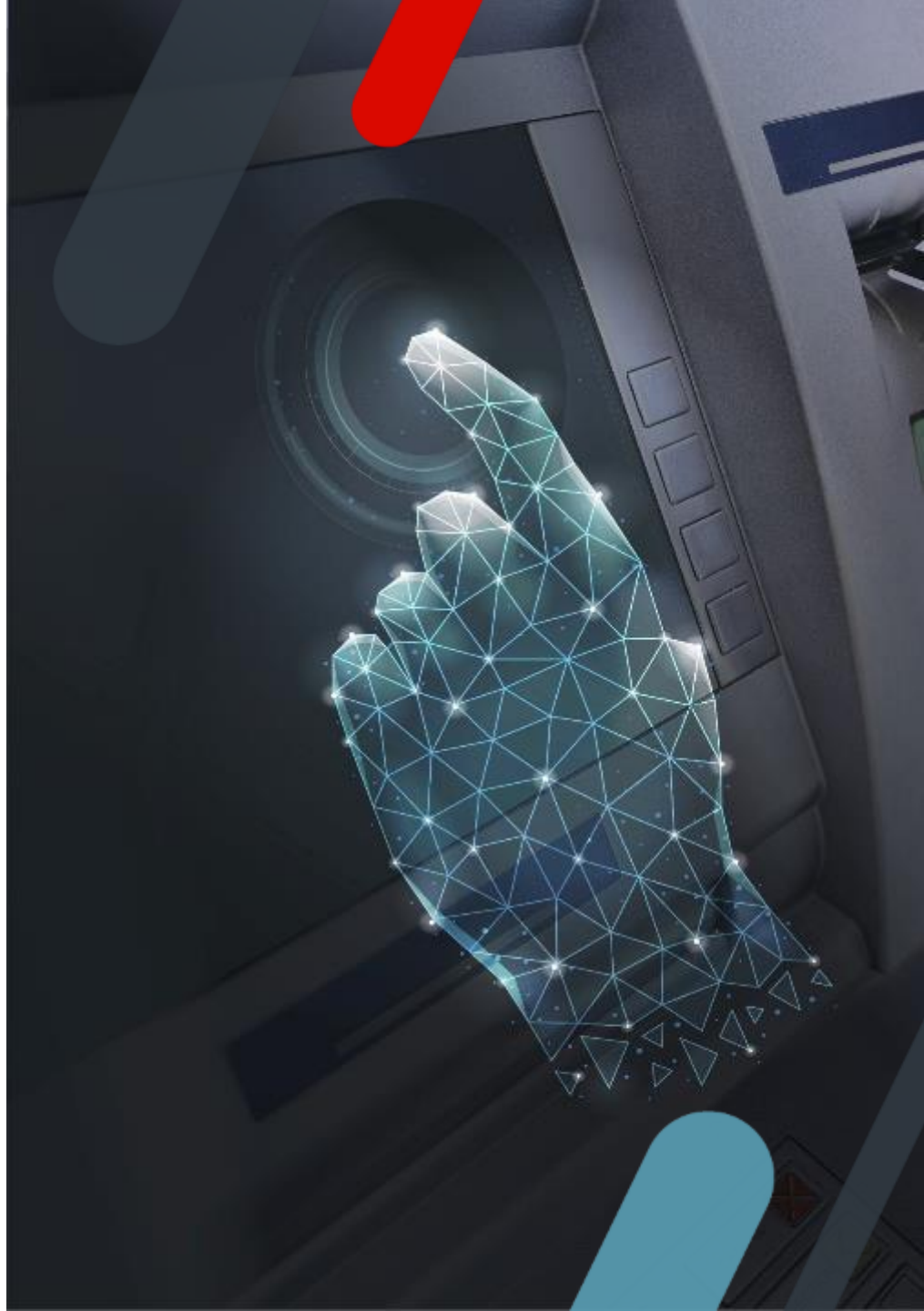
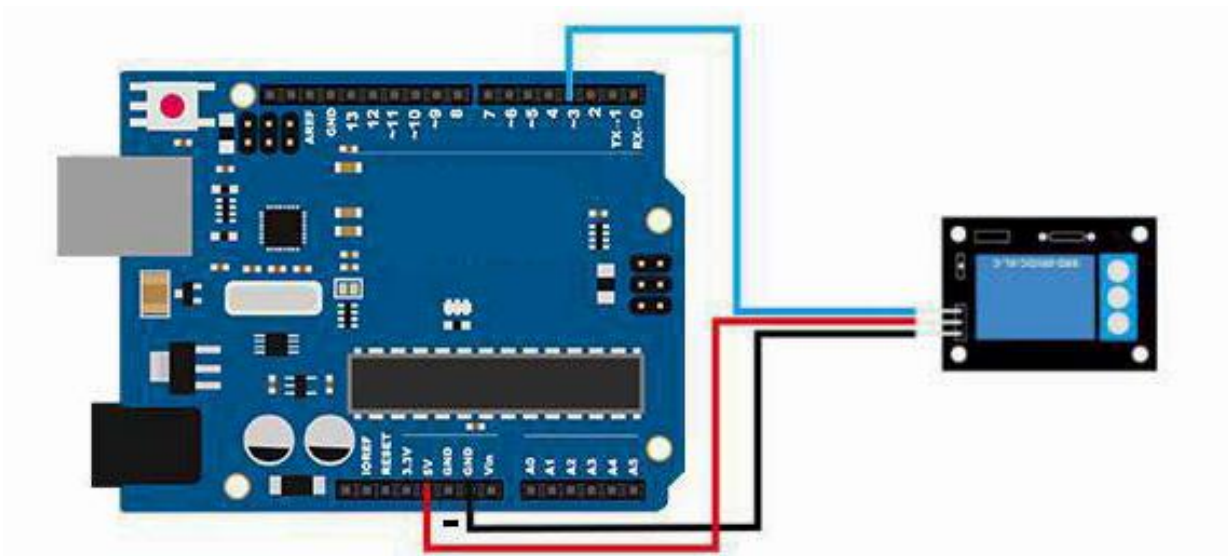


- 1.GND:ground
- 2.VCC:5V DC
- 3.OUTPUT

A relay is a type of component which responds to a change in input variables based on specified parameters in the input circuit. The output circuit switch on as soon as the conditions are met

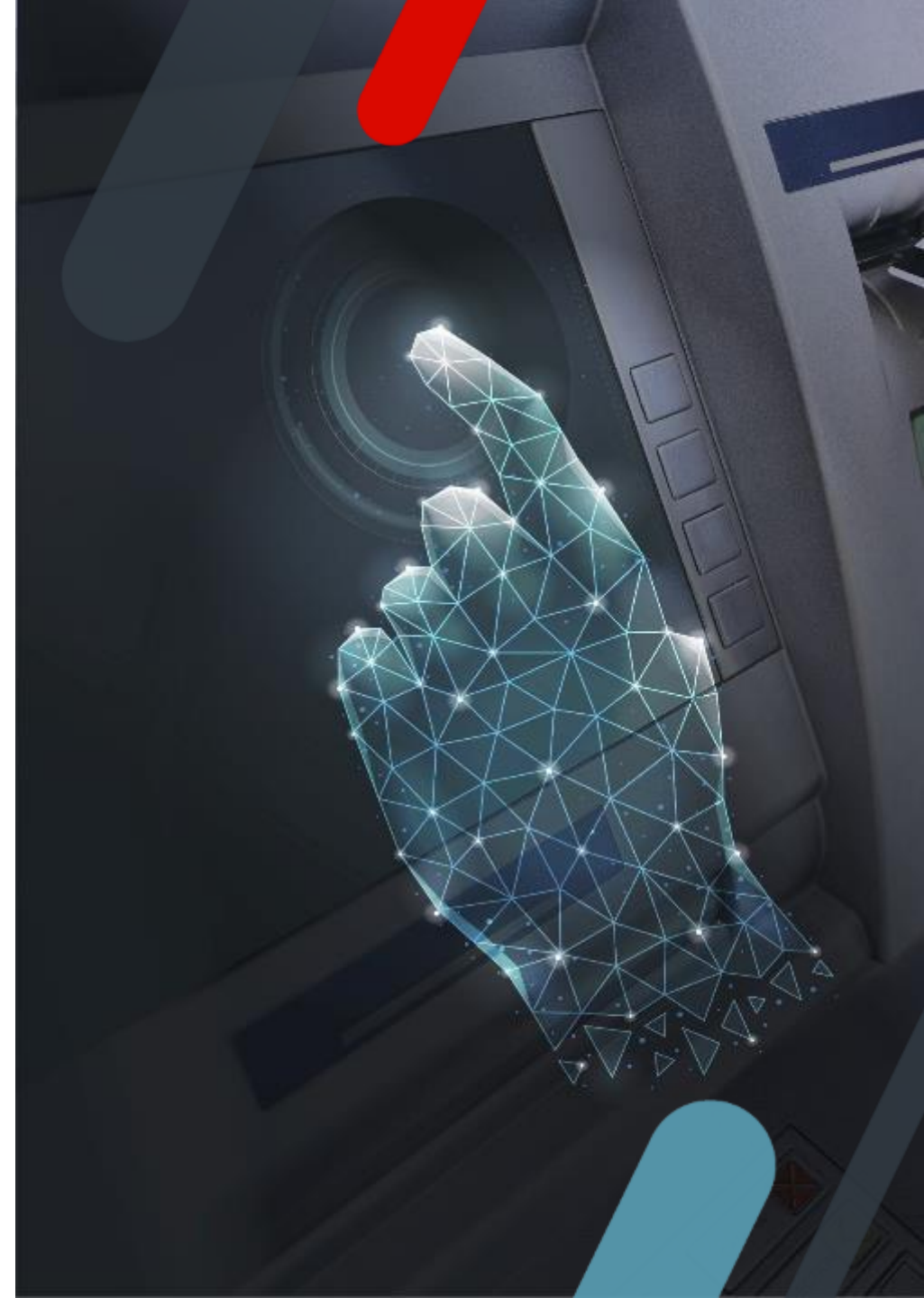
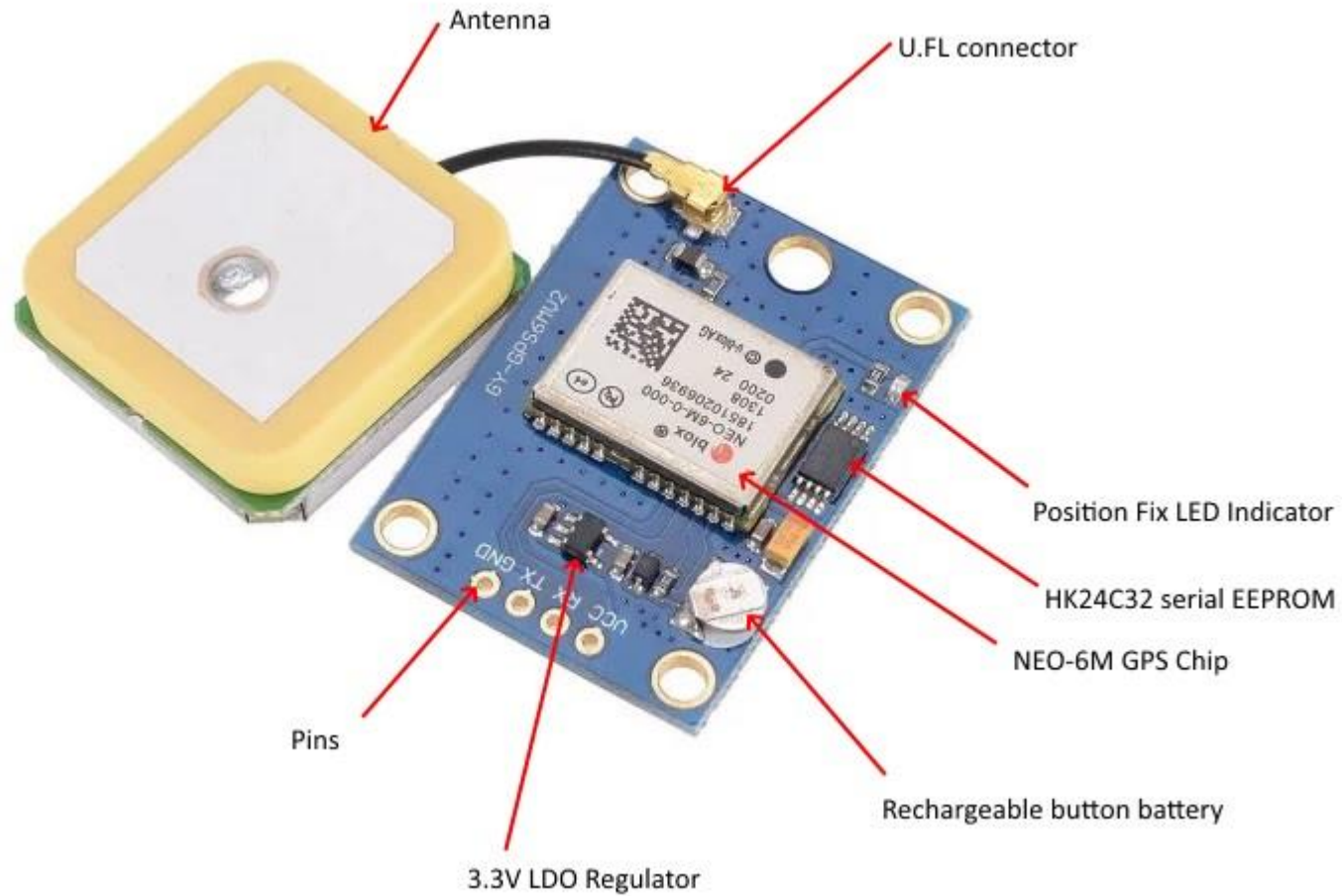


# Relay





# GPS module – gps6mv2

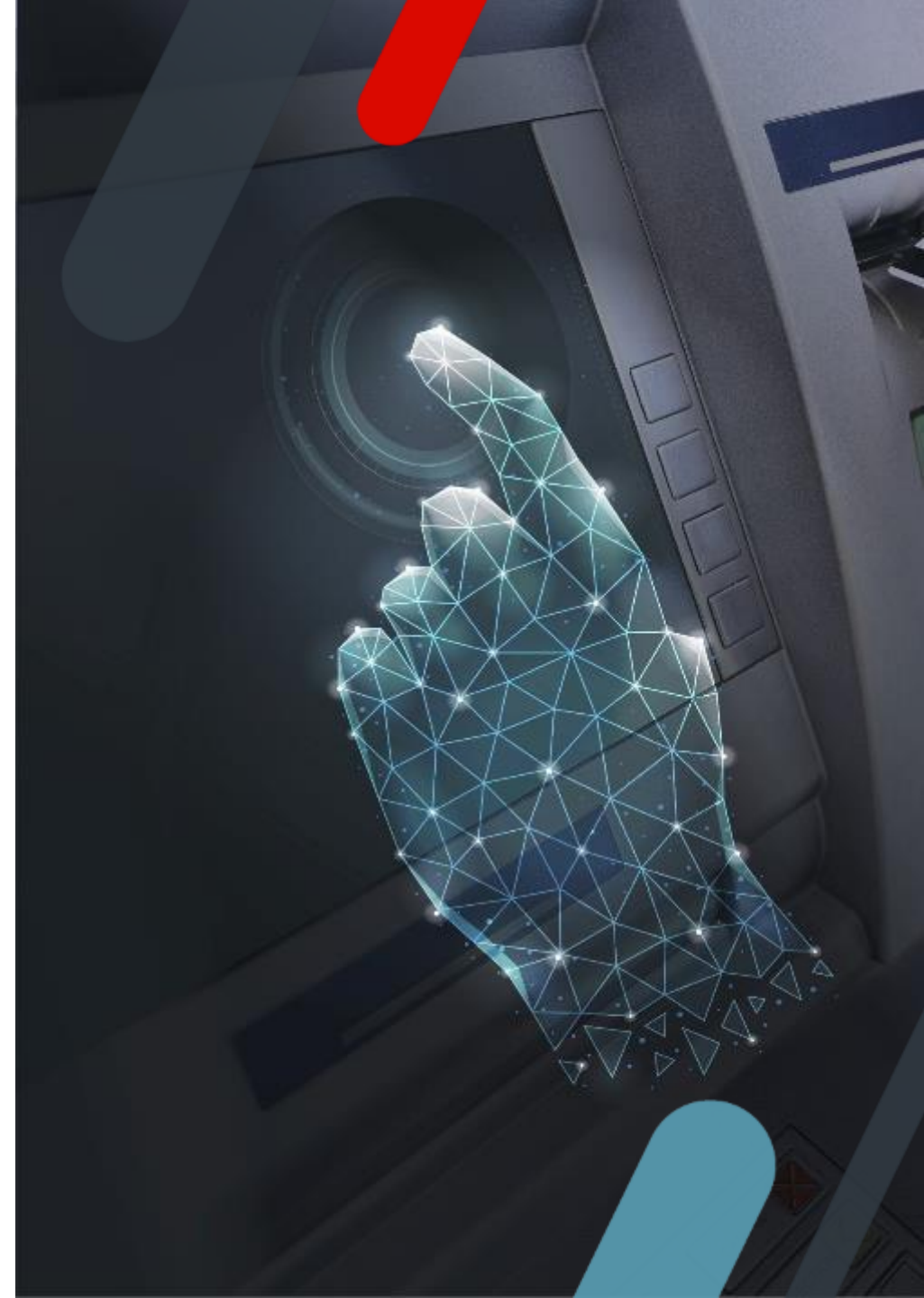




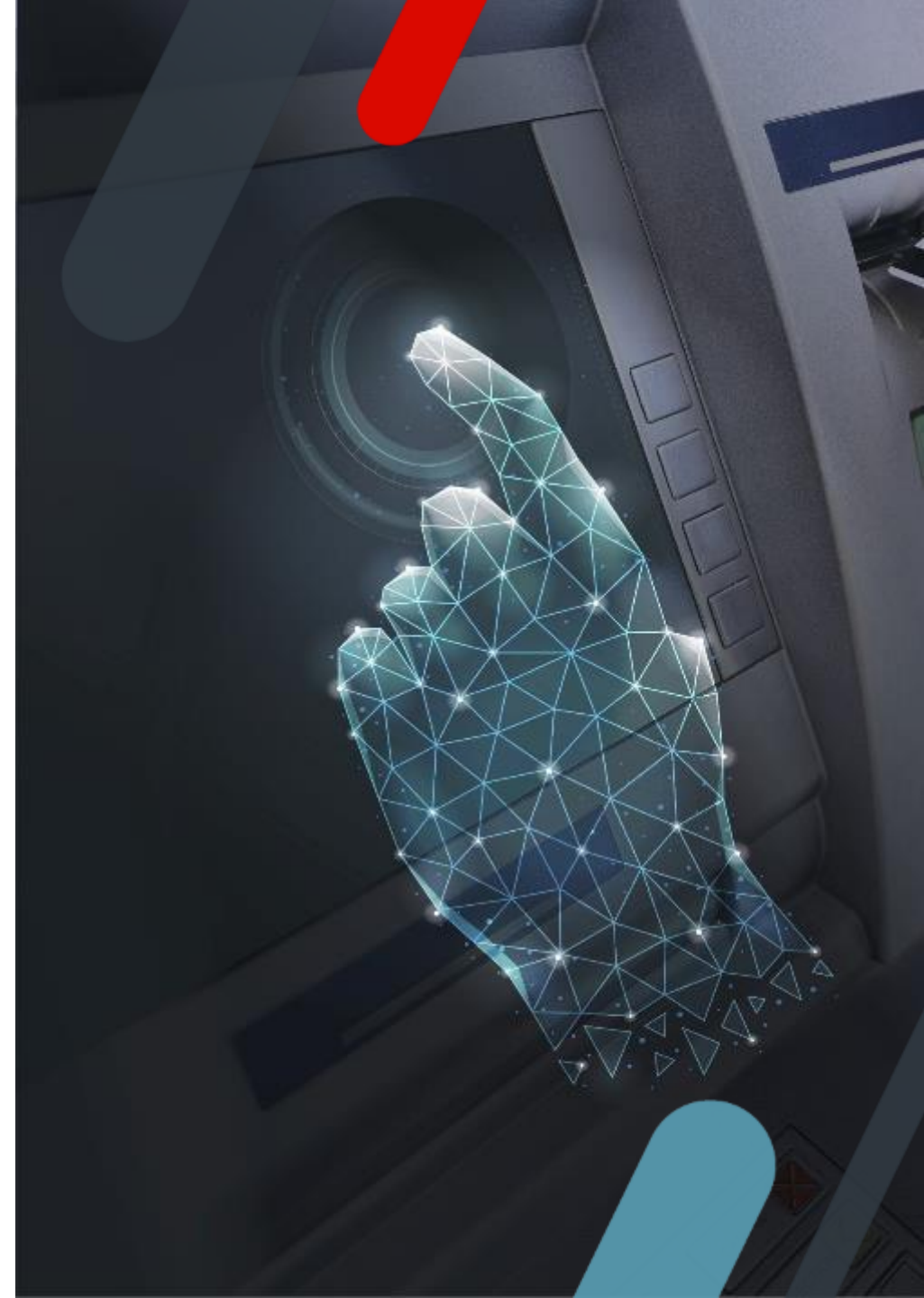
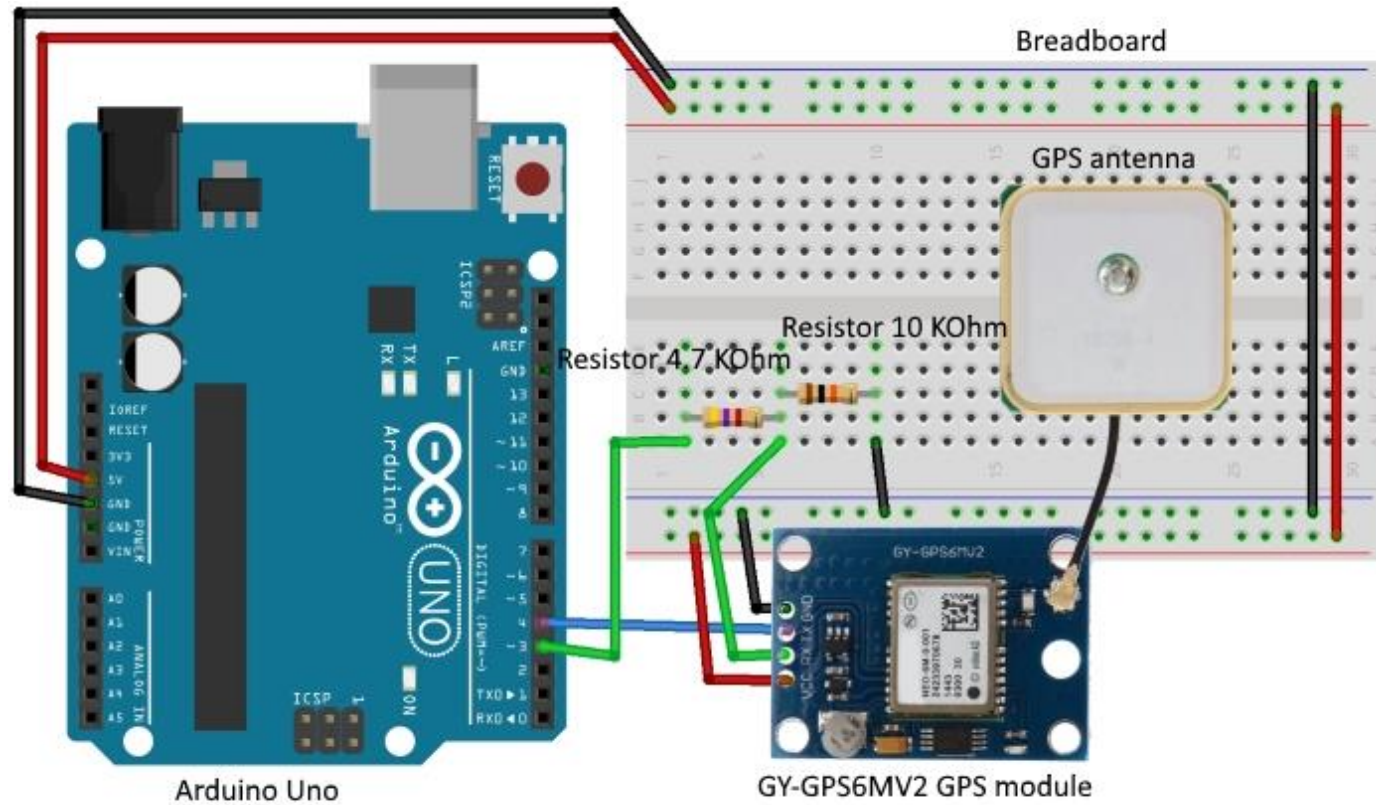
## GPS module – gps6mv2

The NEO6MV2 GPS module comes with 4 connections: RX, TX, VCC and GND, which is quite easy to incorporate with using SoftwareSerial on an Arduino Uno or a serial interface on an Arduino Mega.

The typical China-produced breakout-boards contain a voltage regulator so that 3-5V VCC so it does not harm the board. Since the digital pins also produce 5V, the resistor is used on the receivers RX channel since this is not regulated.



# GPS module – gps6mv2





# GSM module - SIM800L evb

Fast blink - Searching network  
Slow blink - Good network signal

Network LED    Ring LED  
IPX Antenna Port    Polarity Diode



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