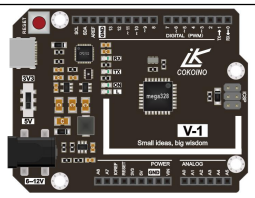
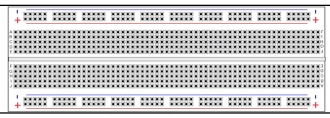
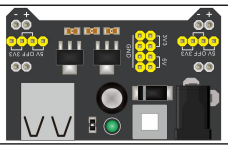
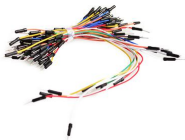
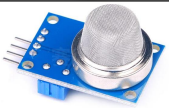
11.Smoke and gas alarm

ABOUT THIS PROJECT：

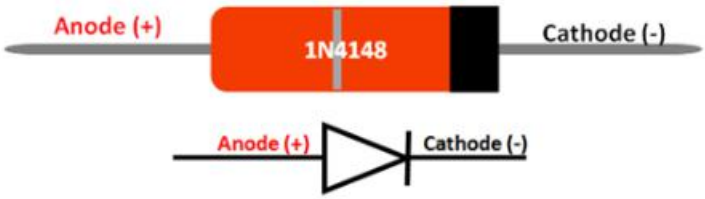
You will learn：

- How to make a smoke and gas alarm

1、Things used in this project：

Hardware components	Picture	Quantity
V-1 board		1 PCS
Breadboard		1 PCS
Battery button (you need to buy 9V battery yourself)		1 PCS
Breadboard power module		1 PCS
Male to Male DuPont Cable		12 PCS
30 CM USB Cable		1 PCS
SS8050 Transistor		1 PCS
IN4148 diode		1 PCS
Active buzzer		1 PCS
MQ-135 gas sensor		1 PCS
220R Resistance		1 PCS

2. 1N4148 Diode

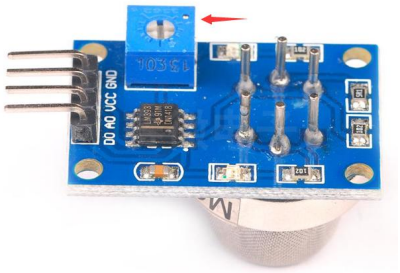


A diode is a device which allows current flow through only one direction. That is the current should always flow from the Anode to cathode.

Applications of Diodes
Can be used to prevent reverse polarity problem
Protect Power electronic switches that are operating with high switching frequency.
Half Wave and Full Wave rectifiers
Used as a protection device
Current flow regulators

The buzzer is an inductive load, in the experimental circuit below, when the transistor is turned off, the buzzer will generate a high reverse voltage, this voltage may damage the electronic components. In this experiment, 1N4148 diode is used to eliminate the reverse voltage of the active buzzer.

2.1、MQ-135 gas sensor



LED indicator: There are two LED lights on the MQ-135 module, one is the power indicator and the other is the digital output indicator.
Adjusting the digital output sensitivity: By adjusting the potentiometer indicated by the red arrow in the figure above, make the module's digital output indicator light reaches the critical point of opening and closing, at this time the sensor is most sensitive to gas.
Principle: The gas sensor module consists of a steel exoskeleton under which a sensing element is housed. This sensing element is subjected to current through connecting leads. This current is known as heating current through it, the gases coming close to the sensing element get ionized and are absorbed by the sensing element. This changes the resistance of the sensing element which alters the value of the current going out of it.
MQ-135 gas sensor is a hazardous gas detection apparatus for the family, the environment, suitable for ammonia, aromatic compounds, sulfur, benzene vapor, smoke and other gases harmful gas detection, gas-sensitive element test concentration.

Air quality sensor is for detecting a wide range of gases, including NH3, NOx, alcohol, benzene, smoke and CO2. Ideal for use in office or factory, simple drive and monitoring circuit.

Precautions for use: Please read the sensor value after warming up for one minute after power-on.

Gas test concentration range: 10 to 1000ppm

PINS：

Pin number	Identification	Description
1	DO	DO digital output
2	AO	AO analog output
3	VCC	VCC power supply (5V)
4	GND	GND power ground

2.2、Active buzzer

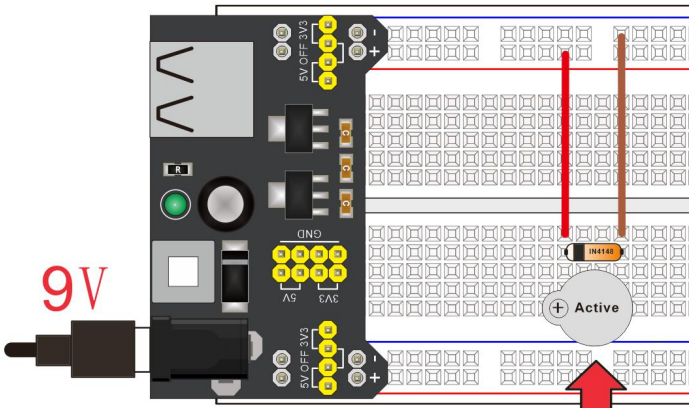
The active buzzer is an integrated electronic sounder that is powered by a DC voltage and has pins that are divided into positive and negative poles. Widely used in computers, alarms, electronic toys, telephones, timers and other electronic products. The buzzer is mainly divided into two types: a piezoelectric buzzer and an electromagnetic buzzer. The buzzer is represented in the circuit by the letters "H" or "HA" (the old standard is "FM", "LB", "JD", etc.).

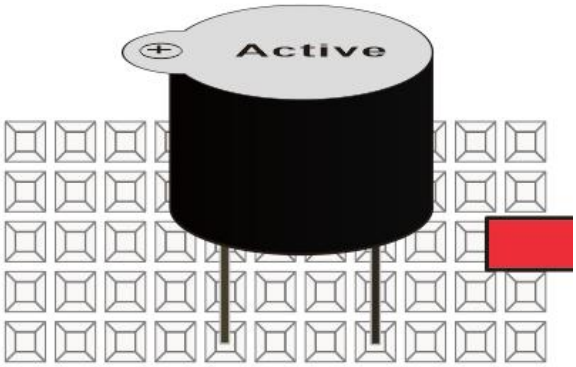
Piezoelectric buzzer: mainly composed of multivibrator, piezoelectric buzzer piece, impedance matching device, resonance box, outer casing and so on. The multivibrator is composed of a transistor or an integrated circuit. When the power is turned on (1.5~15V DC working voltage), the multivibrator starts to oscillate and outputs an audio signal of 1.5~2.5kHZ, and the impedance matching device pushes the piezoelectric buzzer to sound.

Electromagnetic buzzer: It consists of an oscillator, an electromagnetic coil, a magnet, a diaphragm, and a casing.

After the electromagnetic buzzer is powered on, the audio signal current generated by the oscillator passes through the electromagnetic coil, causing the electromagnetic coil to generate a magnetic field. The vibrating diaphragm periodically vibrates the sound under the interaction of the electromagnetic coil and the magnet.

2.2.1、Active buzzer experiment:





Symptom: Connect the wiring as shown above and provide power. The active buzzer will automatically emit a fixed frequency chirp.

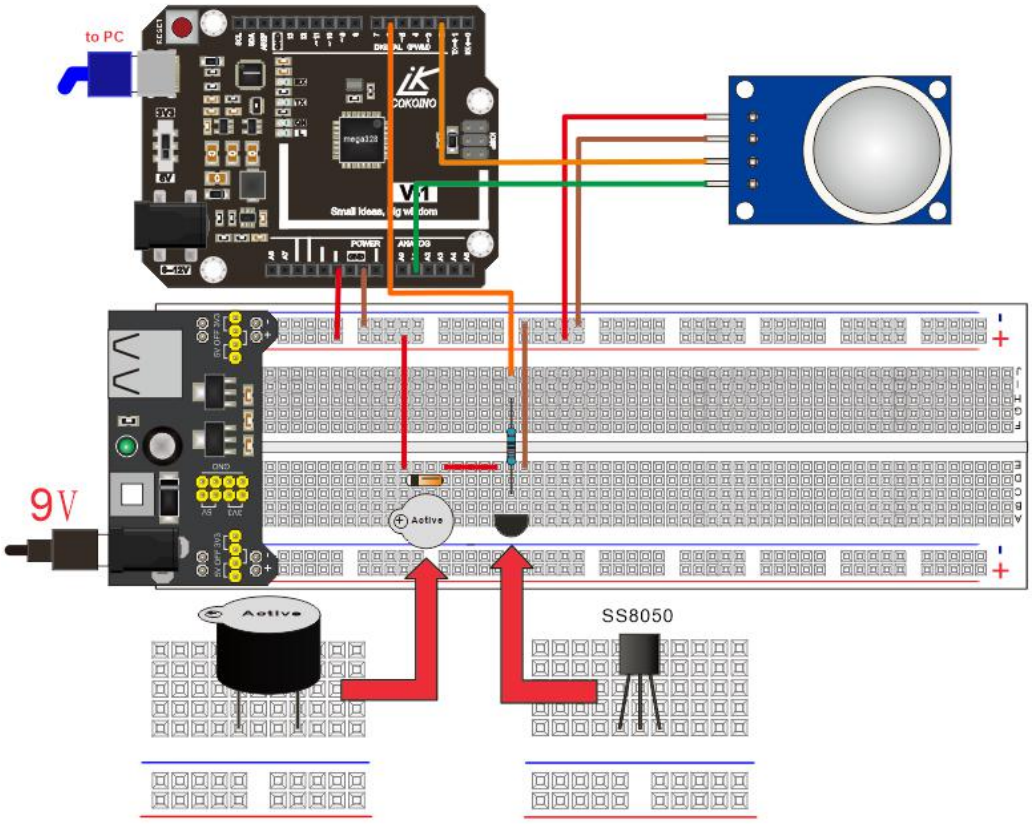
3. Safe home circuit

Use the digital port and analog port of V-1 board to read the digital and analog values of the MQ-135 output.
When a harmful gas in the home is detected, the buzzer will beep and the IDE will print out the analog value. The main statement of this program is: PWM_data = analogRead (A1); analogWrite (pin, PWM_data); attachInterrupt (); and the use of IDE serial monitor.
More grammar references https://www.arduino.cc/reference/en/

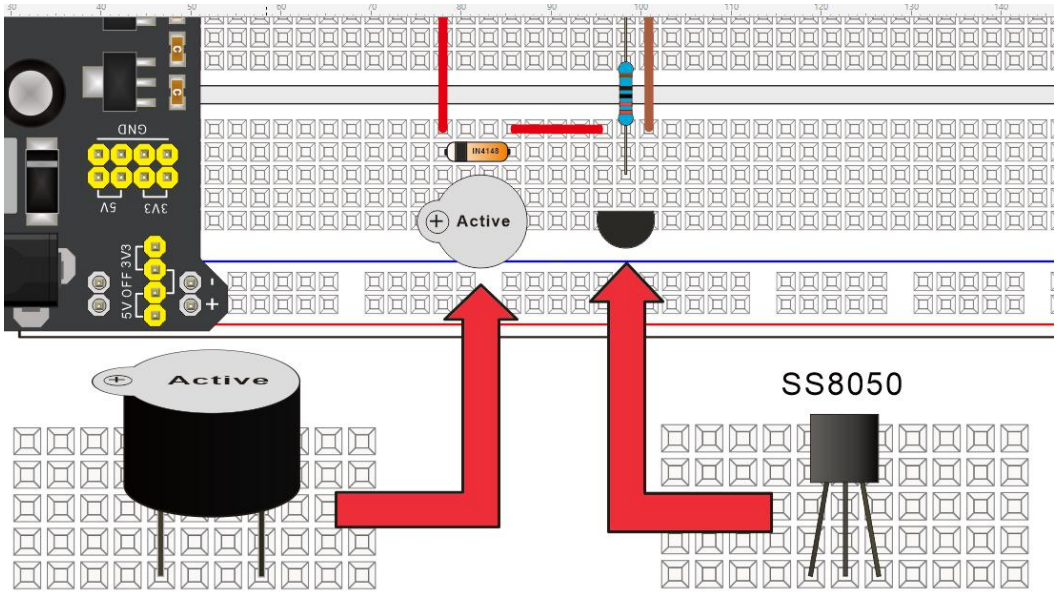
3.1、Sketch

```
#define analogGAS A1
#define digitalGAS 2
#define buzzer 6
int GAS_data=0;
void setup() {
  pinMode(buzzer,OUTPUT);
  pinMode(analogGAS,INPUT);
  pinMode(digitalGAS,INPUT);
  attachInterrupt(0, printData, LOW);
  Serial.begin(9600);
}
void loop() {
  GAS_data = analogRead(A1);
  digitalWrite(6,LOW);
}
void printData(){
  Serial.println(GAS_data);
  digitalWrite(6,HIGH);
}
```

3.2、Wiring Diagram

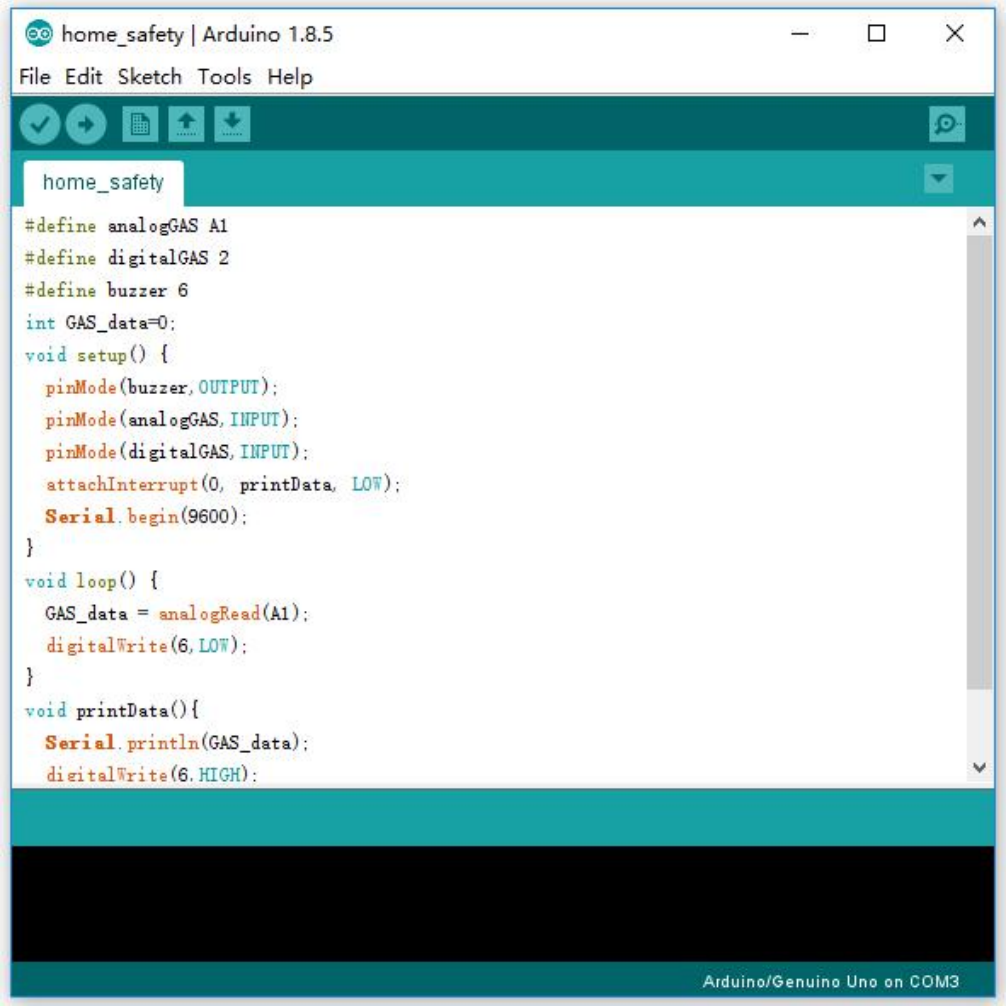


Detail enlargement

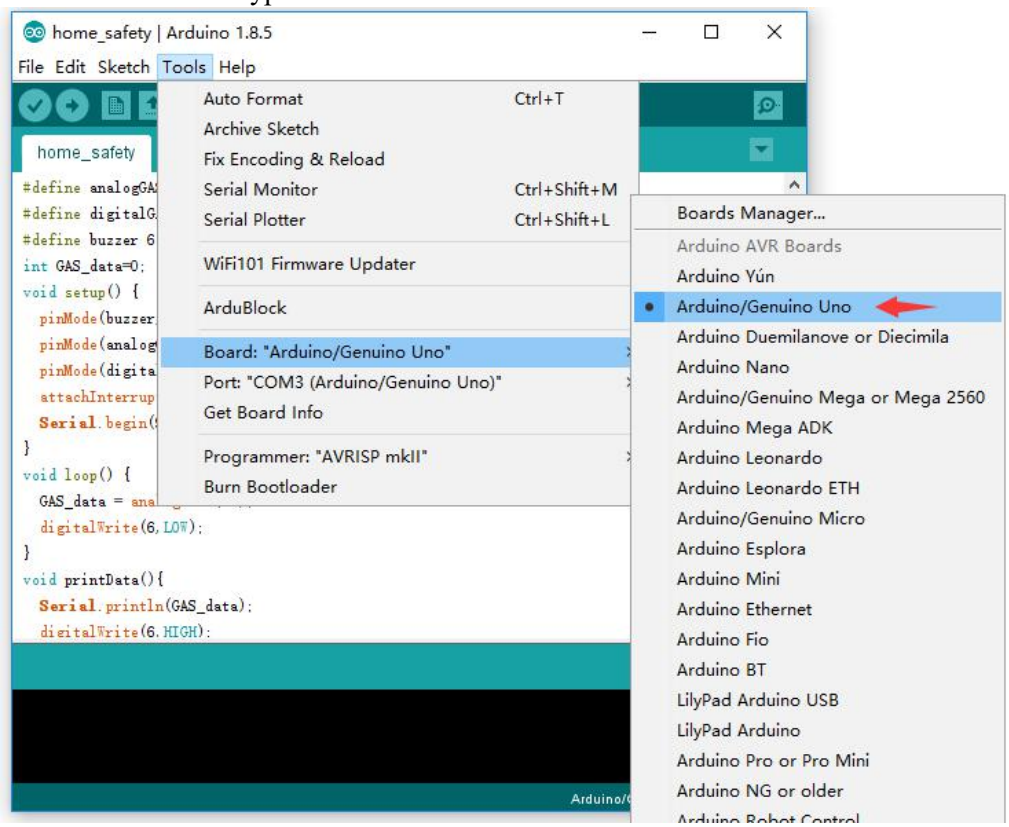


3.3、Project Step

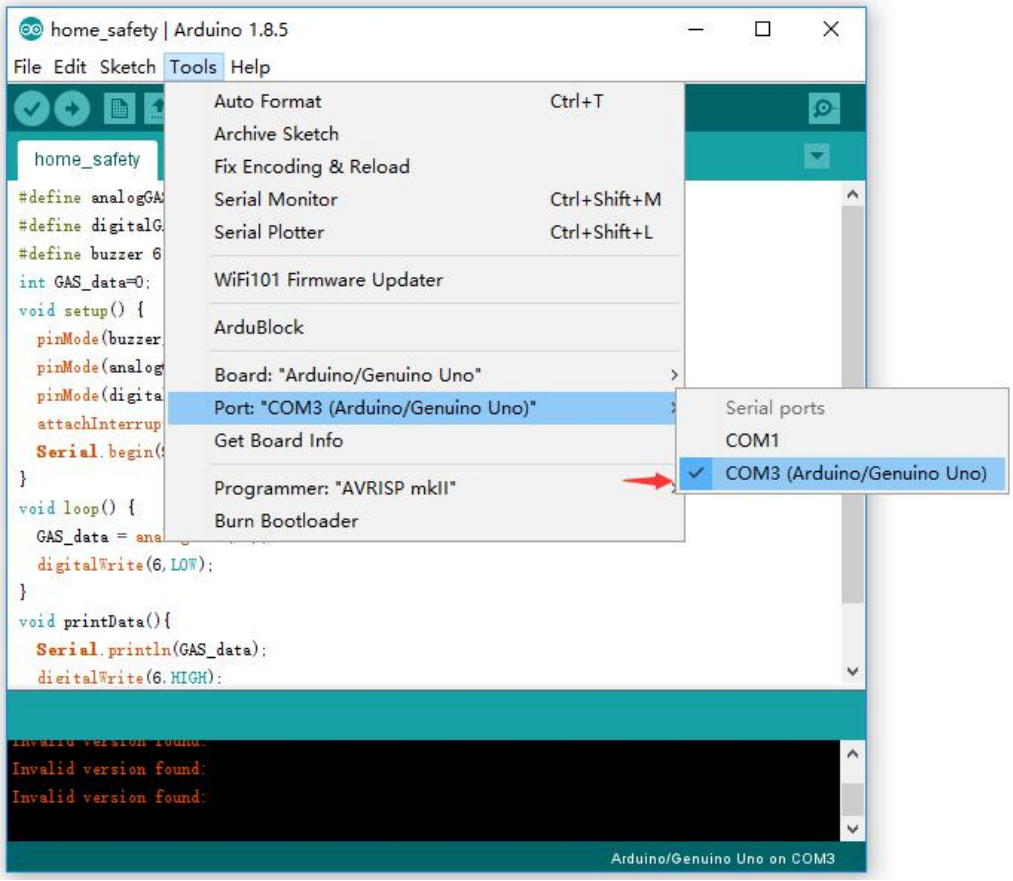
3.3.1、Connect the computer and V-1 board with a USB cable and copy the above sample code to the Arduino IDE as shown below：



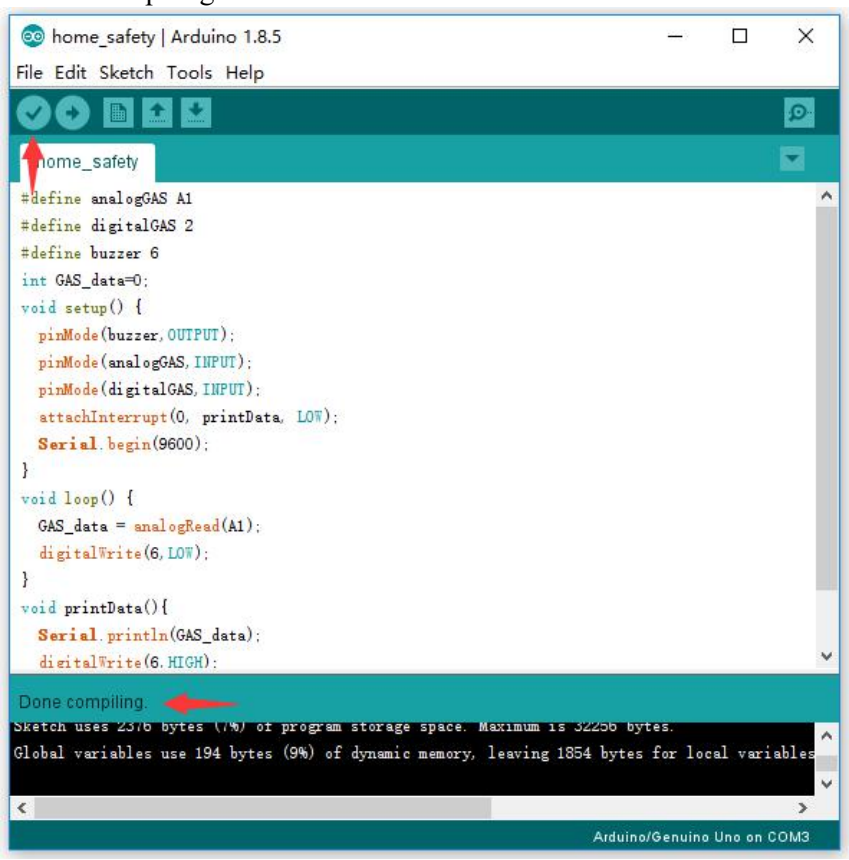
3.3.2、Select board type



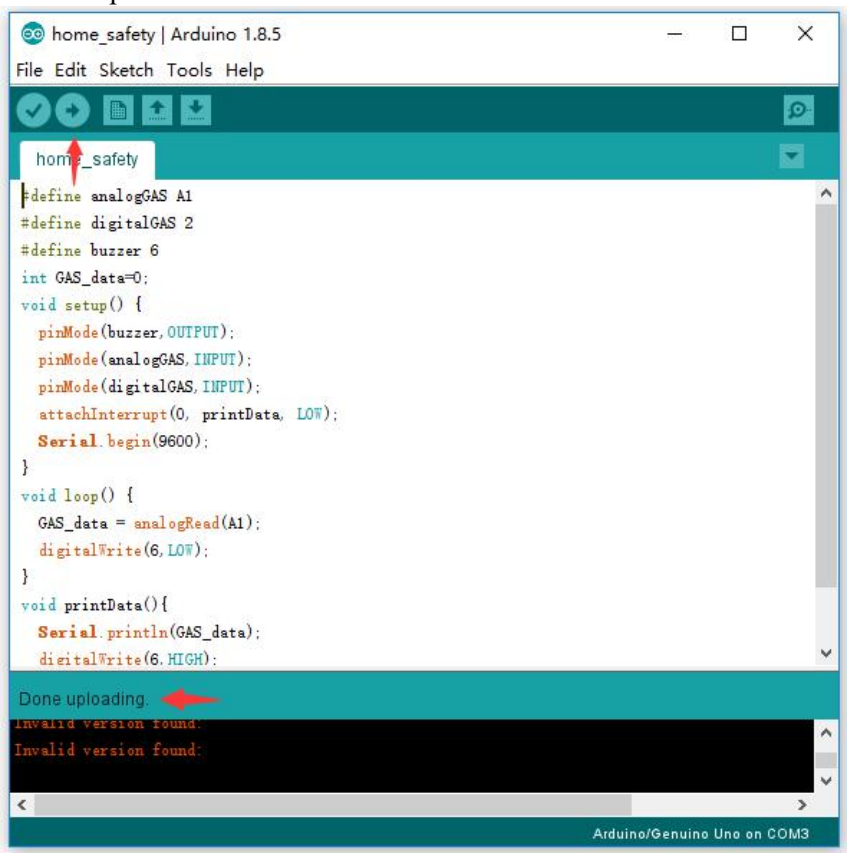
3.3.3、Select port



3.3.4、Compiling



3.3.5、Upload the sketch



3.3.6、Result

Unplug the USB cable from the V-1 board, connect the power module to the external power supply, and then turn on the switch of the power module on the breadboard. After 1 minute, you will see that the DO-LED on the module is off, or you can adjust the potentiometer on the MQ-135 module to bring the DO-LE to the critical point of on and off, at which point it is the most sensitive to gas. Open the IDE serial monitor as shown in Figure 1 and adjust the baud rate to 9600. Use a metal probe that can generate ammonia, nitrogen oxides, alcohols, aromatics, sulfides, or fumes (such as a liquefied gas from a lighter) to get close to the metal probe of the MQ-135 sensor module. The buzzer will beep, The DO-LED of the sensor will light up, and the serial monitor will print the analog value of MQ-135, as shown below.