

keyestudio EASY plug learning kit for Arduino starters

EASY plug learning kit for Arduino starters



EASY plug starter kit for Arduino

Based on open-source hardware

19 various sensors in one box

For you to make interesting projects

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1. Summary:



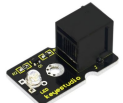

What about you and your kids being makers? What about getting creative and making your ideas come true? Well, let's get started right away!

EASY plug learning kit is developed not only for professional electronic enthusiasts, but also for friends in other lines of work. Even if you have no electronics related knowledge, you can use it to realize your ideas as long as you want to.

The tutorial of this kit has fully considered the learning interest of beginners. Starting from the basics to more complex lessons, well-arranged content and a connection diagram for every lesson help you get started easily and quickly in learning Arduino.

Its unique EASY plug interface makes the wire connection easier than ever! You never have to worry about wrong connection or complicated soldering, avoiding component damage due to wrong wiring or wrong soldering. It's both safe and environmental-friendly.

2. Kit list

No.	Name	QTY	Picture
1	EASY plug controller Board	1	
2	Acrylic Board + Copper bush set	1	
3	EASY plug cable	3	
4	USB cable	1	
5	EASY plug Digital White LED Module	3	
6	EASY plug Active Buzzer Module	1	
7	EASY plug Passive Buzzer Module	1	
8	EASY plug Analog Temperature Sensor	1	
9	EASY plug Analog Sound Sensor	1	

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10	EASY plug Photocell Sensor	1	
11	EASY plug Water Sensor	1	
12	EASY plug Soil humidity Sensor	1	
13	EASY plug Analog Rotation Sensor	1	
14	EASY plug Hall Magnetic Sensor	1	
15	EASY plug Collision Sensor	1	
16	EASY plug Digital Push Button	1	
17	EASY plug Capacitive Touch Sensor	1	
18	EASY plug Knock Sensor	1	
19	EASY plug Digital Tilt Sensor	1	
20	EASY plug Flame Sensor	1	
21	EASY plug Vibration Sensor	1	
22	EASY plug Reed Switch Module	1	
23	EASY plug LM35 Temperature Sensor	1	

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3. Lesson list

1. Hello world
2. Who's blinking
3. Visible breath
4. Flowing light
5. Make a sound
6. Who's singing
7. Temperature measuring
8. Make a sound-controlled lamp
9. Make a light-controlled lamp
10. Water level alarm
11. I'm thirsty
12. Visible analog value
13. Magnetic field detecting
14. Collision detecting
15. Button-controlled lamp
16. Touch alarm
17. Knock Sensing
18. Tilt Sensor
19. Fire alarm
20. Vibration alarm
21. Magnetic field detector
22. Temperature alarm

4. Lesson details:

Lesson 1: Hello world

Introduction

For the first lesson, we will begin with something simple. This lesson is called "Hello World!". This is a communication test of your Arduino and PC, also a primer project for you to have your first try of the Arduino world!

Hardware required

EASY plug controller Board *1
USB cable *1

Sample Code

Connect the board to your PC using the USB cable; copy below code into Arduino IDE, and click upload to upload it to your board.

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```
////////////////////////////////////
int val;// define variable val
void setup()
{
    Serial.begin(9600);// set the baud rate at 9600 to match the software settings. When
    connected to a specific device, (e.g. Bluetooth), the baud rate needs to be the same with it.
}
void loop()
{
    val=Serial.read();// read the instruction or character from PC to Arduino, and assign them to
    Val.
    if(val=='R')// determine if the instruction or character received is "R"
    { // if it's "R"
        Serial.println("Hello World!");// display "Hello World!"
    }
}
////////////////////////////////////
```

Result

Open serial port monitor of the Arduino IDE, input "R", click "Send", you can see it displays "Hello World!".

Lesson 2: Who's blinking

Introduction

After entry lesson of "Hello World!", let's up the stake and learn how to control the blinking of an LED. This lesson is quite simple. All you need to do is to connect an LED to one of the digital pins. We will be using hardware form "Hello World!" and also some extra parts.

Hardware required

EASY plug controller Board *1

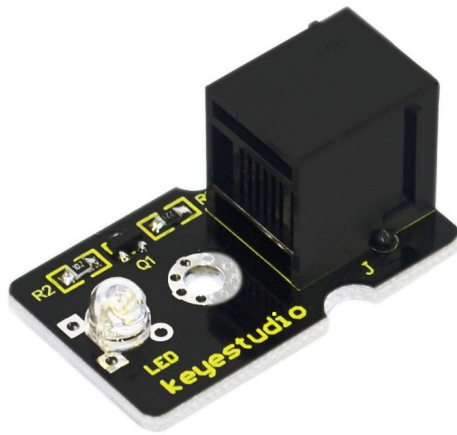
EASY plug cable *1

USB cable *1

EASY plug Digital White LED Module *1

In the hardware list, you can see there is an EASY plug Digital White LED Module. Here is a brief introduction of it.

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This LED module has a bright white color. It's ideal for Arduino starters. You can easily connect it to the IO port of our EASY plug controller board. Its specifications are as below:

Type: Digital

PH2.54 socket

White LED module

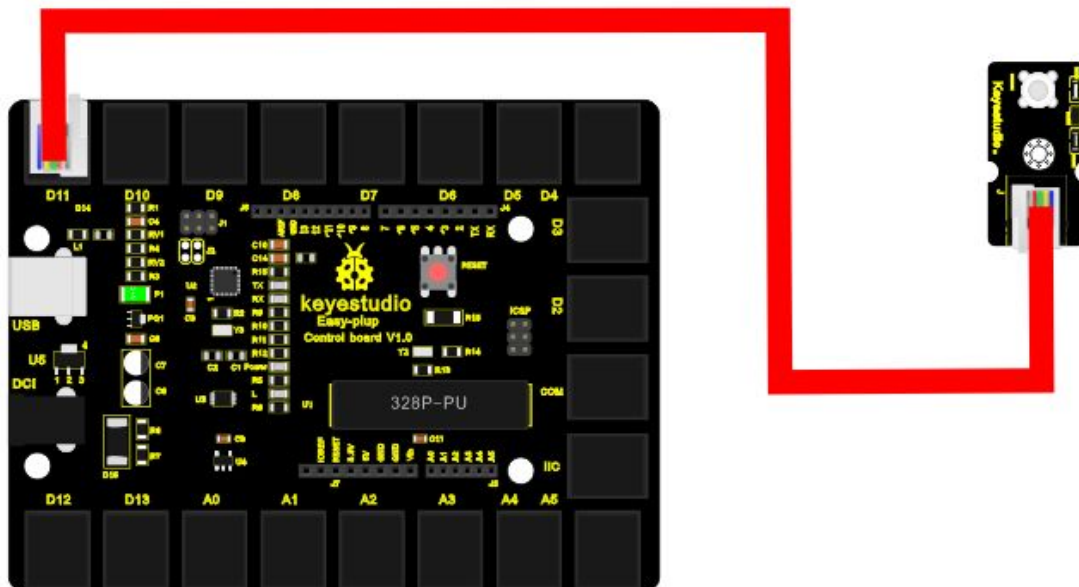
Enables interaction with light-related works

Size: 33.7*20mm

Weight: 3g

Connection Diagram

Now, let's connect this module to the D11 port of the controller board using the EASY plug cable, just as simple as that!



Sample Code

Connect the board to your PC using the USB cable; copy below code into Arduino

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IDE, and click upload to upload it to your board.

```
//////////
```

```
int ledPin = 11; // define digital pin 11
```

```
void setup()
```

```
{
```

```
pinMode(ledPin, OUTPUT); // define LED pin as output
```

```
}
```

```
void loop()
```

```
{
```

```
analogWrite(ledPin,255); //set the LED on, regulate light brightness, ranging from  
0-255, 255 is the brightest
```

```
delay(1000); // wait for a second
```

```
digitalWrite(ledPin, LOW); // set the LED off
```

```
delay(1000); // wait for a second
```

```
}
```

```
//////////
```

Result

The LED will be on for one second, and then off for one second with an interval of one second, just like a shining eye blinking.

Lesson 3: Visible breath

Introduction

After the first two lessons, I believe you've grown familiar with Arduino. In this lesson, we will use the LED to do something else, simulating breath. Sounds cool? Well, let's get on with it. We will still be using the same hardware from lesson 2.

Hardware required

EASY plug controller Board *1

EASY plug cable *1

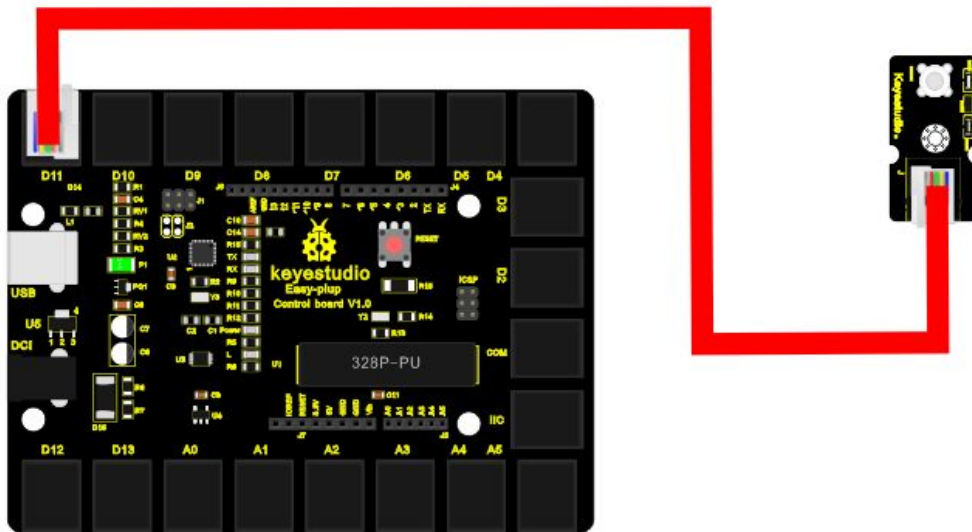
USB cable *1

EASY plug Digital White LED Module *1

Connection Diagram

Now, connect the LED module to the D11 port of the controller board using the EASY plug cable.

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Sample Code

Connect the board to your PC using the USB cable; copy below code into Arduino IDE, and click upload to upload it to your board.

```
////////////////////////////////////
```

```
int ledPin = 11; // define digital pin 11
```

```
void setup()
```

```
{
```

```
pinMode(ledPin, OUTPUT); // define LED pin as output
```

```
}
```

```
void loop()
```

```
{
```

```
for (int a=0; a<=255;a++) // set the LED to be brighter gradually
```

```
{
```

```
analogWrite(ledPin,a); // turn on LED, regulate light brightness, ranging from 0-255,  
255 is the brightest
```

```
delay(10); // wait for 0.01S
```

```
}
```

```
for (int a=255; a>=0;a--) // set LED to be dimming gradually
```

```
{
```

```
analogWrite(ledPin,a); // turn on LED, regulate light brightness, ranging from 0-255,  
255 is the brightest
```

```
delay(10); // wait for 0.01S
```

```
}
```

```
delay(1000); // wait for 1S
```

```
}
```

```
////////////////////////////////////
```


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Result

LED becomes brighter gradually, wait for 0.01S, then dimming gradually, wait for 1S, and then cycles on, just like the LED is breathing.

Lesson 4: Flowing light

Introduction

LED can do many things. I believe you have seen billboards with lights changing to form various patterns. Now, you can make one! This lesson is called Flowing light. We will need 2 more EASY plug cables and 2 more LEDs than the previous lesson.

Hardware required

EASY plug controller Board *1

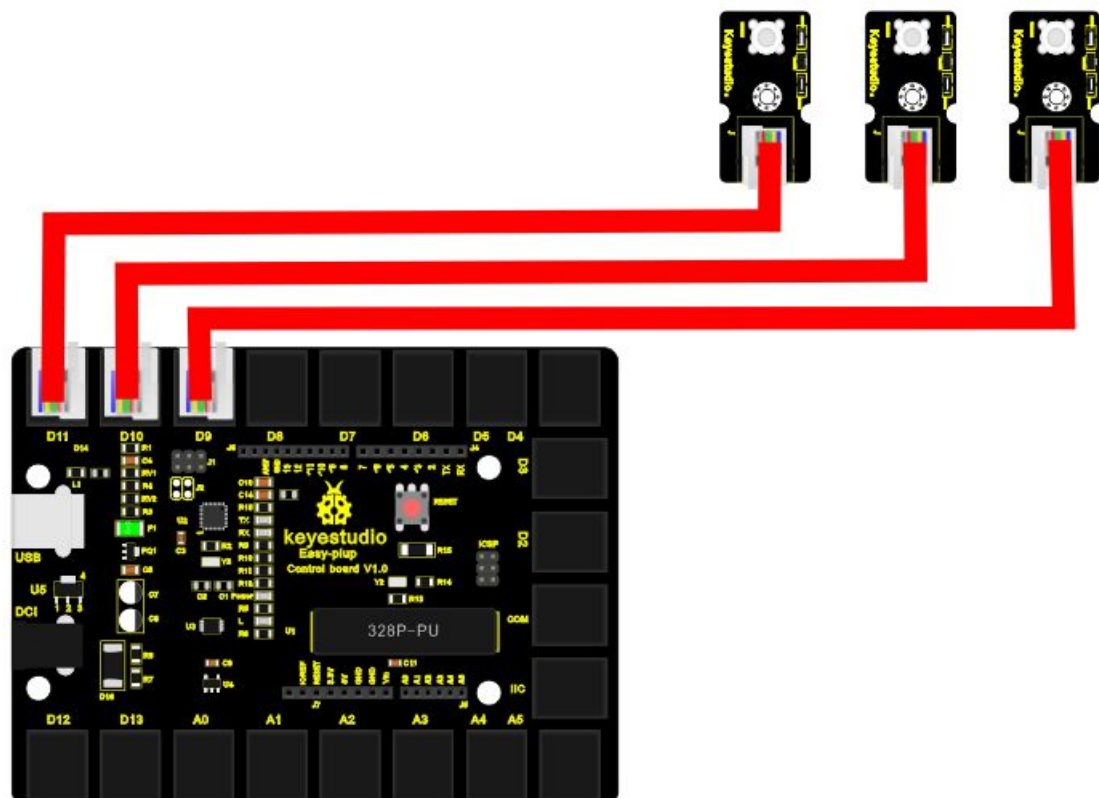
EASY plug cable *3

USB cable *1

EASY plug Digital White LED Module *3

Connection Diagram

Now, connect the LED modules one by one to D9, D10 and D11 ports of the controller board using the EASY plug cables.



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Sample Code

Connect the board to your PC using the USB cable; copy below code into Arduino IDE, and click upload to upload it to your board.

```
////////////////////////////////////
int BASE = 9 ; // the I/O pin for the first LED
int NUM = 3;   // number of LEDs
void setup()
{
    for (int i = BASE; i < BASE + NUM; i++)
    {
        pinMode(i, OUTPUT); // set I/O pins as output
    }
}

void loop()
{
    for (int i = BASE; i < BASE + NUM; i++)
    {
        digitalWrite(i, HIGH); //set I/O pins as “high”, turn on LEDs one by one
        delay(200);           // wait 0.2S
    }
    for (int i = BASE; i < BASE + NUM; i++)
    {
        digitalWrite(i, LOW); // set I/O pins as “low”, turn off LEDs one by one
        delay(200);           // wait 0.2S
    }
}
////////////////////////////////////
```

Result

3 LEDs turn on one by one, and then turn off one by one, just like flowing light.

Lesson 5: Make a sound

Introduction

After many light-related lessons, let's learn how to make a sound. Sound experiment is usually done with a buzzer or a speaker, while buzzer is simpler and easier to use. In this lesson, we will learn how to make a sound with an active buzzer.

Hardware required

EASY plug controller Board *1

EASY plug cable *1

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USB cable *1

EASY plug Active Buzzer Module *1

Here is a brief introduction of EASY plug Active Buzzer Module.



EASY plug Active Buzzer module is the simplest sound making module. It has an inner vibration source. Simply connect it with 5V power supply, it can buzz continuously. With Easy plug design, you can easily plug it into EASY plug controller board to have a try. Below are its specifications:

Working voltage: 3.3-5v

Interface type: digital

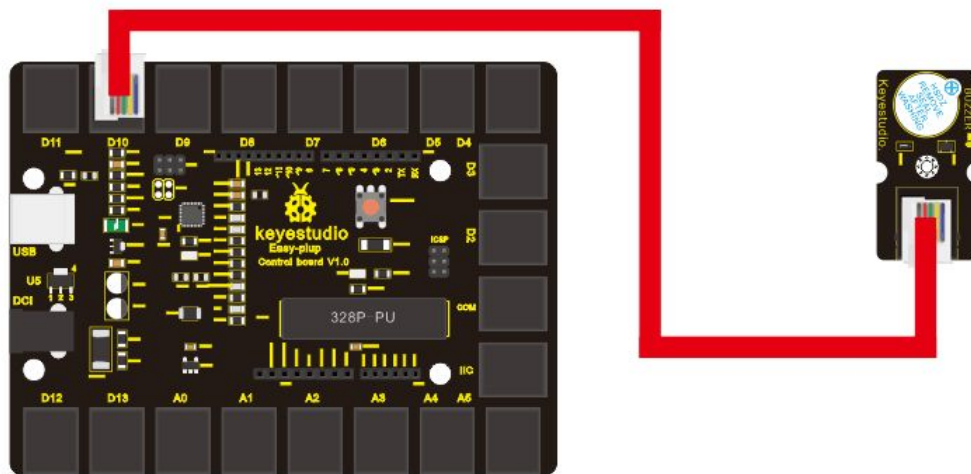
Size: 39*20mm

Weight: 4g

Connection Diagram

Now, connect the module to the D10 port of the controller board using the EASY plug cable.

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Sample Code

Connect the board to your PC using the USB cable; copy below code into Arduino IDE, and click upload to upload it to your board.

```
////////////////////////////////////
```

```
int buzzPin = 10; // Connect Buzzer to D10
```

```
void setup()
```

```
{
```

```
  pinMode(buzzPin, OUTPUT); // set I/O pin as "output"
```

```
}
```

```
void loop()
```

```
{
```

```
  digitalWrite(buzzPin, HIGH); // set digital I/O output as "high", the buzzer will sound
```

```
  delay(500); // wait for 0.5S
```

```
  digitalWrite(buzzPin, LOW); // set digital I/O output as "low", the buzzer will stop making sound
```

```
  delay(500); // wait for 0.5S
```

```
}
```

```
////////////////////////////////////
```

Result

The buzzer will ring for 0.5S and stop making sound for 0.5S.

```
*****
```

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Lesson 6: Who's singing

Introduction

In the previous lesson, we have learned how to make a sound. In this lesson, we will use another type of buzzer to code the melody of a song. It's called a passive buzzer. Using the codes we gave you, this lesson is also quite simple.

Hardware required

EASY plug controller Board *1

EASY plug cable *1

USB cable *1

EASY plug Passive Buzzer module *1

Let's first learn a little bit about this EASY plug passive Buzzer Module.



Different from active buzzer, passive buzzer is not set with a vibration source, so DC signal cannot make it buzz. A 2K~5K square wave is used to drive it. Different frequencies produce different sounds. So we can use Arduino to code the melody of a song. Below are its specifications:

Working voltage: 3.3-5v

Interface type: digital

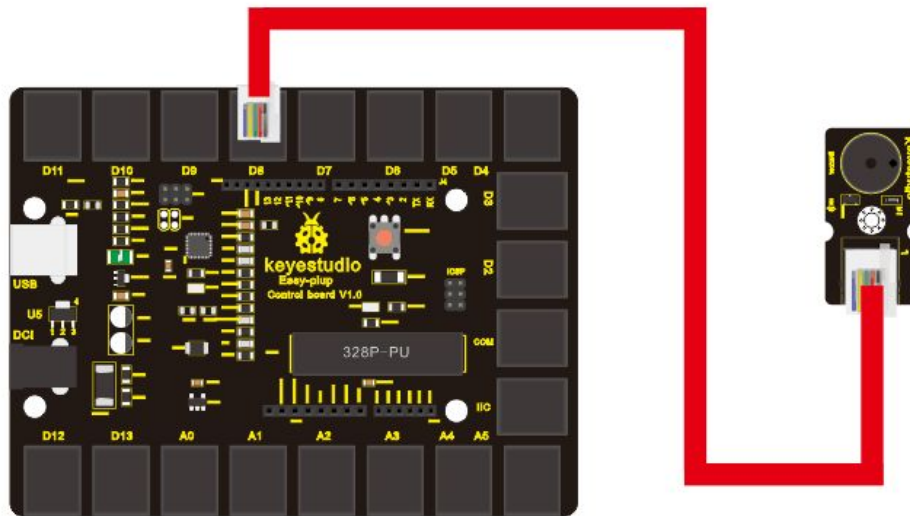
Size: 39*20mm

Weight: 4g

Connection Diagram

Now, connect the module to the D8 port of the controller board using the EASY plug cable.

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Sample Code

Connect the board to your PC using the USB cable; copy below code into Arduino IDE, and click upload to upload it to your board.

```
////////////////////////////////////
```

```
#define D0 -1  
#define D1 262  
#define D2 293  
#define D3 329  
#define D4 349  
#define D5 392  
#define D6 440  
#define D7 494
```

```
#define M1 523  
#define M2 586  
#define M3 658  
#define M4 697  
#define M5 783  
#define M6 879  
#define M7 987
```

```
#define H1 1045  
#define H2 1171  
#define H3 1316  
#define H4 1393  
#define H5 1563  
#define H6 1755
```

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```
#define H7 1971
// List all D tune frequency
#define WHOLE 1
#define HALF 0.5
#define QUARTER 0.25
#define EIGHTH 0.25
#define SIXTEENTH 0.625
// list all tempos
int tune[]=          // List each frequency according to numbered musical notation
{
    M3,M3,M4,M5,
    M5,M4,M3,M2,
    M1,M1,M2,M3,
    M3,M2,M2,
    M3,M3,M4,M5,
    M5,M4,M3,M2,
    M1,M1,M2,M3,
    M2,M1,M1,
    M2,M2,M3,M1,
    M2,M3,M4,M3,M1,
    M2,M3,M4,M3,M2,
    M1,M2,D5,D0,
    M3,M3,M4,M5,
    M5,M4,M3,M4,M2,
    M1,M1,M2,M3,
    M2,M1,M1
};
float durt[]=        // list all tempo according to numbered musical notation
{
    1,1,1,1,
    1,1,1,1,
    1,1,1,1,
    1+0.5,0.5,1+1,
    1,1,1,1,
    1,1,1,1,
    1,1,1,1,
    1+0.5,0.5,1+1,
    1,1,1,1,
    1,0.5,0.5,1,1,
    1,0.5,0.5,1,1,
    1,1,1,1,
    1,1,1,1,
    1,1,1,0.5,0.5,
    1,1,1,1,
}
```

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```
    1+0.5,0.5,1+1,
};
int length;
int tonepin=8;    // set module signal pin to D8
void setup()
{
    pinMode(tonepin,OUTPUT);
    length=sizeof(tune)/sizeof(tune[0]);    // calculate length

}
void loop()
{
    for(int x=0;x<length;x++)
    {
        tone(tonepin,tune[x]);
        delay(500*durt[x]);    // this is use to adjust tempo delay, you can change the
number to your liking.
        noTone(tonepin);
    }
    delay(2000);
}
//////////
```

Result

The buzzer will play Ode to Joy, and then pause for 2S.

Lesson 7: Temperature measuring

Introduction

In this lesson, we will learn how to measure the temperature of our surroundings. You may feel hot or cold sometimes, but how can you know for sure? Well, let's measure it.

Hardware required

EASY plug controller Board *1

EASY plug cable *1

USB cable *1

EASY plug Analog Temperature Sensor *1

First, let's take a look at this EASY plug Analog Temperature Sensor.

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Analog Temperature Sensor is based on the working principle of a thermistor (resistance varies with temperature change in the environment). It can sense temperature change in its surrounding and send the data to the analog I/O in the controller board. Below are its specifications:

Interface type: analog

Working voltage: 5V

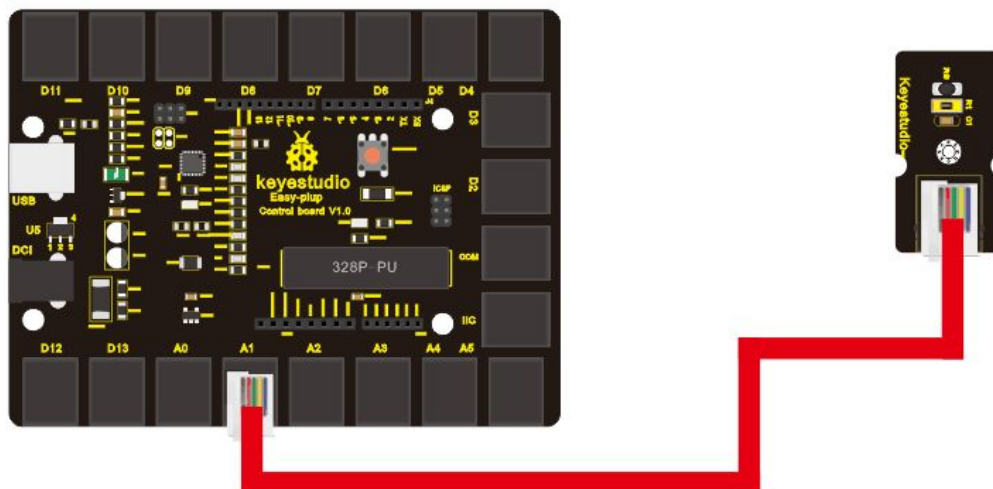
Temperature range: $-55^{\circ}\text{C} \sim 315^{\circ}\text{C}$

Size: 38*20mm

Weight: 3g

Connection Diagram

Now, connect the module to the A1 port of the controller board using the EASY plug cable.



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Sample Code

Connect the board to your PC using the USB cable; copy below code into Arduino IDE, and click upload to upload it to your board.

```
////////////////////////////////////
```

```
double Thermister(int RawADC)
{
  double Temp;
  Temp = log(((10240000/RawADC) - 10000));
  Temp = 1 / (0.001129148 + (0.000234125 + (0.0000000876741 * Temp * Temp ))*
  Temp );
  Temp = Temp - 273.15; // Convert Kelvin to Celcius
  return Temp;
}

void setup()
{
  Serial.begin(9600);
}

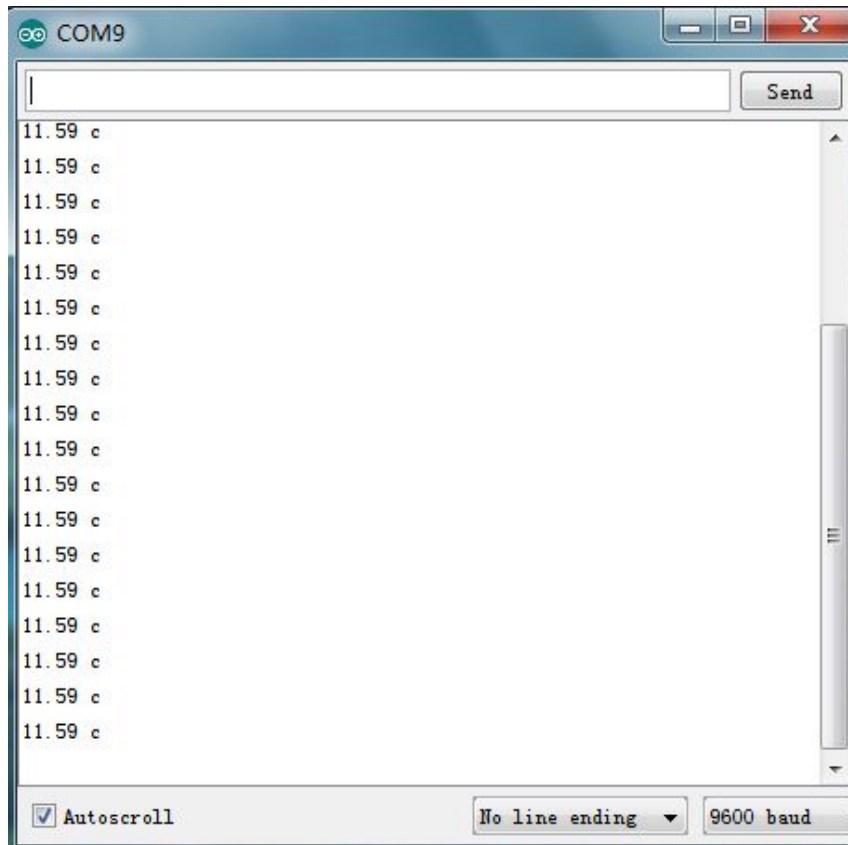
void loop()
{
  Serial.print(Thermister(analogRead(1))); // display Fahrenheit
  Serial.println(" c");
  delay(500);
}
```

```
////////////////////////////////////
```

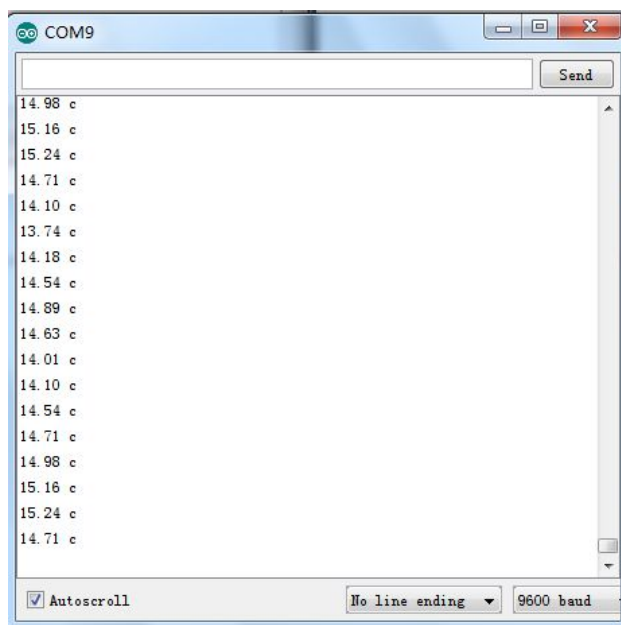
Result

Pic 1 is the temperature the sensor senses in serial monitor; pic 2 is when you blow air with your mouth to the sensor, the temperature goes higher; pic 3 is when you aim a fan to the sensor, the temperature drops. Now, you can know the exact temperature of your surroundings.

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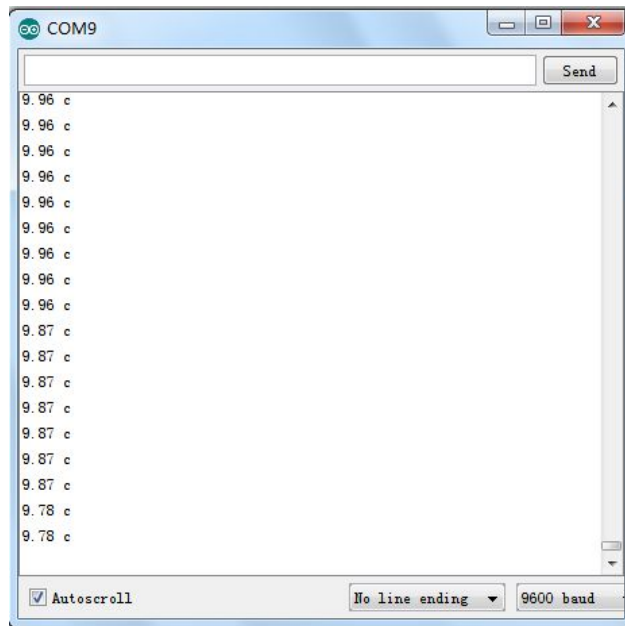


Pic 1



Pic 2

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Pic 3

Lesson 8: Make a sound-controlled lamp

Introduction

This is a simple, but interesting lesson. We will make a sound-controlled lamp. Usually, this test is done by clapping your hand. But due to many sound interference in the environment, we will blow air into the sound sensor instead.

Hardware required

EASY plug controller Board *1

EASY plug cable *1

USB cable *1

EASY plug Digital White LED Module *1

EASY plug Analog Sound Sensor *1

First, let's learn something about this EASY plug Analog Sound Sensor.

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Analog Sound Sensor is typically used in detecting the loudness in ambient environment. The sound sensor can pick up sound signal and convert it into voltage value. You can use it to make some interesting interactive works such as a voice operated switch or a sound-controlled lamp in this lesson. Below are its specifications:

Supply Voltage: 3.3V to 5V

Detecting sound intensity

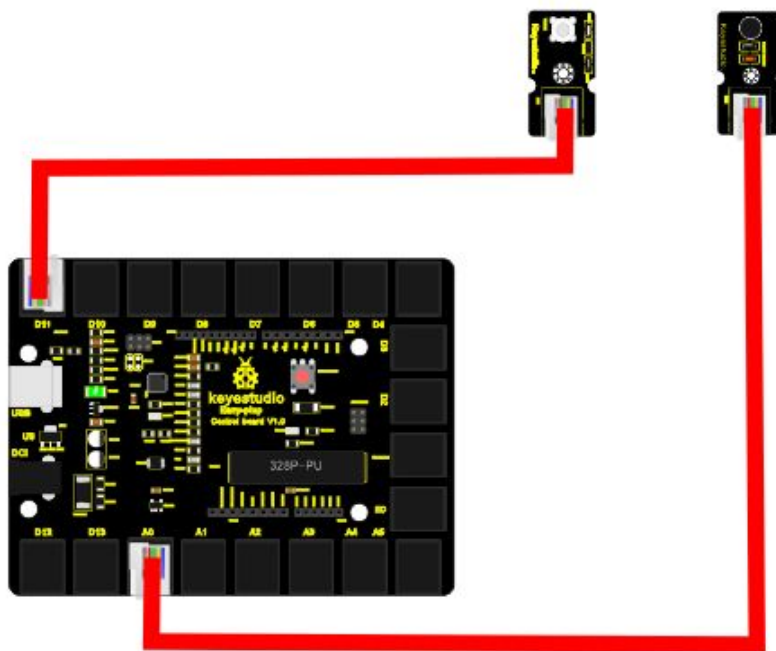
Interface: Analog

Size: 38*20mm

Weight: 4g

Connection Diagram

Now, connect the LED module to the D11 port of the controller board, and sound module to A0 using the EASY plug cables.



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Sample Code

Connect the board to your PC using the USB cable; copy below code into Arduino IDE, and click upload to upload it to your board.

```
////////////////////////////////////
int ledpin=11;// set LED to D11
int soundpin=0;// set sensor to A0
void setup()
{
  Serial.begin(9600); // open serial port, set the baud rate at 9600 bps
  pinMode(ledpin,OUTPUT);// set LED pin as output
}
void loop()
{
  int val;
  val=analogRead(soundpin);    // read the value of sensor pin and assign it to val
  Serial.println(val);
  if (val>170)
  {
    digitalWrite(ledpin, HIGH);  // turn LED ON
  }
  else
  {
    digitalWrite(ledpin, LOW); // turn LED OFF
  }
  delay(100);
}
////////////////////////////////////
```

Result

When you blow air into the sensor, the air vibrates; the sensor will pick up the sound signal and turn on LED.

Lesson 9: Make a light-controlled lamp

Introduction

From the lesson title, you know this lesson is very similar to the previous one. In the last one, the LED is controlled by sound; in this one, the LED will be controlled by light. So here, we will use a light-related photocell sensor.

Hardware required

EASY plug controller Board *1

EASY plug cable *2

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USB cable *1

EASY plug Digital White LED Module *1

EASY plug Photocell Sensor *1

First, a brief introduction of this EASY plug Photocell Sensor.



Photocell is a semiconductor. It has features of high sensitivity, quick response, spectral characteristic, and R-value consistence, maintaining high stability and reliability in environment extremes such as high temperature, high humidity. It's widely used in automatic control switch fields. Below are its specifications:

Interface type: analog

Working voltage: 5V

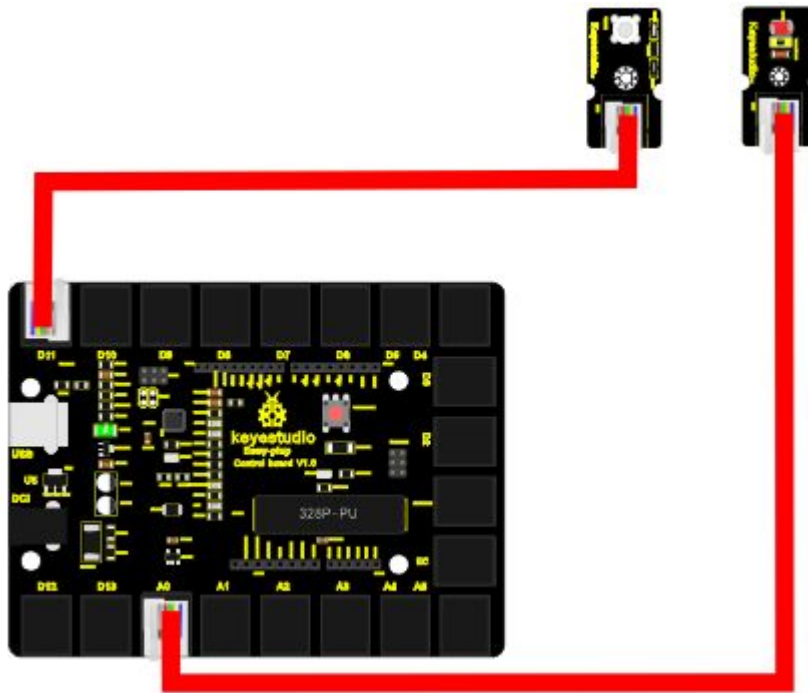
Size: 38*20mm

Weight: 3g

Connection Diagram

Now, connect the LED module to the D11 port of the controller board, and photocell sensor to A0 port using the EASY plug cables.

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Sample Code

Connect the board to your PC using the USB cable; copy below code into Arduino IDE, and click upload to upload it to your board.

```
////////////////////////////////////
```

```
int photopin=0;// set photocell sensor to A0
```

```
int ledpin=11;// set pin11 LED as PWM output to adjust the LED brightness
```

```
int val=0;// define variable val
```

```
void setup()
```

```
{
```

```
pinMode(ledpin,OUTPUT);// set digital pin 11 as output
```

```
Serial.begin(9600);// set baud rate to 9600
```

```
}
```

```
void loop()
```

```
{
```

```
val=analogRead(photopin);// read the analog value of the sensor and assign it to val
```

```
Serial.println(val);// display val value
```

```
analogWrite(ledpin,val/4);// turn on LED and set to maximum brightness(PWM  
output is 255)
```

```
delay(10);// wait 0.01S
```

```
}
```

```
////////////////////////////////////
```


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Result

When you block light of the sensor, the LED becomes less bright; when you shine light on the sensor, the LED becomes brighter.

Lesson 10: Water level alarm

Introduction

We are all very familiar with alarms. In this lesson, we will make a water level alarm. This experiment principle can be applied to many occasions. For example, it's used in washing machines to tell water level.

Hardware required

EASY plug controller Board *1

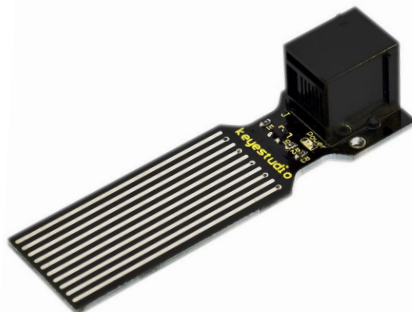
EASY plug cable *2

USB cable *1

EASY plug Active Buzzer Module *1

EASY plug Water Sensor *1

Here is a brief introduction of this EASY plug Water Sensor.



Our water sensor is easy- to-use, portable and cost-effective, designed to identify and detect water level and water drop. This sensor measures the volume of water drop and water quantity through an array of traces of exposed parallel wires. Compared with its competitors, this sensor is smaller and smarter. Below are its specifications:

Operating voltage: DC5V

Operating current: < 20mA

Sensor type: Analog

Detection area: 40mm x16mm

Production process: FR4 double-side tinned

Humanized design: Anti-slippery semi-lunar recess

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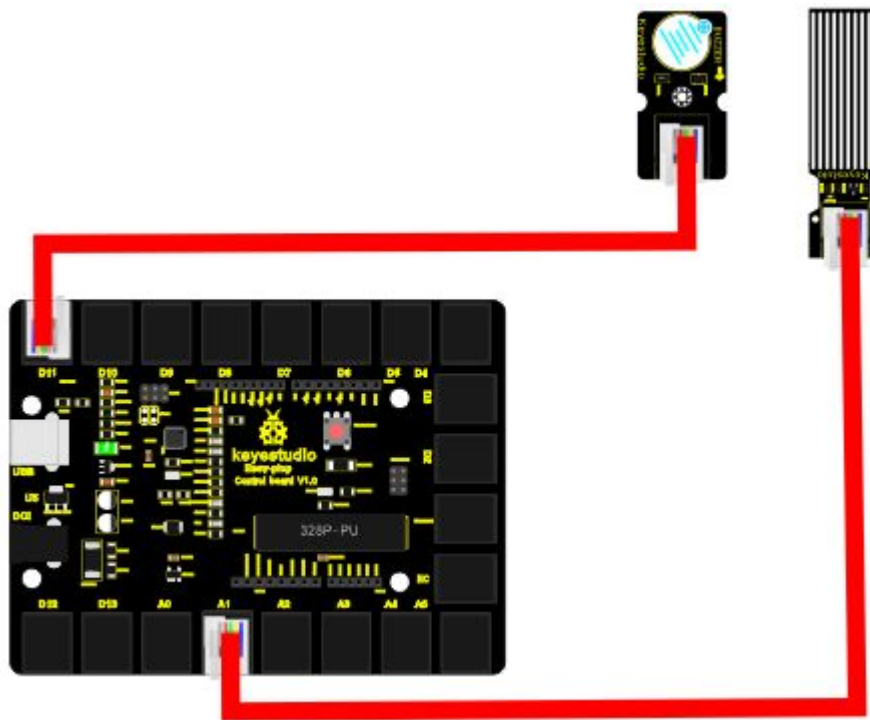
Operating temperature: 10%~90% without condensation

Size: 68.3 x 20mm

Weight: 3g

Connection Diagram

Now, connect the LED module to the D11 port of the controller board, and water sensor to A1 port using the EASY plug cables.



Sample Code

Connect the board to your PC using the USB cable; copy below code into Arduino IDE, and click upload to upload it to your board.

////////////////////////////////////

```
int analogPin = 1; // connect water sensor to analog interface 1
int buzzPin= 11; // buzzer to digital interface 11
int val = 0; // define the initial value of variable 'val' as 0
int data = 0; // define the initial value of variable 'data' as 0
void setup()
{
  pinMode(buzzPin, OUTPUT); // define buzzer as output pin
  Serial.begin(9600); // set baud rate at 9600
}
void loop()
{
  val = analogRead(analogPin); // read and assign analog value to variable 'val'
```

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```
if(val>400)
{ // decide whether variable 'val' is over 400
digitalWrite(buzzPin,HIGH); // turn on buzzer when variable 'val' is over 400
}
else{
digitalWrite(buzzPin,LOW); // turn off buzzer when variable 'val' is under 400
}
data = val; // variable 'val' assigns value to variable 'data'
Serial.println(data); // print variable 'data' by Serial.print
delay(100);
}
////////////////////////////////////
```

Result

Place the sensor sensing part into water, open serial monitor, you can see the value it displays. When the value is over 400, the buzzer will ring.

Lesson 11: I'm thirsty

Introduction

Do you have plants? I believe you do. Do you water them often? How do you know when they need water? Well, this alarm here can help you do that.

Hardware required

EASY plug controller Board *1

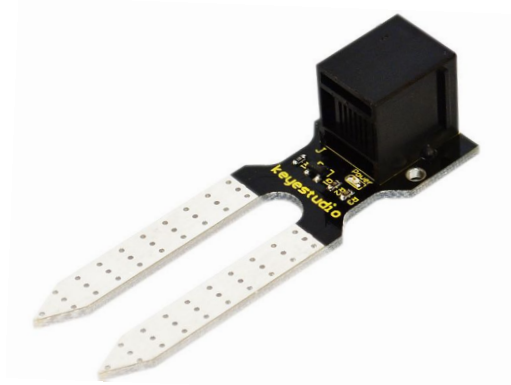
EASY plug cable *2

USB cable *1

EASY plug Active Buzzer Module *1

EASY plug Soil humidity Sensor *1

Let's first take a look at this sensor.



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This soil humidity sensor aims to detect the soil humidity. If the soil is in lack of water, the analog value output by the sensor will decrease, otherwise, it will increase. Together with Arduino, you can make an alarm or an automatic watering device, making your plant more comfortable and your garden smarter.

Below are its specifications:

Power Supply Voltage: 3.3V or 5V

Working Current: $\leq 20\text{mA}$

Output Voltage: 0-2.3V (When the sensor is totally immersed in water, the voltage will be 2.3V), the higher humidity, the higher the output voltage

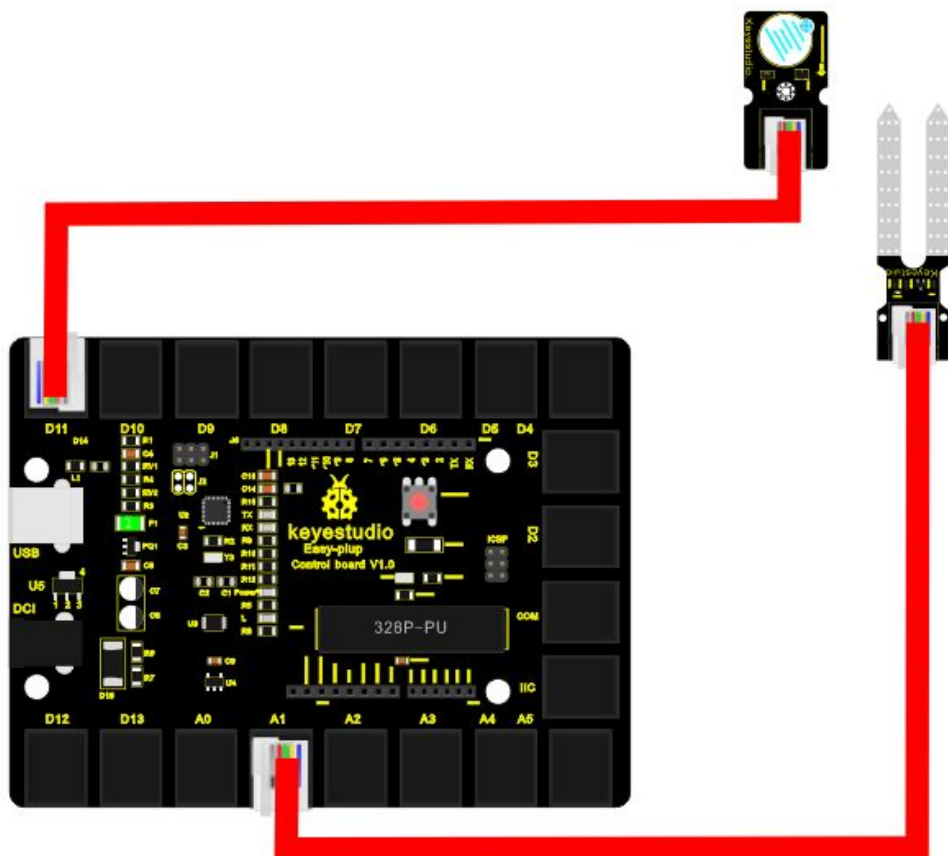
Sensor type: Analog output

Size: 65.5*20mm

Weight:

Connection Diagram

Now, connect the buzzer module to the D11 port of the controller board, and soil humidity sensor to A1 port using the EASY plug cables.



Sample Code

Connect the board to your PC using the USB cable; copy below code into Arduino

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IDE, and click upload to upload it to your board.

```
////////////////////////////////////
```

```
int analogPin = 1; // connect soil humidity sensor to analog interface 1
int buzzer= 11; // buzzer to digital interface 11
int val ;
void setup()
{
  pinMode(buzzer, OUTPUT); // define buzzer as output pin
  Serial.begin(9600); // set baud rate at 9600
}
void loop()
{
  val = analogRead(analogPin); // read and assign analog value to variable 'val'
  Serial.print(val); // print variable 'val' by Serial.print
  if(val<=300)
  {
    {
      digitalWrite(buzzer,HIGH);
    }
    Serial.println("  dry soil");
    delay(50);
  }
  if((val>300)&&(val<500))
  {
    {
      digitalWrite(buzzer,LOW);
    }
    Serial.println("  humid soil");
    delay(50);
  }
  if(val>=500)
  {
    {
      digitalWrite(buzzer,HIGH);
    }
    Serial.println("  in water");
    delay(50);
  }
  delay(100);
}
```

```
////////////////////////////////////
```

Result

Open serial monitor, you can see the value indicating soil humidity; when the value is ≤ 300 , the serial monitor will display “dry soil” and buzzer will ring; when the value

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is between 300-500, the serial monitor will display “humid soil”; when the value is ≥ 500 , the serial monitor will display “in water” and the buzzer will ring.

Lesson 12: Visible analog value

Introduction

In this lesson, we will make the mysterious analog value become less mysterious. We will be using the analog rotation sensor, a typical output component of analog value. Together with an LED, we can see clearly if the analog value is changing.

Hardware required

EASY plug controller Board *1

EASY plug cable *2

USB cable *1

EASY plug Digital White LED Module *1

EASY plug Analog Rotation Sensor *1

Now, let's meet this new EASY plug Analog Rotation Sensor.



This analog Rotation Sensor is Arduino compatible. It is based on a potentiometer. Its voltage can be subdivided into 1024. By rotating it to a certain position, it can output certain voltage value. Below are its specifications:

Supply Voltage: 3.3V to 5V

Interface: Analog

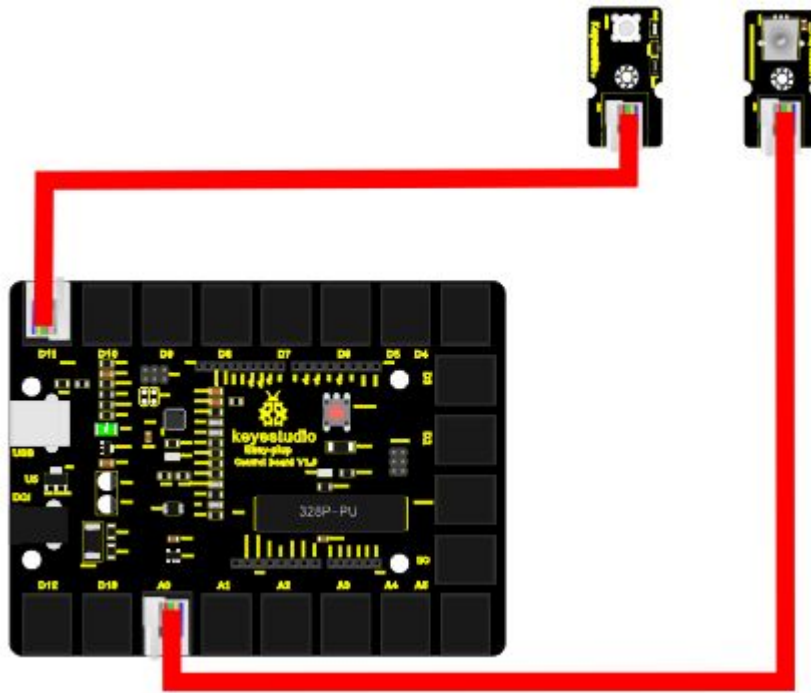
Size: 39*20mm

Weight: 8g

Connection Diagram

Now, connect the LED module to the D11 port of the controller board, and analog rotation sensor to A0 port using the EASY plug cables.

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Sample Code

Connect the board to your PC using the USB cable; copy below code into Arduino IDE, and click upload to upload it to your board.

```
////////////////////////////////////
```

```
int rotatepin=0;// set rotation sensor to A0
```

```
int ledpin=11;// set pin11 LED as PWM output to adjust the LED brightness
```

```
int val=0;// define variable val
```

```
void setup()
```

```
{
```

```
pinMode(ledpin,OUTPUT);// set digital pin 11 as output
```

```
Serial.begin(9600);// set baud rate to 9600
```

```
}
```

```
void loop()
```

```
{
```

```
val=analogRead(rotatepin);// read the analog value of the sensor and assign it to val
```

```
Serial.println(val);// display val value
```

```
analogWrite(ledpin,val/4);// turn on LED and set to maximum brightness(PWM  
output is 255)
```

```
delay(10);// wait 0.01S
```

```
}
```

```
////////////////////////////////////
```

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Result

By rotating the knob on the module, you can adjust the LED brightness. Now you can see the change of analog value clearly.

Lesson 13: Magnetic field detecting

Introduction

We know that earth is surrounded by magnetic field. We may not feel it, but it's critical to our survival. In this lesson, we will teach you how to detect magnetic field of magnetic materials, not the magnetic field of earth because it's too weak to be detected by this sensor.

Hardware required

EASY plug controller Board *1

EASY plug cable *2

USB cable x1

Magnetic-iron *1 (not included)

EASY plug Digital White LED Module *1

EASY plug Hall Magnetic Sensor *1

Well, let's take a look at this EASY plug Hall Magnetic Sensor first.



This sensor senses the magnetic materials within a detection range up to 75px. The detection range and the strength of the magnetic field are proportional. The output is digital on/off. Below are its specifications:

Detection range: up to 75px

Output: digital on/off

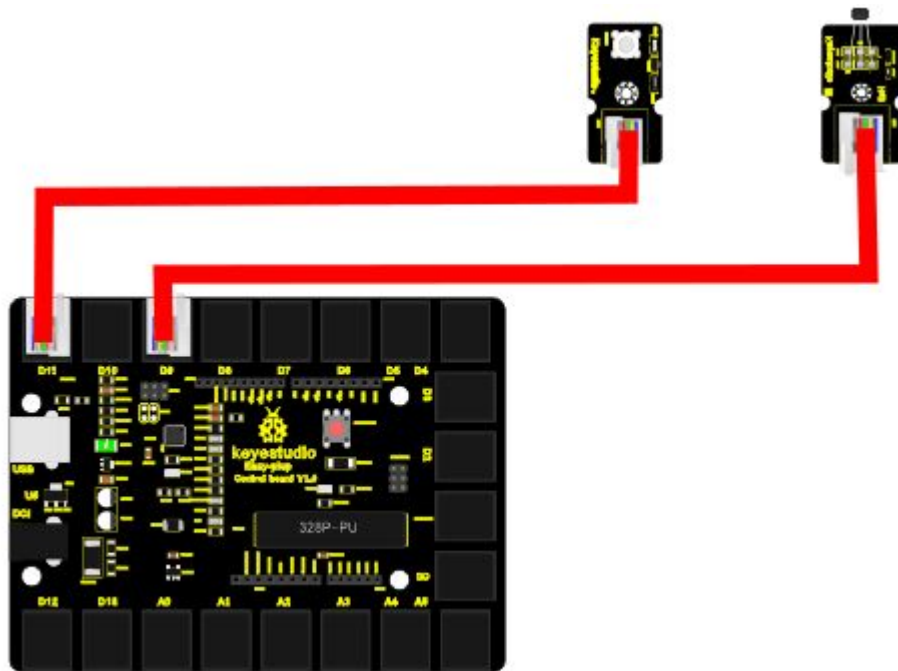
Size: 42.3*20mm

Weight: 3g

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Connection Diagram

Now, connect the LED module to the D11 port of the controller board, and hall magnetic sensor to D9 port using the EASY plug cables.



Sample Code

Connect the board to your PC using the USB cable; copy below code into Arduino IDE, and click upload to upload it to your board.

```
////////////////////////////////////
int ledPin = 11;                // set LED pin to D11
int inputPin = 9;              // set sensor to input pin 9
int val = 0;                   // define variable val
void setup() {
  pinMode(ledPin, OUTPUT);      // declare LED as output
  pinMode(inputPin, INPUT);     // declare magnetic sensor as input
}
void loop(){
  val = digitalRead(inputPin);  // read input value
  if (val == HIGH) {           // check if the input is HIGH
    digitalWrite(ledPin, LOW); // turn LED OFF
  } else {
    digitalWrite(ledPin, HIGH); // turn LED ON
  }
}
////////////////////////////////////
```

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Result

Place the magnetic-iron near the sensor, LED turns on; remove the magnetic-iron, LED turns off.

Lesson 14: Collision detecting

Introduction

In this lesson, we will use a collision sensor and an LED to detect collision. This lesson is also simple, but you can apply what you learn here to many applications. For example, you can install it to a robot to realize collision detection function.

Hardware required

EASY plug controller Board *1

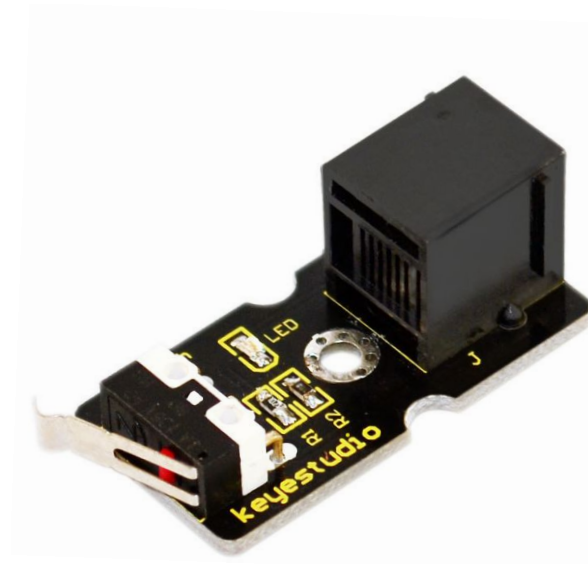
EASY plug cable *2

USB cable *1

EASY plug Digital White LED Module *1

EASY plug Collision Sensor *1

Here is a brief introduction of EASY plug Collision Sensor.



Collision sensor is also known as electronic switch. By programming, it can realize control over light, sound device, key choice function of LCD display etc. Below are its specifications:

Reserving a M3 mounting hole, convenient for fixation on a robot.

With indicator light

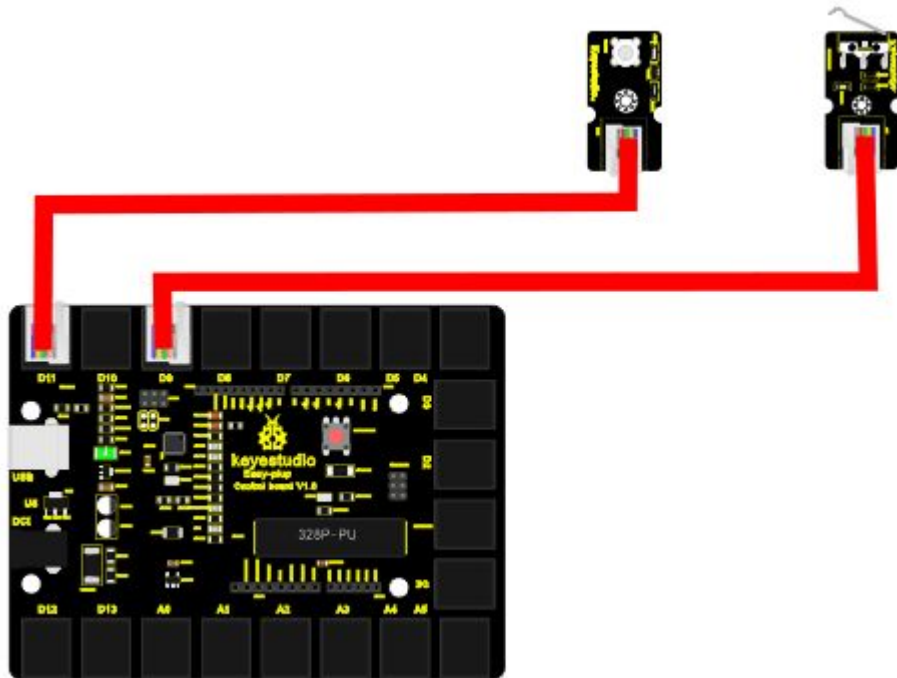
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Size: 39 * 20mm

Weight:

Connection Diagram

Now, connect the LED module to the D11 port of the controller board, and collision sensor to D9 port using the EASY plug cables.



Sample Code

Connect the board to your PC using the USB cable; copy below code into Arduino IDE, and click upload to upload it to your board.

////////////////////////////////////

```
int ledpin=11;// set LED to D11
int inpin=9;// set sensor to D9
int val;// define variable val
void setup()
{
  pinMode(ledpin,OUTPUT);// set pin LED as output
  pinMode(inpin,INPUT);// set collision sensor as input
}
void loop()
{
  val=digitalRead(inpin);// read value on pin 9 and assign it to val
  if(val==HIGH)// check if the switch on the module if in closed state; if Yes, turn on LED
  { digitalWrite(ledpin,LOW);}
```

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```
else  
{ digitalWrite(ledpin,HIGH);}  
}
```

////////////////////

Result

You can see on the module, there is a clip, when collision happens, the clip is in closed state, just like a switch, and the LED turns on. Otherwise, LED remains off.

Lesson 15: Button-controlled lamp

Introduction

In previous lessons, we have learned how to control the LED with various modules. In this lesson, we will use something that is most straightforward, a button. I believe you are all familiar with buttons. When it's pressed, the circuit is in closed (conducting) state. When you release it, the circuit is disconnected.

Hardware required

EASY plug controller Board *1

EASY plug cable *2

USB cable *1

EASY plug Digital White LED Module *1

EASY plug Digital Push Button *1

First, let's take a look at this EASY plug Digital Push Button.



It is a basic application module. You can simply plug it into EASY plug controller board to give it a try. Bellow are its specifications:

Supply Voltage: 3.3V to 5V

Easy to 'plug and play'

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Large button and high-quality first-class cap

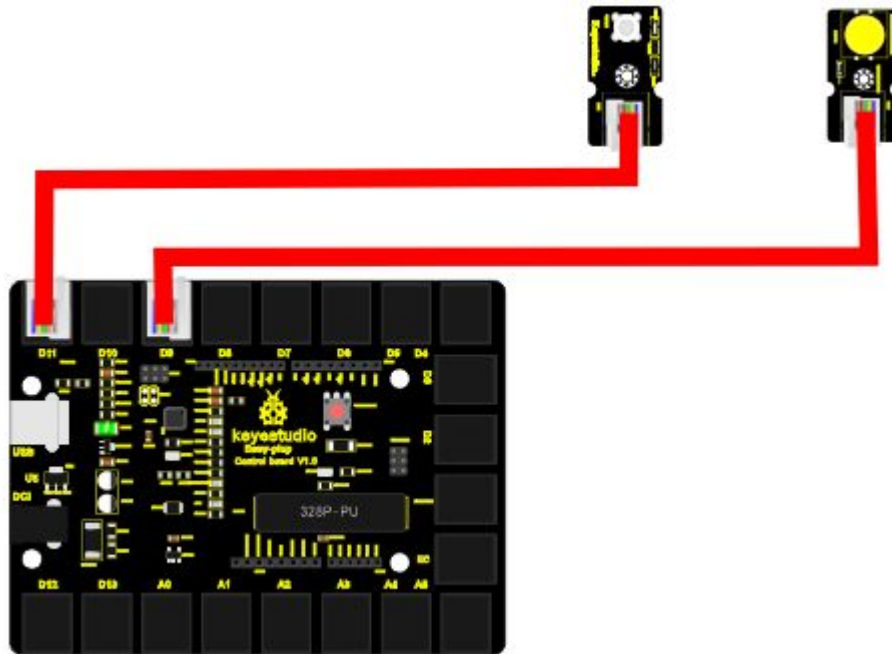
Interface: Digital

Size: 38*20mm

Weight: 4g

Connection Diagram

Now, connect the LED module to the D11 port of the controller board, and digital push button to D9 port using the EASY plug cables.



Sample Code

Connect the board to your PC using the USB cable; copy below code into Arduino IDE, and click upload to upload it to your board.

////////////////////////////////////

```
int ledpin=11;// set LED to pin D11
int inpin=9;// set button to pin D9
int val;// define variable val
void setup()
{
  pinMode(ledpin,OUTPUT);// set LED pin as “output”
  pinMode(inpin,INPUT);// set button pin as “input”
}
void loop()
{
```

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```
val=digitalRead(inpin);// read the level value of pin 9 and assign it to val
if(val==HIGH)// check if the button is pressed, if yes, turn on the LED
{ digitalWrite(ledpin,LOW);}
else
{ digitalWrite(ledpin,HIGH);}
}
////////////////////////////////////
```

Result

When the button is pressed, LED is on, otherwise, LED remains off.

Lesson 16: Touch alarm

Introduction

In the electronic world, many elements can be used as switches. Here is another one, touch sensor. In this lesson, we will make a touch alarm with this sensor and an active buzzer. When you touch the sensor sensing area, the alarm will go off.

Hardware required

EASY plug controller Board *1

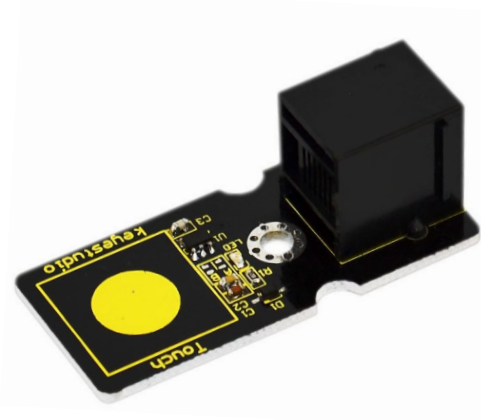
EASY plug cable *2

USB cable *1

EASY plug Active Buzzer module *1

EASY plug Capacitive Touch Sensor *1

First, let's first take a look at this EASY plug Capacitive Touch Sensor.



Are you tired of clicking mechanic button? Well, this little sensor can "feel" people and metal touch and feedback a high/low voltage level. Even isolated by some cloth

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and paper, it can still feel the touch. Its sensitivity decrease as isolation layer gets thicker. Below are its specifications:

Supply Voltage: 3.3V to 5V

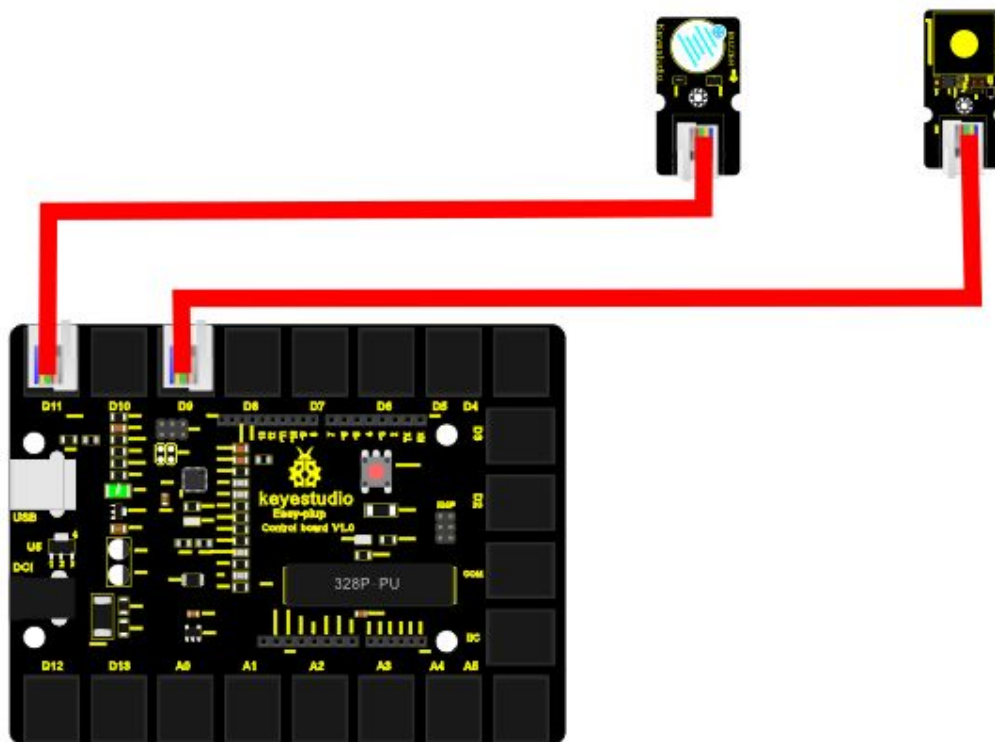
Interface: Digital

Size: 45*20mm

Weight: 3g

Connection Diagram

Now, connect the buzzer module to the D11 port of the controller board, and capacitive touch sensor to D9 port using the EASY plug cables.



Sample Code

Connect the board to your PC using the USB cable; copy below code into Arduino IDE, and click upload to upload it to your board.

```
////////////////////
```

```
int buzzPin = 11;    //Connect Buzzer to Digital Pin11
int inputPin = 9;     // Connect Touch sensor to Digital Pin 9
void setup() {
  pinMode(buzzPin, OUTPUT);    // declare buzzer as output
  pinMode(inputPin, INPUT);    // declare Touch sensor as input
}
void loop(){
  int val = digitalRead(inputPin); // read input value
  if (val == HIGH) {              // check if the input is HIGH
```

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```
digitalWrite(buzzPin, HIGH); // turn buzzer ON
} else {
digitalWrite(buzzPin, LOW); // turn buzzer OFF
}
}
}
////////////////////////////////////
```

Result

Use your finger to touch the sensor sensing area, the buzzer will ring; otherwise the buzzer remains silent.

Lesson 17: Knock Sensing

Introduction

We know sensor can sense all kinds of changes. In this lesson, we will learn how to sense a knock. This sensor has many applications; it can also functions like a switch.

Hardware required

EASY plug controller Board *1

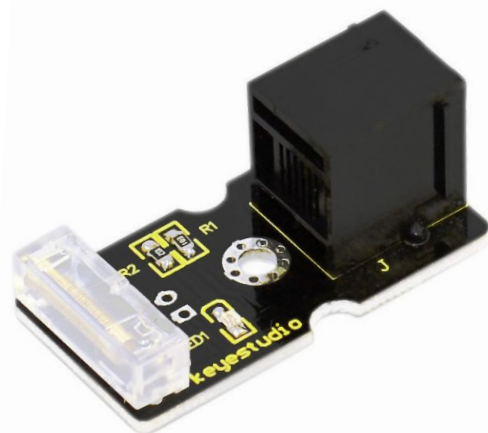
EASY plug cable *2

USB cable *1

EASY plug Digital White LED Module *1

EASY plug Knock Sensor *1

Let's first take a look at this EASY plug Knock Sensor.



This module is a knock sensor. When you knock it, it can send a momentary signal. We can combine it with Arduino to make some interesting experiment, e.g. electronic drum. Below are its specifications:

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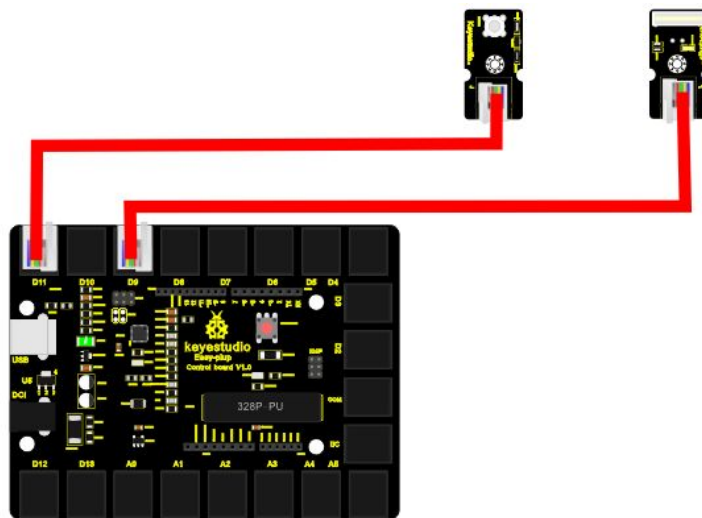
Working voltage: 5V

Size: 38*20mm

Weight: 3g

Connection Diagram

Now, connect the LED module to the D11 port of the controller board, and knock sensor to D9 port using the EASY plug cables.



Sample Code

Connect the board to your PC using the USB cable; copy below code into Arduino IDE, and click upload to upload it to your board.

```
////////////////////
```

```
int Led=11;//define LED interface
int knock=9; //define knock sensor interface;
int val;//define digital variable val
void setup()
{
  pinMode(Led,OUTPUT);//define LED pin to be output
  pinMode(knock,INPUT);//define knock sensor pin to be input
}
void loop()
{
  val=digitalRead(knock);// read the value of interface9 and assign it to val
  if(val==HIGH)// when the knock sensor detect a signal, LED will turn on
  {
    digitalWrite(Led,LOW);
  }
}
```

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```
else
{
digitalWrite(Led,HIGH);
}
}
}
//////////
```

Result

Every time you knock the sensor, the LED turns on. Otherwise, it remains off.

Lesson 18: EASY plug Digital Tilt Sensor

Introduction

In this lesson, we will introduce you another type of switch. It's called digital tilt sensor. In the test, we will use the sensor to control the on and off of an LED.

Hardware required

EASY plug controller Board *1

EASY plug cable *2

USB cable *1

EASY plug Digital White LED Module *1

EASY plug Digital Tilt Sensor *1

Here is a brief introduction of EASY plug Digital Tilt Sensor.



Tilt Sensor is a digital tilt switch. It can be used as a simple tilt sensor. Its principle is simple. Inside the sensor, there is a metal ball. When it's in upright position, the ball contacts both ends of power supply so circuit is connected; when it's in upside-down position, circuit is disconnected. Below are its specifications:

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Supply Voltage: 3.3V to 5V

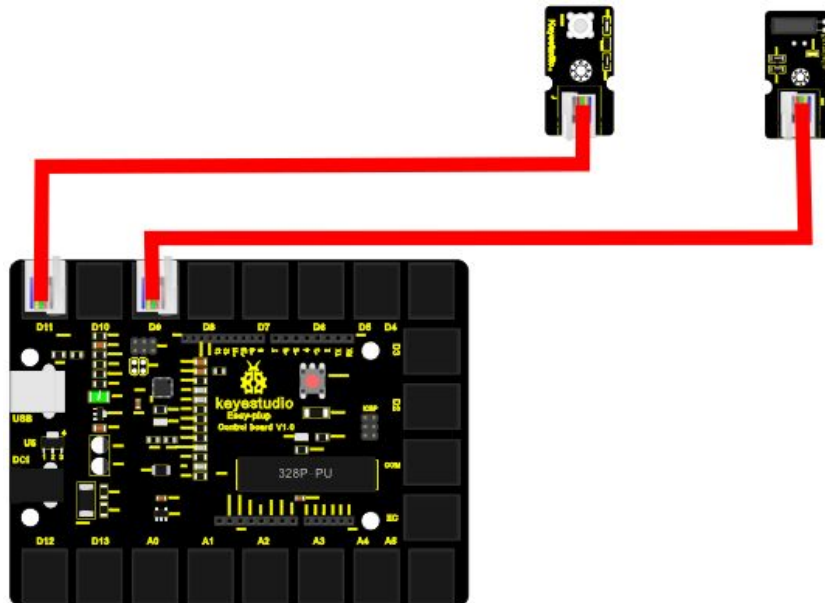
Interface: Digital

Size: 39*20mm

Weight: 3g

Connection Diagram

Now, connect the LED module to the D11 port of the controller board, and digital tilt sensor to D9 port using the EASY plug cables.



Sample Code

Connect the board to your PC using the USB cable; copy below code into Arduino IDE, and click upload to upload it to your board.

```
////////////////////
```

```
int ledPin = 11;           // Connect LED to pin 11
int tilt = 9;              // Connect Tilt sensor to Pin9
void setup()
{
  pinMode(ledPin, OUTPUT); // Set digital pin 11 as output
  pinMode(tilt, INPUT);    // Set digital pin 9 as input
}
void loop()
{
  if(digitalRead(tilt)==HIGH) //Read sensor value
  {
    digitalWrite(ledPin, HIGH); // Turn on LED when the sensor is triggered
  }
}
```

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```
    }  
    else  
    {  
        digitalWrite(ledPin, LOW);    // Turn off LED when the sensor is not  
triggered  
    }  
}  
////////////////////////////////////
```

Result

Tilt the sensor to one end, you can see the LED turns on; tilt the sensor to another end, you can see the LED turns off.

Lesson 19: Fire alarm

Introduction

In this lesson, we will make a commonly seen alarm, fire alarm. Fire alarm is very useful and critical in our life. It has helped save many lives. Similarly to many alarms we've made, it includes a sensor and a buzzer. Be careful with the flame when you are doing the test!

Hardware required

EASY plug controller Board *1

EASY plug cable *2

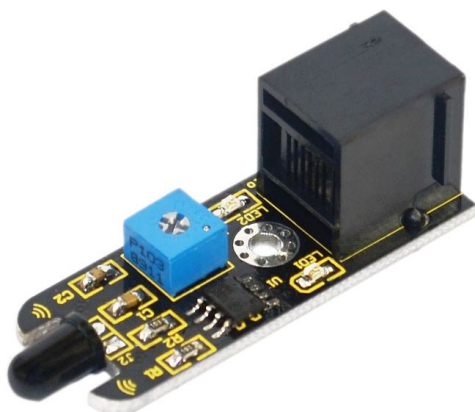
USB cable *1

Lighter *1 (not included)

EASY plug Active Buzzer module *1

EASY plug Flame Sensor *1

Let's take a look at this EASY plug flame sensor first.



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This flame sensor can be used to detect fire or other lights whose wavelength stands at 760 nm ~ 1100 nm. In the fire-fighting robot game, the flame plays an important role in the probe, which can be used as the robot's eyes to find fire source. Below are its specifications:

Supply Voltage: 3.3V to 5V

Detection range: 500px (4.8V) ~ 2500px (1V)

Range of Spectral Bandwidth: 760nm to 1100nm

Operating temperature: -25°C to 85°C

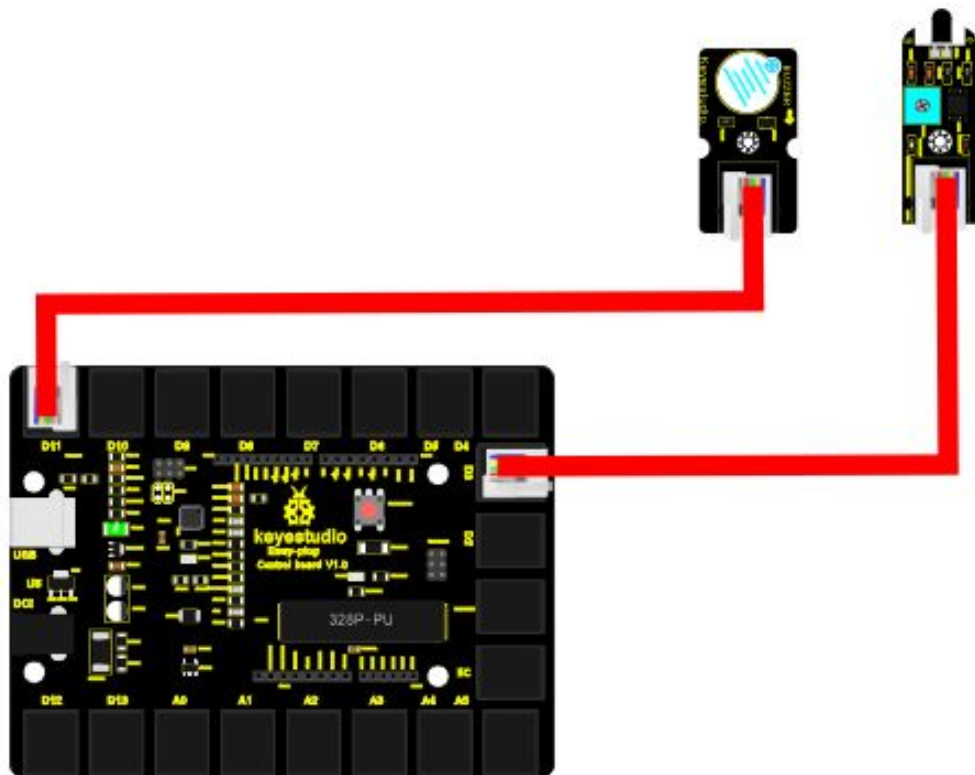
Interface: digital

Size: 49*16.7mm

Weight: 4g

Connection Diagram

Now, connect the buzzer module to the D11 port of the controller board, and flame sensor to D3 port using the EASY plug cables.



Sample Code

Connect the board to your PC using the USB cable; copy below code into Arduino IDE, and click upload to upload it to your board.

////////////////////////////////////

```
const int flamePin = 3;    // the number of the flame pin
const int buzzPin = 11;    // the number of the buzzer pin
```

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```
// variables will change:
int State = 0;          // variable for reading status
void setup() {
  // initialize the buzzer pin as an output:
  pinMode(buzzPin, OUTPUT);
  // initialize the flame pin as an input:
  pinMode(flamePin, INPUT);
}
void loop(){
  // read the state of the value:
  State = digitalRead(flamePin);
  if (State == HIGH) {
    // turn buzzer on:
    digitalWrite(buzzPin, HIGH);
  }
  else {
    // turn buzzer off:
    digitalWrite(buzzPin, LOW);
  }
}
////////////////////
```

Result

Turn on the lighter, put the flame near the flame sensor, the buzzer will ring.

Lesson 20: Vibration alarm

Introduction

In this lesson, we will make another alarm, which is called a vibration alarm. Do you have something you consider a treasure and wouldn't want it stolen in any way. Well, this alarm can help you do that.

Hardware required

EASY plug controller Board *1

EASY plug cable *2

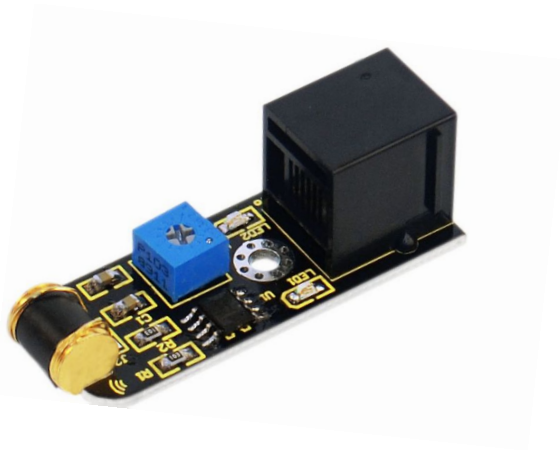
USB cable *1

EASY plug Active Buzzer module *1

EASY plug Vibration Sensor *1

First, let's get to know a little bit about this EASY plug Vibration Sensor.

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This sensor offers the simplest way to check vibration with Arduino. Directly plug it into EASY plug main board, Arduino will receive a digital signal.

Despite its simplicity, you can make full use of it with creative thinking, step counting, and crash warning light, vibration alarm in this lesson etc. Below are its specifications:

IO Type: Digital

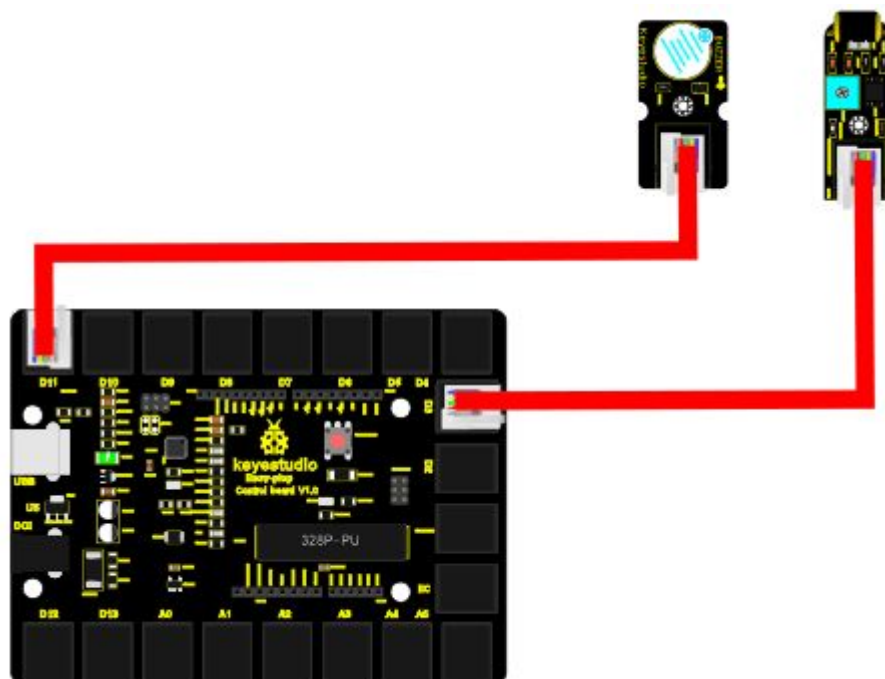
Supply Voltage: 3.3V to 5V

Size: 46.4*16.6mm

Weight: 5g

Connection Diagram

Now, connect the buzzer module to the D11 port of the controller board, and vibration sensor to D9 port using the EASY plug cables.



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Sample Code

Connect the board to your PC using the USB cable; copy below code into Arduino IDE, and click upload to upload it to your board.

```
////////////////////////////////////
#define buzzPin    11
#define SensorINPUT  3 //Connect the sensor to digital Pin 3 which is Interrupt 1.
unsigned char state = 0;
void setup()
{
  pinMode(buzzPin, OUTPUT);
  pinMode(SensorINPUT, INPUT);
  attachInterrupt(1, blink, FALLING);// Trigger the blink function when the falling
  edge is detected
}
void loop()
{  if(state!=0)
    {
      state = 0;
      digitalWrite(buzzPin,HIGH);
      delay(500);
    }
    else
      digitalWrite(buzzPin,LOW);
}
void blink()//Interrupts function
{  state++;
}
////////////////////////////////////
```

Result

Place the sensor on the desk, use your hand to gently hit the desk; the sensor will sense the vibration and the buzzer will ring.

Lesson 21: Magnetic field detector

Introduction

In lesson 13, we have learned how to detect magnetic field. This lesson is similar, is also about detecting the magnetic field, but with different modules and different result.

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Hardware required

EASY plug controller Board *1

EASY plug cable *2

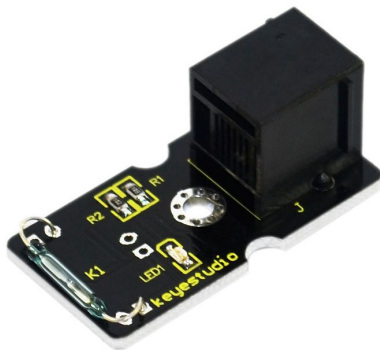
USB cable *1

Magnetic-iron *1 (not included)

EASY plug Active Buzzer module *1

EASY plug Reed Switch Module *1

Here is a brief introduction of EASY plug Reed Switch Module.



Reed Switch is a special switch and a main component for reed relay and proximity switch. Reed switch is usually comprised of two soft magnetic material and metal reed contacts which will disconnect itself when there is no magnetic. Below are its specifications:

Working voltage: DC 3.3V-5V

Working current: $\geq 20\text{mA}$

Working temperature: $-10^{\circ}\text{C} \sim +50^{\circ}\text{C}$

Detection distance: $\leq 10\text{mm}$

IO Interface: 3 wire interface (-/+/S)

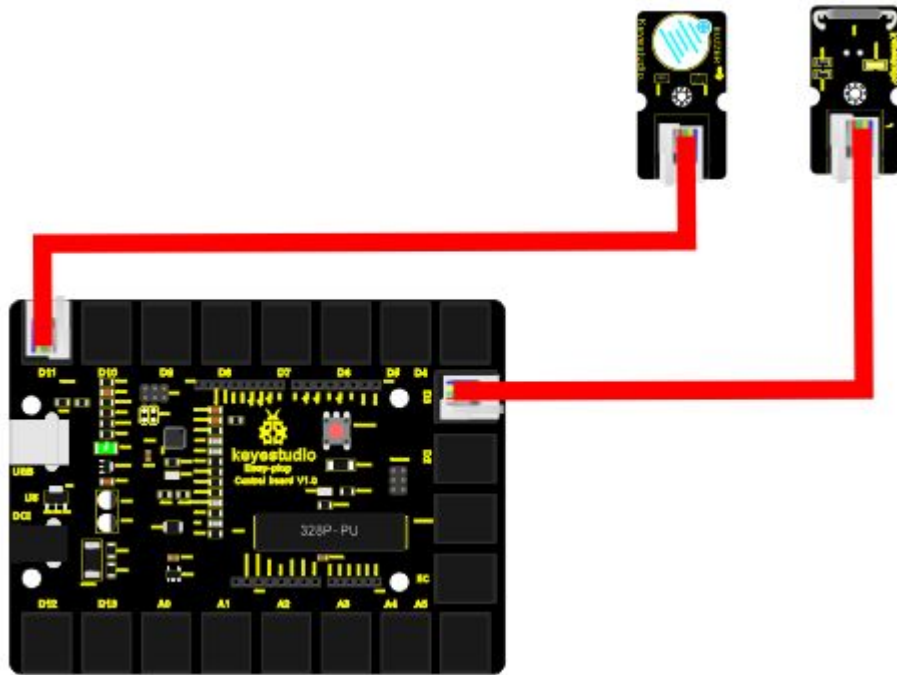
Size: 39*20mm

Weight: 3g

Connection Diagram

Now, connect the buzzer module to the D11 port of the controller board, and reed switch module to D3 port using the EASY plug cables.

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Sample Code

Connect the board to your PC using the USB cable; copy below code into Arduino IDE, and click upload to upload it to your board.

////////////////////////////////////

```
int buzzPin = 11;    // Connect Buzzer on Digital Pin11
int reedpin= 3; // define reed switch sensor interface
int val;// define digital variable val
void setup()
{
  pinMode(buzzPin,OUTPUT);// define buzzer as output interface
  pinMode(buttonpin,INPUT);// define reed switch sensor as output interface
}
void loop()
{
  val=digitalRead(reedpin);// read and assign the value of digital interface 3 to val
  if(val==HIGH)// When a signal is detected by reed switch sensor,Buzzer will on
  {
    digitalWrite(buzzPin,LOW);
  }
  else
  {
    digitalWrite(buzzPin,HIGH);
  }
}
```

////////////////////////////////////

Result

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Place the magnetic-iron near the reed switch module; when the module senses the magnetic field, the LED on the module will turn on; at the same time, buzzer will ring.

Lesson 22: Temperature alarm

Introduction

As a final lesson in this kit, this is relatively more complicated for it involves three different modules. But don't worry. I believe you will also find it simple as you have learned so much in previous lessons.

In this lesson, when the temperature reaches a certain value, here 25°C, the alarm will go off.

Hardware required

EASY plug controller Board *1

EASY plug cable *3

USB cable *1

EASY plug Active Buzzer module *1

EASY plug Digital White LED module *1

EASY plug LM35 Temperature Sensor *1

First, take a look at this EASY plug LM35 Temperature Sensor.



LM35 Linear Temperature Sensor is based on semiconductor LM35 temperature sensor. It can be used to detect ambient air temperature. This sensor offers a functional range among 0 degree Celsius to 100 degree Celsius. Sensitivity is 10mV per degree Celsius. The output voltage is proportional to the temperature.

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This sensor is commonly used as a temperature measurement sensor. Below are its specifications:

Can be used to detect ambient air temperature

Sensitivity: 10mV per degree Celcius

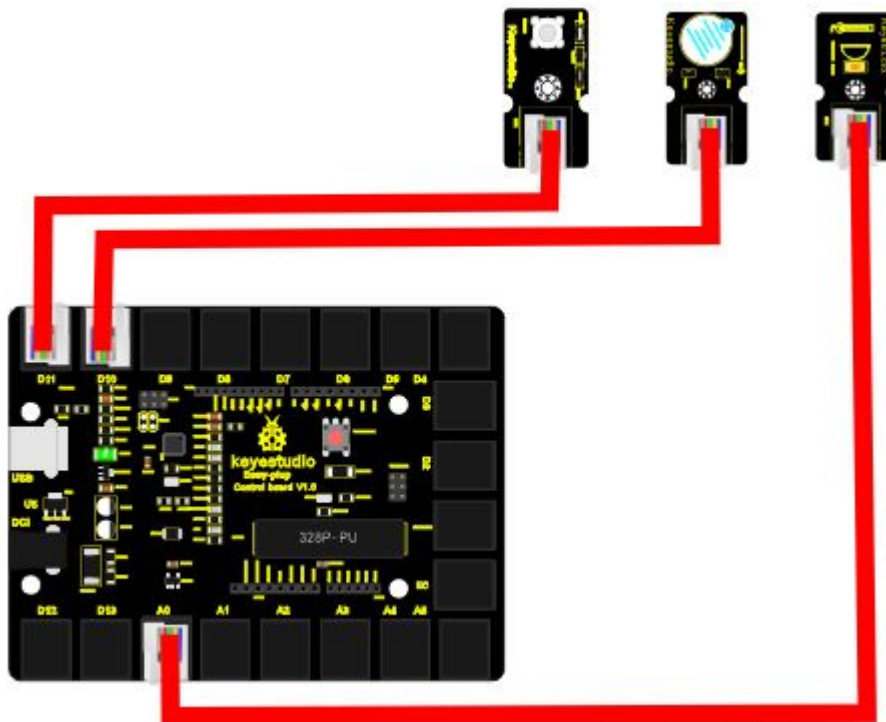
Functional range: 0 degree Celsius to 100 degree Celsius

Size: 38*20mm

Weight: 3g

Connection Diagram

Now, connect the LED module to the D11 port of the controller board, buzzer module to D10, and LM35 temperature sensor to A0 port using the EASY plug cables.



Sample Code

Connect the board to your PC using the USB cable; copy below code into Arduino IDE, and click upload to upload it to your board.

////////////////////////////////////

```
int buzzPin = 10;
int ledpin= 11;
void setup()
{
    Serial.begin(9600);// Set Baud Rate to 9600 bps
    pinMode(ledpin,OUTPUT);// define LED as output
    pinMode(buzzPin,OUTPUT);// define buzzer as output
}
void loop()
```

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```
{  int val;
  int dat;
  val=analogRead(0);// Connect LM35 on Analog 0
  dat=(500 * val) /1024;
  Serial.print("Temp:"); // Display the temperature on Serial monitor
  Serial.print(dat);
  Serial.println("C");
  if (dat>25) // when temperature is higher than 25°C , LED will be turned on, and
buzzer will ring
  {
    digitalWrite(buzzPin, HIGH);  // turn buzzer ON
    digitalWrite(ledpin, HIGH);  // turn LED ON
  }
else
  {
    digitalWrite(buzzPin, LOW);  // turn buzzer OFF
    digitalWrite(ledpin, LOW); // turn LED OFF
  }
  delay(500);
}
```

////////////////////////////////////

Result

Open serial monitor, you can see the current temperature. When the temperature goes higher than 25°C (you can blow air with your mouth to the module to make the temperature go higher or you can change the 25 here `if (dat>25)` to a lower value), the LED will be turned on, and the buzzer will ring.
