

Part number : FK-FA1419

Product name : VOICE AND SPEAKER SHIELD

This is the experimental board for Sound Generator and Voice circuit as the fundamental controlling programming. This circuit is adaptable or is able to upgrade to the other forms of circuits such as Melody Generator, Voice Controller.

Specification

- 1.Power Supply direct from Microcontroller Board.
- 2.The circuit can be used with Microcontroller Board such as Arduino UNO R3.
3. The circuit is composed of Speaker Driver circuit and Microphone circuit.
- 4.PCB dimension : 2.28"x1.34"

Circuit function

The circuit is composed of 3 sections as follow:

Section1 is Mini Speaker Driver circuit, driven by Transistor. This circuit can be connected with Buzzer Speaker or Voice Coil Speaker by choosing ant types of both speakers at the jumper of JP3. If Buzzer Speaker, jump at BZ point but if Voice Coil Speaker, jump at SP point and connect the Voice Coil Speaker at SP point. The signal connector is at the port A0.

Section2 is Microphone circuit. On the circuit's function, MIC functions as a convertor from voice signal to electric signal. IC1/1 functions as signal amplifier which has VR1 as a gain signal amplifier. The signal from IC1/1 will be sent to IC1/2 to transform the AC signal to the DC signal and the DC signal will be sent to the port of A1 of Arduino board.

Section3 is LED circuit which connected with the port of A5.

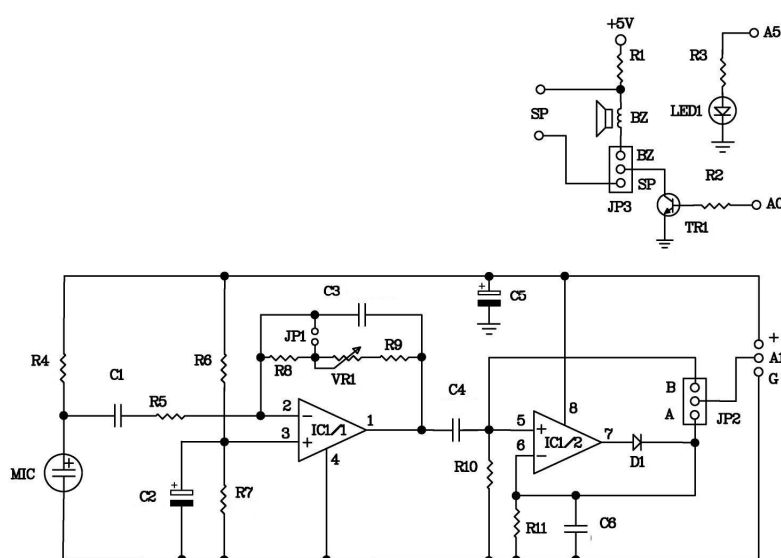


Figure 1. Circuit Diagram of FK1419

Circuit Assembling

According to Figure 2, the easy assembling should be started with putting the smallest part on the circuit which is resistor. Caution, all parts must be on the right electrodes such as LED. Please see Figure 3 for putting parts on electrodes. On the soldering, use a soldering iron max. 40 watts and tin/lead at 60/40 with flux. After assembling and soldering, re-check the positions of each part. In case some parts are on the wrong positions, use solder suction or solder wick to correct the positioning of those parts.

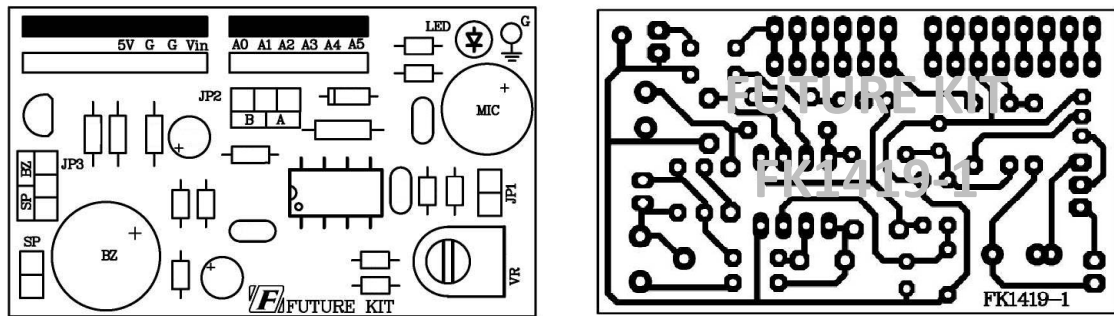


Figure 2. The positions for assembling and PCB copper line.

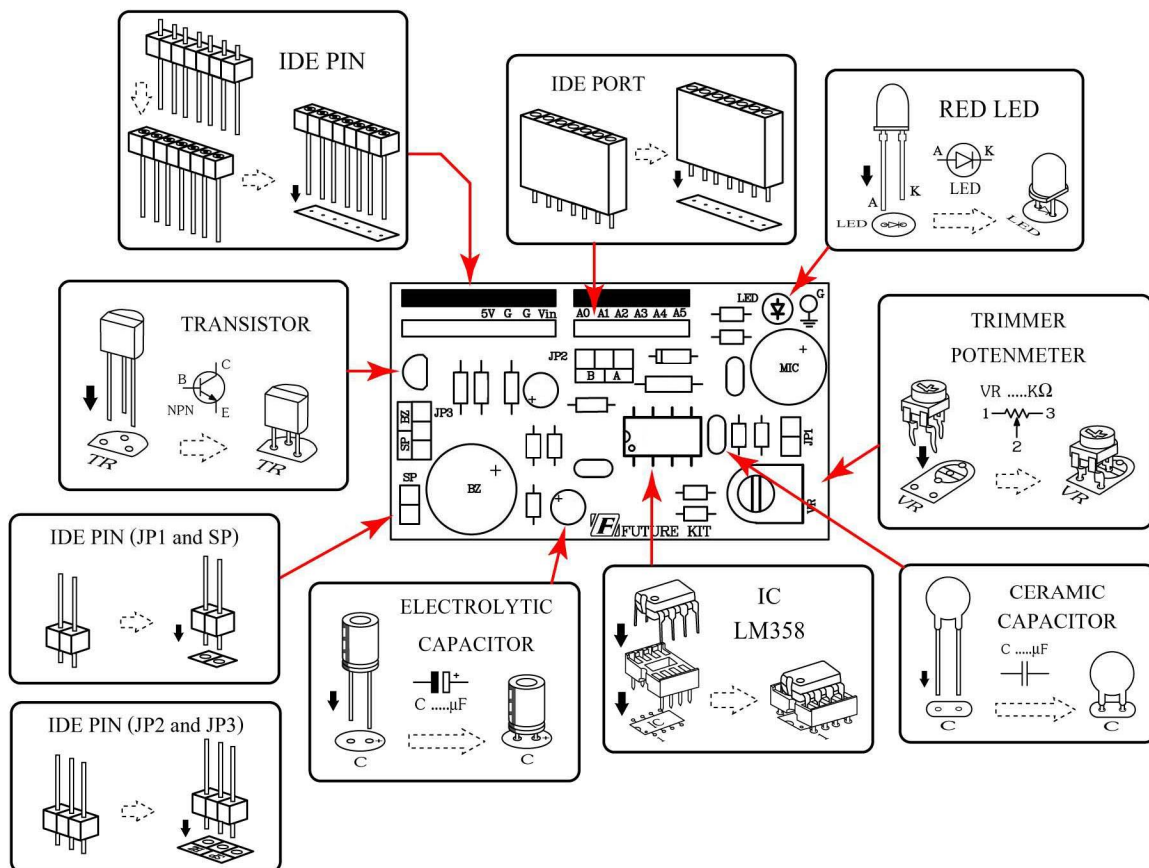


Figure 3. Positioning the parts on PCB

Programming instrument for the experimental board

1.FK-FA1419 VOICE AND SPEAKER SHIELD	1	set
2.Microcontroller Board ex. Arduino UNO R3	1	set
3.USB Cable	1	Piece
4.Computer Set	1	Set
5.Arduino Software	1	Piece

Testing Arduino UNO R3 Board

- 1.Connect USB cable with USB port of computer and USB port of Arduino UNO R3 Board.



Figure 4. Connecting USB cable with USB port of Arduino Board

- 2.Open Arduino program by double-click on Arduino icon. Go to the menu bar, click on File and choose Open. Go to the folder "EX", open the folder "TEST" and click on the file "Test".



Figure 5. Opening Arduino program

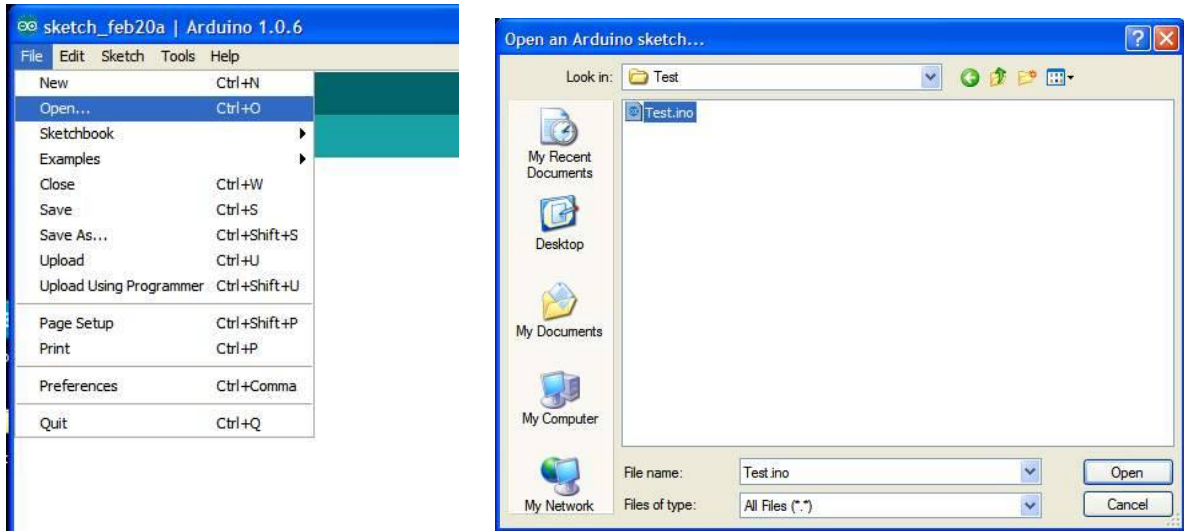


Figure 6. TEST Program

3. Download TEST program to Arduino Board.



Figure 7. Downloading TEST program

4. After downloading, the LED L on Arduino Board will blink which means Arduino board is working.



Figure 8. The position of LED L on Arduino Board circuit

The details of TEST program, Flashing Light Program, Arduino UNO R3 experiment.

```
void setup() {  
  pinMode(13, OUTPUT);    // Set the pin 13 is OUTPUT pin.  
}  
void loop() {  
  digitalWrite(13, HIGH); // LED at the pin 13 is light-on.  
  delay(1000);           // delay time 1 second  
  digitalWrite(13, LOW); // LED at the pin 13 is light-off.  
  delay(1000);          // delay time 1 second  
}
```

The method to connect the circuit with Arduino UNO R3 board

Connect FK1419 board with Arduino UNO R3 board following Figure 9.



Figure 9. Connecting FK1419 board with Arduino UNO R3 board

Programming

1. Connect Arduino UNO R3 board with experimental board by following the instruction of the method to connect the circuit with Arduino UNO R3 board. Jumping the jumper at JP3 position to BZ position.

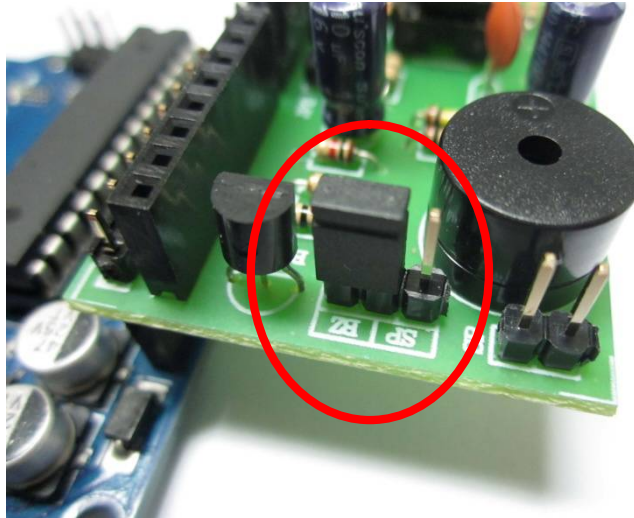


Figure 10. Jumping the jumper at JP3 position to BZ position.

2. Connect the USB cable with USB port of computer and USB port of Arduino UNO R3 board.

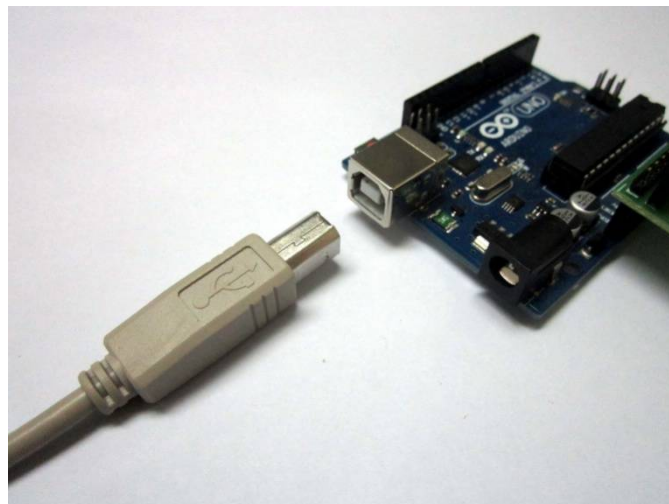


Figure 11. Wiring the USB cable

3. Double-click on Arduino icon to open Arduino program. Go to "File" in menu bar and choose "Open". Then click on folder "Ex", choose folder "FK1419", choose folder "LAB1419-1" and click on file "LAB1419-1".

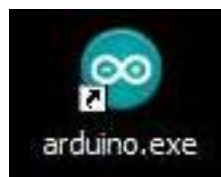


Figure 12. Opening Arduino Program

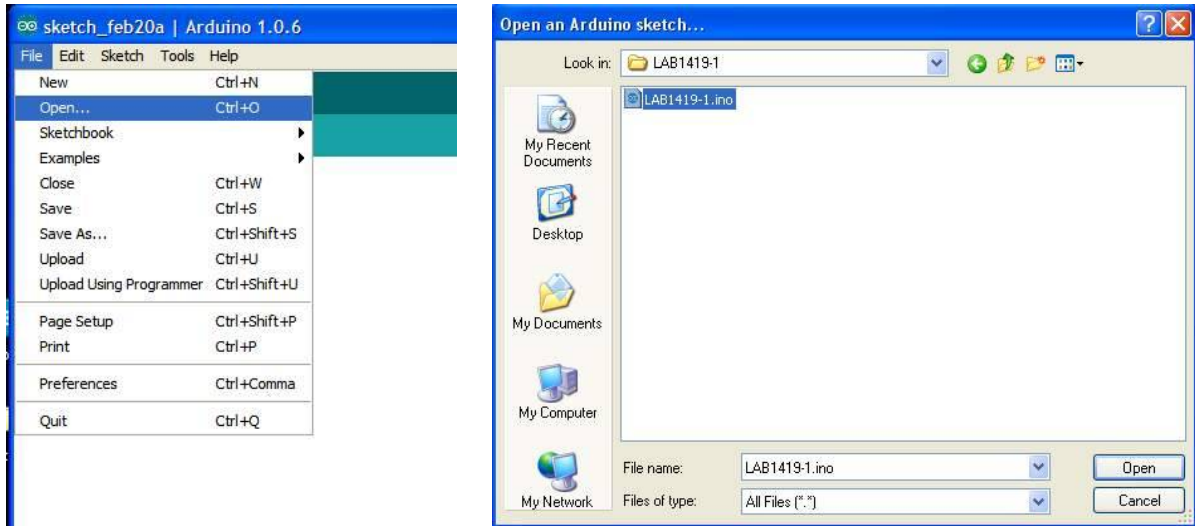


Figure 13. LAB1419-1 program

4. Download LAB1419-1 program to Arduino board. After downloading, the sound from Buzzer Speaker will ring “Beep” rhythmically which means Buzzer Speaker is functional. In case of using Voice Coil Speaker, insert the jumper at JP3 point on SP position and connect the speaker with SP position (please see Figure 15).

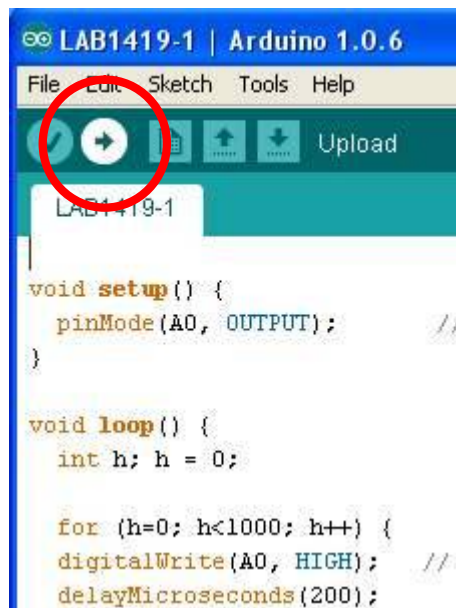


Figure 14. Downloading LAB1419-1 program

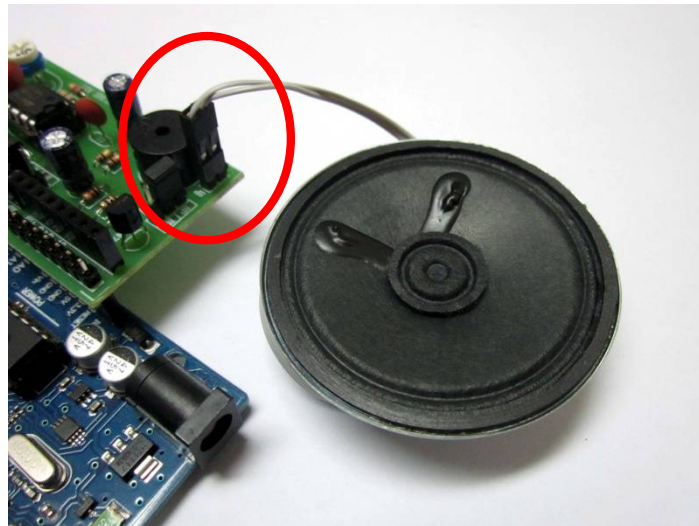


Figure 15. Connecting the voice coil speaker

5. Insert the jumper at JP2 on A position. Download LAB1419-2 program to Arduino board. After downloading, test the circuit by clapping hands or raise any sounds to the microphone, the result is the LED will be light-on for a while, then light-off.

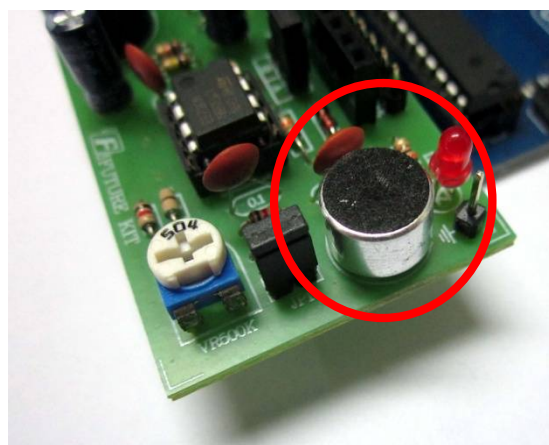


Figure 16. Condenser microphone at FK1419 board

The details of LAB1419-1 BEEP SOUND GENERATOR program

```
void setup() {  
    pinMode(A0, OUTPUT);    // Set the pin A0 is OUTPUT pin.  
}  
  
void loop() {  
    int h; h = 0;           // Set the integer "h" is zero.  
    for (h=0; h<1000; h++) { // Looping the integer "h" is 1,000 times.  
        digitalWrite(A0, HIGH); // LED at the pin A0 is High status.  
    }  
}
```



```
delayMicroseconds(200);    // delay time 200 microsecond
digitalWrite(A0, LOW);     // LED at the pin A0 is High status.
delayMicroseconds(200);    // delay time 200 microsecond
}
digitalWrite(A0, LOW);     // LED at the pin A0 is Low status.
delay(1000);               // delay time 1 second
}
```

Function of LAB1419-1 program

The program starts from setting the pin A0 to pin A3 as OUTPUT pin. Set the status of A0 pin as HIGH and LOW alternately until the sound of frequency is loud from Buzzer Speaker at 1 second and stop sounding at 1 second. When all functions are done, the program will start again.

Remark: In case we want LED ON/OFF to blink frequently, reduce the value in the parentheses by commanding “delayMicroseconds”. The unit of the digit is microsecond.

The details of LAB1419-2 MICROPHONE TEST program

```
int sensorPin = A1;
int ledPin = A5;
int sensorValue = 0;
void setup() {
  pinMode(ledPin, OUTPUT);
}
void loop() {
  sensorValue = analogRead(sensorPin);
  if (sensorValue >= 400) {
    digitalWrite(ledPin, HIGH);
    delay(2000);
  }
  digitalWrite(ledPin, LOW);
}
```

Function of LAB1419-2 program

The program starts from setting the alphabets "sensorPin" as an integer instead of the name of A1 pin, set the alphabets "ledPin" as an integer instead of the name of A5 pin and set the alphabets "sensorValue" as an integer with the value 0. Set the ledPin is an OUTPUT pin.

Read the value of sensorPin in the form of Analog. After that, replace the sensorValue with the value of sensorPin. Compare the sensorValue with the value of sensorPin if it is greater than or equal to 400. If it's greater than or equal to 400, LED will light up for 2 seconds which means the status of ledPin is HIGH. If any sounds go through microphone and the value is greater than or equal to 400 again, LED will light up.