



Sound Detector

This guide will teach you how to set up the SparkFun sound detector and change the gain of the microphone.

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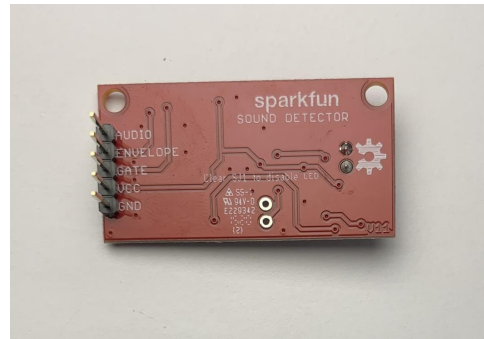
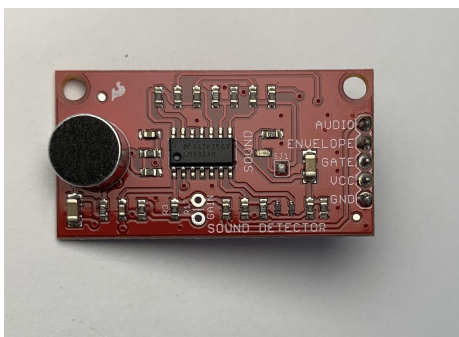
Sound Detector Basics

What Is a Sound Detector?

The SparkFun Sound Detector picks up sound with a small microphone, and has 3 outputs:

- Audio: Detects the raw audio output
- Envelope: Analog output that detects amplitude of the sound
- Gate: Binary output which detects if there is sound present or not

We will be using the Envelope output to determine if the sound is quiet, moderate, or loud, but all 3 outputs will be wired for possible future use.



Product Information/Technical Specifications

You can find product information and technical specifications at <https://www.sparkfun.com/products/12642>.

Adding a Resistor

There is no extra preparation necessary for the sound detector to function properly, but it may be necessary to solder an extra resistor onto R17 of the board to lower the gain (lowering the sensitivity of the sensor).

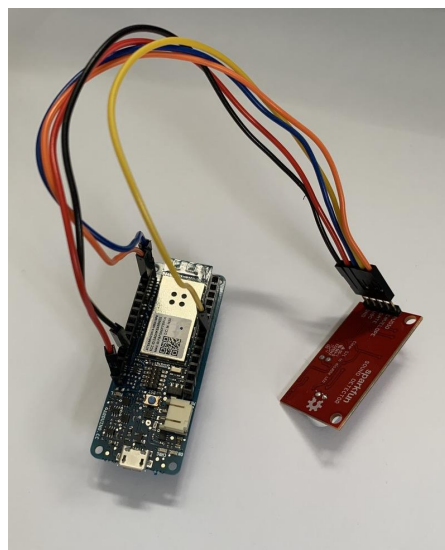
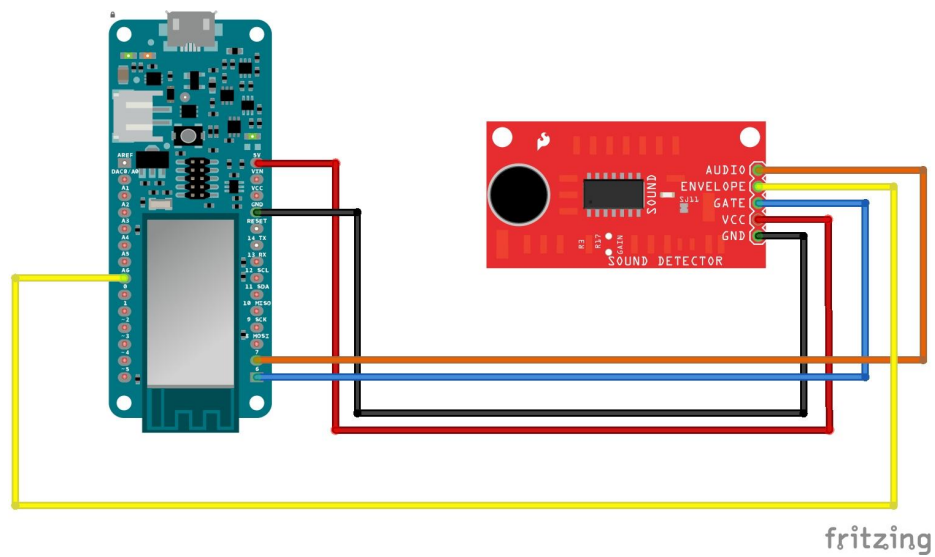
If the breakaway header pins have not already been soldered onto the sound detector, then they will need to be soldered on in order to use the board. For a How-To, refer to “*How to solder headers onto boards*” in the “**Tools and Prototyping How-To**”.

Wiring Connections

In this tutorial, we will only be using the Envelope and Gate pins, but it is shown how to wire them all.

This table shows which pins to connect between the MKR1000 and the Sound Detector.

MKR1000 WiFi Microcontroller	Sound Detector
5V	VCC
GND	GND
6 (pin6)	GATE
A6 (analog pin6)	ENVELOPE
7 (pin7)	AUDIO



Setting Up the Sound Detector

Instructions

1. Open the Arduino IDE
2. Delete the pre-existing text so you have a blank IDE
3. Copy and Paste this code into the IDE:

```
/*
*****
***
* sound_detector_demo.ino
* Sound detector sample sketch
* Byron Jacquot @ SparkFun Electronics
* February 19, 2014
* https://github.com/sparkfun/Sound_Detector
*
* Distributed as-is; no warranty is given.
*****
***
*/

// Define hardware connections
#define PIN_GATE_IN 6
#define IRQ_GATE_IN 0
#define PIN_LED_OUT 6
#define PIN_ANALOG_IN A6

// soundISR()
// This function is installed as an interrupt service routine for the pin
// change interrupt. When digital input 2 changes state, this routine
// is called.
// It queries the state of that pin, and sets the onboard LED to reflect
// that
// pin's state.
void soundISR()
{
    int pin_val;

    pin_val = digitalRead(PIN_GATE_IN);
    digitalWrite(PIN_LED_OUT, pin_val);
}
```

```

}

void setup()
{
  Serial.begin(9600);
  // Configure LED pin as output
  pinMode(PIN_LED_OUT, OUTPUT);
  // configure input to interrupt
  pinMode(PIN_GATE_IN, INPUT);
  attachInterrupt(IRQ_GATE_IN, soundISR, CHANGE);
  // Display status
  Serial.println("Initialized");
}

void loop()
{
  int value;
  // Check the envelope input
  value = analogRead(PIN_ANALOG_IN);
  // Convert envelope value into a message
  Serial.print("Status: ");
  if(value <= 10)
  {
    Serial.println("Quiet.");
  }
  else if( (value > 10) && ( value <= 30) )
  {
    Serial.println("Moderate.");
  }
  else if(value > 30)
  {
    Serial.println("Loud.");
  }

  // pause for 1 second
  delay(1000);
}

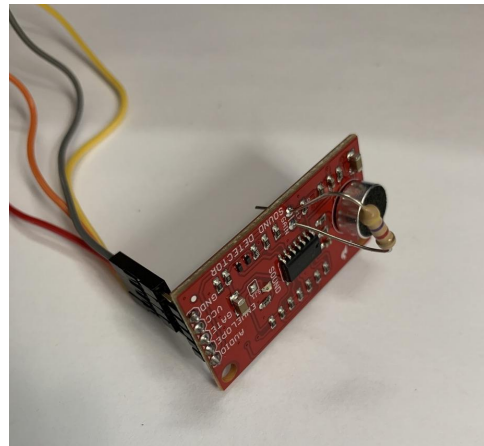
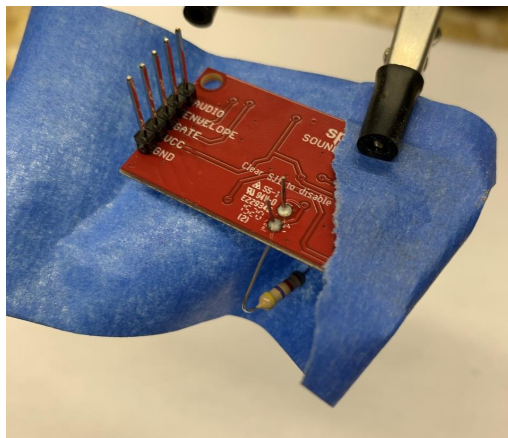
```

4. Plug the MKR1000 into the computer
5. Upload the program

6. Open the Serial Monitor
7. The Serial Monitor should read:

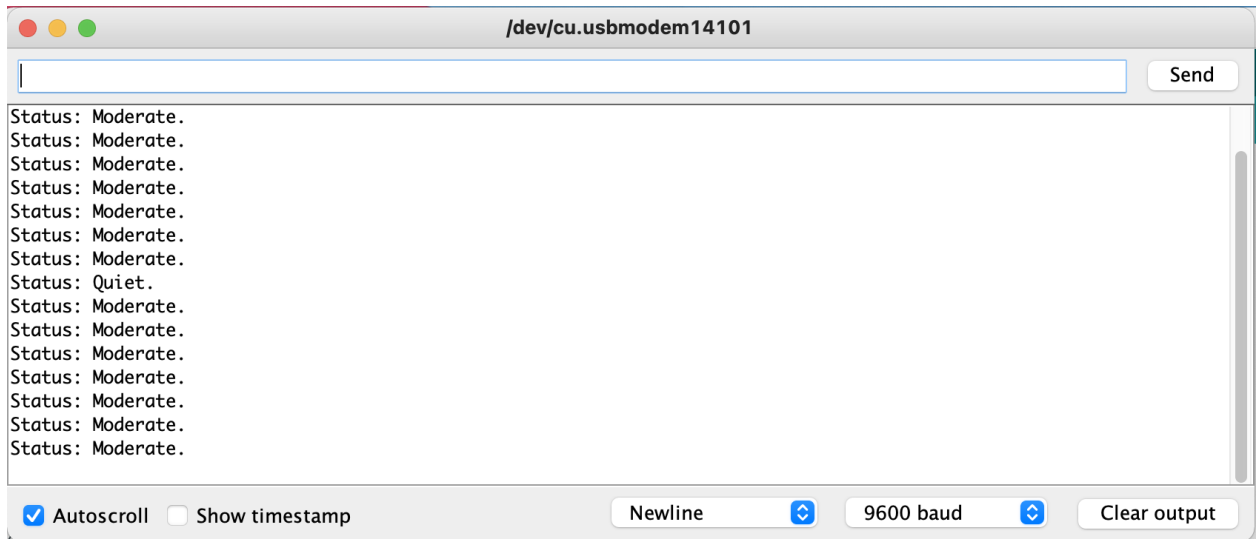


8. To lower the gain (make the detector less sensitive), solder a resistor into the R17 spot on the board. (4.7K ohm resistor used)



R3 Value	R17 Value	Arithmetic Gain	Gain (dB)
100K	-	100	40
100K	100K	50	33
100K	47K	32	30
100K	22K	18	25
100K	10K	9	19
100K	4.7K	4	13
100K	2.2K	2	6

9. With the gain lowered, the status will show more quiet and moderate sounds now.



Troubleshooting

If there are any errors displayed in the serial monitor, double check the connections of all the jumper cables, and that the pins are properly defined in the code.

Alternative Guide

You can find alternative instructions at <https://learn.sparkfun.com/tutorials/sound-detector-hookup-guide/all>.