

Tone Melody 2

<http://arduino.cc/en/Tutorial/Melody>

This example uses a piezo speaker to play melodies. It sends a square wave of the appropriate frequency to the piezo, generating the corresponding tone.

The calculation of the tones is made following the mathematical operation:

$$\text{timeHigh} = \text{period} / 2 = 1 / (2 * \text{toneFrequency})$$

where the different tones are described as in the table:

note	frequency	period	timeHigh
c	261 Hz	3830	1915
d	294 Hz	3400	1700
e	329 Hz	3038	1519
f	349 Hz	2864	1432
g	392 Hz	2550	1275
a	440 Hz	2272	1136
b	493 Hz	2028	1014
C	523 Hz	1912	956

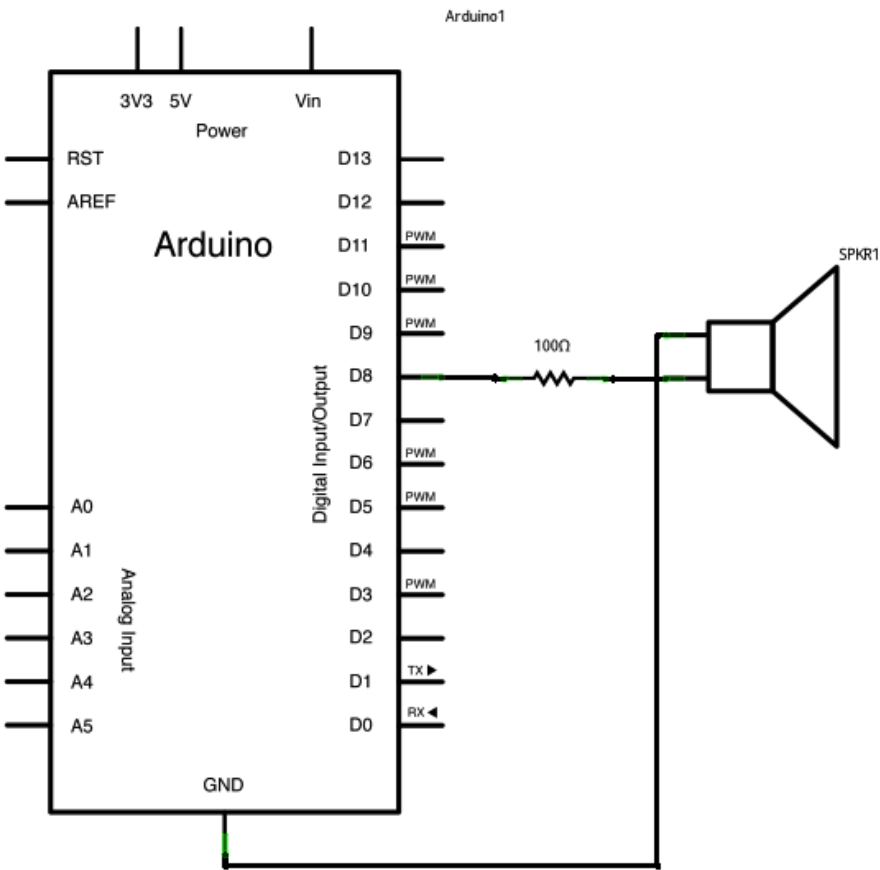
HARDWARE REQUIRED

Arduino Board
Breadboard
(1) Piezo Buzzer
(1) 100 ohm resistor

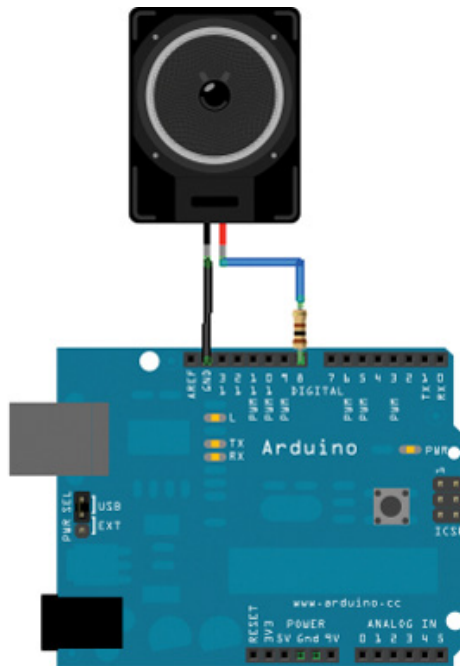
CIRCUIT

Piezos have polarity. Commercial devices are usually have a red (positive) and a black (negative). Connect the red wire digital pin 9 and the black wire to ground. Sometimes it is possible to acquire Piezo elements without a plastic housing, then they will just look like a metallic disc.

SCHEMATIC



IMAGE



CODE

```
int speakerPin = 9;

int length = 15; // the number of notes
char notes[] = "ccggaagffeeddc "; // a space represents a rest
int beats[] = { 1, 1, 1, 1, 1, 1, 1, 2, 1, 1, 1, 1, 1, 1, 2, 4 };
int tempo = 300;

void playTone(int tone, int duration) {
  for (long i = 0; i < duration * 1000L; i += tone * 2) {
    digitalWrite(speakerPin, HIGH);
    delayMicroseconds(tone);
    digitalWrite(speakerPin, LOW);
    delayMicroseconds(tone);
  }
}

void playNote(char note, int duration) {
  char names[] = { 'c', 'd', 'e', 'f', 'g', 'a', 'b', 'C' };
  int tones[] = { 1915, 1700, 1519, 1432, 1275, 1136, 1014, 956 };
  // play the tone corresponding to the note name
  for (int i = 0; i < 8; i++) {
    if (names[i] == note) {
      playTone(tones[i], duration);
    }
  }
}

void setup() {
  pinMode(speakerPin, OUTPUT);
}

void loop() {
  for (int i = 0; i < length; i++) {
    if (notes[i] == ' ') {
      delay(beats[i] * tempo); // rest
    } else {
      playNote(notes[i], beats[i] * tempo);
    }

    // pause between notes
    delay(tempo / 2);
  }
}
```

/*
Melody

Plays a melody

circuit:
* 8-ohm speaker on digital pin 8

created 21 Jan 2010
modified 30 Aug 2011
by Tom Igoe

This example code is in the public domain.

<http://arduino.cc/en/Tutorial/Tone>

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