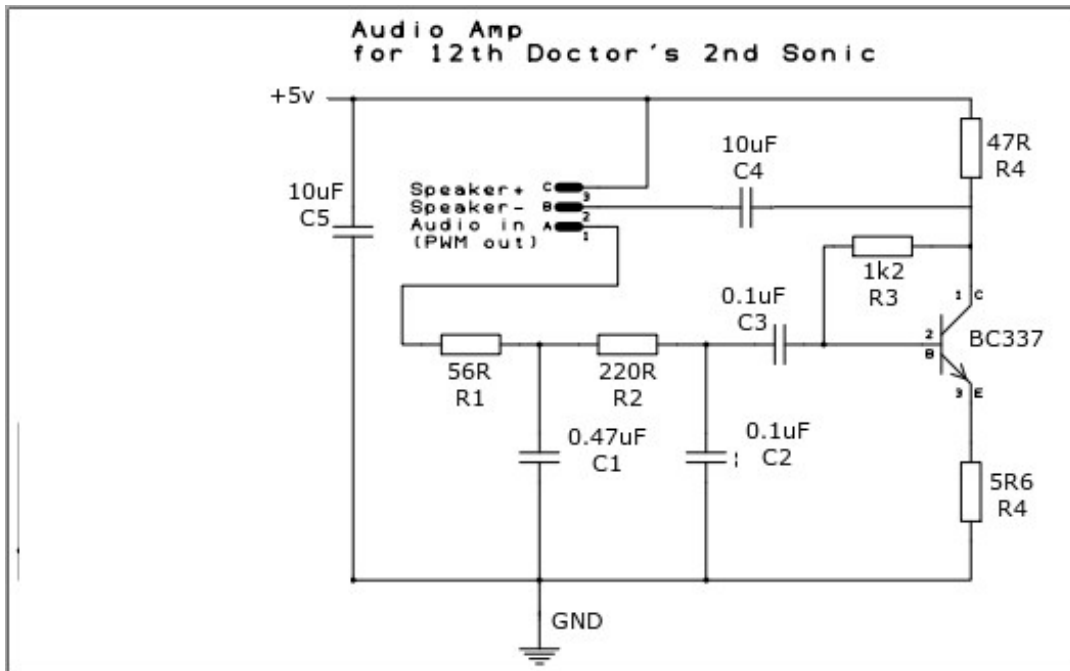


## 12<sup>th</sup> Doctor's Sonic

new code: March 2026 – for use with LSM9DS1 gyro/accelerometer

Notes:

Audio PWM output is on D9 to a simple amplifier driving a tiny loudspeaker:



RGB Neopixel LEDs are driven from pin D4

I used an Adafruit LSM9DS1 breakout board to test this.

This board is 5v compatible (the old Flora LSM9DS0 board was 3v only)  
and has a 10k pull-up for the I2C lines

I drive it using I2C:

LSM9DS1 board	Arduino Nano / Pro mini
SDA	A4 (PC4/SDA pin)
SCL	A5 (PC5/SCL pin)
VIN	5V or VCC
G or GND	GND

Battery ~ 7.4v should be connected to VIN on Arduino Nano or RAW on the Pro Mini

Accelerometer should be aligned with axes as follows: (see pic on next page)

X axis pointing forwards

Y axis pointing downward

Z axis pointing to the right

## Sonic modes:

### Startup mode:

Twinkles all LEDs blue, generates sonic sound  
rotating left/right changes the 'pulse rate' slower and faster  
tilting up/down changed the frequency.

### Gestures:

Twist/flick left:        change LED pattern  
Twist/flick right:      change sound mode  
Thrust forwards:        resets to startup mode;

### LED modes:

0        =        Startup mode, pulsing Blue  
1        =        Green  
2        =        Red  
3        =        Rainbow

### Sound modes:

1        =        Startup mode, modulated Sonic sound  
2        =        Play Dr.Who theme tune  
3        =        Plays a recorded Sonic sound  
4        =        Plays a different recorded sonic sound  
5        =        Compass mode – highest pitch is North  
LED's change colour based on direction (Red is North)  
NOTE: only Thrust forwards will exit this mode !!

Note: using the startup 'modulated Sonic Sound' you can flick left to change colours without changing the sound generation.

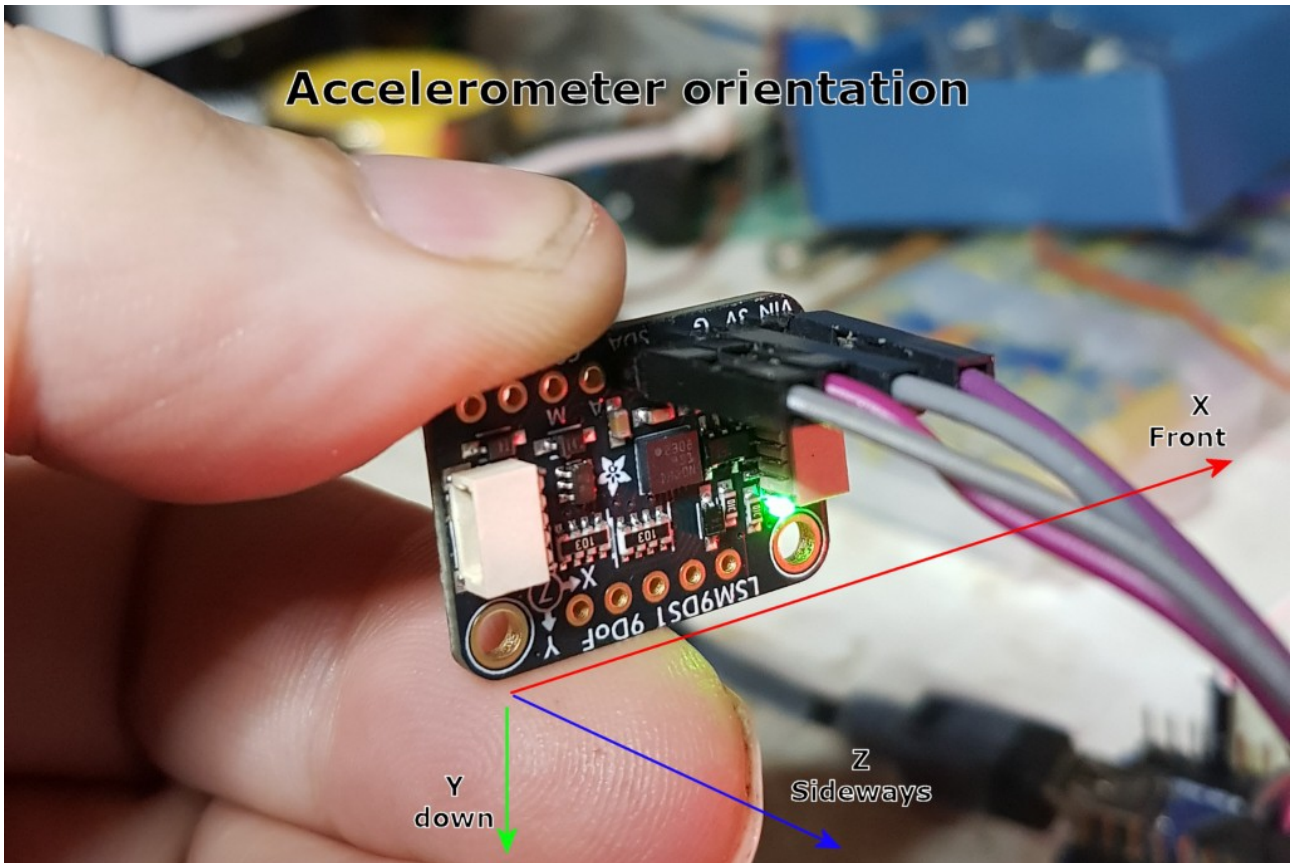
### Compass mode:

If you've ever has to calibrate ther compass on a drone or on some mobile phone app, this will be pretty obvious:

After switch-on and selecting Compass mode, the software has to try and auto-calibrate the compass before the sound and LED's start to make some sense: Slowly rotate the sonic horizontally and vertically and the sound should become more consistent and based on direction – hold the sonic level and more round in a circle, the highest pitch should be northwards.

If you move it near an actual magnet, it will respond nicely – **BUT** it will lose the sensitivity to be a compass and just respond to magnets. Turn the sonic off/on to reset this.

## Accelerometer orientation



LSM9DS1 with  
Arduino Nano used to  
check out the new software

