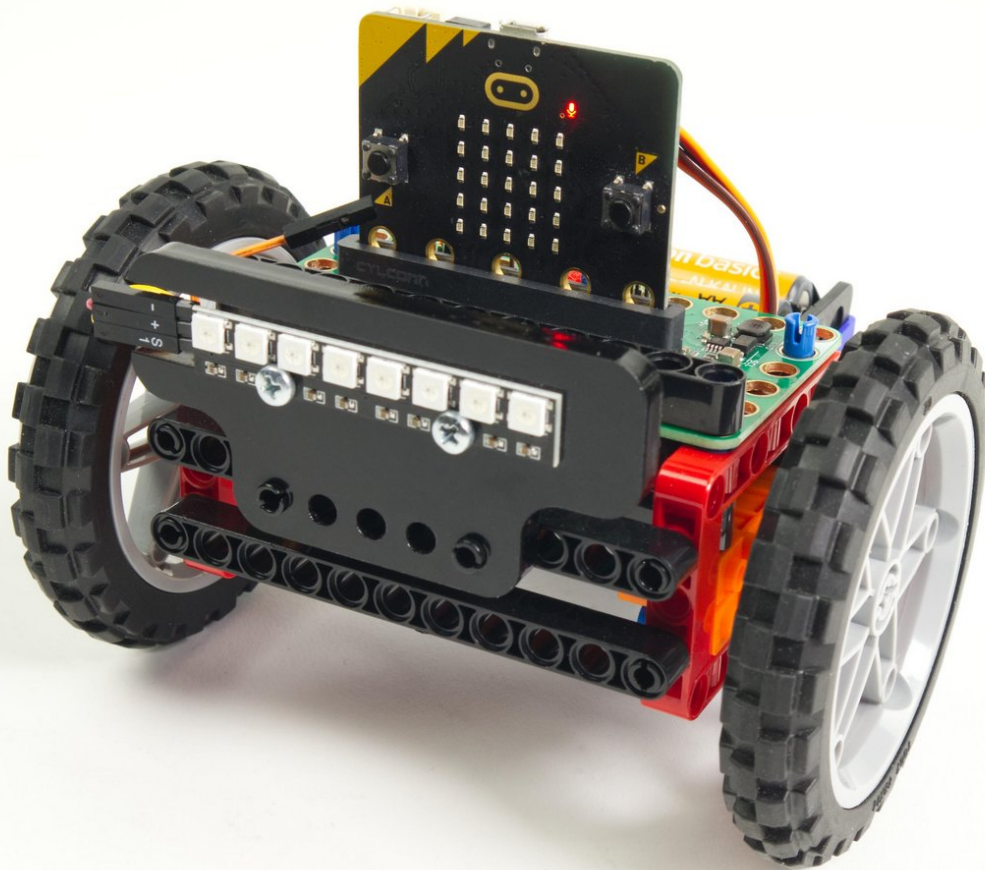




# Rover - Sound Activated (with NeoPixels)

Add NeoPixels to your Sound Activated Rover to provide visual feedback of the sound levels.

Written By: Pete Prodoehl



# INTRODUCTION

Add NeoPixels to your [Sound Activated Rover](#) to provide visual feedback of the sound levels.



## TOOLS:

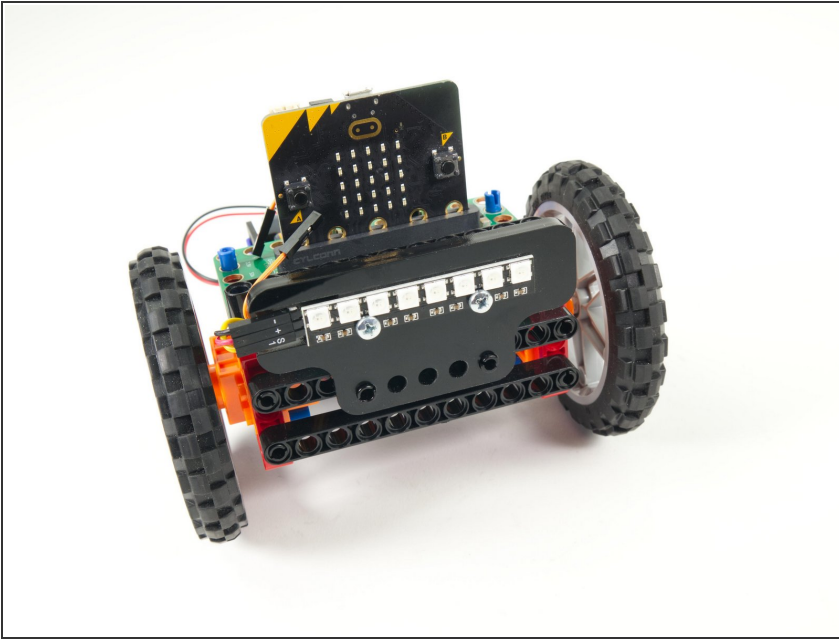
- [Computer](#) (1)



## PARTS:

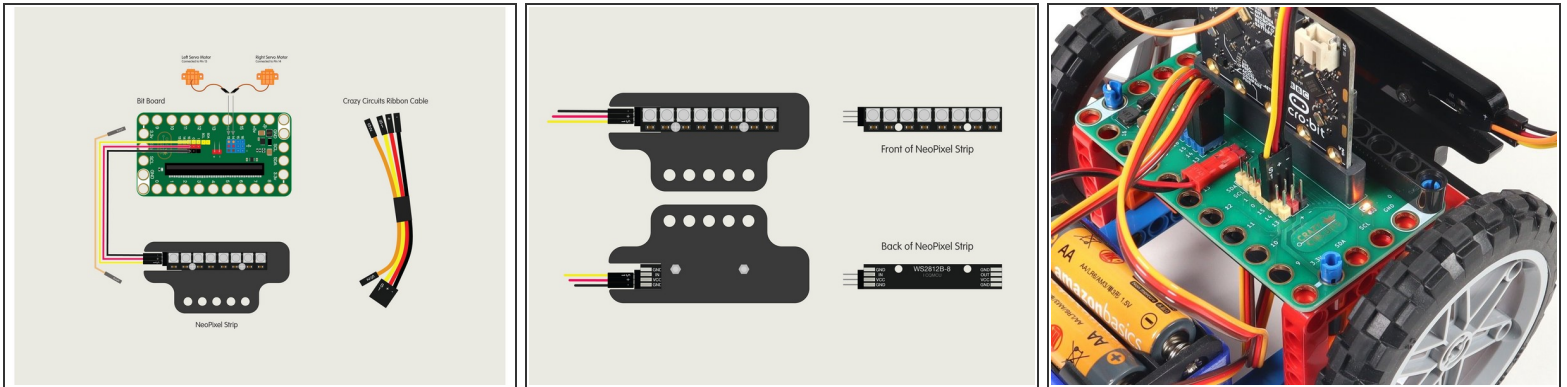
- [Bit Board Rover Kit](#) (1)

## Step 1 — Prepare Your Rover



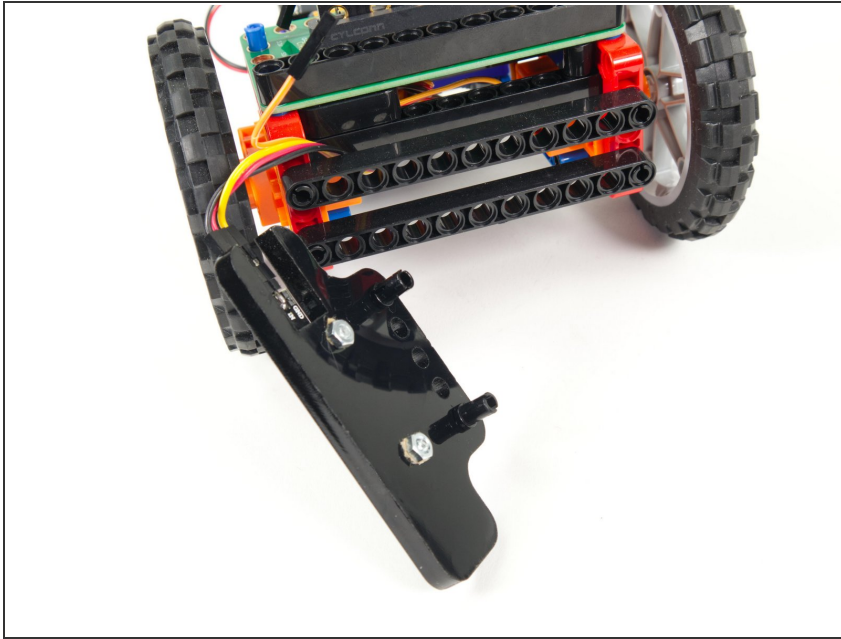
- This guide assumes you've already built the [Sound Activated Rover](#). **If you haven't you'll need to do that first.**
- We're going to add the [NeoPixel Addressable RGB LED Strip](#) to the front of the Rover to get a visual display of the sound level the micro:bit will use to activate the Rover.

## Step 2 — Add NeoPixels



- ✦ Since your Rover is already built and working, the Servos are already plugged into the Blue Pins (13 and 14) on the **Bit Board**, so we just need to add the **NeoPixels**.
- So let's get connected! If you turn the **NeoPixel Strip** over you'll see labels for the three pins. You should see **IN**, **VCC**, and **GND**.
- Use the [Crazy Circuits Ribbon Cable](#) to connect the **NeoPixel Strip** to the **Bit Board**.
- The end with **S1**, **+**, and **-** can plug directly into the **Pin 15** row (make sure **S1** goes into **15**) and the other end should plug into the **NeoPixel Strip** as shown.
- We only need three wires for the **NeoPixel Strip** so you can leave **S2** (the Orange wire) unconnected.

### Step 3 — Attach NeoPixels to Rover



- Use two pins to connect the NeoPixel Strip to the front of the Rover.

## Step 4 — Load the Code



⚠ If you've never used a micro:bit before you'll want to check out this guide: [Bit Board V2 Setup and Use](https://makecode.microbit.org/_F6990MMYg...)

- We're going to load the following code for our **Rover Sound Detecting NeoPixels** program: [https://makecode.microbit.org/\\_F6990MMYg...](https://makecode.microbit.org/_F6990MMYg...)
- When you power on the Rover **it will start moving** *while* it runs a calibration routine to check for sound levels. (We'll cover the calibration in **Step 5**.)
- Once the calibration is done the Rover will sit there waiting for the sound levels to go above the threshold that was set in the calibration routine...

## Step 5 — Calibration

```

function calibrate
  play tone Middle B for 1/2 beat
  pause (ms) 1000
  set padding to 35
  set samples to 10
  repeat samples times
    do
      set soundCalAll to soundCalAll + sound level
      call goBackward 1
      show icon
      pause (ms) 50
      clear screen
      pause (ms) 50
  set soundCal to soundCalAll / samples + padding
  play tone High B for 1 beat
  
```

```

on button A pressed
  set soundCal to 0
  set soundCalAll to 0
  call calibrate

on button B pressed
  call stopMoving 1000
  
```

⚠ Make sure to see the **note** at the bottom of this step.

- We need to calibrate the sound levels in the room before the micro:bit can tell if there is a sound.
- The sound level can be anywhere between **0 and 255**. (0 is very quiet and 255 is very loud.)
- Our code takes 10 readings (with a slight pause between each reading) adds them all together and then divides by the number of samples (10 in this case) to get our final value.
- Calibration routines often use this **sampling** technique where a number of values are captured and then the *average* of them is used.
- Once we've calculated our ambient sound level we pad the number a bit to prevent false triggering. We used **35** for our pad value in this example but you can experiment with lower (or higher) values.
- ☑ The calibration runs automatically when you power on the Rover but you can also run it by pressing the **A Button** on the micro:bit if you need to recalibrate.

⚠ **Note:** The Rover needs to move (or at least spin the wheels) when it calibrates! This is because **the motors make noise**, and we need to take that sound into account when doing the calibration.

## Step 6 — Test it Out!



- Power on the Rover, and either set it down so it can roll, or hold it in your hand so the wheels can spin freely.
- Do your best to be quiet and wait for the calibration to complete. Once the heart stops flashing on the micro:bit and you hear a second beep, the calibration should be done.
- The Rover should be still when the room is quiet, so... Make some noise! Clap, yell, laugh... See if you can get the Rover moving.
- You can make the Rover stop by being quiet. (Shhh!)