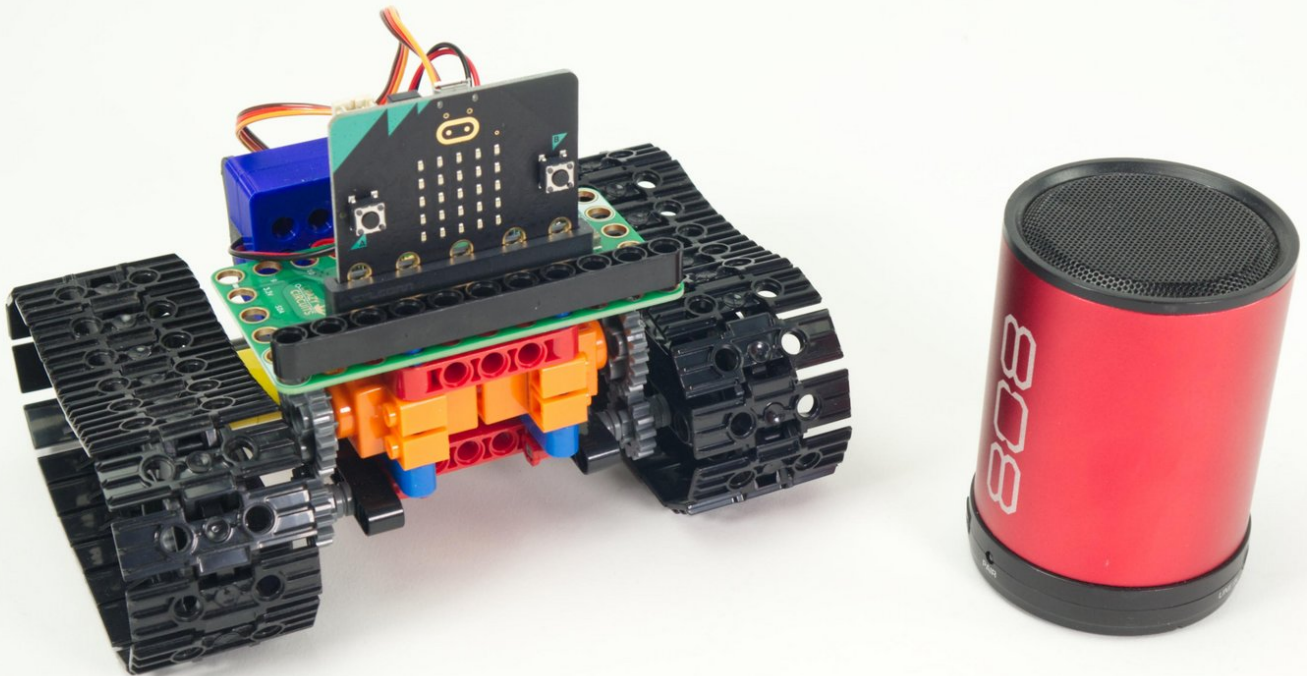




Tank - Sound Activated

Make your Tank move when it hears a sound! Get the whole class to applaud and watch the Tank roll away.

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INTRODUCTION

The Bit Board Tank can take advantage of the built-in sensors found on the micro:bit, and we can use microphone to "remotely control" the Tank so it moves when it detects sound.

You might also want to check out our [Tank - Light Activated](#) guide which lets you control your Tank with a flashlight.



TOOLS:

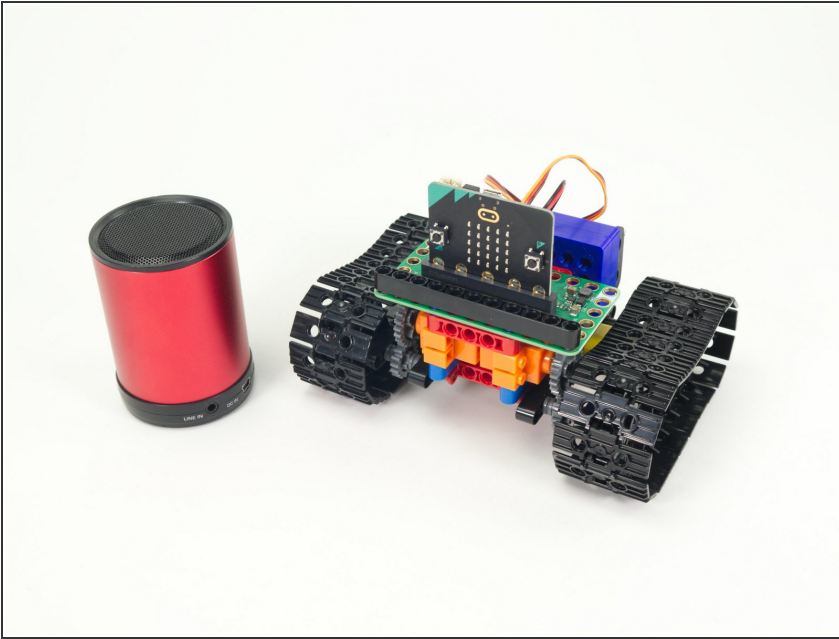
- [Computer](#) (1)



PARTS:

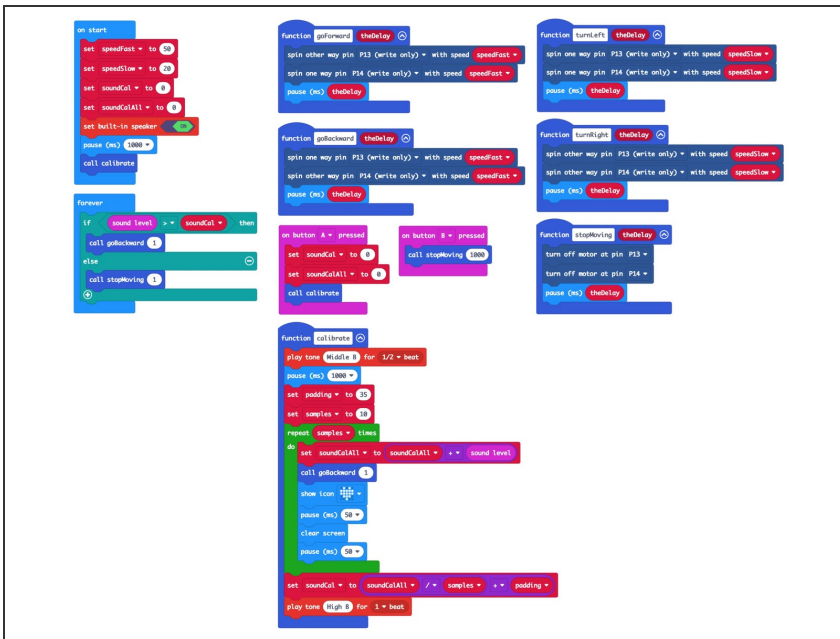
- [Bit Board Rover Kit](#) (1)

Step 1 — Prepare Your Tank



- For this guide you'll need a completed [Tank Main Body](#).
 - You'll also need something to make sound! It could be your own voice, or a classroom full of clapping students.
 - You can also use a speaker playing a sound. (A Bluetooth speaker connected to a mobile phone or tablet works great.)
- ★ Our [Sensor Showcase](#) covers using the sensors built in to the micro:bit. The microphone is covered in [Step 11](#).

Step 2 — 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/_VbuMij5FX...)

- We're going to load the following code for our **Tank Sound Detecting Simple** program:
https://makecode.microbit.org/_VbuMij5FX...
- Note: This version of the code is a great starting point for this project. If you want to take it further examine the code for the [Tank - Light Detecting Turner](#) and consider using it for a starting point.
- When you power on the Tank **it will start moving** *while* it runs a calibration routine to check for sound levels. (We'll cover the calibration in **Step 3**.)
- Once the calibration is done the Tank will sit there waiting for the sound levels to go above the threshold that was set in the calibration routine...

Step 3 — 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

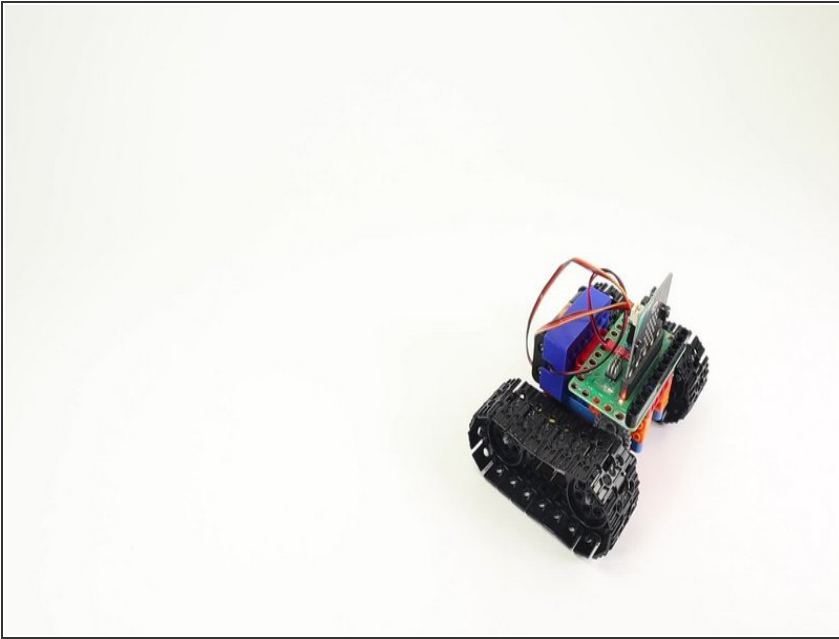
on button B pressed
  call stopMoving 1000
  
```

⚠ 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 Tank but you can also run it by pressing the **A** Button on the micro:bit if you need to recalibrate.

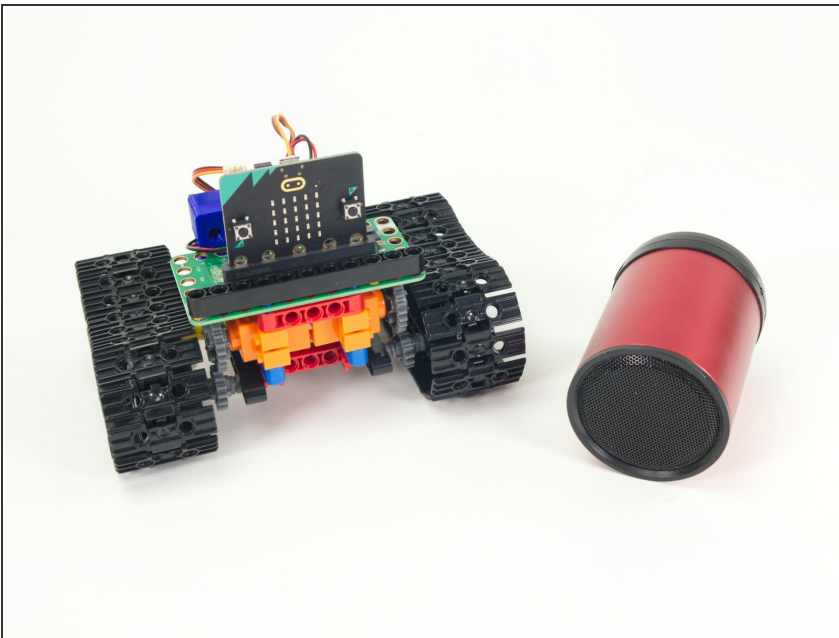
⚠ **Note:** The Tank needs to move when it calibrates! This is because **the motors make noise**, and we need to take that sound into account when doing the calibration. The Tank's tracks can be a bit noisier than the Rover wheels.

Step 4 — Test it Out!



- Power on the Tank, and either set it down so it can roll, or hold it in your hand so the treads can move 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 Tank should be still when the room is quiet, so... Make some noise! Clap, yell, laugh... See if you can get the Tank moving.
- You can make the Tank stop by being quiet. (Shhh!)

Step 5 — Take it Further



- The code provided should serve as a starting point for your own ideas about how the Tank can react to sound.
- You could program a sequence of movements and then try to control them by making sounds.

