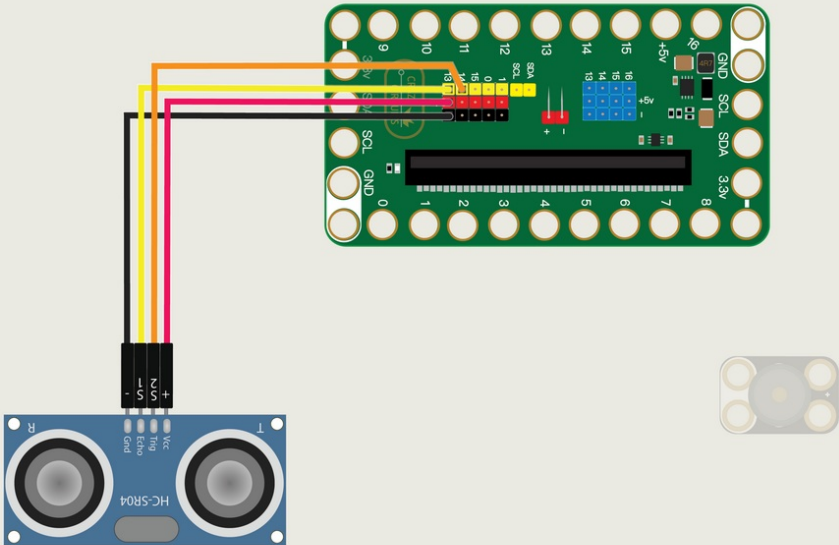




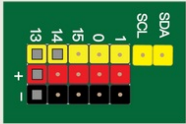
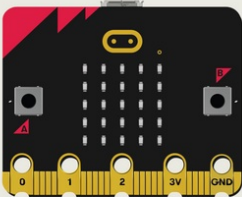
CH39-D - Distance Piezo Theremin

Connect a Distance Sensor to a Bit Board and use it to control the output of a Piezo Speaker.

Written By: Pete Prodoehl



DIST	Bit Board
VCC	-> + (Positive) Pin
TRIG	-> PIN 14 (S2)
ECHO	-> PIN 13 (S1)
GND	-> - (Negative) Pin

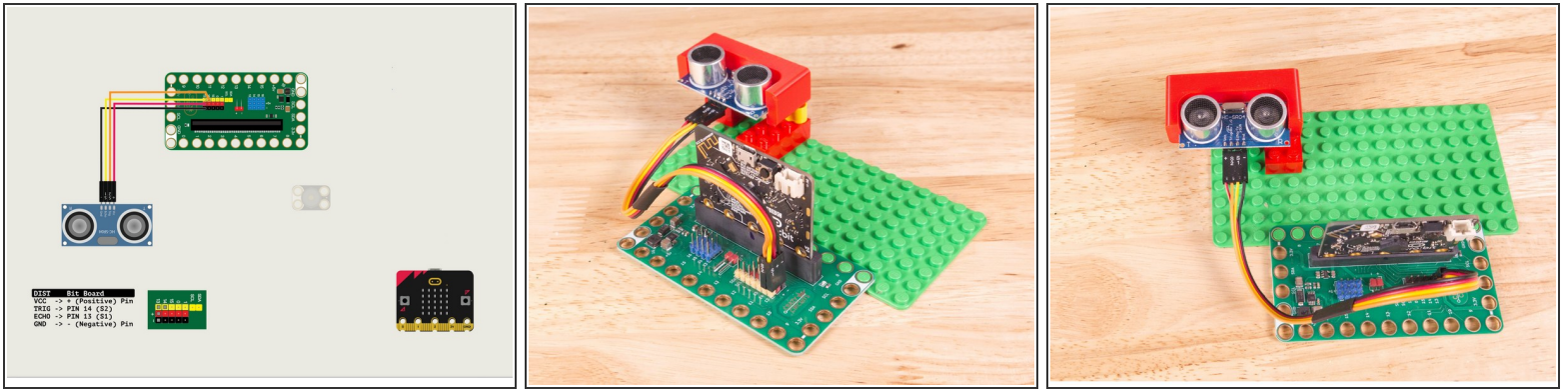


INTRODUCTION

Connect a Distance Sensor to a Bit Board and use it to control the output of a Piezo Speaker.

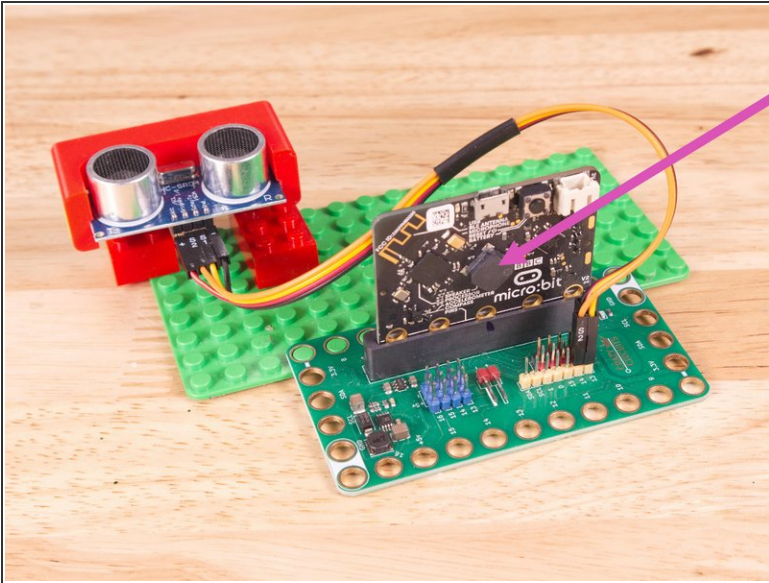
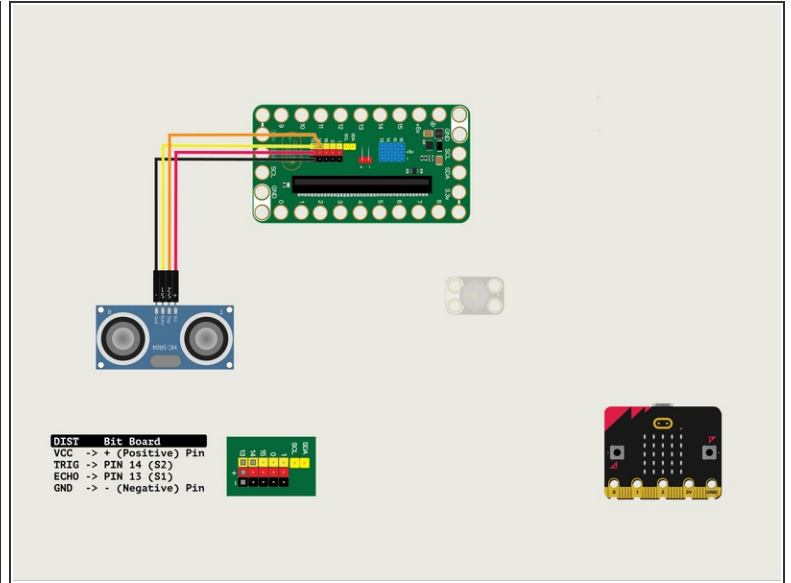
<div> TOOLS:</div> <div><ul style="list-style-type: none">• Computer (1)</div>	<div><div></div> PARTS:</div> <div><ul style="list-style-type: none">• Crazy Circuits Bit Board (1)• micro:bit (1)• Crazy Circuits Ribbon Cable (1)• Distance Sensor (1)• Crazy Circuits Piezo Speaker Chip (1)<div>(Optional)</div></div>
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Step 1 — Connect the Distance Sensor



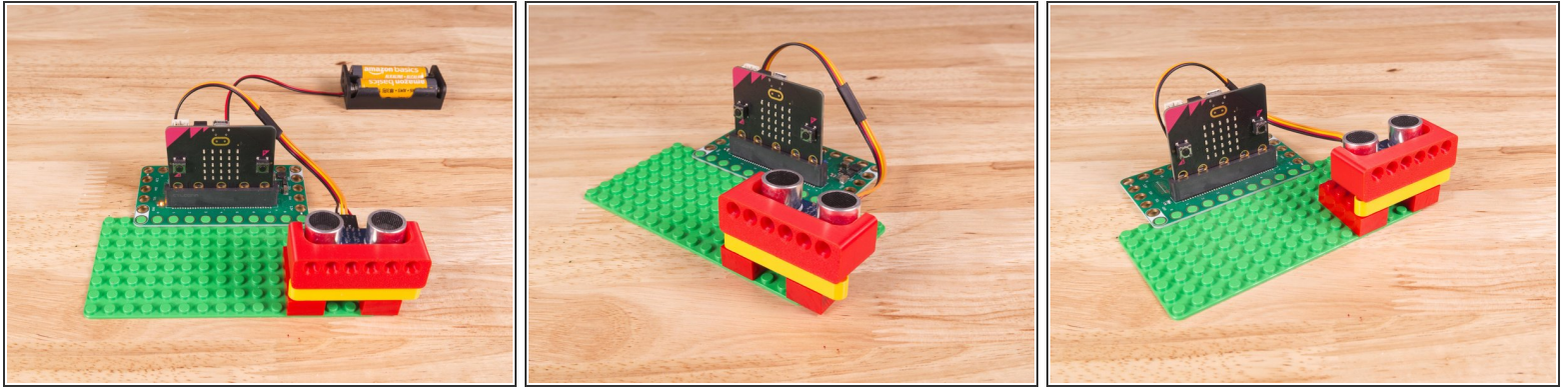
- We'll connect the **Distance Sensor** with a **Crazy Circuits Ribbon Cable** using all four wires.
- Plug the three-wire connector of the **Crazy Circuits Ribbon Cable** into the row with **Pin 13** on the Bit Board. The wire colors should match the pin header colors, with **S1** (yellow) going to the yellow pin.
- Next, plug **S2** (orange) into **Pin 14**. *(S2 is separated from the three-wire connector to allow you to plug it into another row.)*
- To the Distance Sensor plug **+** (red) into **VCC**; **S2** (orange) into **TRIG**; **S1** (yellow) into **ECHO**; and **-** (black) into **GND**.

Step 2 — Connect the Piezo (Optional)



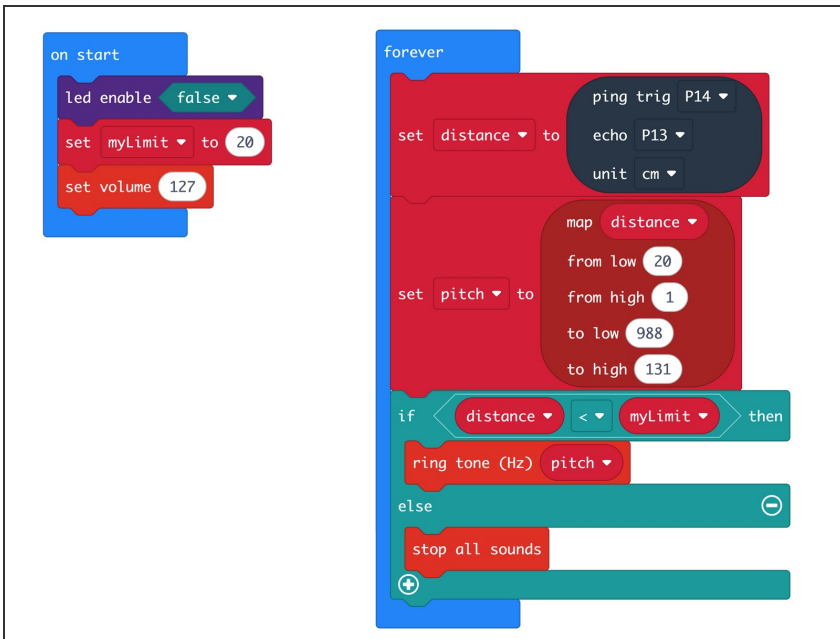
- For this guide we'll use the **built-in** piezo speaker found on the micro:bit V2.
- ☑ If you prefer to connect a Crazy Circuits Piezo Speaker take a look at [Chapter 13](#) for notes on connecting one and adding code to use it.

Step 3 — Mounting the Sensor



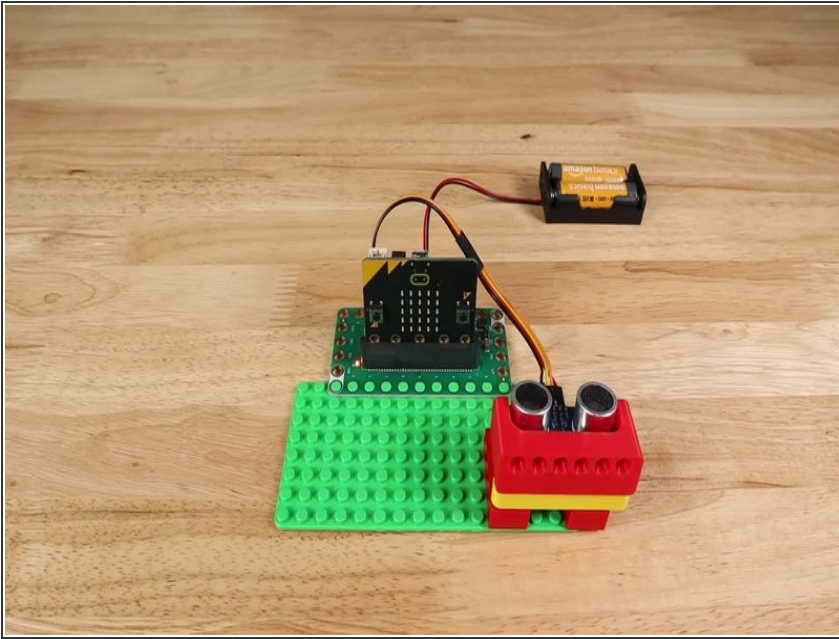
- We used a 3D printed part we designed to hold the Distance Sensor in place on the LEGO baseplate.
- A few Technic pins, a Technic beam, and some LEGO bricks are all that is needed.
- Alternately you can use some LEGO bricks and a rubber band or tape to hold the sensor in place. *(But don't use anything conductive!)*
- 3D print your own [Distance Sensor Holder with Holes](#).

Step 4 — Load the Code



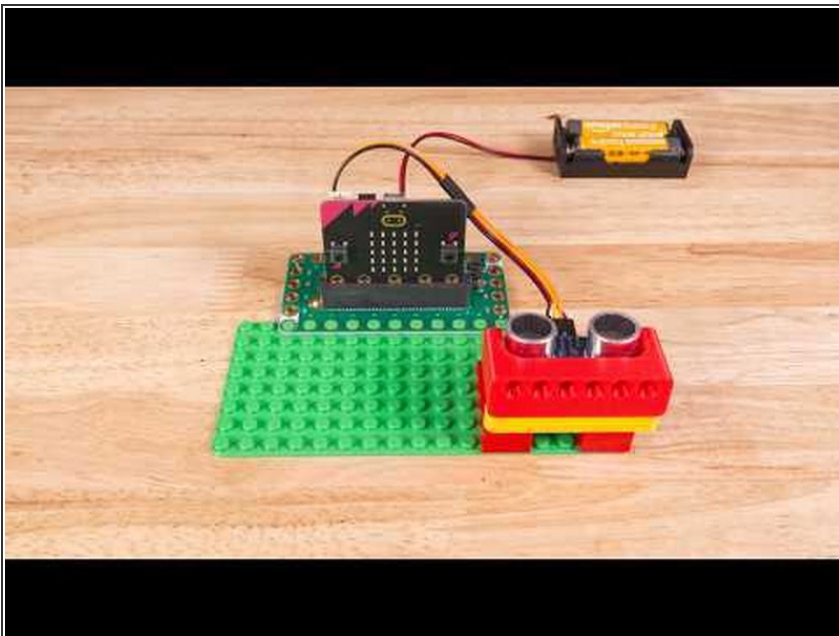
- If you've never used a micro:bit before you'll want to check out this guide: [Bit Board V2 Setup and Use](#)
- We're going to load the following code for our **Distance Piezo Theremin** program:
https://makecode.microbit.org/_3y9Fhz9ss...
- In the on start block we'll disable the LED matrix, set **myLimit** to 20, and set the **volume** to 127 (out of 255).
- In our forever loop we'll read the distance sensor and assign the value to a variable named **distance**.
- We'll then use map function to take the value of **distance** and map it from a scale of 20 to 1 onto a scale of 988 to 131, then assign that to a variable named **pitch**.
- In the **if/then** block we'll check if distance is less than **myLimit** and if so, play the sound at the pitch which we've calculated based on the distance of an object from the sensor.

Step 5 — Test it Out!



- Once the code is loaded it should start running immediately.
- ❗ You can power the micro:bit via the USB cable you used to load the code or you can use a battery pack plugged into the Bit Board.
- Move your hand (or a flat object) close to the sensor. If the object is less than 20cm away the piezo will play a sound and the pitch will change based on the distance of the object.
- Congratulations! You now have a low-tech theremin!

Step 6 — Follow Along



- Follow along with our recorded Live Stream!
- ❗ You can watch the full video of us walking through this project, along with explaining and exploring the code:
<https://youtube.com/live/8rIhboQLKSo>

