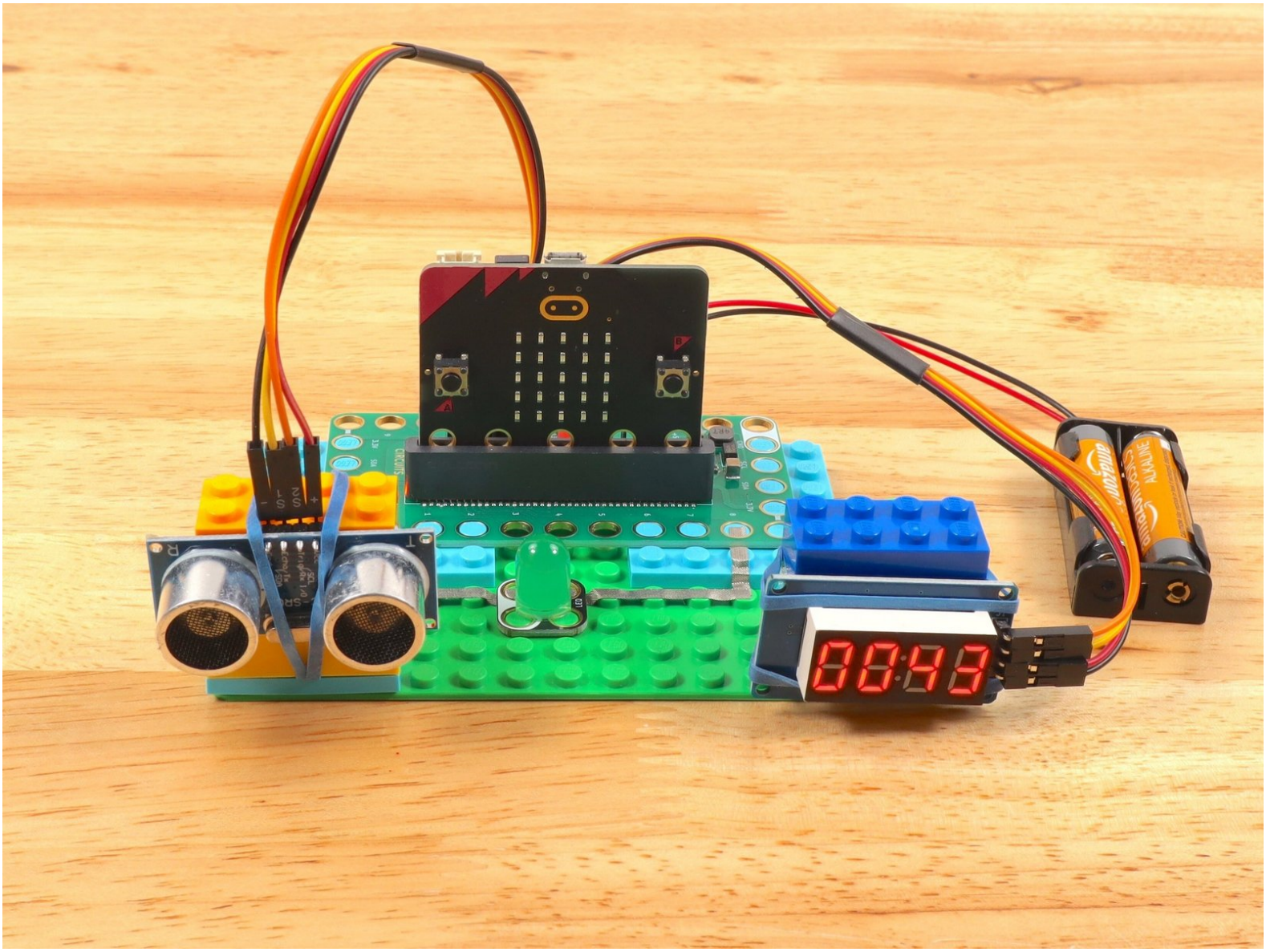
Distance Display

Use an Ultrasonic Distance Sensor and a 7 Segment Display with a micro:bit and our Bit Board to see how far away an object is.

Written By: Pete Prodoehl



INTRODUCTION

Use an Ultrasonic Distance Sensor and a 7 Segment Display with a micro:bit and our Bit Board to see how far away an object is.

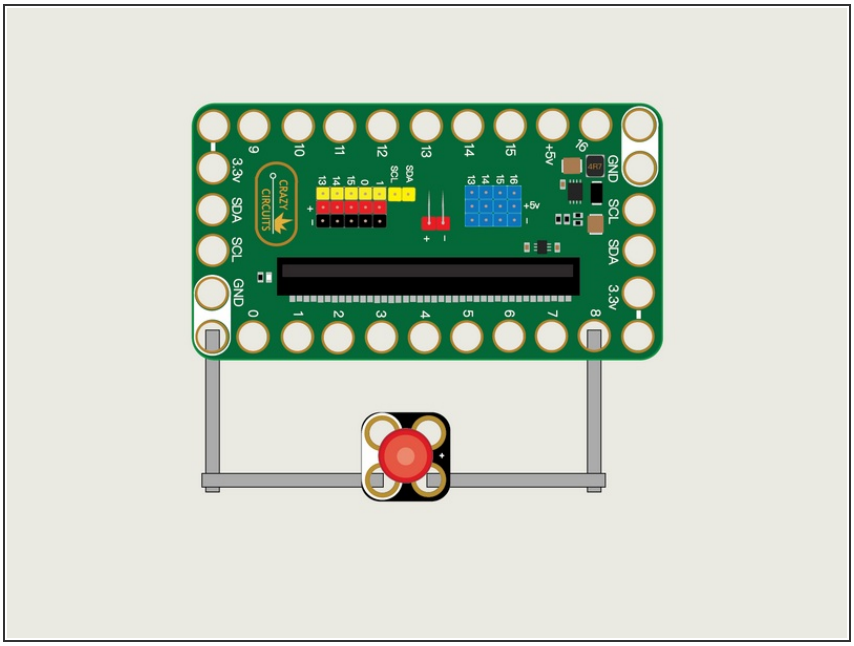
TOOLS:

- Scissors (1)
- Computer (1)

PARTS:

- Crazy Circuits Bit Board (1)
- micro:bit (1)
- Distance Sensor (1)
- 7 Segment Display (1)
- Crazy Circuits LED Chip (1)
- Maker Tape (1)
  1/8"
- Crazy Circuits Ribbon Cable (2)

Step 1 — Build your Circuit



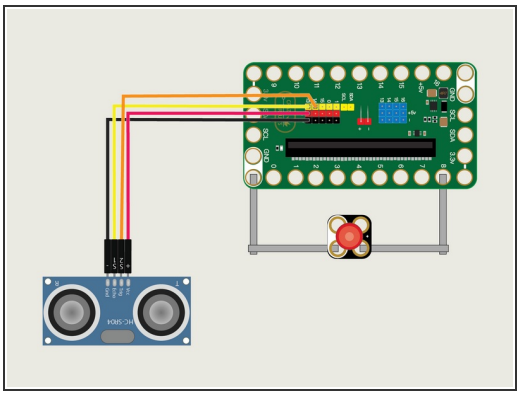
- Gather your components. You will need a micro:bit, a Bit Board, a Jumbo 10mm LED, an Ultrasonic Distance Sensor, a 7 Segment Display, and some 1/8" Maker Tape.

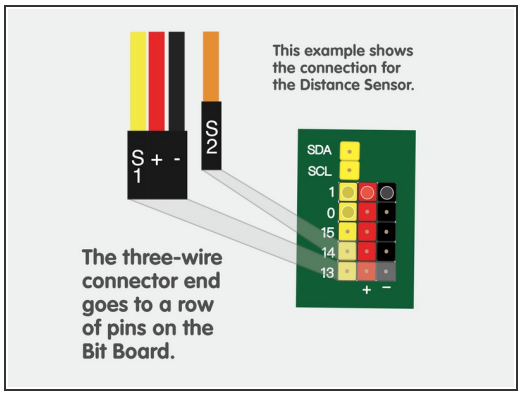
Make sure to view the PDF for a full diagram and more information about this project.

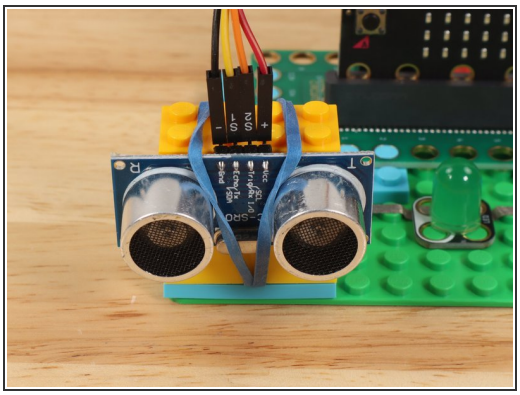
- Build on a LEGO baseplate with a few LEGO pieces used to raise up the Bit Board on the edges.
- Add the LED as show, connecting it to Pin 8 and Ground with Maker Tape.

Make sure you have the polarity correct for your LED or it will not light up. Positive goes to Pin 8. Negative goes to Ground.

Step 2 — Add the Distance Sensor



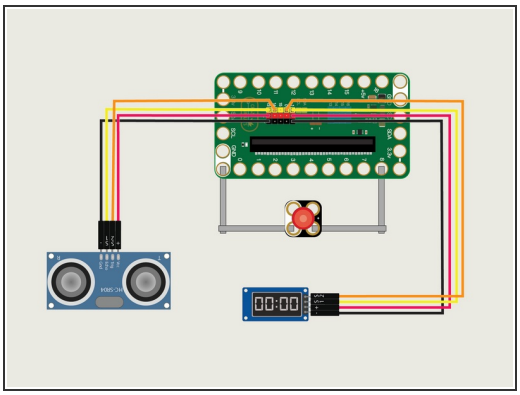
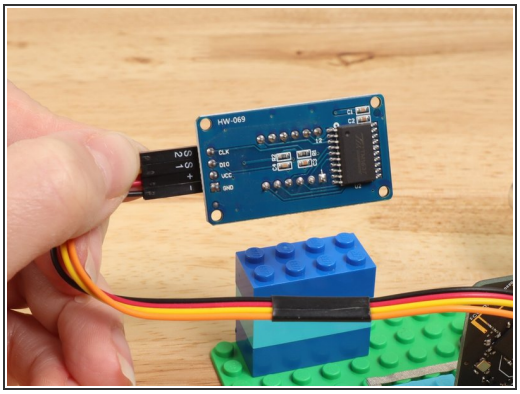


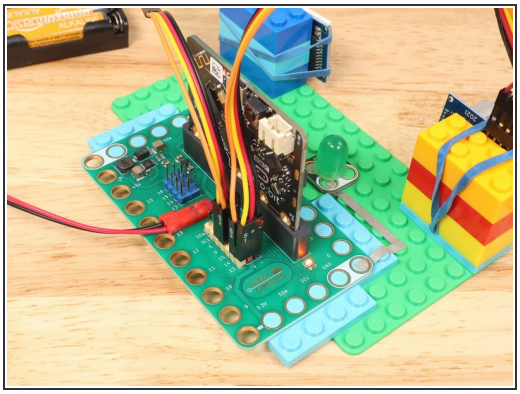


- Add the Ultrasonic Distance Sensor by connecting it to the header pins on the back of the Bit Board using a Crazy Circuits Ribbon Cable.
- Plug the three-wire connector of the **Crazy Circuits Ribbon Cable** into the row with **Pin 13** on the Bit Board. The wire colors should match the pin header 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.)*
- Now we can plug the other end of the Crazy Circuits Ribbon Cable (with each wire independent) into the pins on the Distance Sensor.
- Plug **+** (red) into **VCC**; **S2** (orange) into **TRIG**; **S1** (yellow) into **ECHO**; and **-** (black) into **GND**.

ⓘ You'll notice a high-tech solution to mounting our sensor and our display... rubber bands and LEGO!

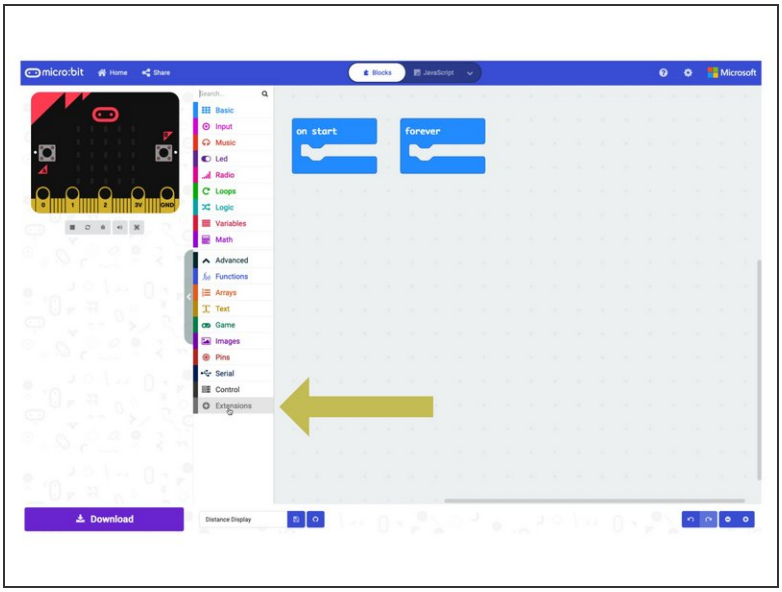
Step 3 — Add the 7 Segment Display

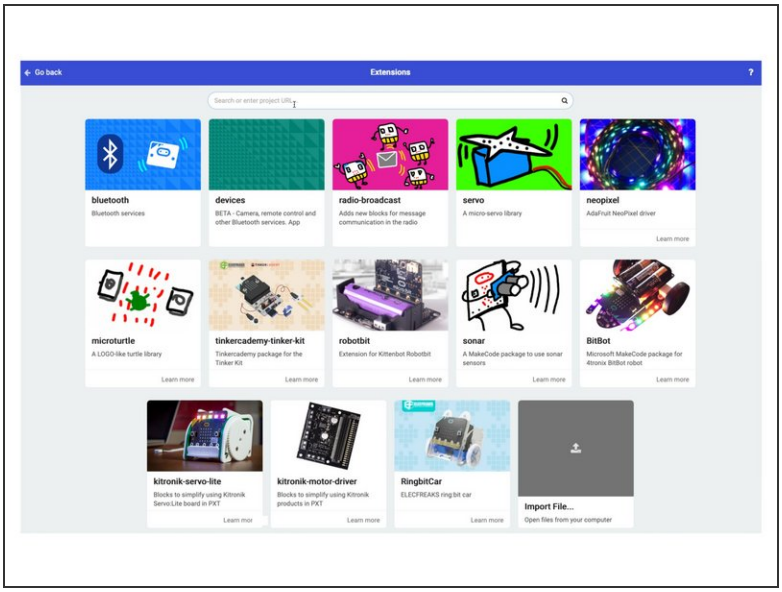





- Add the 7 Segment Display by connecting it to the header pins on the back of the Bit Board using a Crazy Circuits Ribbon Cable.
- Plug the three-wire connector of the **Crazy Circuits Ribbon Cable** into the row with **Pin 1** on the Bit Board. The wire colors should match the pin header colors, with **S1** (yellow) going to the yellow pin.
- Next, plug **S2** (orange) into **Pin 0**. *(S2 is separated from the three-wire connector to allow you to plug it into another row.)*
- Now we can plug the other end of the Crazy Circuits Ribbon Cable (with each wire independent) into the pins on the 7 Segment Display.
- Plug **S2** (orange) into **CLK**; **S1** (yellow) into **DIO**; **+** (red) into **VCC**; and **-** (black) into **GND**.
- You should now have your LED connected with Maker Tape, and your sensor and display connected with the Crazy Circuits Ribbon Cable.

Step 4 — Adding Code Extensions





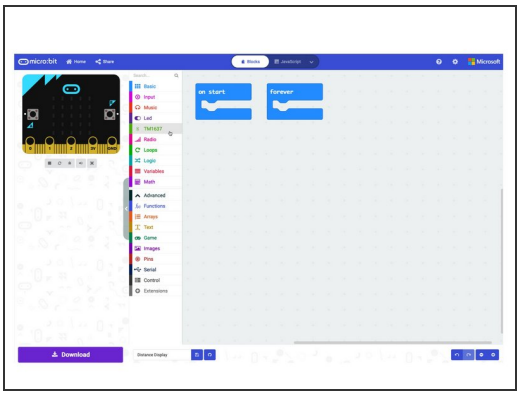
⚠ If you already know how to add code extensions you can skip to Step 8 where we provide the code.

- In the next few steps we'll walk you through how to add code extensions.
- This is meant to be informational, and you can follow along if you like, but if you use the code we provide it will all automagically work.
- In the MakeCode editor, click on **Extensions** under the **Advanced** menu on the left.
- You'll go to the extension repository where you can browse or search for extensions.

Step 5 — TM1637 Extension

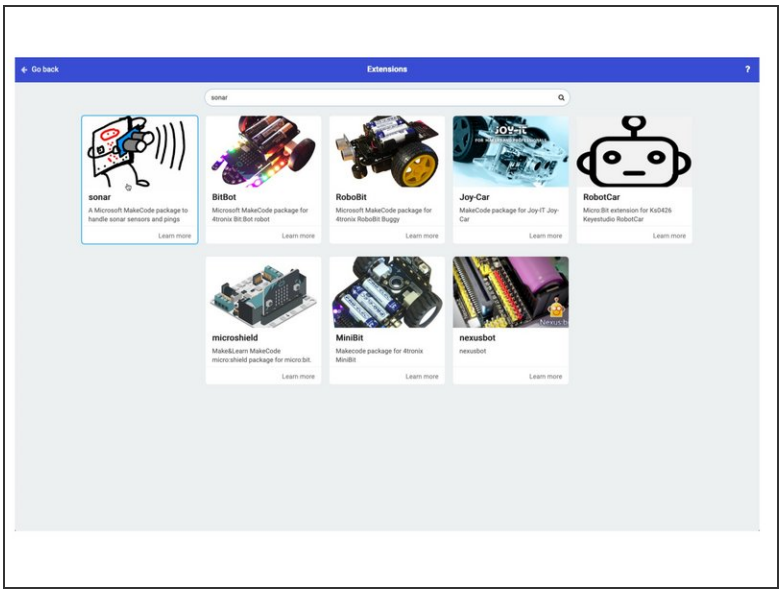


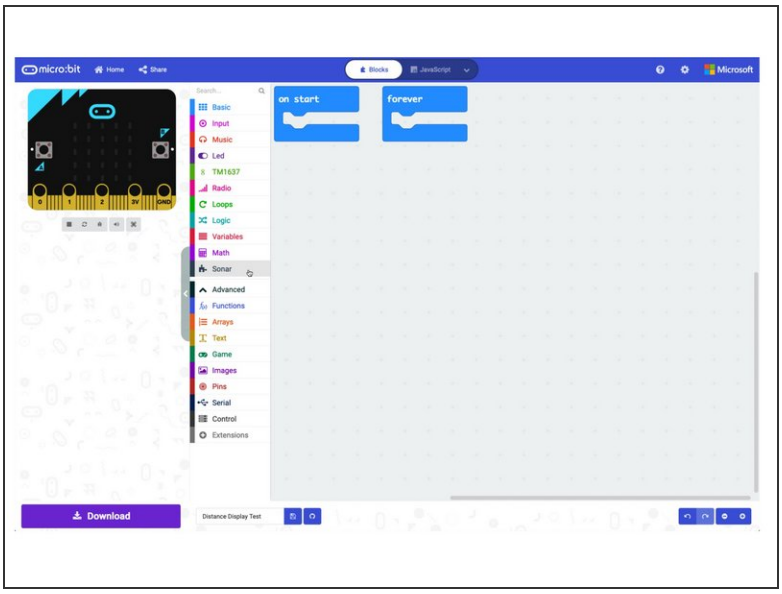




- We're going to type **TM1637** into the search bar, and we should get the TM1637 as a result.
- Click on it to add it to your program. This will allow us to use our 7 Segment Display.
- After it is added you'll see it appear in the left menu.

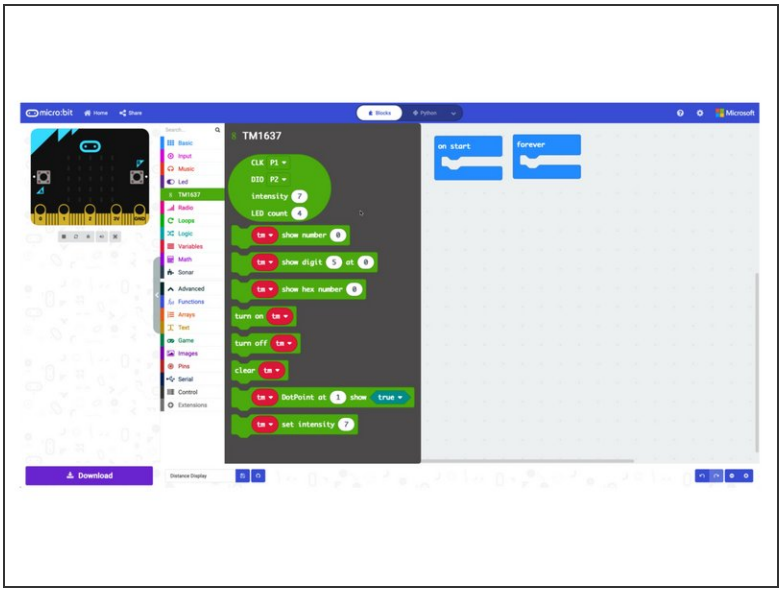
Step 6 — Sonar Extension

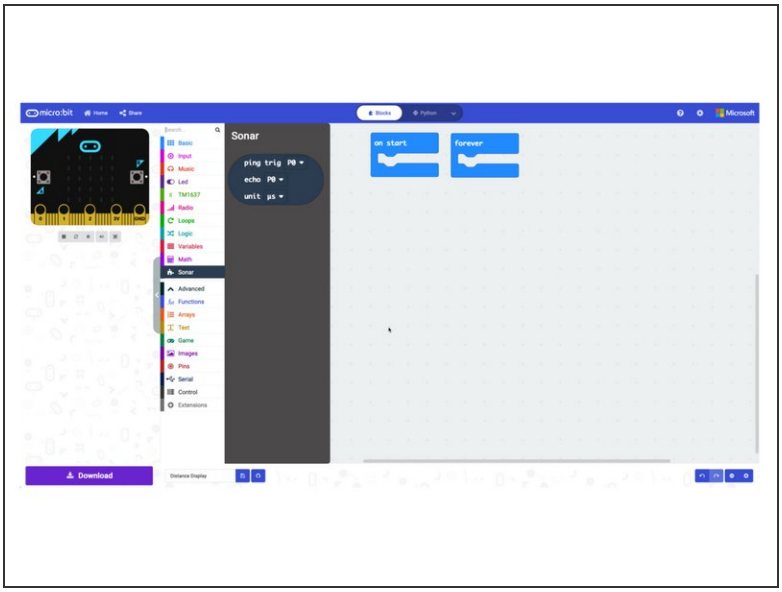




- Now we'll add the **Sonar** extension using the same procedure.
- This extension will allow us to use the Ultrasonic Distance Sensor in our program.

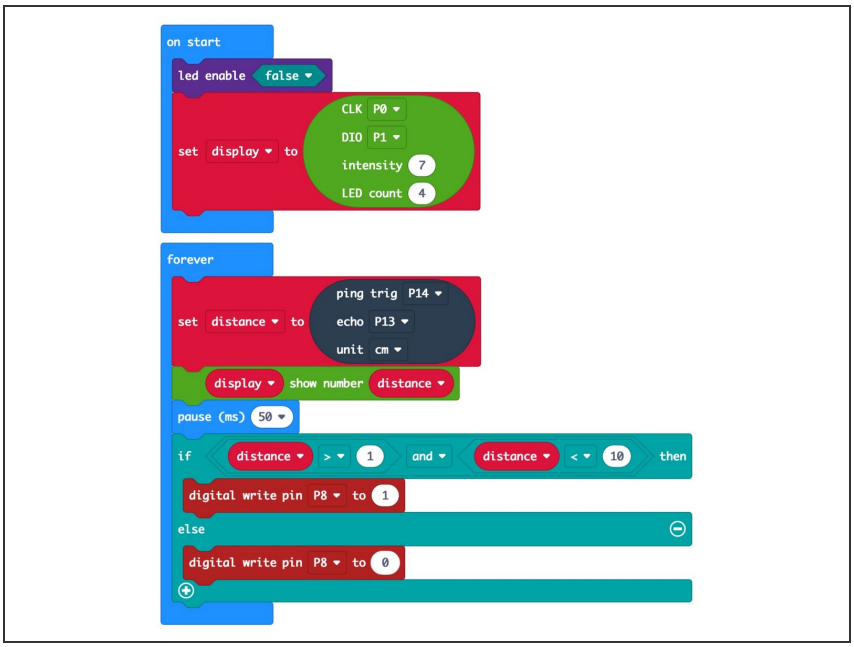
Step 7 — New Functions





- For our new extensions you can click on their names in the left menu and you'll see the new functionality you now have in your program.
- Some extensions add a lot of new functions, and some are quite minimal, adding just a few new functions.

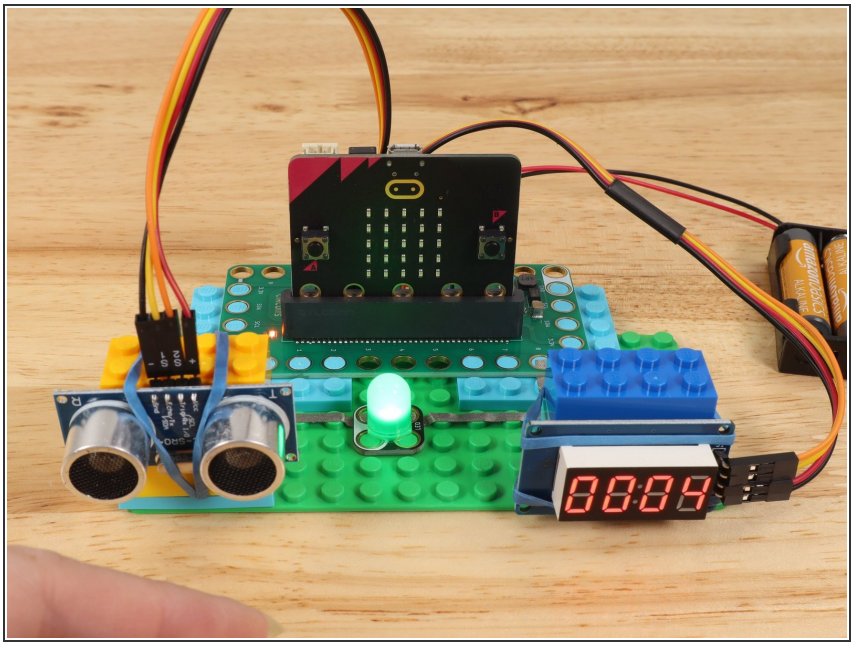
Step 8 — Load the Code



- 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 Display** program: https://makecode.microbit.org/_VHVhgkV43...
- Once the code is loaded you should start to see numbers on the display.

The included PDF has more information about the code if you want to dig deeper.

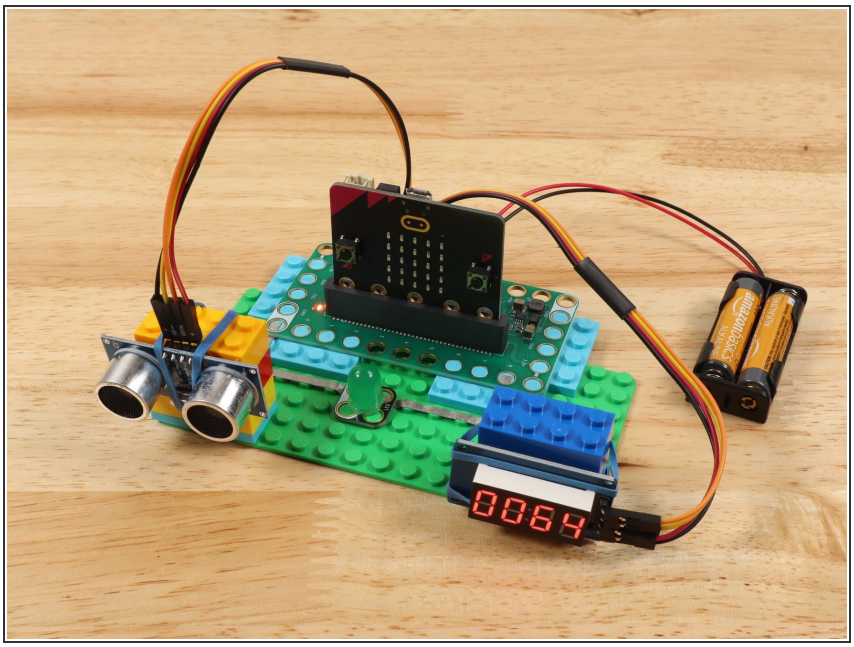
Step 9 — Test it Out!



- Once you've got everything assembled and you've loaded your code, you can test it out!
- Move your hand towards and then away from the sensor. You should see the numbers change, showing the distance your hand is from the sensor in centimeters.

If something isn't working right, double check all of your connections and make sure you've loaded the code properly.

Step 10 — Take it Further



- Our program is pretty simple, and you should be able to figure out how to change the numbers that cause the LED to turn on as a starting point to expanding this project.
- You can play a tone or a melody when someone gets too close.
- Or you could also add more LEDs and have different LEDs turn on to indicate different distances.
- Like many circuits, we've got a cause and effect thing happening. Think about what you want to happen when an object is a certain distance from the sensor, and work through what is involved in altering the circuit (or the code) to do what you want.