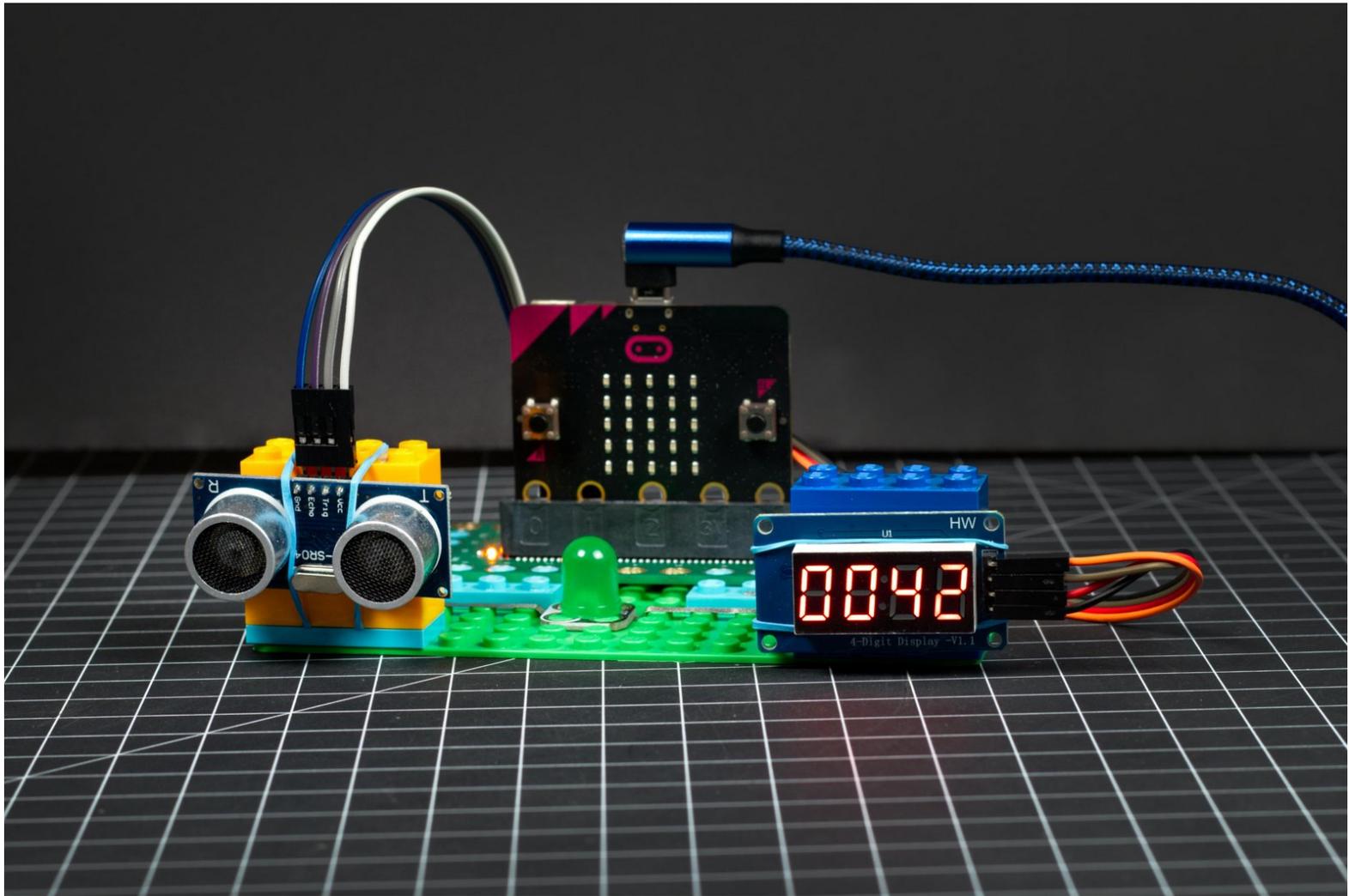




Distance Display

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.

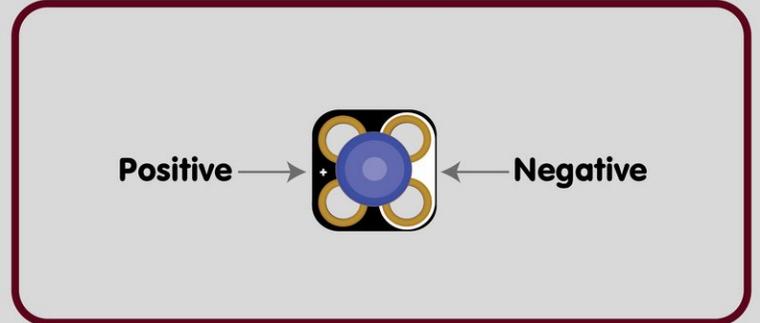
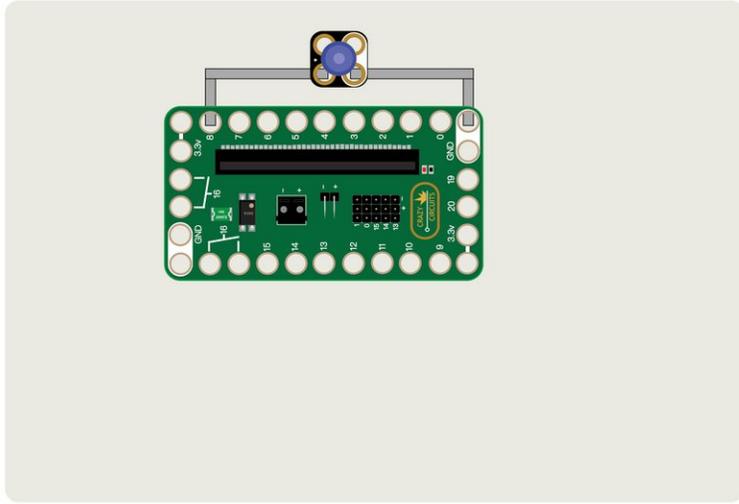
TOOLS:

- Scissors (1)
- Computer (1)

PARTS:

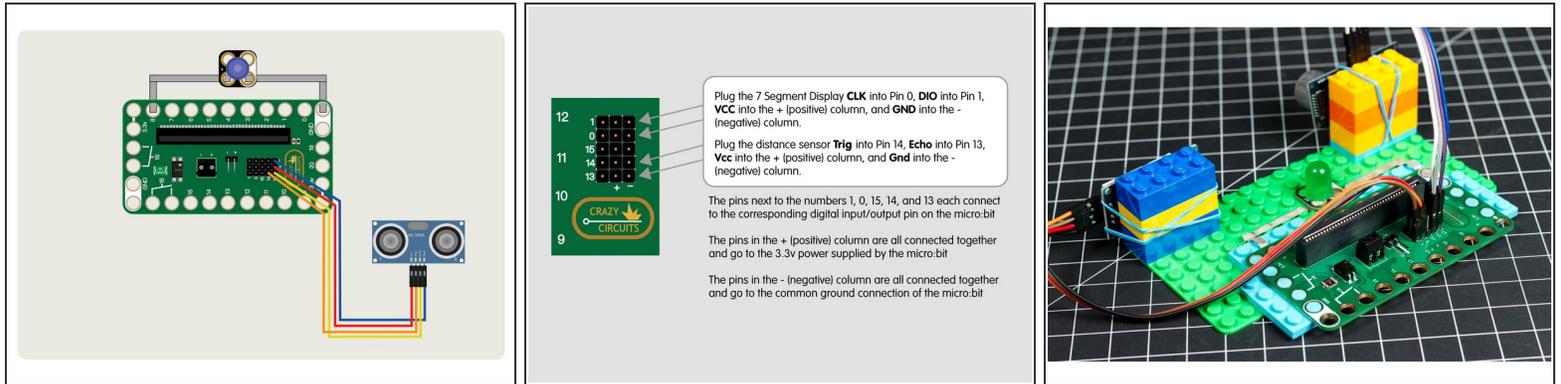
- Crazy Circuits Bit Board (1)
- micro:bit (1)
- Ultrasonic Distance Sensor (1)
- 7 Segment Display (1)
- Crazy Circuits LED Chip (1)
- Maker Tape (1)
- 1/8" Jumper Wires (8)

Step 1 — Build your Circuit



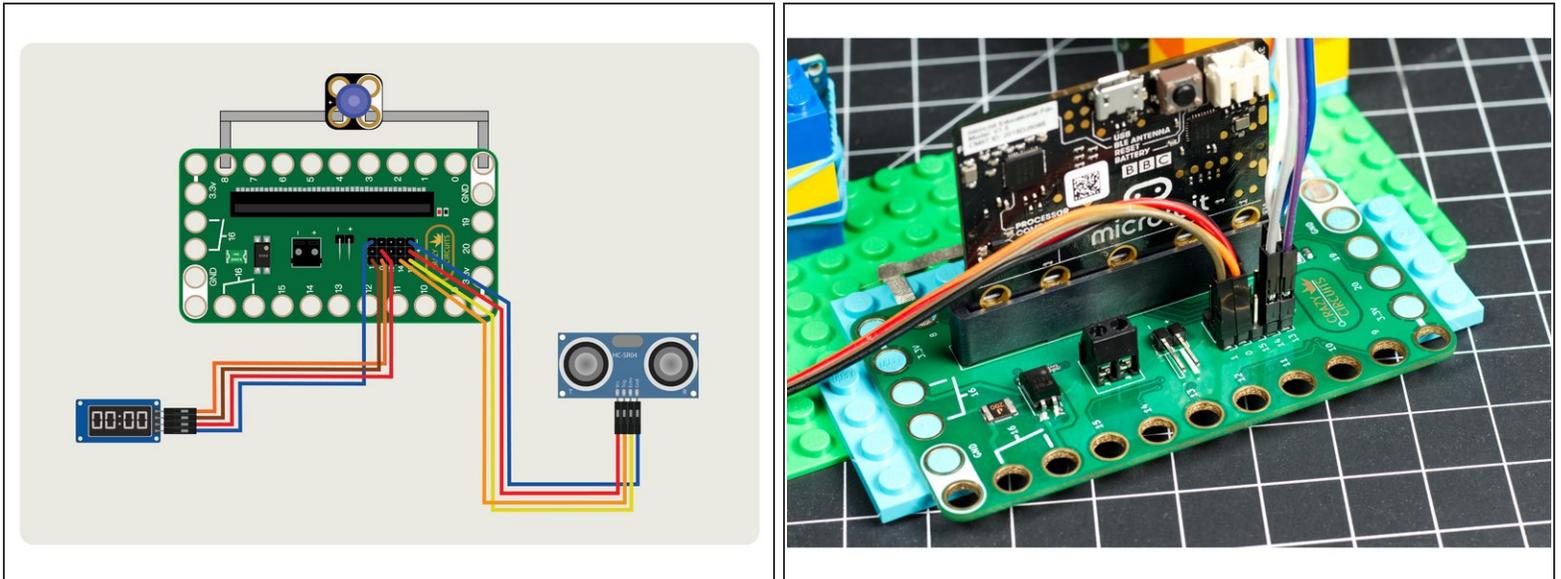
- Gather your components. You will need a micro:bit, a Bit Board, Jumbo 10mm LED, Ultrasonic Distance Sensor, 7 Segment Display, and some 1/8" Maker Tape.
- ☞ Make sure to view the PDF for a full diagram and more information about this project.
- Build on a LEGO baseplate with a few LEGO pieces used 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



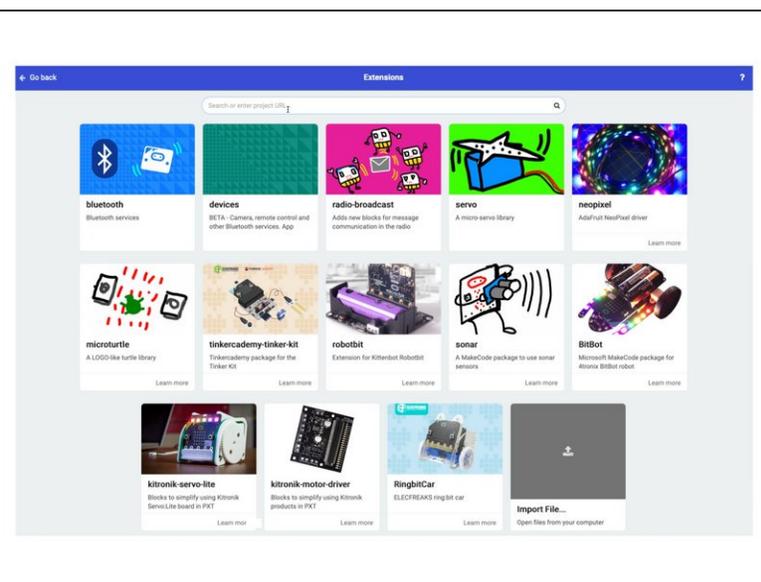
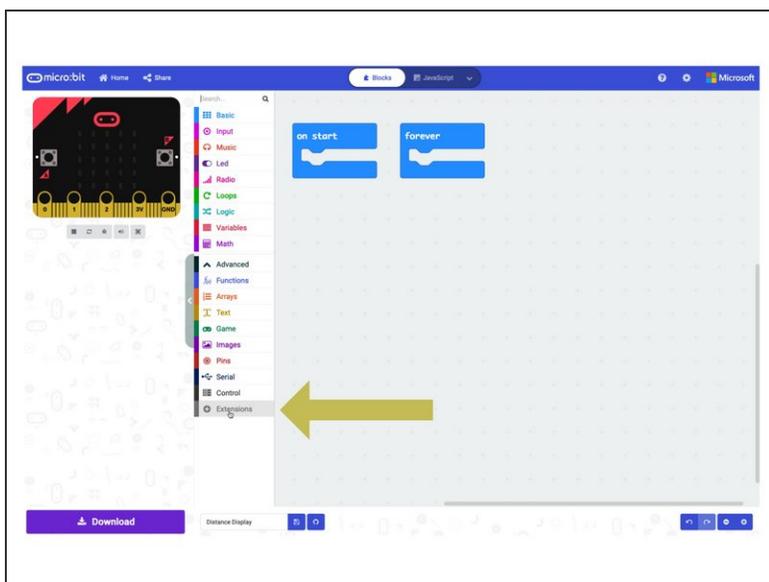
- Add the Ultrasonic Distance Sensor by connecting it to the header pins on the back of the Bit Board using jumper wires.
- 📌 You can use any color jumper wire for your connections, just make sure they are connected to the correct pin.
- 📌 It can be easier to plug in all the jumper wires before plugging your micro:bit into the Bit Board.
- 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



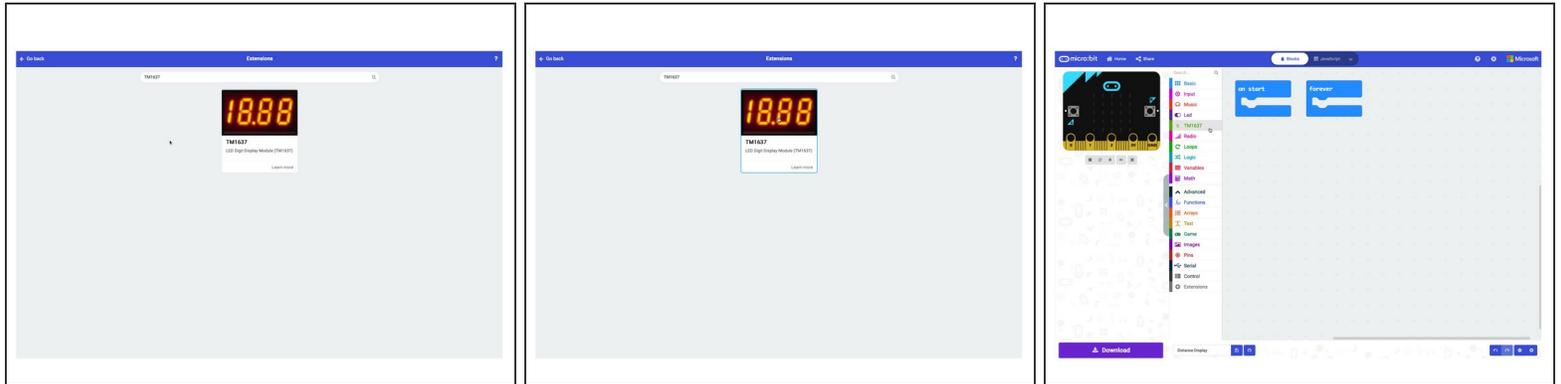
- Add the 7 Segment Display by connecting jumper wires to the correct pins on the module and the Bit Board.
- You should now have your LED connected with Maker Tape, and your sensor and display connected with jumper wires.

Step 4 — Adding Code Extensions



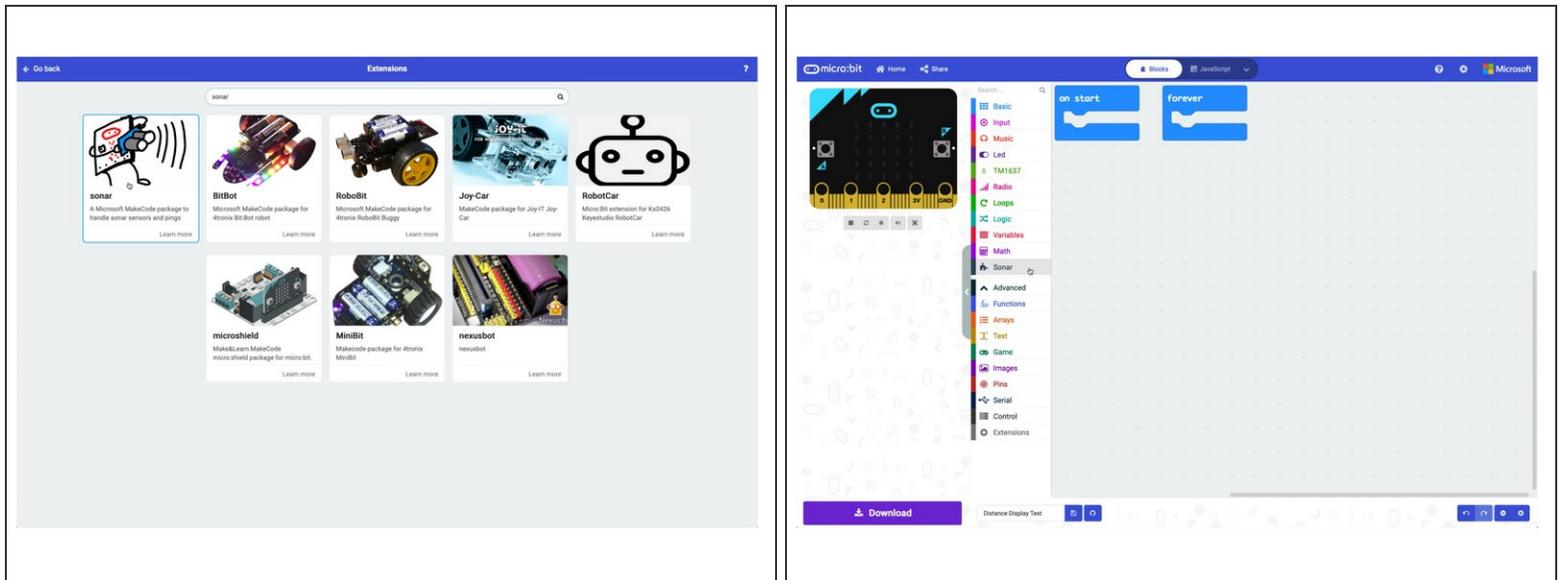
- In the next few steps we'll walk you through how to add code extensions.
- This is meant to be informational, and you can follow along if you like, but if you use the code we provide it will all automatically work.
- If you already know how to add code extensions you can skip to Step 8 where we provide the code.
- 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



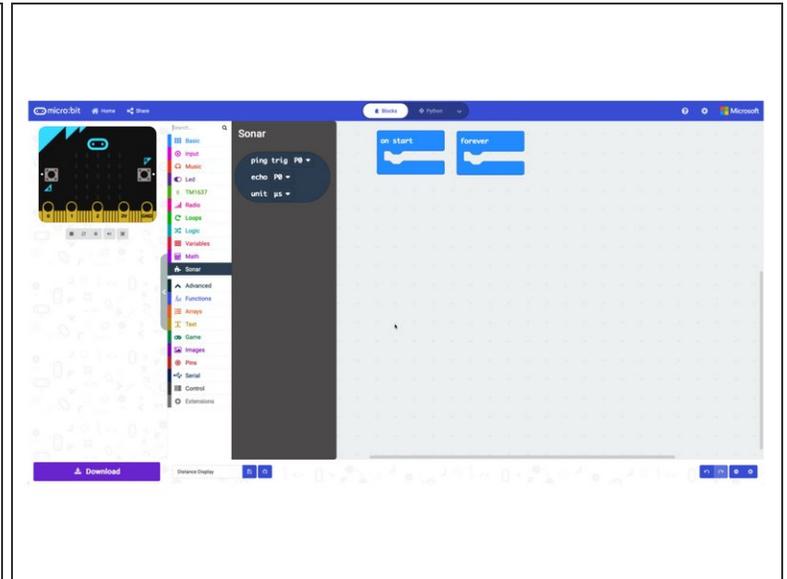
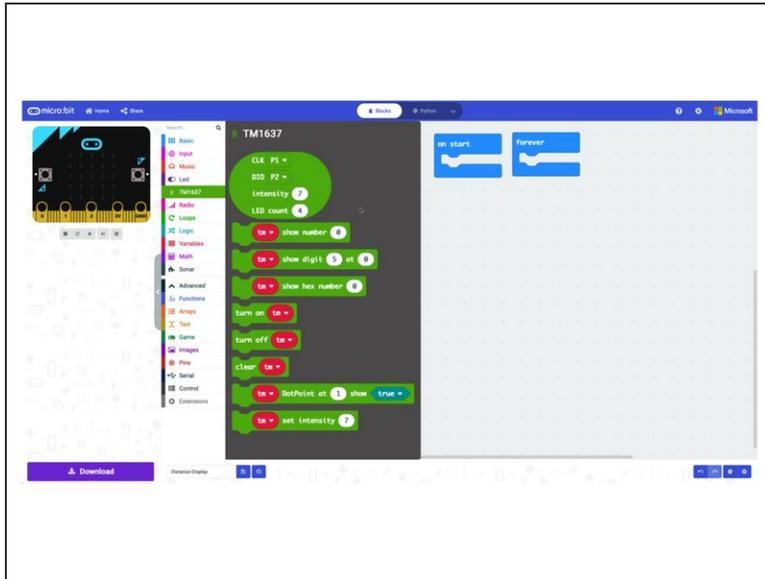
- We're going to type **TM1637** into the search bar, and we should get the TM1637 as a result.
- Click on it to add it to your program. This will allow us to use our 7 Segment Display.
- After it is added you'll see it appear in the left menu.

Step 6 — Sonar Extension



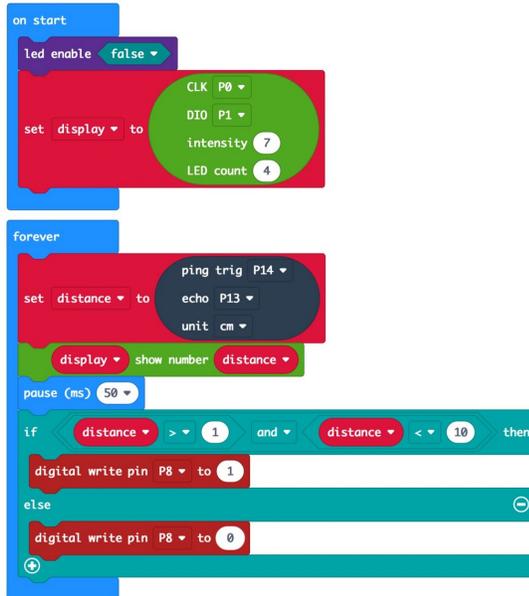
- Now we'll add the **Sonar** extension using the same procedure.
- This extension will allow us to use the Ultrasonic Distance Sensor in our program.

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

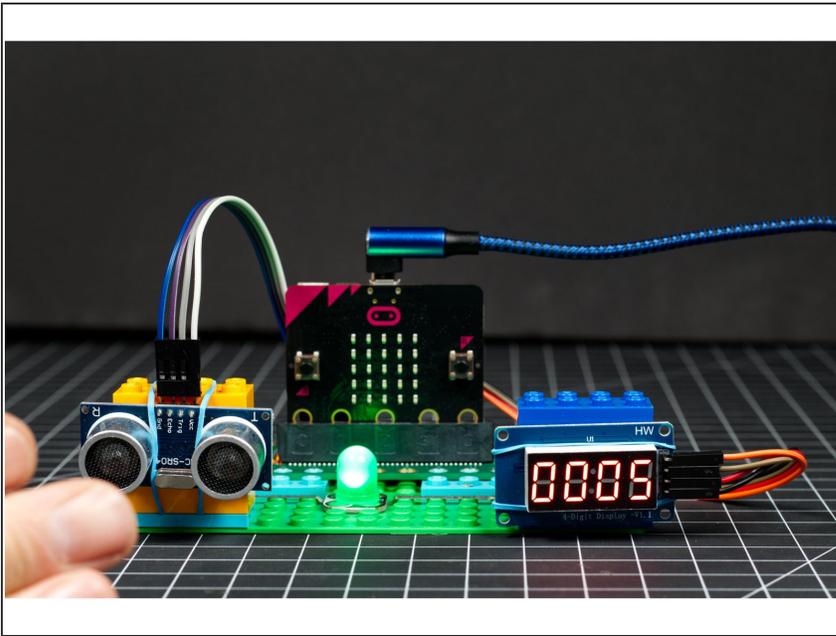


```
on start
  led enable false
  set display to
    CLK P0
    DIO P1
    intensity 7
    LED count 4

  forever
    ping trig P14
    set distance to
      echo P13
      unit cm
    display show number distance
    pause (ms) 50
    if distance > 1 and distance < 10 then
      digital write pin P8 to 1
    else
      digital write pin P8 to 0
```

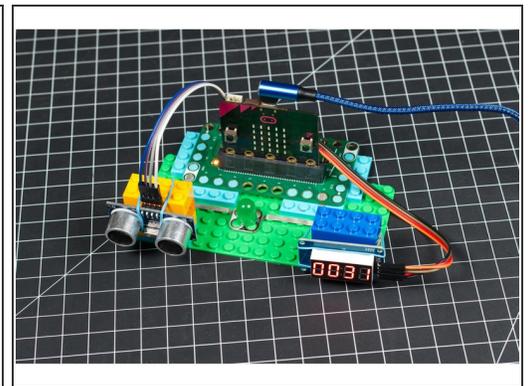
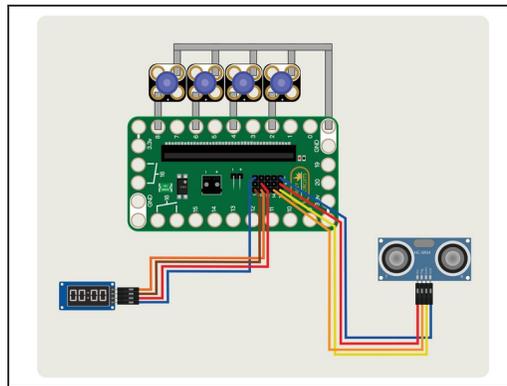
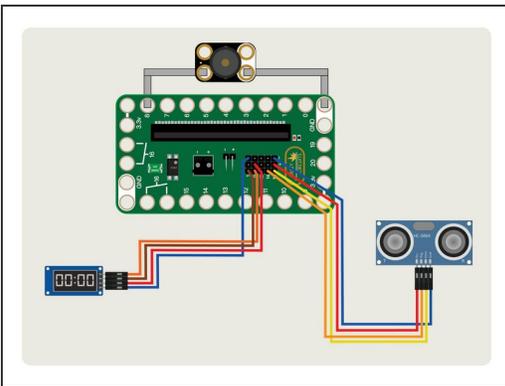
- Connect a USB cable to the micro:bit and then plug it into your computer.
 - We'll be using makecode.microbit.org to program our board. It uses a simple drag and drop block interface.
 - We're going to load the following code for our **Distance Display** program:
https://makecode.microbit.org/_VHVhgkV43...
 - 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.
- Maybe you can add a Piezo Speaker and play a tone or a melody when someone gets too close.
- 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 going on. 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.

