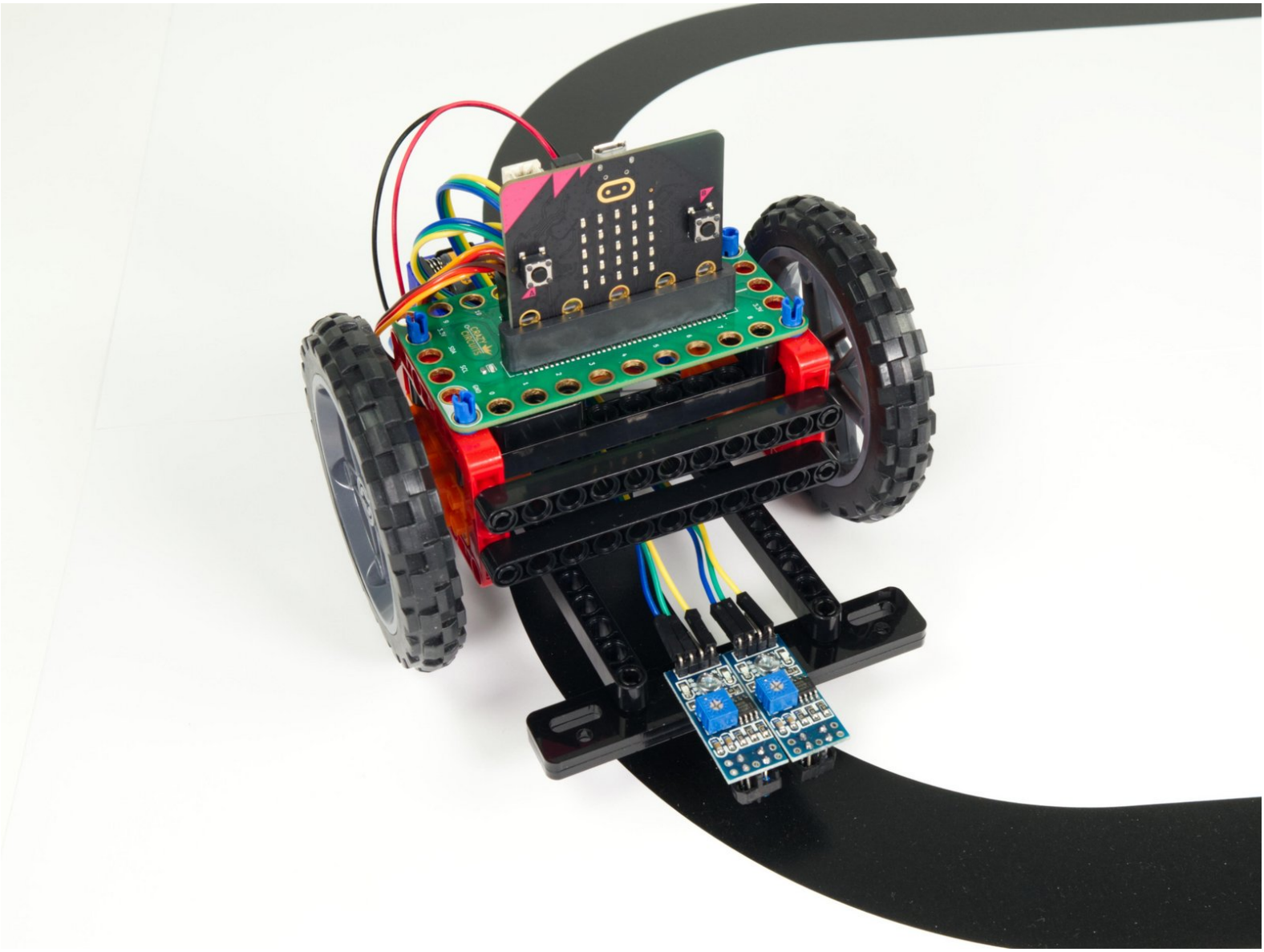
Rover Line Following

If you've built our Rover Main Body you can add two IR Sensors so your Rover can become a line following robot.

Written By: Pete Prodoehl



This document was generated on 2026-05-03 02:36:22 PM (MST).

INTRODUCTION

If you've built our Rover Main Body you can add two IR Sensors so your Rover can become a line following robot.

TOOLS:

- Computer (1)

PARTS:

- Bit Board Rover Kit (1)
- micro:bit (1)
- IR Sensor (2)

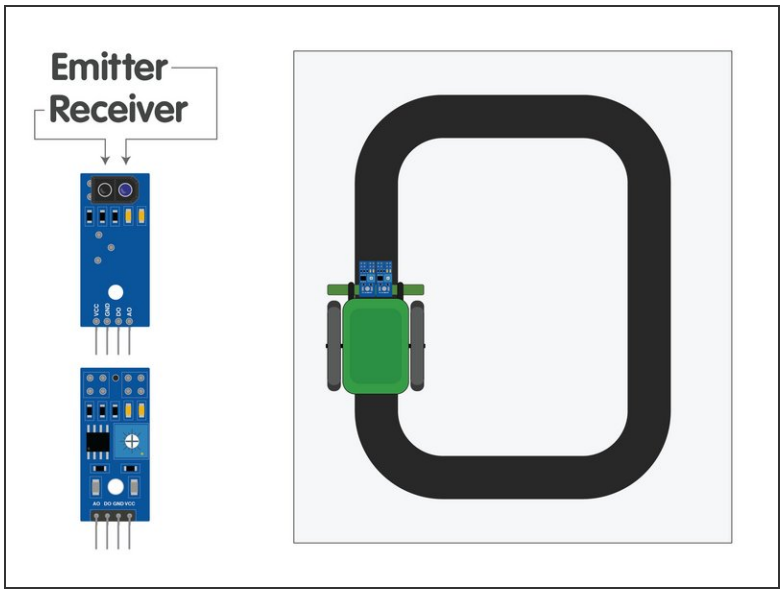
Included with Rover Kit

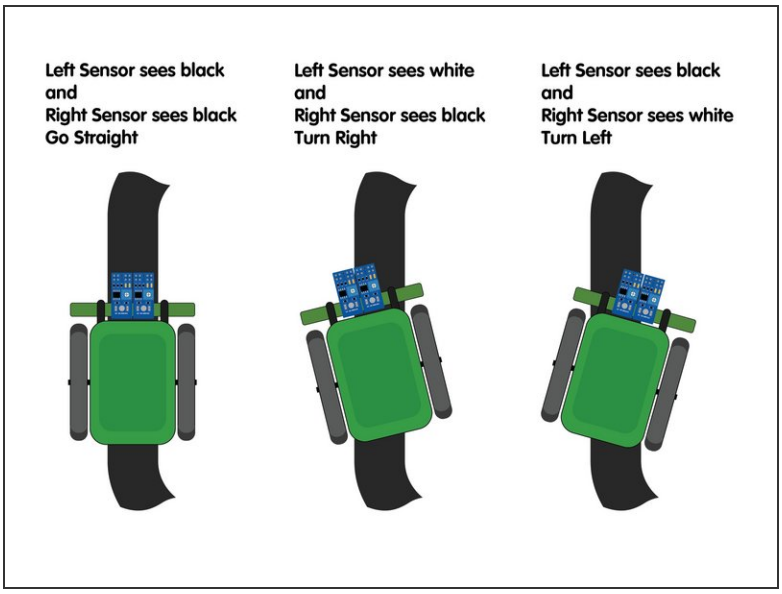
- Crazy Circuits Ribbon Cable (2)

Included with Rover Kit

© 2026

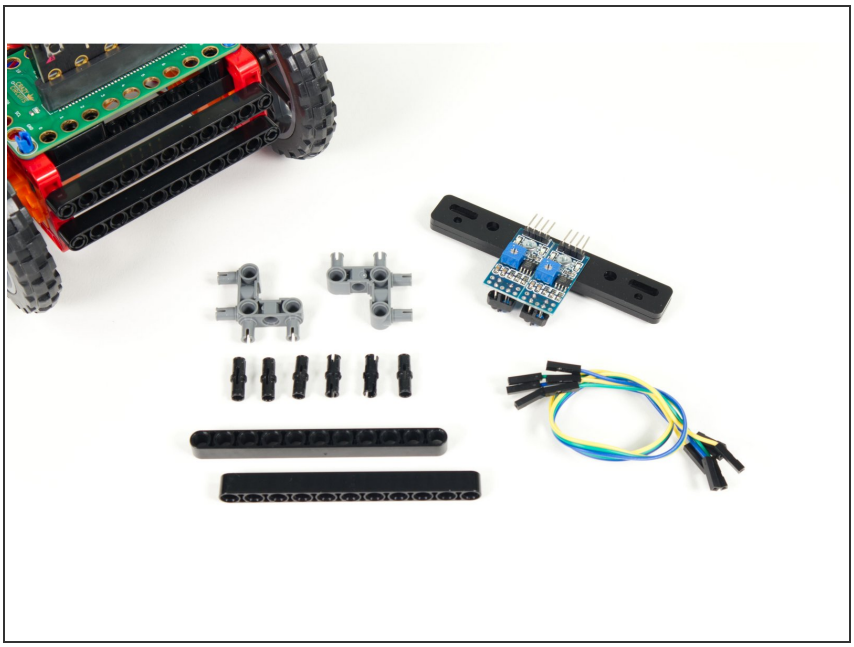
Step 1 — How Does it Work?





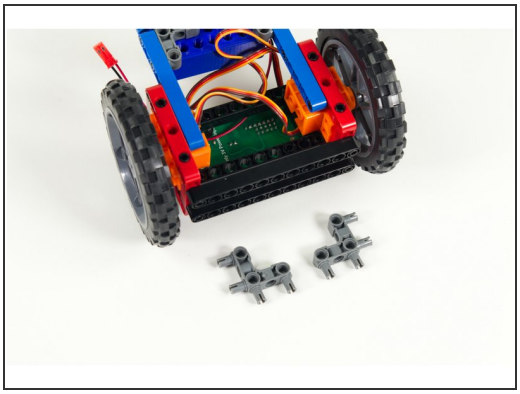
- With the addition of the Light Following Bar our Rover can function as a Line Following Robot.
- The two sensors on the bar detect light (white) or dark (black) on the mat by shining IR (infrared) light on the surface and then measuring how much light is reflected back.
- The **Emitter** is an LED that shines infrared light and the **Receiver** is a photodiode sensor that can detect infrared light.
- When both sensors detect black the rover moves forward. If the left sensor detects white it will cause the rover to turn right. If the right sensor detects white in will cause the rover to turn left.

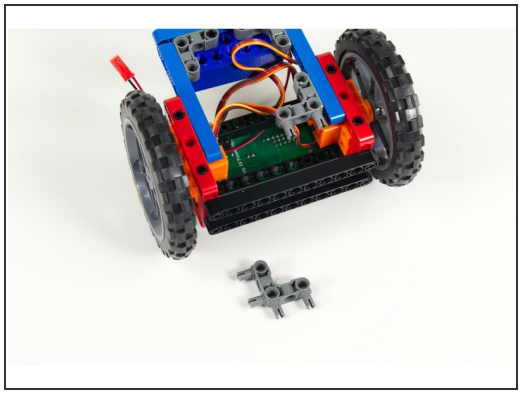
Step 2 — Gather Parts

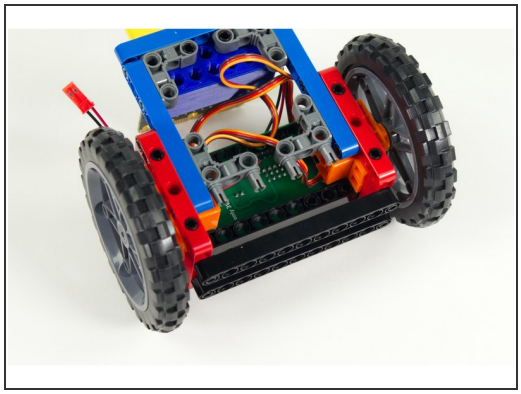


- Gather the parts needed to add the Line Following Bar.
- The Line Following Bar should be preassembled and consists of two pieces of acrylic with two IR sensors attached using 3mm bolts.
- You'll need two gray 90 degree connectors, two black 11 beams, and 6 short black pins.
- You will also need 6 F/F Jumper Wires to attach the Line Following Bar to the Bit Board.

Step 3 — Add 90 Degree Connectors to Rover

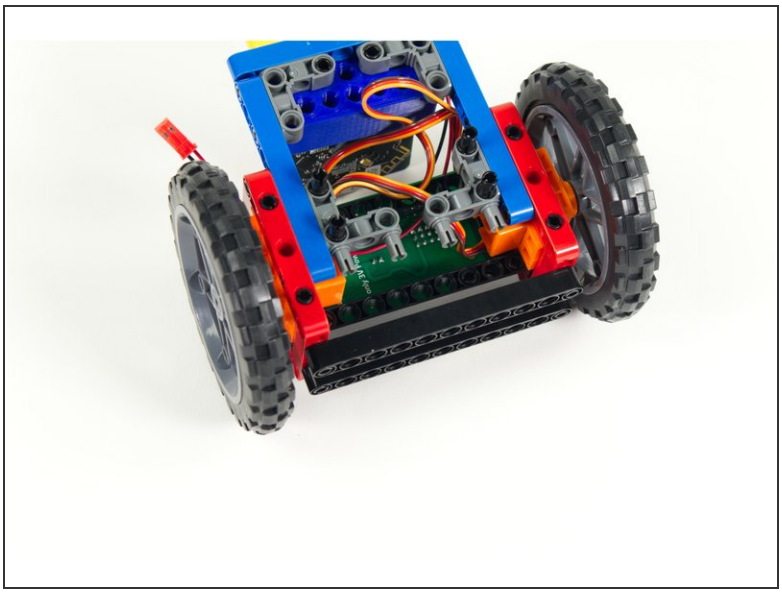






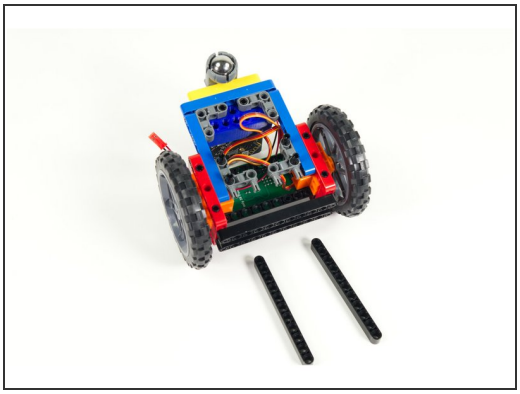
- Turn the Rover upside down. We'll add two 90 degree connectors to the blue rear stabilizer beams as show.

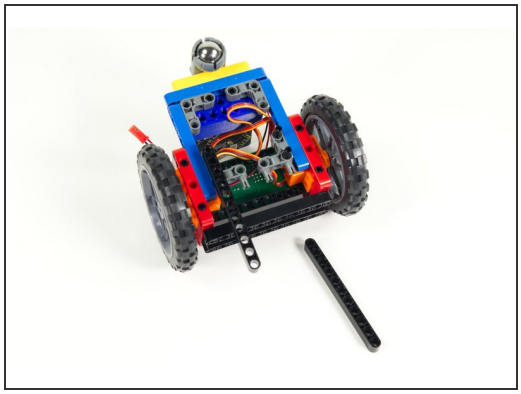
Step 4 — Add Pins to 90 Degree Connectors

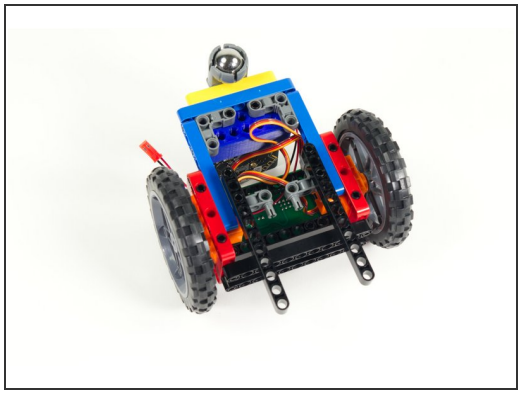


- Add four short pins to the 90 degree connectors as shown, two for each connector, in line with the blue beams.

Step 5 — Add Beams to Rover

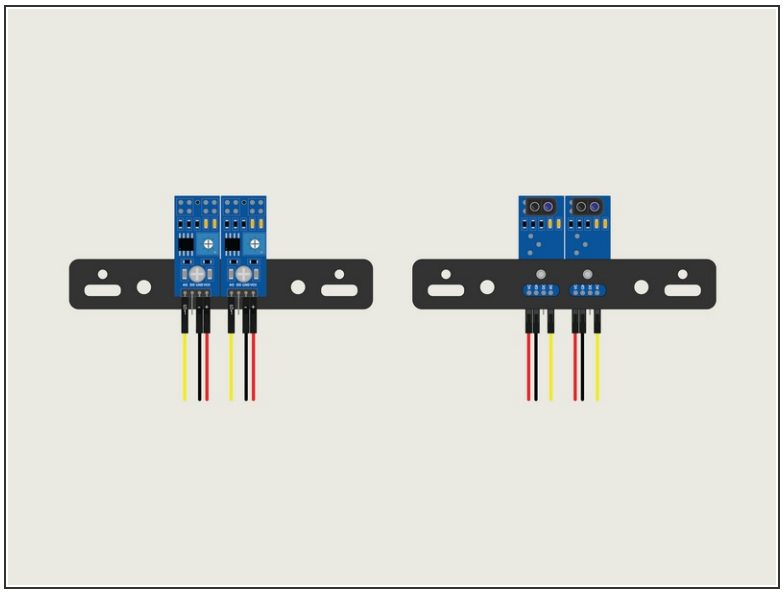


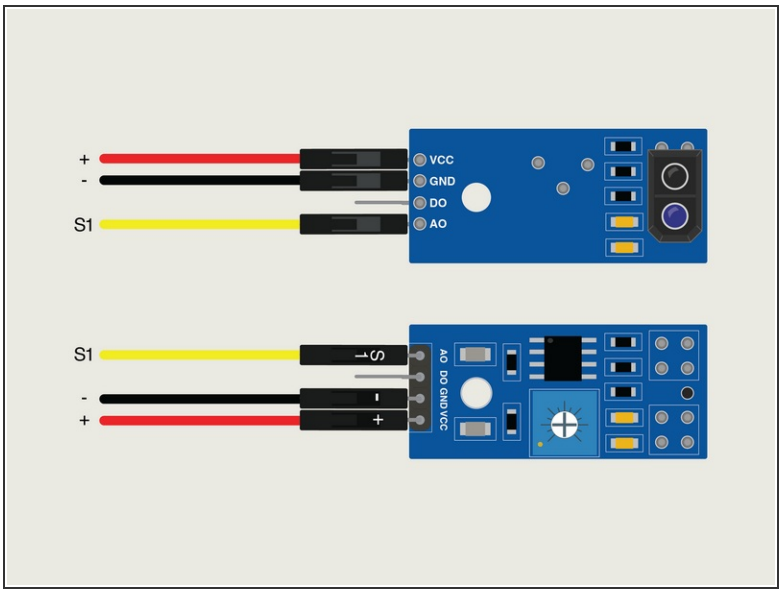




- Add the black 11 beams to each set of of pins so the beams stick out the front of the Rover.

Step 6 — Prepare to Add Wires

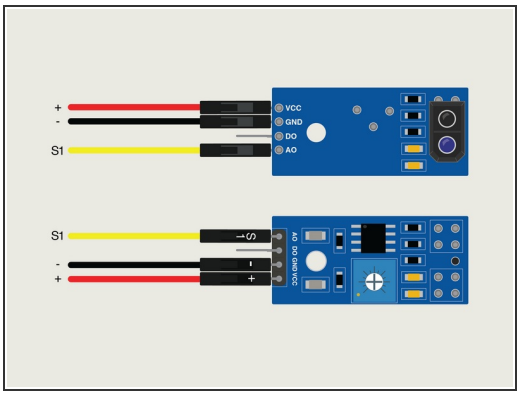


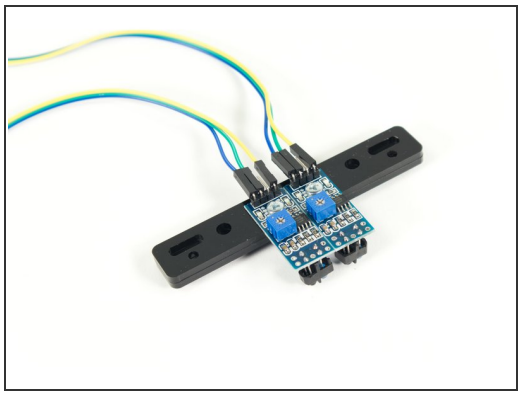
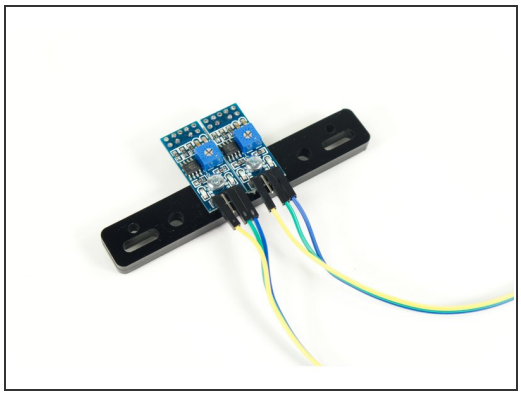


- In the next step we'll be adding wires to the sensors. This step will help clarify how they are connected.
- Because the sensors are already mounted it may be a challenge to read the text on them, so use this step to determine orientation and wire connections.

⚠ Note: Take care when connecting the wires. Accidentally mixing up **VCC** and **GND** can damage the sensor!

Step 7 — Connect Wires to the Sensors



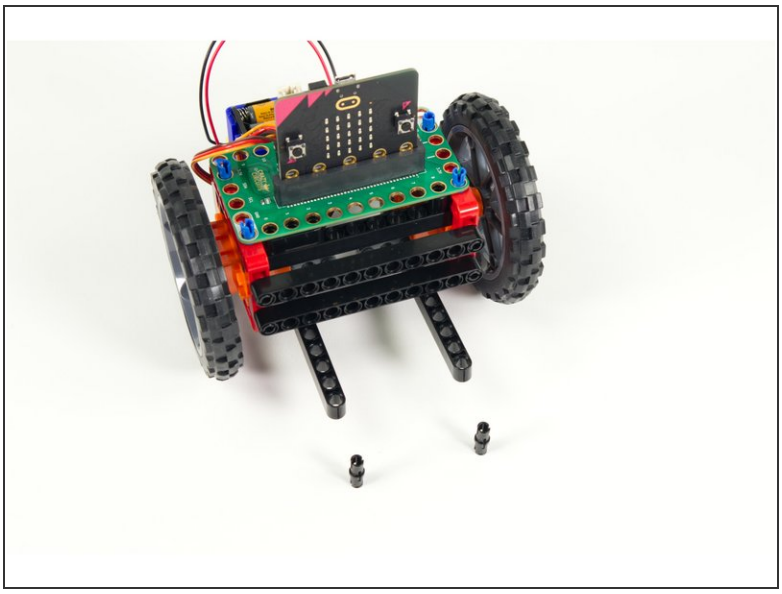
- Now let's add one Crazy Circuits Ribbon Cable to each of the sensors. We'll be plugging in the end with the four independent connectors.
- Plug **+** (red) into **VCC**; **-** (black) into **GND**, and **S1** (yellow) into **AO**.
  - **S2** (orange) does not plug into anything, but if you don't want it dangling you can plug it into **DO**.
- The **S1** (yellow) wire on each ribbon cable carries the data/signal from each sensor and will plug into either **Pin 0** or **Pin 1** on the Bit Board. (We'll do that in Step 11.)

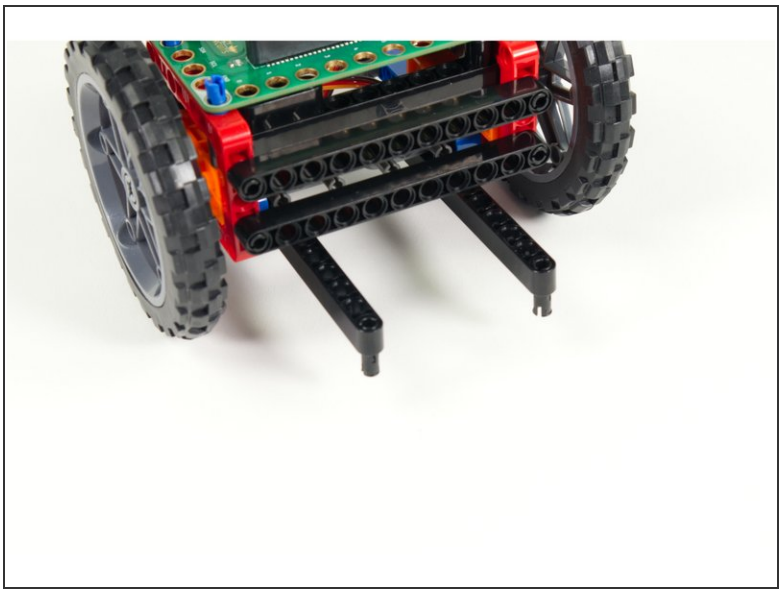
ⓘ **AO versus DO**? You'll notice we connect to the sensor pin marked **AO**. This is the **Analog Output**. The **DO** pin is the **Digital Output**.

ⓘ While the DO can be adjusted using the small potentiometer on the sensor we've found that using the AO allows us to do calibration in the code, and gives us more control.

- Once all the wires are connected you can move on.

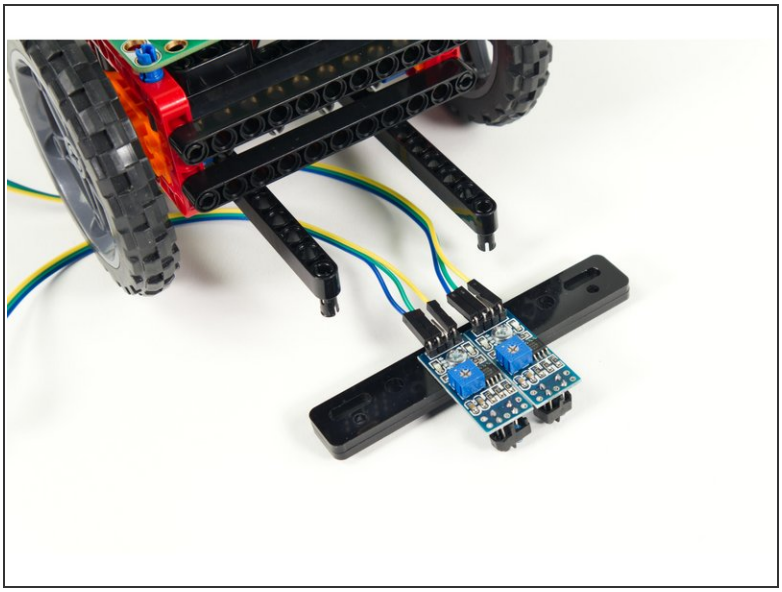
Step 8 — Prepare to Mount Line Following Bar

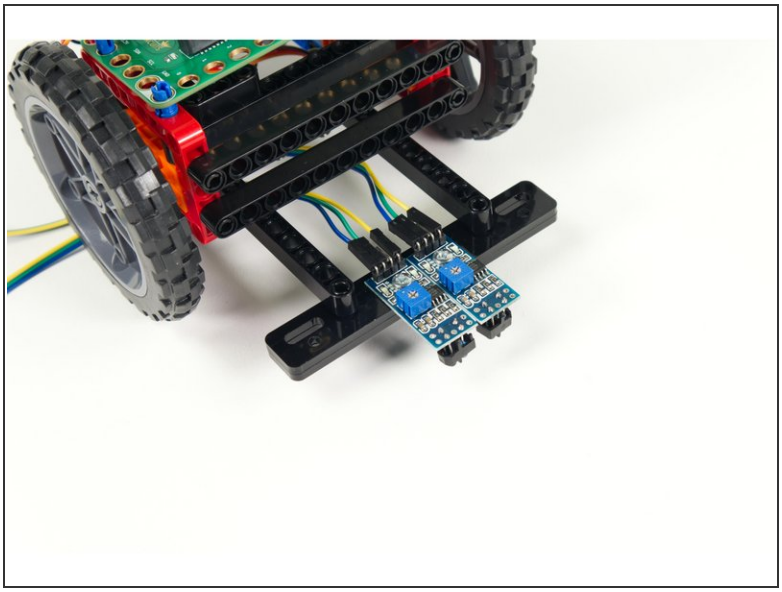




- Turn the Rover back over so it can rest of the wheels.
- Add two short black pins to the first holes in the beams that were added in Step 5.

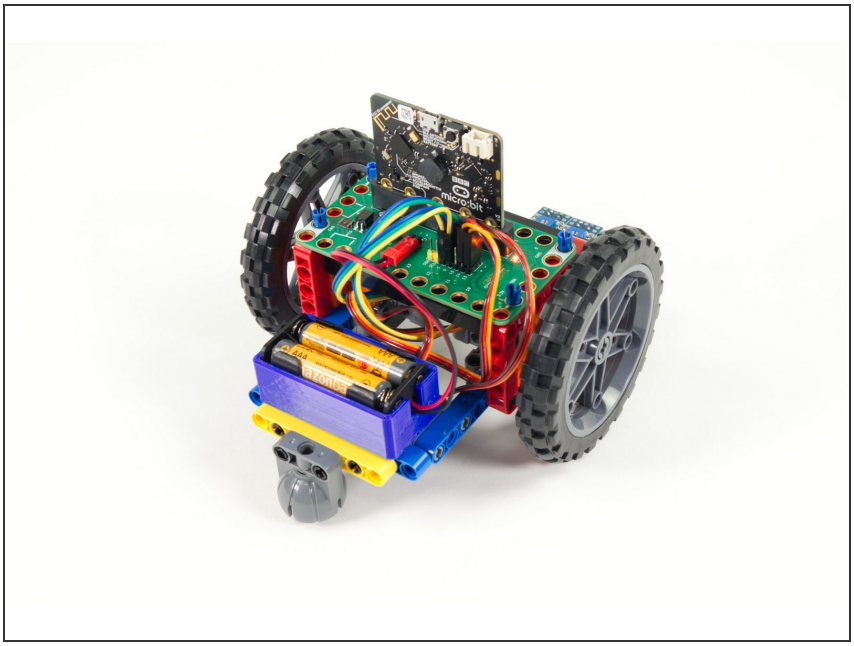
Step 9 — Mount the Line Following Bar





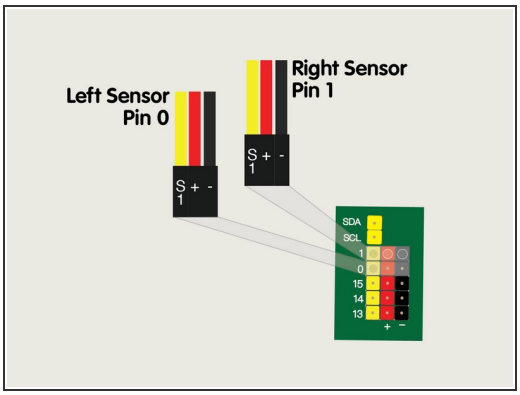
- Attach the Line Following Bar to the pins we added to the beams.
- Make sure the sensors are pointing down.

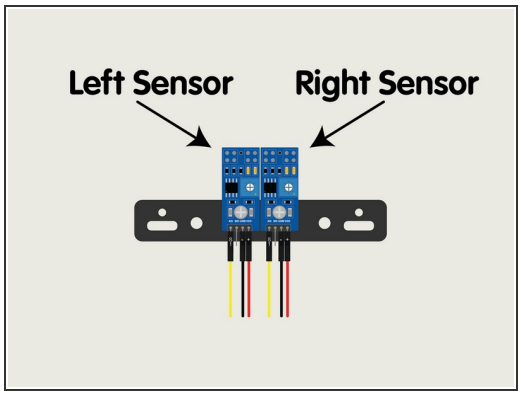
Step 10 — Thread the Wires

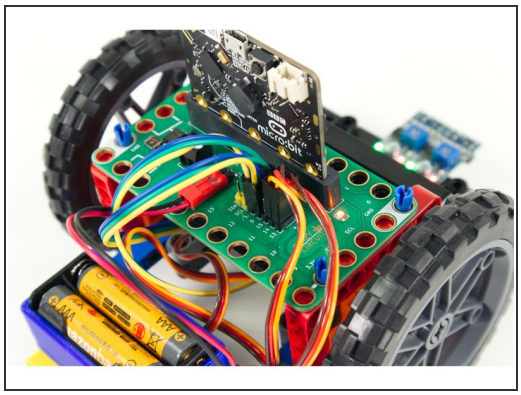


- We'll need to route the wires from the sensors to the Bit Board.
- We routed ours beneath the Rover so they can come up to the back of the Bit Board where they will plug in.

Step 11 — Connect to the Bit Board

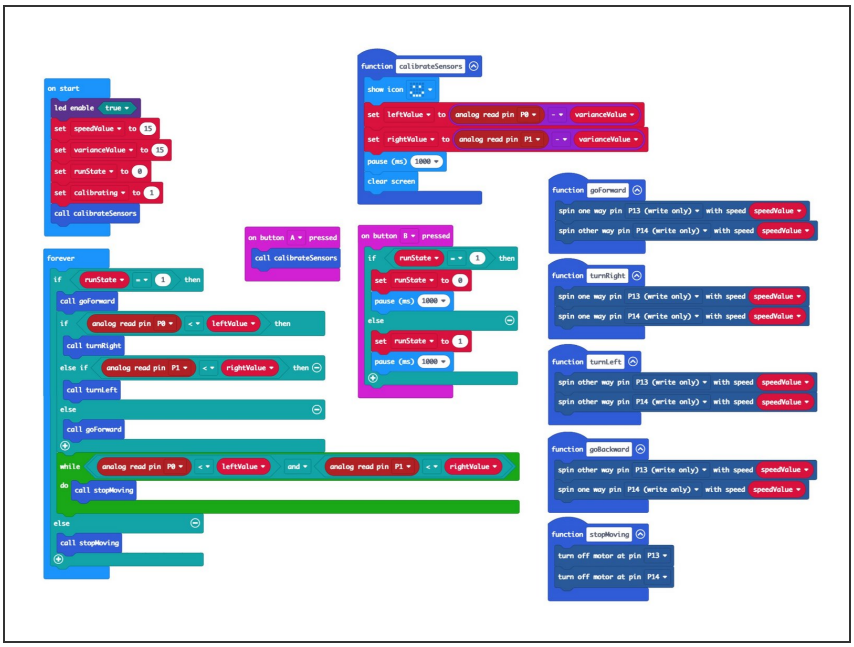






- When looking at the Rover from above with it facing the same direction as you are (meaning, away from you, not facing you) you'll see the **Left Sensor** and the **Right Sensor**.
- Each of the three wires from each sensor needs to connect to a pin on the Bit Board. This is simple to do using the Crazy Circuits Ribbon Cables since you just need to plug in the three-wire connector.
- Plug the three-wire connector from the **Left Sensor** into the **Pin 0** Row. The wire colors should match the pin header colors, with **S1** (yellow) going to the yellow pin.
- Plug the three-wire connector from the **Right Sensor** into the **Pin 1** Row. The wire colors should match the pin header colors, with **S1** (yellow) going to the yellow pin.

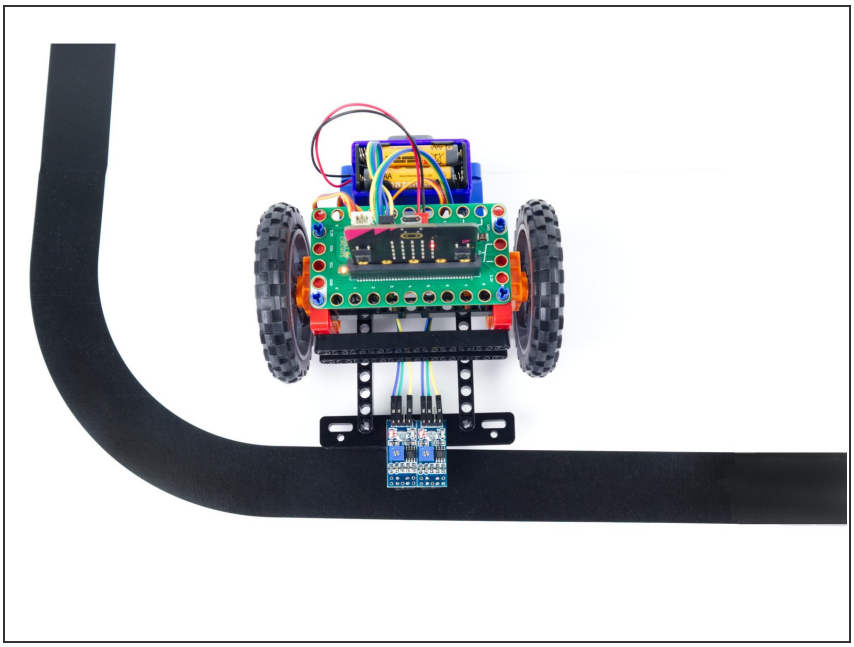
Step 12 — Load the Code



⚠ 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 **Rover Line Following** program: [https://makecode.microbit.org/_ExUPXV5yw...]
- Once the code is loaded your Rover is (almost) ready to follow a line. We'll just need to calibrate it.

Step 13 — Calibrate

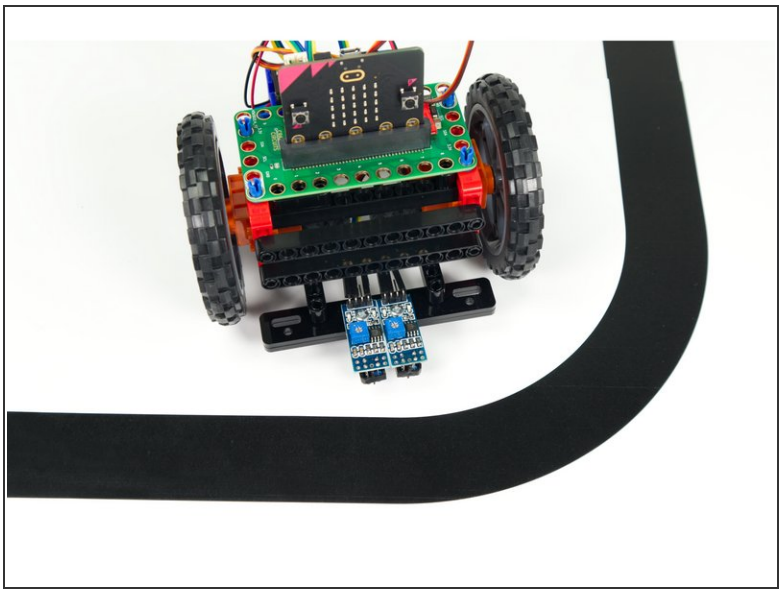


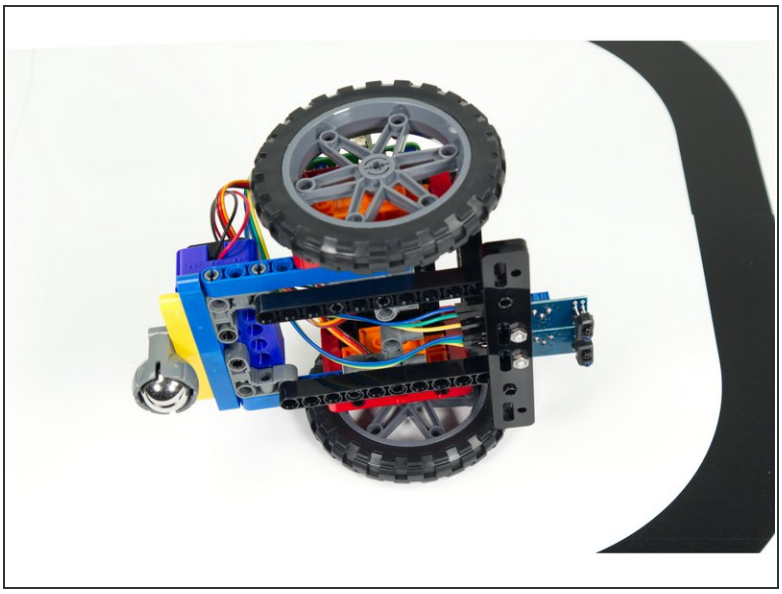
- Plug in the battery pack so your Rover has power. It will not start moving yet...
- Place the Rover on the mat so the sensors are directly over the black line...
- Press the **A button** on the micro:bit
- You will see a smiley face on the LED matrix of the micro:bit, and then it will disappear. Your sensors are now calibrated!

Step 14 — Test it Out!

- You are now ready to test out the Rover's line following capabilities.
- Put the Rover on the mat so the sensors are over the black line, and the Rover is positioned to follow the line...
- Press the **B button** and the Rover should start moving!
- You can press the **B button** again to stop the Rover. It is programmed to toggle between moving and stopped.
- Did the Rover follow the line? If not, Check the previous steps of this guide to make sure you didn't miss anything in the build, wiring, or programming.

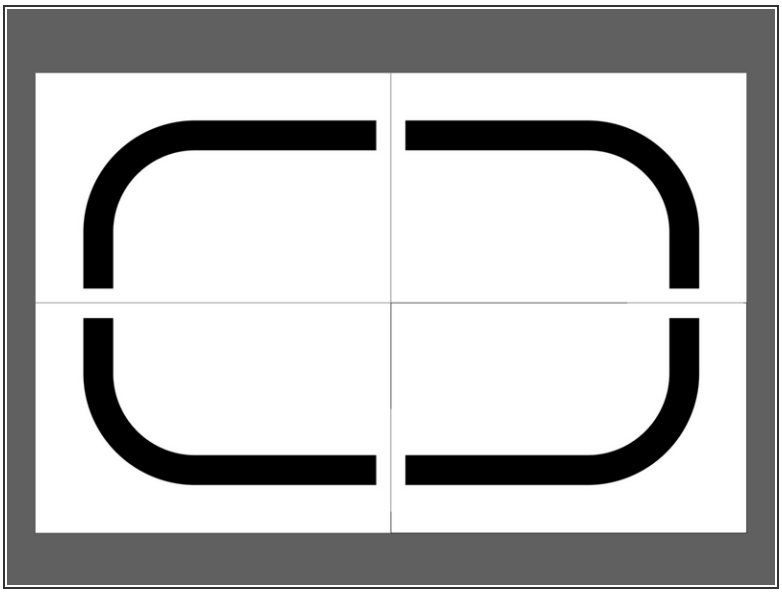
Step 15 — Make Some Changes

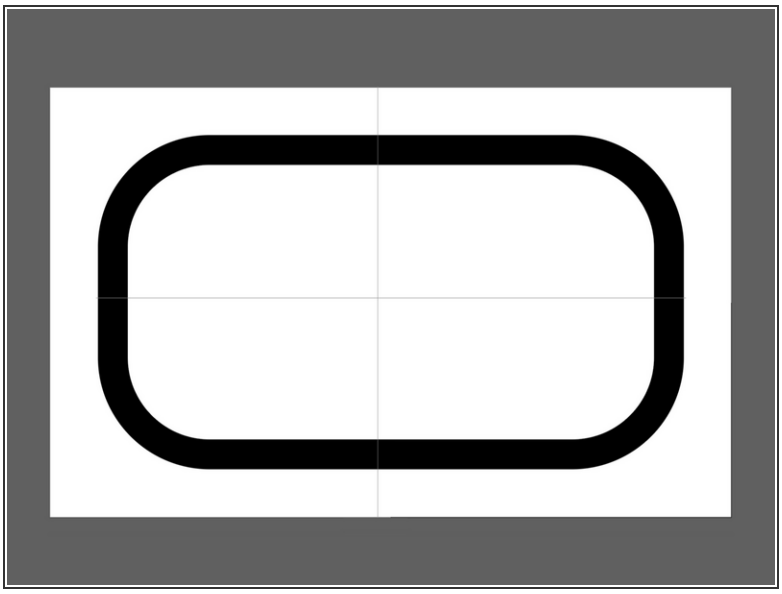




- Let's make a change and see how it affects the Rover's performance.
- Turn the Rover over again and moved the two black 11 beams back further so the sensors are closer to the body of the Rover.
- Now test it out and see how moving the sensors affects the performance. It is better or worse? Try different positions and see what results you get.

Step 16 — Make a Mat





- Download the file **Line Following Mat Ledger.pdf** at the bottom of this page in the **Attached Documents** section.
- Print the four pages on Ledger/Tabloid paper and then assemble into a loop.
- If your printer cannot print to the edge of the paper and leaves a white border just trim it off enough to allow the black lines to line up and then tape the pieces together.

If you prefer to make your own mat we recommend making the black line about 35mm wide (1-1/4") and it's best to avoid shiny material like electrical tape.

© 2026