



## Measuring Distance and Navigating Objects:

### How far are major rock formations from your landing site?

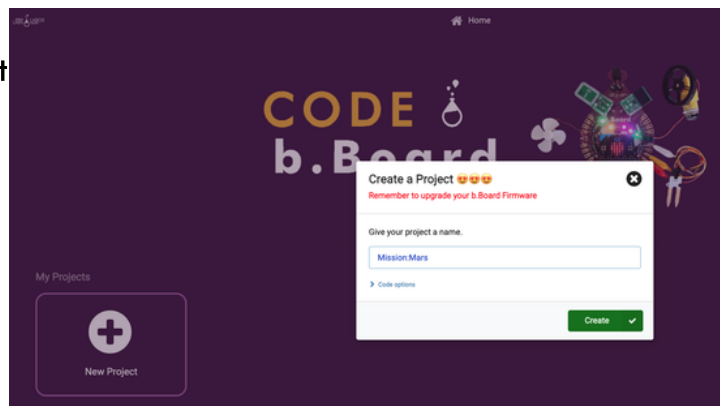
Scientists and engineers use remote controlled rovers to trek around the surface of Mars each day. The rovers are designed to move around 100 meters each Martian day (around 24 hours and 40 minutes), and are solar powered. Rovers have specific tasks like collecting data for further study, analyzing minerals, and conducting measurements. Engineers and scientists also have to figure out how far the rover has travelled, use hazard avoidance, create maps to guide the rover, understand which direction the rover is facing to make sure the rover is traversing far and well.

It is important to map out new terrain when you are exploring so that future missions can use your data. Your mission will be to collect data with your IR Distance sensor to map out the distance between the rover and different geological formations. Additionally for bonus points, use your IR distance sensor to add intelligence to your rover for obstacle avoidance and other autonomous features.

If you don't know much about the b.Board, or how to power it or plug anything in, take a minute to go through our great Getting Started Guide before you go any further!

Getting Started Guide

Once you're ready to go, head on over to [code.brilliantlabs.ca](https://code.brilliantlabs.ca) and start testing it out! Create a new project or open one that you've already created. In my case, I selected the new project + icon and gave it the name Mission: Mars.

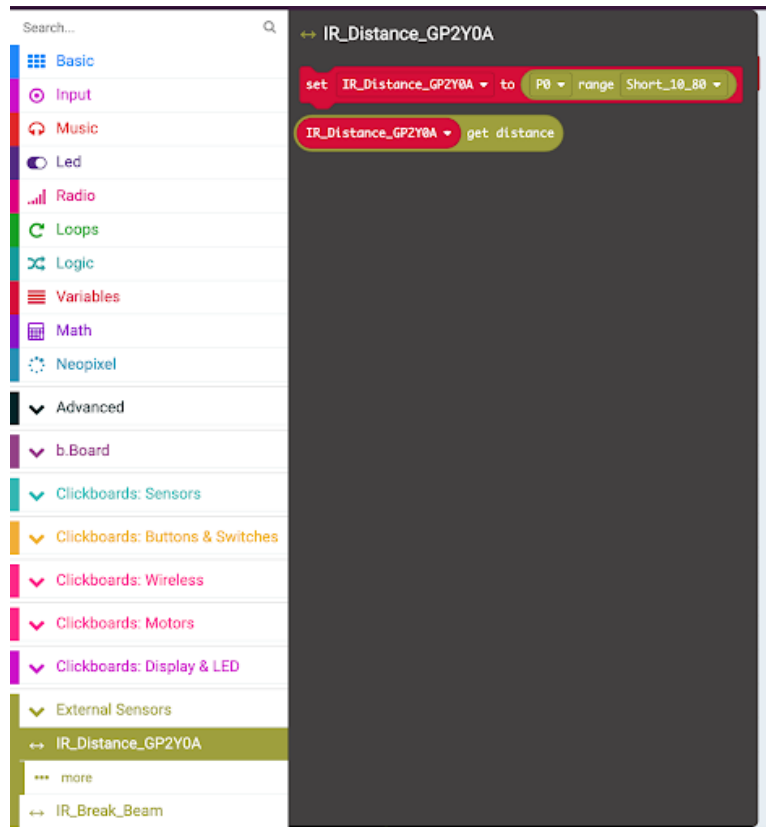


NASA. (2021). Moving around Mars. NASA. <https://mars.nasa.gov/mer/mission/timeline/surfaceops/navigation/#traverse>.

As soon as you select “create”, your new project will open.

On the left-hand side of the screen, you can see the toolbox. This is where we keep all of the blocks of code you need to control your micro:bit and b.Board.

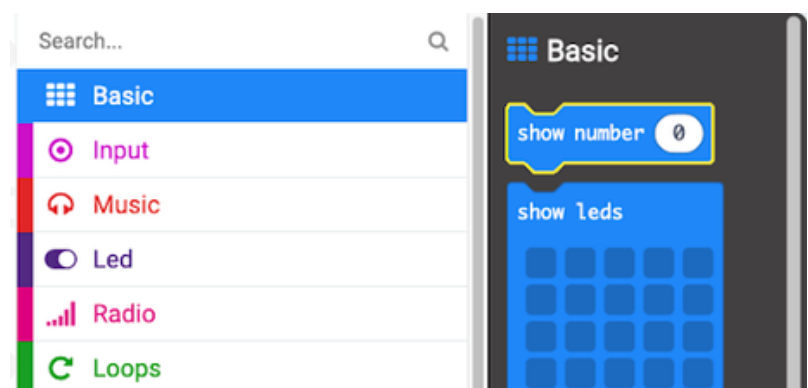
We will be using the IR GP2Y0A 10-80cm external sensor, so we should scroll to the bottom of the toolbox and expand the “External Sensors” category and select the GP2Y0A as shown here: →



Because this sensor isn’t built into the b.Board or micro:bit, we need to tell them where we connected it. In our case, we connected ours to P0, so let’s grab the top block and drop it in our “on start” block and set it as shown below:



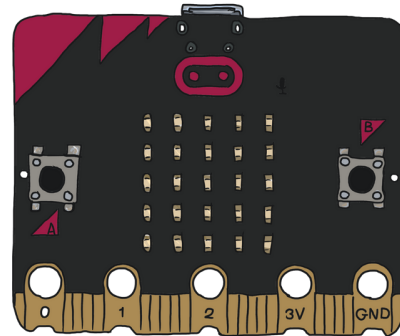
Now let’s experiment with IR distance sensing by displaying the distance from your sensor to different obstacles within 10-80cm in front of it. To do this, grab the “show number” block as shown here: →



Drop it in your forever loop, then go back to your External Sensors IR GP2Y0A2 toolbox and select the get distance block and drop that into your show number block you just put in your forever loop as shown below:



Download your code to your micro:bit and observe how the value changes as you hold different objects, such as your hand, in front of it.



## What next?

Continue to experiment with this idea. How accurate is it? What value does it return when I'm less than or greater than 10-80cm? How will you tell your rover when it should take a measurement? How could you incorporate distance measurements into your driving for obstacle avoidance? Once you've got it all sorted out, head on over to our WiFi guide to learn how you can connect your rover to our Brilliant Labs Cloud ([cloud.brilliantlabs.ca](https://cloud.brilliantlabs.ca)) and get your rover ready to send your distance data from "Mars" back to "Earth". :)

### Join the Mission: Mars Challenge!

Are you on track to complete your Mission: Mars Rover by early May? If so, Brilliant Labs welcomes you to visit or mail your rover to 1 of 5 in-person Provincial School Maker Faires or the Atlantic Virtual Mission: Mars Challenge (June 2nd). This is your chance to showcase your work and participate in up to 10 mission challenges. Each challenge, when completed successfully, will earn points and badges. The Mission: Mars student engineers with the most points will win the Mission: Mars Challenge Showcase!

### Download, Register & Book Today!

Get the Mission: Mars Challenge Guide to learn more about what to expect and how the points will be awarded. Plus, don't forget to register and book your Mission Challenge(s) at [Brilliantlabs.ca/innovation-challenge/missionmars](https://Brilliantlabs.ca/innovation-challenge/missionmars) (winners will be announced at the June 9th Atlantic Virtual School Maker Faire). Join the challenge and explore Maker Mars!

