This board shows sensors that robots use to find their way around in the world.

On the left is a simple “switch” that gets turned on when a robot bumps into something.

When the switch closes, a program that runs in the microcontroller will instruct the robot to back up.

Infrared sensors are also low-cost ways to know when a robot is close to an object in front of it. These sensors send out an invisible beam of infrared light that our eyes can’t see. When enough light bounces back, the robot picks up this light and knows to turn around.

Next is a sensor that sends out a very high-pitched sound and then listens for how long it takes for the sound to come back. This works just like a bat.

Next is our favorite sensor the wonderful time-of-flight sensor. It sends out an invisible pulse of laser light that will not harm our eyes. It then measure how long it take for the light to return. Since light moves at a constant speed, we can calculate how far an object is away from us. We have to be quick about it though. Light travels at 186,000 miles per second. So our stop watch has to be able to count time in the fraction of a nano second.

These four sensors all cost just a few dollars each. But if you want your robot to build a highly accurate map of the world around it, you need a lot more money. The last sensor is a $300 LIDAR scanner. It has a laser that spins around 9,000 times per minute and can create a 3D map of everything around our robot. If you are building car-sized robots, this is a good choice.