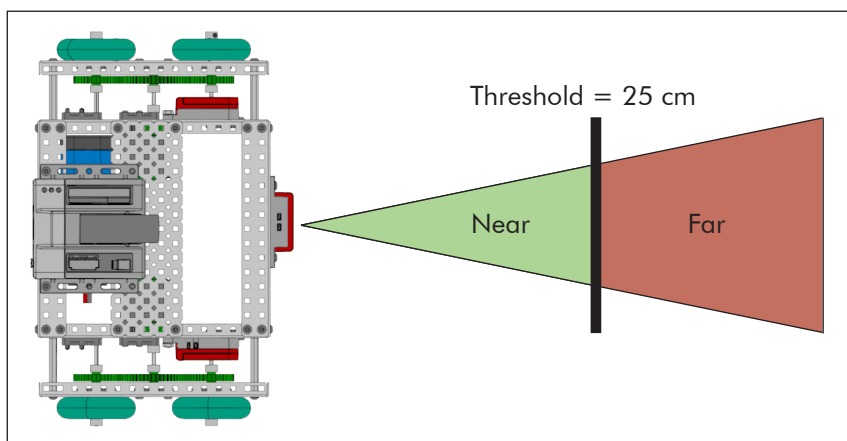


## Reference

### Thresholds with Natural Language

Thresholds are values that set a cutoff in a range of values, so that even if there are many possibilities, the value eventually falls above the threshold, or below the threshold. Using thresholds allows you to perform certain behaviors depending on where a certain value (usually a sensor value) falls in relation to the threshold.



If you look at this image, it shows a VEX using an Ultrasonic Rangefinder. The threshold in this case is 25 centimeters. We can create behaviors that tell the robot to go forward until the Ultrasonic Rangefinder detects something closer than 25 centimeters.

```
forward(63);
untilSonarLessThan(25);
```

The threshold is just used to determine at which point the robot should be performing a different behavior.

#### Calculated Thresholds

Some sensors, like the Ultrasonic Rangefinder and Potentiometer, provide the same set of values no matter what environment the robot is in; for the most part, their thresholds can simply be chosen based on their application. Other sensors, like the Light Sensor and Line Tracking Sensor, will provide very different values based on the environment they're in, due to factors such as the amount of ambient light or the type of surface the robot is tracking. Sensors that provide a different range of values based on their environment need to have their thresholds calculated.

For example, to find a dark line on a light surface, you must first calculate a threshold to distinguish light from dark. One recommended method is:

1. Measure the Line Follower Sensor value of the light surface. (For more information on finding sensor values, reference the ROBOTC Debugger document.)
2. Measure the Line Follower Sensor value of the dark surface
3. Add the two light sensor readings together
4. Divide by two to find the average, and use it as your threshold

In equation form:

$$\frac{\text{light value} + \text{dark value}}{2} = \text{threshold}$$

