

LEGO® MINDSTORMS® NXT Measurement Instructions

For the Science of Spring Force activity, there is no additional programming needed for the LEGO® MINDSTORMS® NXT brick. The necessary activity device is built by attaching an ultrasonic sensor onto the MINDSTORMS® NXT brick so that it points downward. An example of one setup is shown in Figure 1.

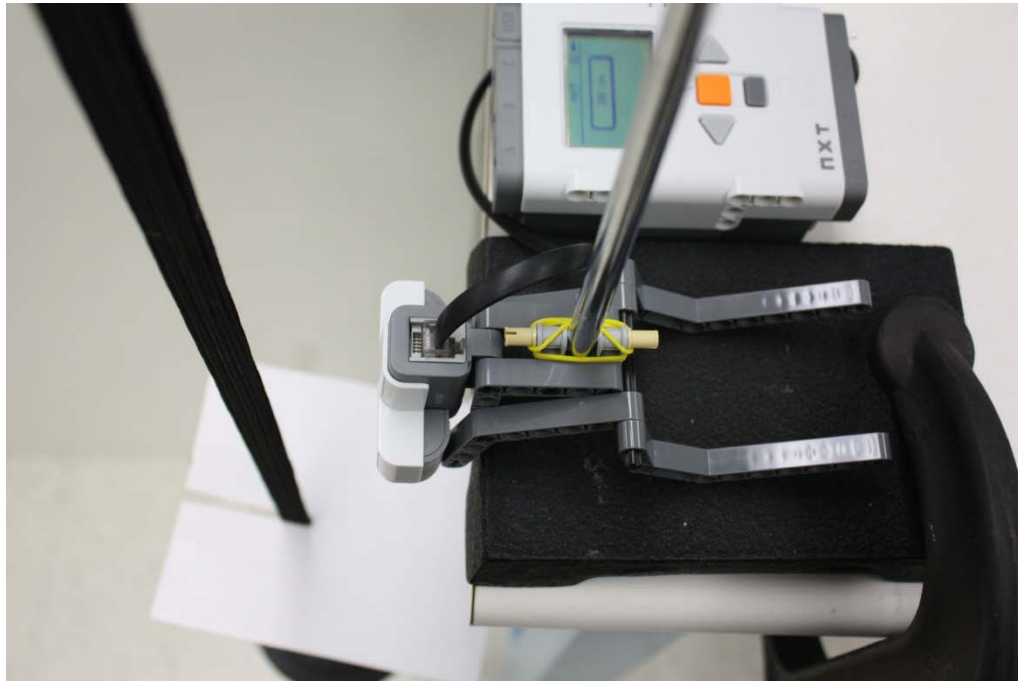


Figure 1: Alternate NXT sensor setup, with brick and attached ultrasonic sensor.

In order to view real-time measurements using the sensor and NXT, turn the NXT on using the orange button. At the start menu, use the grey arrow buttons to scroll to the “View” menu, as shown in Figure 2. Press the orange button to select the “View” submenu.

View



In the View submenu, you can do a quick test of your Sensors and Motors and see the current data for each.

Connect Sensors or Motors to the NXT port(s). View will help you select the right port or check the default settings.

Select View in the NXT display.



1 Select the icon of the Sensor or Motor that you want to test. You can only get readings from one sensor or motor at a time.



2 Select the port to which the Sensor or Motor is attached.



3 The data from the Sensor or Motor appears on the display.

Figure 2: "View" menu introduction, taken from the LEGO® MINDSTORMS® NXT user guide.

In this submenu, scroll to "Ultrasonic cm" in order to view measurements using the ultrasonic sensor in centimeters. There is also an option named "Ultrasonic in," which allows the user to view measurements in inches. However, smaller units have better measurement resolution, so for the purposes of this activity, use centimeters.

Next, as shown in Figure 2, select the port to which the sensor is connected. If it is not connected already, connect the ultrasonic sensor to one of the bottom sensor ports by using the black wires included in the kit. Make sure that the selected port corresponds to the port to which the sensor is physically connected.

Once this is done, the user should be able to read values measured by the NXT. Objects, preferably flat objects, can now be detected by the sensor, and the distance from the object to the sensor can be read out by the NXT. Make sure that the object is positioned directly above the sensor for a proper measurement.

To recap these instructions, view Figure 3.

View

Test the Ultrasonic Sensor's ability to measure distance using View.

Connect the Ultrasonic Sensor to the NXT.

Select View in the NXT display.



Select the Ultrasonic Sensor icon. Select the port in which you have placed the sensor.

Try to measure the distance to an object. Move the object closer and see the different readings.

Figure 3: Ultrasonic sensor activation, as taken from the LEGO Mindstorms NXT user guide.