

Robotics – Vehicle Builds

Week of 9.23.2014

Working in the same groups as the previous vehicle build, you will be tasked with two assignments this week. Our original “Sachi Bots” may present to outside observers as intelligent little creatures. Able to navigate a table maze, they rely purely on directional instructions. Functionally blind to their environment, they are incapable of adaptation. This week we change the game with the introduction of sensors! Your vehicles will now have the ability to sense and interact with their environment. The ability to adapt and change behavior with varying conditions is essential to intelligent robotic systems. Your robots will have the ability to sense touch (bumpers) and distance (ultrasonic). You have Thursday, Friday and the weekend to complete both assignments. Your group should email Chad two separate programs before class Tuesday morning. (One program for each assignment.)



Vehicle Components:

2 Motors	1 Touch (bumper) Sensor
2 Wheels	1 NXT MindStorms “Brain”
1 Ultrasonic Distance Sensor	Any pieces you wish to connect

Assignment One:

The first vehicle will only need to use the ultrasonic sensor. Your vehicle will need to drive towards the classroom wall on the floor.

- The vehicle will start at a random distance between 200 and 120 cm away from the wall.
- When you press Start, it should drive until it is 50 cm from the wall.
- At 50 centimeters it should speed up a noticeable amount until it is 25 centimeters from the wall.
- At the 25 cm mark, it should drive until it is 10 cm from the wall slowly.
- At the 10 cm mark, it should perform a 180° turn.
- Once it turns, it should drive back to a portion 100 cm from the wall and STOP

Assignment Two:

The second vehicle will need to use the ultrasonic sensor and a bumper sensor. This vehicle will drive around on top of the classroom table. It must demonstrate the ability to stop, back up and turn when it “sees” the cliff edge of the table. It must also be able to stop, back up and move around a box that it may hit on the table. Hint: The bumper may be a good sensor for knowing when it hits an object. The ultrasonic sensor (pointing towards the ground), may be ideally suited for detecting when it encounters a table edge. A truly well designed vehicle will be capable of driving around a table by itself for many minutes without stopping, falling or getting stuck! Good luck!

Example program for your reading enjoyment

The following program example uses some important programming elements that you may find useful. Feel free to copy and adapt as needed. Take note of the switch that is embedded (inside) the other switch. This setup is sometimes referred to as a nested conditional statement. What it means is that the switch on the inside will not be triggered until the outer distance switch sensor encounters a situation in which the sensor is closer than 50 cm. Good luck and have fun.

