Activity 1 – Building the Base Robot

Vocabulary

90° block connector

beam

bracket

connector

Straight Block Connector

Objective

Learn how to build a basic two-wheel robot that can be used as a base for additional activities.

Background

The TETRIX PRIME system enables you to construct various robots using the parts included in the base set. As you become more proficient in using the building system, more complex activities using additional parts might be assigned to expand your learning.

Materials

- TETRIX PRIME Building System
- R/C Components Set
- Painter's tape
- Tape measure
- Stopwatch
- *TETRIX PRIME Robotics: Autonomous Student Logbook*

Procedure

1. Become familiar with the PRIME Building System.
   - Examine the metal and plastic parts.
   - Identify and inventory each element within the PRIME set using the top card from the set.
   - Think critically about why the parts are separated into storage bins and why this is a necessary step.
2. Follow the instructions in the Resource pages to assemble the base robot. The base robot is a two-wheel robot with two continuous rotation servos driving two wheels for propulsion and providing the steering control. A third contact point is a metal rod, or skid, placed on the front of the robot.
3. After you have successfully assembled your robot, connect the servos to the receiver. The drive servos should be plugged in so that the right joystick moves the right drive servo forward when the joystick is moved forward. The left servo should operate the same way using the left joystick.
4. If the servomotors do not move in direct relation to the joystick movement, use the NOR/REV switches to change the direction of rotation.

5. Become familiar with the operation of the robot by operating the controls and driving it.
6. After you have become familiar with the control systems, drive the robot in a straight line for distances of 500 centimeters, one meter, and two meters.
7. Record the time required for the robot to travel the measured distances in the table found in the student logbook.
8. Complete the activities in the Building the Base Robot Data Sheet.
9. Unless instructed not to do so, disassemble the robot and return the TETRIX PRIME parts to the storage container.

Troubleshooting

If the robot does not function correctly, you should make sure:

- The batteries in the controller are fresh. They should have a solid green light on the controller.
- They have a solid red light on the receiver.
- The controller and receiver have been connected to each other. Turn off the controller, press the connect button on the receiver until the red light flashes quickly, turn on the controller, and press and hold the connect button until the red light on the receiver stops flashing.
- All wheels turn freely. Loosen the setscrews and adjust clearance so the wheels turn freely.
- The battery and servos are correctly connected. The black wire on each connector should be located at the outer end of the receiver.

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Building the Base Robot Data Sheet

1. Complete the table below to determine the average time required for the robot to travel a distance.

	500 centimeters	1 meter	2 meters
Student 1			
Student 2			
Student 3			
Average Time			

2. Use the speed formula, $s = \frac{d}{t}$, to determine the speed of the robot in centimeters per second.

3. Use the speed formula to determine the time required for the robot to travel each distance.

Distance	Time Required
1.5 meters	
5 meters	

4. Drive the robot the distances in the table shown in Problem 4. Compare the **actual time required** to the **calculated time required** in the chart. Are they the same? Explain any differences.

5. Determine the distance traveled for each of the following times.

Time	Distance
0.75 second	
5.00 seconds	

6. Measure the distance traveled as you use a stopwatch to drive the robot the times shown in the table in Problem 6. Compare the **actual distance** traveled to the **calculated distance** in the chart. Are they the same? Explain any differences.