

Lab Activity

Does Wheel Size Matter? Procedure Sheet

Overview: Students will use the Vex Robotics System in a laboratory setting and conduct scientific inquiry-based experiments to determine the effect wheel size has on the speed reached in a set distance.

In this Lesson, the student will be able to...

1. Build a robotic test bed
2. Identify the independent, dependent, and control variables in this investigation
3. Run the investigation using 3 different conditions
4. Collect data, record it on a data table, and graph the data
5. Convert between centimeters and inches
6. Apply and describe the various points of experimental procedure:
 - a. Experimental hypothesis
 - b. Measurement technique
 - c. Multiple trials
 - d. Systematic Error
 - e. Random Error
7. Analyze data and draw conclusions
8. Extrapolate the new distance traveled based on prior testing
9. Write up a summary of lessons learned in the investigation

Materials needed:

Vex Squarebot
Wheels for modifications
Stopwatch
Radio Transmitter
Yard Stick
Marking Tape

1.0 Small-Sized Wheel Testing

1.1

Modify the Squarebot with the first wheel condition. (small)



Fig. 1

1.2

Prepare the test area by adding a starting line and then a finish line 72 inches away.

1.3

You will need a stopwatch handy for this experiment. At this point, gather any other materials you may need, such as a ruler, pen, and paper.

1.4

Identify who will run the robot and who will keep track of time.

1.5

Take turns with your partners driving the robot. Become familiar with the controls so you can have good trial runs.

1.6

Measure the diameter of the wheels and record it on your data table.

1.7

- a) Set the robot behind the starting line.
- b) When the robot crosses the starting line, start the stopwatch.
- c) When the robot crosses the finish line, stop the stopwatch
- d) Record the time on the data table
- e) Repeat 4 more times
- f) Average the time of the 5 trial runs
- g) Calculate the average speed of the condition
- h) Plot the Wheel Size vs. Speed for the condition

2.0 Medium-Sized Wheel Testing

2.1

Modify your Squarebot so that it is equipped with the medium-sized wheel.



Fig. 2

2.2

Estimate the robot's speed based on the wheel's size.

2.3

Repeat the steps from 1.7

- a) Set the robot behind the starting line.
- b) When the robot crosses the starting line, start the stopwatch.
- c) When the robot crosses the finish line, stop the stopwatch
- d) Record the time on the data table
- e) Repeat 4 more times
- f) Average the time of the 5 trial runs
- g) Calculate the average speed of the condition
- h) Plot the Wheel Size vs. Speed for the condition

3.0 Large-Sized Wheel Testing

3.1

Modify your Squarebot so that it is equipped with the large-sized wheel.

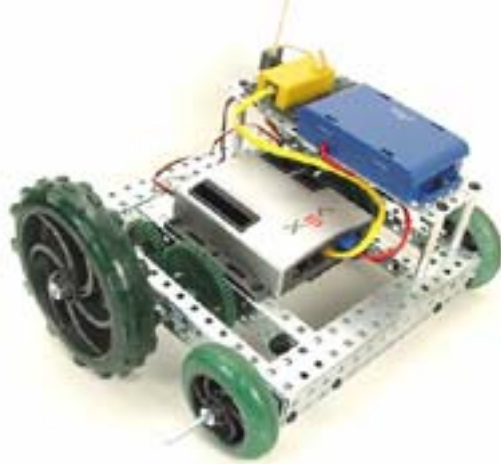


Fig. 3

3.2

Repeat the steps from 1.7 and 2.3

- a) Set the robot behind the starting line.
- b) When the robot crosses the starting line, start the stopwatch.
- c) When the robot crosses the finish line, stop the stopwatch
- d) Record the time on the data table
- e) Repeat 4 more times
- f) Average the time of the 5 trial runs
- g) Calculate the average speed of the condition
- h) Plot the Wheel Size vs. Speed for the condition