

Going the Distance - NXT

Suggested Time

60 minutes

Age

8 - 13

Challenge

In this activity, use an RCX car equipped with a light sensor to determine the hidden letter (under a table or in another room). The letter will be determined using light sensor collected data on 3 passes over the letter.



Topics

Distance, Time, Graphing, Linear Relationships, Linear Equations, Making Predictions

Subjects

Math & Engineering

Programming Themes

Motor Forward & Wait for Time

Related Math & Science Concepts

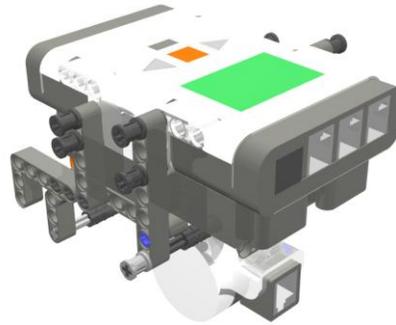
- Acceleration
- Vector Quantities
- Velocity
- Wheels and Axles

Materials

- NXT Car
- Assortment of LEGO Technic Pieces
- Tape Measure
- Tape or a LEGO person

***Building
Instructions***

1. Take an NXT and attach a motor using connector pegs, connector beams, and axles.



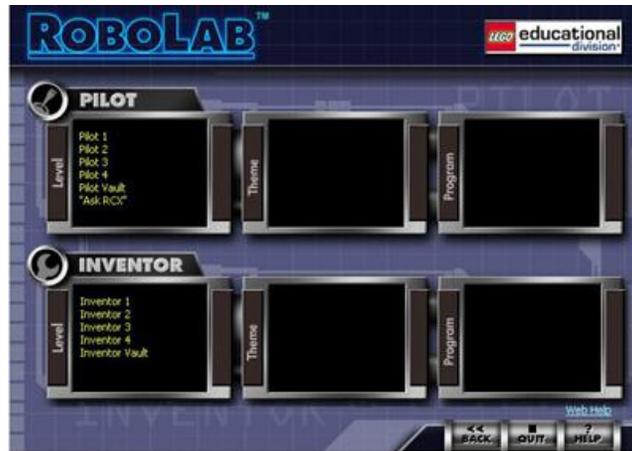
2. Assemble the wheel assemblies and attach to the NXT motor assembly.



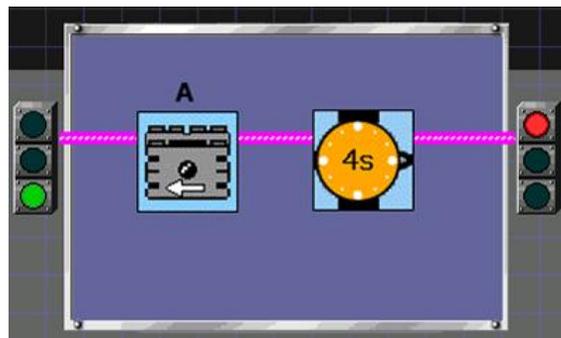
3. Wire the motor to output A.

Programming Instructions

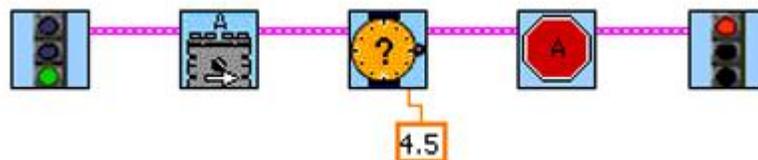
1. Choose whether to use ROBOLAB or the LEGO NXT Software to program (follow step 2 for ROBOLAB; follow step 5 for LEGO NXT Software.)
2. In ROBOLAB, choose whether to use PILOT or INVENTOR to program (follow step 3 for PILOT; follow step 4 for INVENTOR).



3. Using ROBLAB PILOT 1, program the car to travel for 2, 4, and 6 seconds.



4. Using ROBLAB INVENTOR 1, program the car to travel for 2, 4, and 6 seconds.



- Using the LEGO NXT Software, program the car to move.



- Set the controls to travel for 2, 4, and 6 seconds.



Collect three data points (time, distance) and plot. Using this plot determine how much time is required to run the car in order to come within an inch of an arbitrary distance. The arbitrary distance can be marked using a small LEGO person.

In Action

Classroom Management

- Use tape to make a "starting line" on the floor.
- Cars should be programmed to drive for 2 seconds and then stop. Students should place the cars at the starting line and run the program.
- Students should measure the distance the car traveled.
- Repeat this programming and measuring action at least two times, programming for 4 and 6 seconds.
- For added excitement, the teacher can place LEGO people on the finish line and students can try to drive as close to the line as possible without knocking over any of the people.
- Students should plot the data on graph paper. Time is on the X-axis and distance is on the Y-axis.
- After students have plotted data, the teacher will pick a distance and ask students to use their graphs to predict how long their cars should drive in order to stop as close to the line as possible without touching it or driving over it.
- Discuss the activity with the students, talking about graphing, linear equations, and making predictions.
- Have groups of students test their cars at one time to see which group can come closest to the line.
- Include a few minutes at the end of the activity to talk for discussion. Topics can include discussions about why different cars drive different distances in the same amount of time.