

Name _____

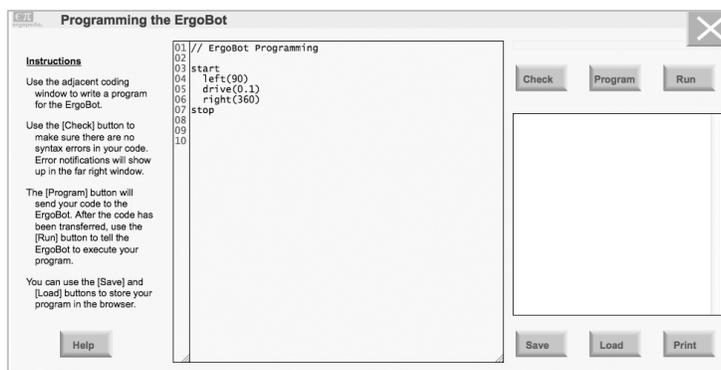
Project 4. Programming the ErgoBot

Question	How do you tell a robot where to go and what to do?
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Learning to program is a skill that can open the doors to a wide variety of career opportunities. In this project you will get a feel for the process of programming, as well as the satisfaction of watching a robot do exactly what you program it to do.

Using the interactive

1. Pair the ErgoBot to your computer or tablet and set it to drive mode.
2. Open the interactive simulation: *Programming the ErgoBot*.
3. Type commands into the programming window.
4. [Check] finds any errors in the program and reports them to the Output window.
5. Click [Program] to download your program to the ErgoBot.
6. Click [Run] to execute the program.



Materials: ErgoBot, meter stick, tape, stopwatch, cardboard boxes, plastic cup

Part 4a: Forward and back

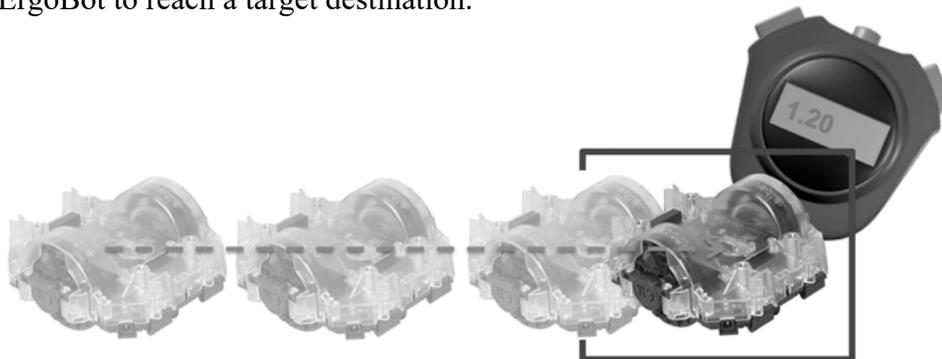
Program the ErgoBot to start behind a line (marked with tape or tiles). It must move forward 1 meter, maneuver around an obstacle (such as a cone), and return to its starting position. Record your program below.



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Part 4b: Just in time

In this mission you will determine the default speed of the ErgoBot and use this value to predict the time for the ErgoBot to reach a target destination.



1. Measure: With a stopwatch, measure the time it takes the ErgoBot to travel 0.50 m, 1.0 m, 1.5 m, and 2.0 m. For each measurement, start the ErgoBot slightly behind your starting line so that it reaches full speed at time $t = 0$ s. Record your data in Table 1.

Table 1: Calculate the default speed of the ErgoBot.

distance	0.50 m	1.0 m	1.5 m	2.0 m
time				
speed = distance/time				

What is the default velocity of your ErgoBot? Is it constant? How can you tell?

2. Predict: Your instructor will set up a starting line and target destination. Using your speed data, predict the time at which your ErgoBot will enter the target destination. Record your work below. Remember to consider the size of the ErgoBot when measuring the distance it must travel!

predicted time: _____

3. Write the code: Program your ErgoBot to reach the target destination “just in time”, and park. Record your code below. Test your solution while your instructor measures your time. How close was your prediction?

Example program:

measured time: _____

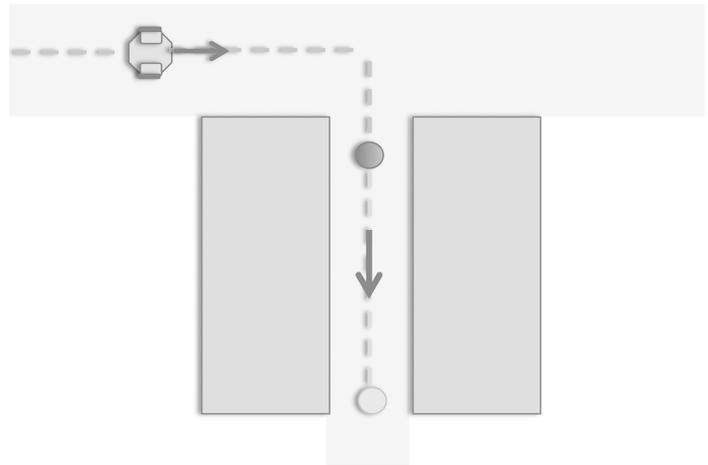
$$\% \text{ error} = \left| \frac{\text{measured} - \text{predicted}}{\text{measured}} \right| = \underline{\hspace{2cm}}$$

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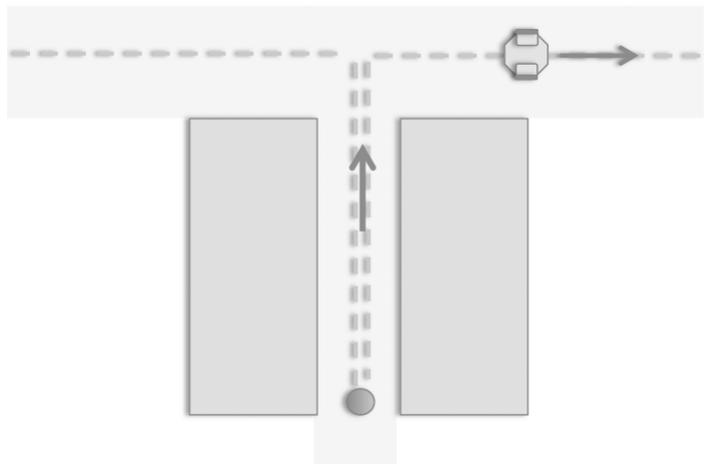
Part 4c: Clear the road

Program the ErgoBot to clear an obstacle out of the road, using these steps:

1. Drive down a straight “street”.
2. Turn into a “side road”.
3. Plow an obstacle to the end of the side street.



4. Return to the main road and continue on.



Demonstrate your working program by clearing the side street set up by your teacher.

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Applying new knowledge

1. What is an *argument* in computer programming?
 - A. the proper structure and arrangement of commands in a computer program
 - B. a programmable electro-mechanical device that contains a microprocessor
 - C. data provided as an input to a command to specify the action taken by the command
 - D. a list of commands written in a specific programming language to accomplish a task
 - E. a conflict in a decision tree

2. Find three syntax errors in this example of an ErgoBot program:


```

      Start
      right (20)
      left (90)
      forward (-2.0)
      
```

3. Modern farmers program their tractors to plow the fields. Write a program that will cause the ErgoBot to “plow” the edge of a “field” that is 50 cm by 50 cm.

4. Describe the shape traced out by an ErgoBot that executes this program.

```

start
drive (1)
drive (-0.5)
left (90)
drive (0.5)
drive (-1)
stop

```

5. What does it mean to debug a program?