Activity 3.1.2 Basic Outputs Programming – VEX

Introduction

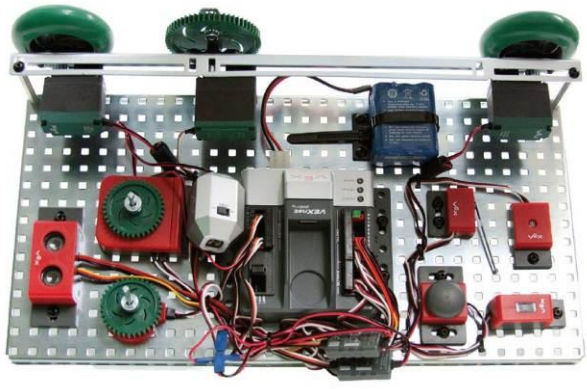
Computer programs are used in many applications in our daily life. Devices that are controlled by a processor are called outputs. These devices have a variety of functions such as producing motion, light, and sound. In this activity you will use ROBOTC to control several outputs.

Equipment

- Computer with ROBOTC software
- POE VEX testbed
- PLTW ROBOTC template

Procedure

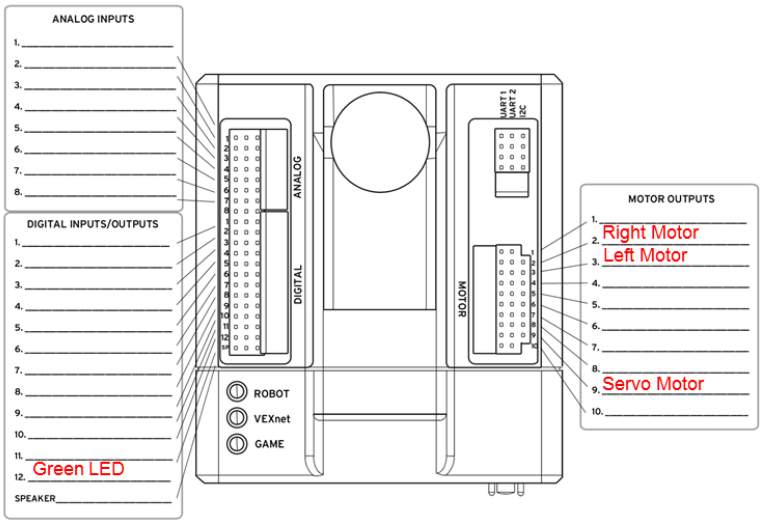
1. Form groups of four and acquire your group's POE VEX Kit under your teacher's direction.
2. Within your four student group, form a two student team known as Team A and a two student team known as Team B.
    a. Team A will use the VEX Testbed without the ultrasonic and the light sensor.
    b. Team B will use the VEX Testbed without the servo motor and flashlight.
    c. At the appropriate time, both teams will exchange testbeds.
3. Connect the POE VEX testbed Cortex to the PC.

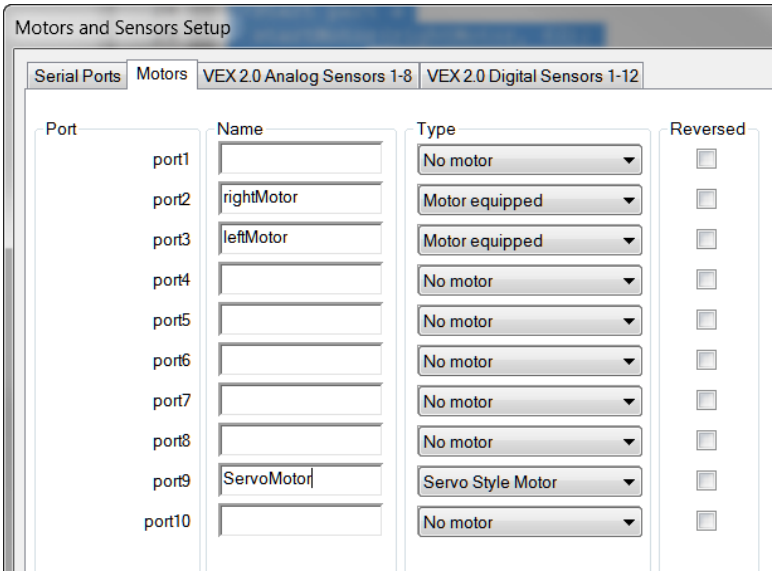


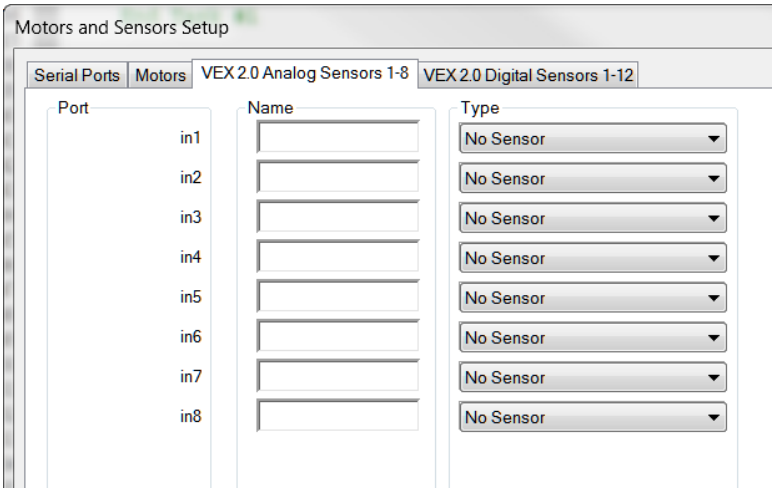
POE VEX Testbed

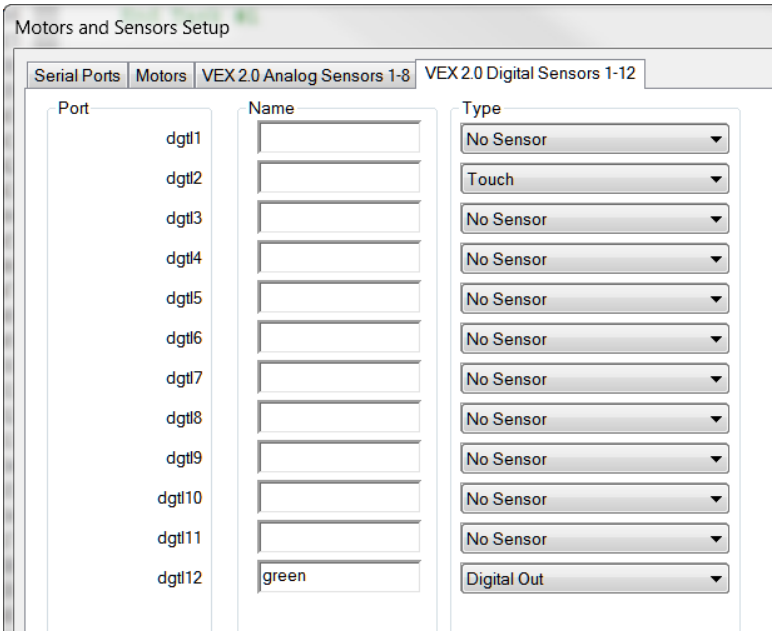
4. Open the PLTW ROBOTC template. Click File, Save As, select the folder that your teacher designated for you to save your ROBOTC programs in, then name the file A3_1_2_Part1.
5. In this activity you will use the Green LED, rightMotor, leftMotor, and Servo. Leave the previously connected motors and sensors wired to the Cortex. Go to the Motors and Sensors Setup window. Configure the Motors and Sensors Setup to reflect the inputs and outputs to be used. Note that additional motors and sensors that are physically attached may be configured; however, these are not required to be configured. Click OK to close the window.

Cortex Wiring Diagram







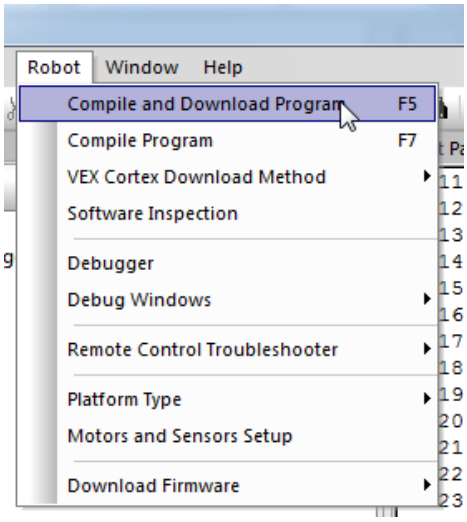


6. Copy and paste or create the program below in the `task main()` section of the program between the curly braces.

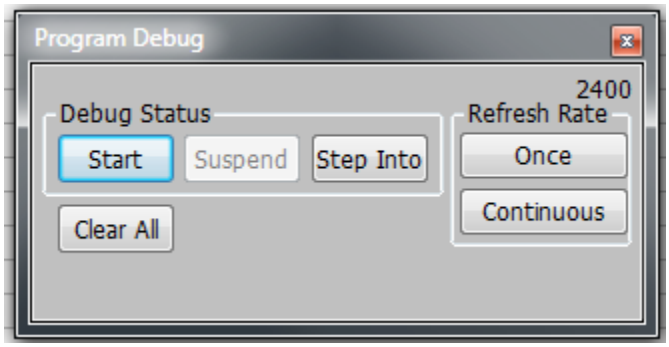
```
turnLEDOff(green);
wait(1);
turnLEDOn(green);
wait(1);
turnLEDOff(green);
wait(1);
turnLEDOn(green);
wait(1);
turnLEDOff(green);
```

Green LED

7. Power on the Cortex.
8. Compile and download the program. If you have any errors, check with your instructor to troubleshoot your program.

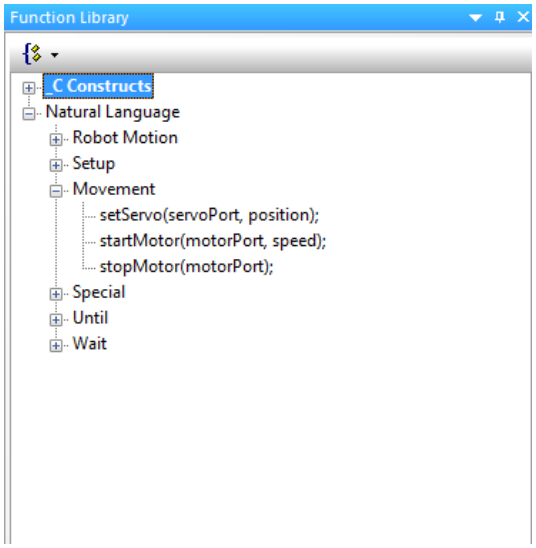


9. Press Start to run the program and observe the behaviors.

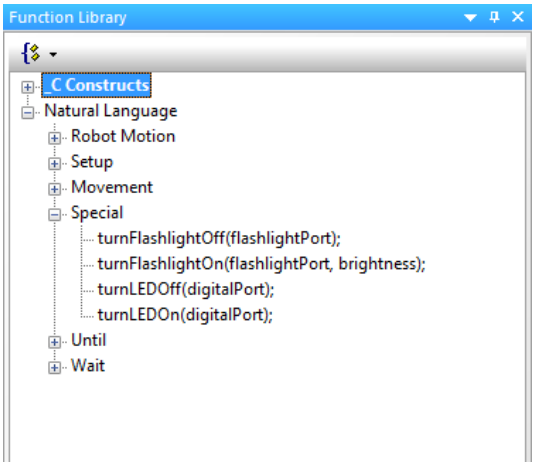


10. Save the program and document this program as pseudocode simple behaviors.

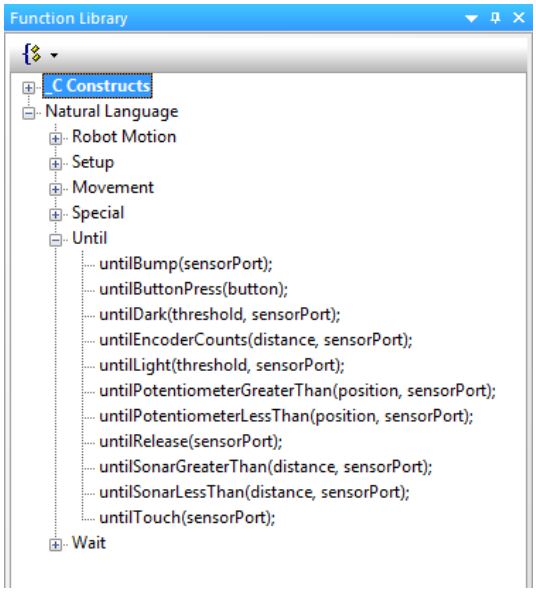
11. Open the PLTW ROBOTC template. Click File, Save As, select the folder that your teacher designated, then name the file A3_1_2_Part2. Setup the motors and sensors as done previously.
12. The wiring configuration and motors and sensors tabs should be the same as above.
13. Write a program that performs the following simple behaviors. Use the natural language functions where appropriate as shown below. Add comments at the end of each command line to explain the purpose of each step.
    a. Turn the rightMotor on forward at half speed for 5 seconds.
    b. Stop the motor.



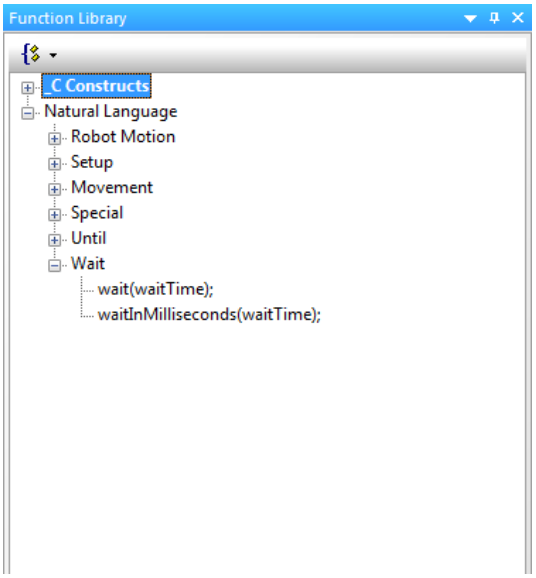
Natural Language – Movement



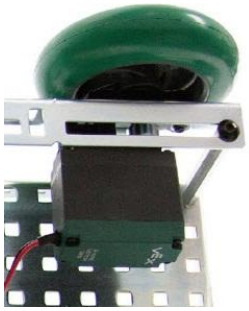
Natural Language – Special



Natural Language – Until



Natural Language – Wait



Motor

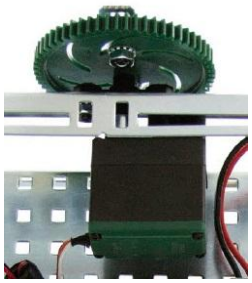
14. Test the program and troubleshoot if needed until the expected behavior has occurred.
15. Modify the program above to include this simple behavior.

    Turn on leftMotor at the same time that rightMotor is turned on.
16. Test the program and troubleshoot if needed until the expected behavior has occurred.
17. Modify the program above to include this simple behavior.

    Reverse both motors using two different programming methods.
18. Test the program and troubleshoot if needed until the expected behavior has occurred. Save the program.
19. Open the PLTW ROBOTC template. Click File, Save As, select the folder that your teacher designated, then name the file A3_1_2_Part3. Setup the motors and sensors as done previously.

20. Write a program that performs the following simple behaviors. Use the natural language functions where appropriate as shown below. Add comments at the end of each command line to explain the purpose of each step.
    a. Turn the rightMotor on forward at half speed for 5 seconds, then stop.
    b. Turn the leftMotor on in reverse at three-fourths speed for 2.5 seconds, then stop.
    c. Turn both motors on at full power, and spinning in the same direction, for 7.25 seconds, then stop.
21. Test the program and troubleshoot if needed until the expected behavior has occurred.
22. Team A will open the PLTW ROBOTC template. Click File, Save As, select the folder that your teacher designated, then name the file A3_1_2_Part4. Setup the motors and sensors as done previously.
23. Copy and paste or create the program below in the `task main()` section of the program between the curly braces.

```
setServo(ServoMotor, -127);
wait(2);
setServo(ServoMotor, 0);
wait(2);
setServo(ServoMotor, 127);
wait(2);
```



Servo Motor

24. Power on the Cortex and Compile and Download the program. If you have any errors, check with your instructor to troubleshoot your program.
25. Document what this program would look like as pseudocode simple behaviors. Save the program.
26. Write a program that performs the following simple behaviors. Use the natural language functions where appropriate as shown below. Add comments at the end of each command line to explain the purpose of each step.

a. Program the servo to go to position -127 for 2 seconds
b. Go to position -63 for 3 seconds
c. Go to position 0 for 2 seconds
d. Go position 63 for 3 seconds
e. Go to position 127 for 2 seconds.

27. Test the program and troubleshoot if needed until the expected behavior has occurred. Save the program.
28. Team A will exchange testbeds with team B. Team B will complete the previous steps.
29. Follow teacher direction and either print the programs or submit electronically with this activity.

Conclusion

1. Describe any challenges that you encountered while developing the program.

2. Describe how these outputs might be used in an application.