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**Grand Blanc High School Robotics Team**  
**2015 Programming Deliverable**  
Beginning-Level Tele-Op Programming Challenge



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Mentors to ask if you have questions about this Challenge: Robin Barrie or Sean Lynch

*IMPORTANT NOTE: if you will be completing this task in the lunchroom, Team Members are required to sit so ALL laptop screens are visible from the lunchroom entrance.*

Gather the following Materials:

- Team Programming laptop with RobotC installed. (or one of the 3 PCs in the back room)
- Logitech Dual Action Joystick. (These should be located in a box by the deliverables milk crate)

Prerequisites:

Ensure you have completed the Beginning level and Intermediate autonomous programming challenges as this challenge will build upon the work you did within those challenge.

Challenge Instructions:

*You will be using one of the Team's computers to complete this Challenge. We do not have enough licenses for Team Members to install our software on their computer(s).*

1. Connect the Logitech joystick to the laptop or desktop USB port. The joystick will look like the below with or without colored buttons.



2. Open Robot C Robot Virtual Worlds-VEX 4.x
3. Click on "Open File"
4. Navigate to Z:\Students\*"your name"*\VEX Curriculum\Programming\.
5. Open the "Vex\_Competition\_Includes\_2337\_Intermediate\_Auton\_Complete." file you saved at the end of the beginning level challenge. We will use this file to complete this challenge.
6. IMPORTANT!!!! Save the file as  
"Vex\_Competition\_Includes\_2337\_Beginning\_Telop\_Complete"
7. Click on "Download to Robot" to open the Virtual World Curriculum Companion.
8. Log in as guest
9. Select the "ROBOTS" tab and select "VEX Clawbot".
10. Switch to the virtual world Joystick Control window.
11. Validate Logitech Dual Action is chosen as the default joystick.

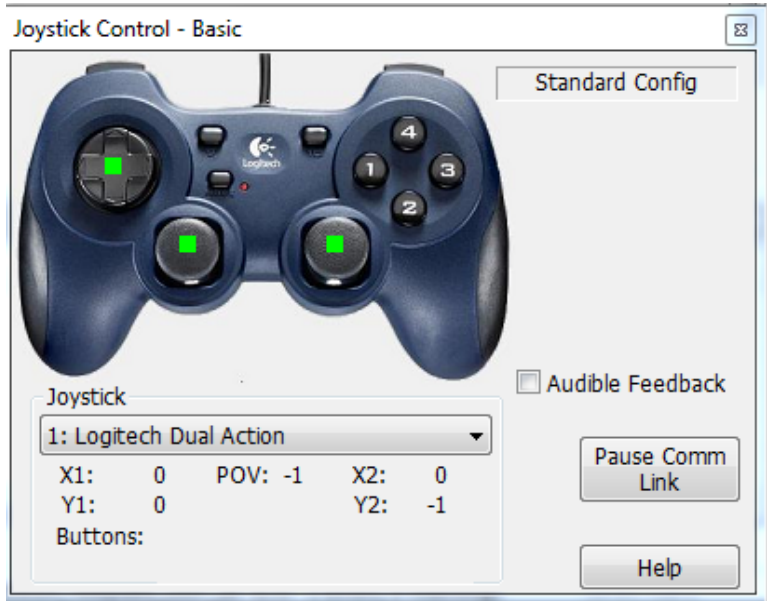


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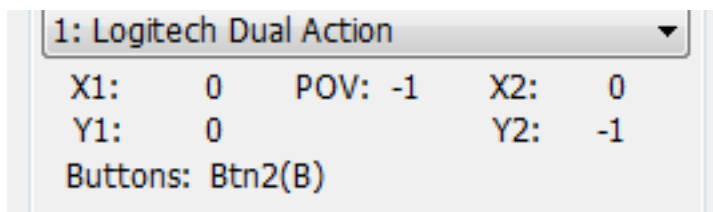
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- If you do not see the Logitech Joystick chosen, click on the drop down menu and choose Refresh to refresh the list. Choose the Logitech if the list is repopulated with that choice. If you still do not see the Logitech as an option troubleshoot the joystick connectivity.
12. Once connected validate the mode button light if in an off state. This will change the joystick variable.
  13. Validate the joysticks move or the numbers light up when you move the joystick or press the buttons.



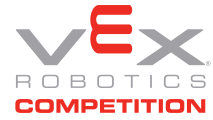
TIP: When pressing the buttons, you should see the button identifier displayed in the Joystick Control window.





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14. In the RobotC window set up the Arm and Claw motors using the following parameters on ports 6 and 7 then click on Ok.

port6	clawMotor	VEX 393 Motor	<input type="checkbox"/>	None
port7	armMotor	VEX 393 Motor	<input type="checkbox"/>	I2C_3

15. Comment out the Auton code you wrote before to prevent the robot from running that section of code.

TIP: In the C programming language you can comment out code using the following methods:

// a the beginning of a line will comment out the entire line.  
/\* and \*/ will comment out blocks of code as shown below.

```

/*
task autonomous()
    code block;
    code block;
    code block;
    code block;
    code block;
allMotorsOff();
allTasksStop();
}
*/

```

NOTE: This will prevent the autonomous code from making your robot move, but **virtual worlds will still run autonomous mode for 20 seconds.**

16. Use the table and diagram below to write the code to utilize the Y axis on joystick 1 and 2 to move the left side and right side wheel motors in tank drive.

TIP: Instead of setting the motors to a speed as you did in the Autonomous challenges you will need to set the motors to equal the input from the joysticks.

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Either insert these pages or have them go to the document on the PC. We can create a link on the bookmark bar on each PC.

[http://www.education.rec.ri.cmu.edu/previews/robot\\_c\\_products/teaching\\_rc\\_tetrix\\_preview/remotecontrol/documents/remote\\_control\\_lab.pdf](http://www.education.rec.ri.cmu.edu/previews/robot_c_products/teaching_rc_tetrix_preview/remotecontrol/documents/remote_control_lab.pdf)

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Analog Stick	Axis	Joystick 1	Joystick 2
Left	X	joy1_x1	joy2_x1
	Y	joy1_y1	joy2_y1
Right	X	joy1_x2	joy2_x2
	Y	joy1_y2	joy2_y2



All eight functions above will return values between -128 and 127.

17. Utilize any of the virtual world fields to validate your code is working.
18. Once you have the robot moving using the joysticks, write the code to utilize the buttons to activate the arm and the claw on the robot.
19. Configure the Joystick to move the robot using the following buttons.
  - a. Button 1 or X = Move the arm motor up
  - b. Button 2 or A = Move the arm motor down
  - c. Button 4 or Y = Close the claw
  - d. Button 3 or B = Open the claw
20. Ensure you are able to stop the arm and claw in the halfway positions.

TIP: You may need to utilize if / then / else statements to make the motors run properly. i.e. if button 1 is pressed run the motor at this speed else if button 2 is pressed run the motor at this speed else stop the motors.



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```
if(boolean_expression 1)
{
    /* Executes when the boolean expression 1 is true */
}
else if( boolean_expression 2)
{
    /* Executes when the boolean expression 2 is true */
}
else if( boolean_expression 3)
{
    /* Executes when the boolean expression 3 is true */
}
else
{
    /* executes when the none of the above condition is true */
}
```

For more information on if-then-else statements, refer to the following document.  
[http://cdn.robotc.net/pdfs/natural-language/hp\\_if\\_else.pdf](http://cdn.robotc.net/pdfs/natural-language/hp_if_else.pdf)

Utilize any of the virtual world fields to validate your code is working. Spend some time getting familiar with driving the robot and using the arm and claw that have items you can pick up.



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Engineering Notebook Entry Instructions:

Write an entry in your engineering notebook:

1. While you are working, detail your observations and document your process
2. Document the programming variables for each of the joystick buttons and joysticks. You can use the Joystick Control window to determine the variables.
  - a. Tip: You may want to print or download a picture of the VEX joysticks on the Internet and note the programming variables on the picture.
3. Answer the following questions:
  - a. What problems or frustrations did you encounter while trying to write and/or deploy your code?
  - b. Did you enjoy this programming task? Why or why not?
  - c. Did you experience issues getting the claw or arm moving in both directions? How were you able to resolve this?
  - d. Were you able to stop the claw without closing fully? What did you learn in being able to do so?

To Complete Your Challenge:

1. Print a copy of your code (use the EngiPRINTER), and add it to your Engineering Notebook entry (scissors and glue sticks are available for use while in the conference room),
2. Ensure that your Engineering Notebook entry is complete, and all required questions have been answered,
3. Open the laptop (or PC) you used to write the code, with RobotC visible and running. Ensure that your code has been deployed and is “working”,
4. Ask Clinton, Sean, or Robin to approve your Engineering Notebook entry and have your deliverables checklist validated,
5. Put the laptop, charger, and mouse away in the designated backpack, and return the bag to the appropriate bin in the conference room (if used),
6. Put all of the materials and resources back in the designated bin in the conference room, and put this document back in the programming binder in the green bin in the conference room.
7. Leave your workspace cleaner than it was when you found it.