

Robotics 2017-2018 Final Exam

Andrew Morin and Jacob Carpenter

1. What is the difference between a Robot Project and a Virtual Instrument?

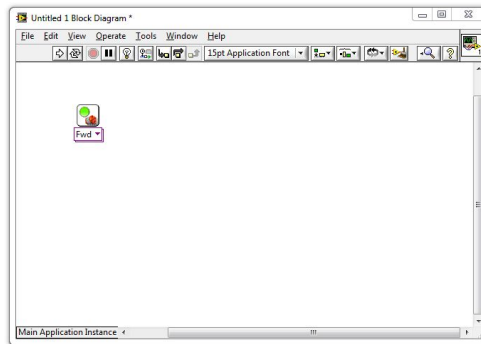
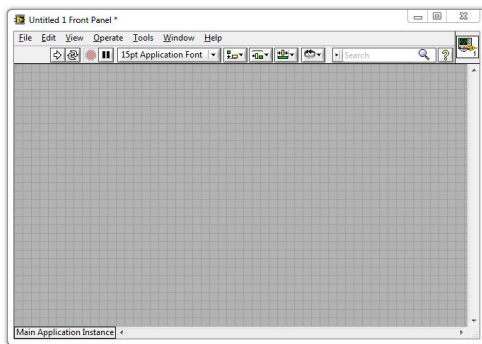
Robot Project

features an enhanced interface that allows you to configure and test your robot without a program, as well organize multiple program files in one place.

Virtual Instrument

contains a single Front Panel and Block Diagram, and can be used to create a single program and interface.

2. For this question, refer to the two pictures below:



a. What is the window on the left with the grey background called?

- The Block Diagram
- The Main Menu
- The Program Field
- The Front Panel

b. What is the window on the right with the white background called?

The Block Diagram

- The Main Menu
- The Program Field
- The Front Panel

c. Which window do you drag VIs into, to give the robot movement commands?

The Front Panel

- The Program Field
 - The Block Diagram
 - The Code Schematic (not shown above)
-

3. What is this called?



A Movement VI

- A Motor Control VI
- A Forward VI
- The Block Diagram

4. If you want to add a Motor VI to your program...

a. Where can you find one?

In the Tools Palette

- In the Functions Palette

- Type the word "Motor" and press enter
 - In bar on the left hand side of the screen
 - b. How do you add it to your program?
 - Double-click the Motor VI in the Functions Palette
 - Drag the Motor VI to the Front Panel
 - Drag the Motor VI to the Block Diagram**
-

5. How do you open the Functions Palette?

- Right-click an empty area of the Block Diagram**
 - Select Functions Palette from the View menu
 - Both of the above
 - None of the above

6. What command does this block give the robot?



- Forward a message to the robot
 - Turn the motors on in the forward direction**
 - Wait for 1 second
 - Stop the motors

7. What command does this block give the robot?



- Make the robot fall apart
 - Turn the motors on in the forward direction
 - Wait for 1 second
 - Stop the motors**

8. What does the pink wire indicate in this program?



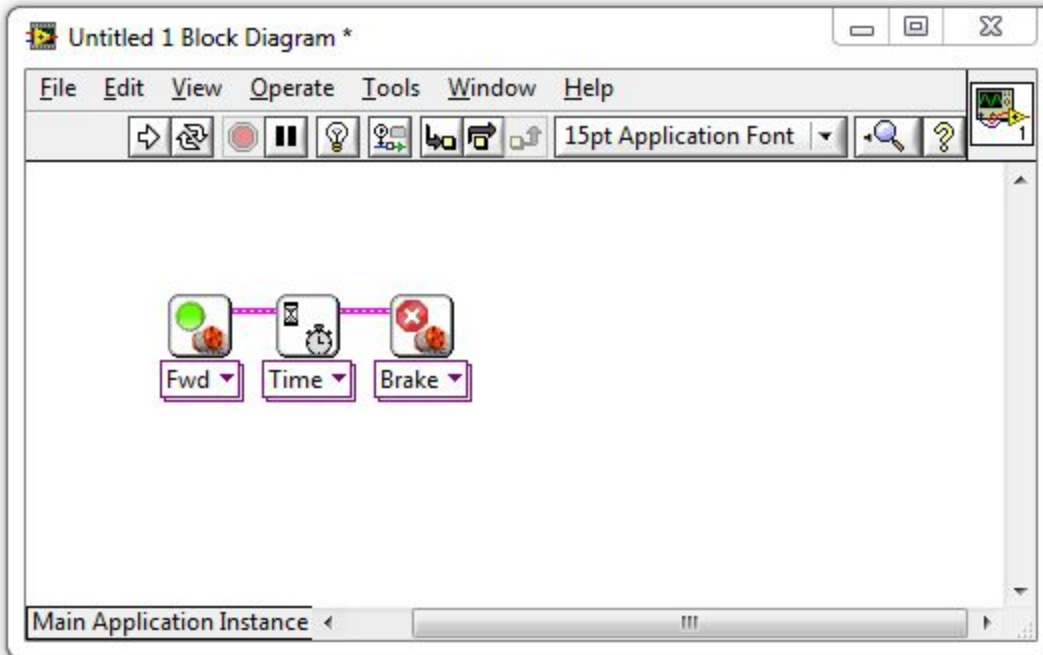
- The blocks were dropped too close together
 - LabVIEW is currently running the commands
 - The commands will take place in order they are connected from left to right
 - This is the Primary Command Sequence for the robot

5. 9. The two blocks shown below were dropped far apart and did not auto-wire. How do you connect them?

- Click their top corners and use the wiring tool to connect them
 - Drag them closer together until the auto-wire appears
 - Right-click the first block and select "Wire to Nearest"
 - You can't wire them together if you miss the first time

6. 10. Which button in the picture below that Runs the program.

The First Arrow



11. What is a Constant (also called a Constant Modifier)?

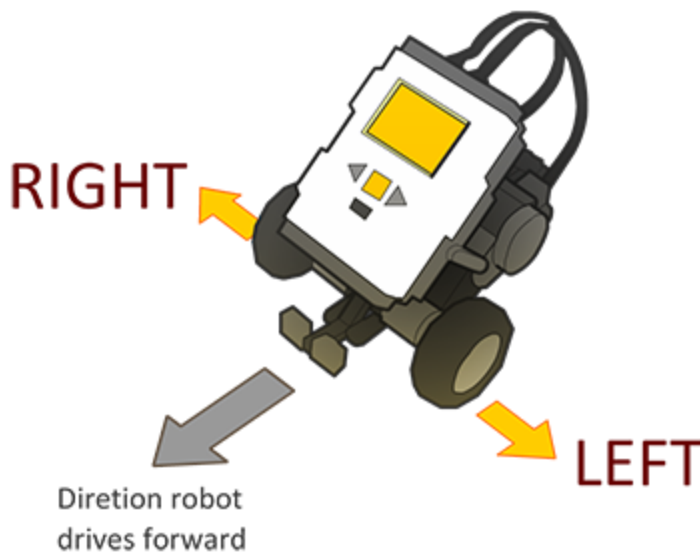
- A command that tells the robot to hold its position
 - Any command given to the robot that does not change its heading
 - Another name for a Variable Block
 - A "thing" representing a specific value, which can be wired into Blocks

12. How do you set a motor to run for 5 seconds instead of 1?

- Click the Motor Block and change the Duration setting to 5
 - Wire a Constant with a "5" in it into a Motor Block's "Time" port
 - Create a Constant with a "5" in it and drag it on top of the Motor Block
 - Drop a 5 Second Motor Block on the Block Diagram instead

13. Where would you check to see what settings are available on a block and what they do?

- Context Help window
 - Block Diagram
 - Front Panel
 - Main Menu



14

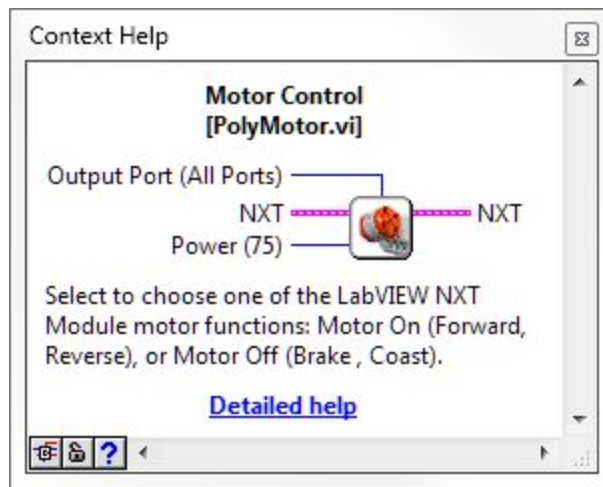
Direction robot drives forward

What ports are the robot's motors attached to on the default REM model?

- Left Motor=A, Right Motor=B
 - Left Motor=B, Right Motor=C
 - Left Motor=C, Right Motor=B
 - Wheel Motors=C, Arm Motor=B

14. Why are Rotations generally better than Time?

- The robot's clock is inaccurate
 - The wheels spin more freely
 - Rotations always go the same distance regardless of speed or battery level
 - You cannot set the number of seconds the robot waits



According to this picture from the Context Help menu, which of the following things can NOT be chosen on a Motor Block?

- How long to keep the motors running
 - Which motor ports to give the command on
 - How much power to give the motors
 - All of the above can be set on the Motor Block

16. Based on the same picture from the Context Help menu in question 4, what is the default value for the Power setting on the Motor Block?

- 75
 - 100
 - All Ports
 - No default

18. How do you make a program that can run on the NXT without needing to be hooked up to the main computer?

- Select "Target to NXT" from the File menu
 - Select "Send to NXT" from the Tools Menu
 - Choose "Run on NXT" from the NXT's LCD screen interface
 - LabVIEW programs cannot be run that way

19. Once you have deployed the program onto the NXT, how do you run it?

- On the NXT: Program Files > Run
 - On the NXT: My Files > Software File > (Name of .VI file) > Run
 - On the PC/Mac: File > Run Deployed Program
 - On the NXT: grey button labeled "Run Deployed"

20. A robot turns when...

- Its wheels move in different direction of at different speeds
 - You use a Motor Block set to Turn
 - You move the Steering slider to the left or right of center
 - Its wheels move together at the same speed

21. If the robot's left motor goes forward while its right motor goes in reverse, how will the robot's body move?

- Turn to the left
 - Turn to the right
 - Move straight ahead
 - Make an outward spiral

22. To make the robot turn...

- Change "Fwd" to "Turn" on the Motor Block
 - Move the steering slider to the left or right
 - Make an outward spiral
 - Give its wheels different movement commands

23. If you don't specify a motor, what does the Motor Block default to?

- Motor/Port A
 - Motor/Port B
 - Motor/Port C
 - All motors/ports

24. To specify which motors a Motor Block controls, you:

- Attach a Constant modifier to the Output Ports node
 - Change "Fwd" to the name of the motor you want
 - Use a "Motor A Block" instead
 - Select the Motor Block and type the letter of motor you want (A, B, or C)

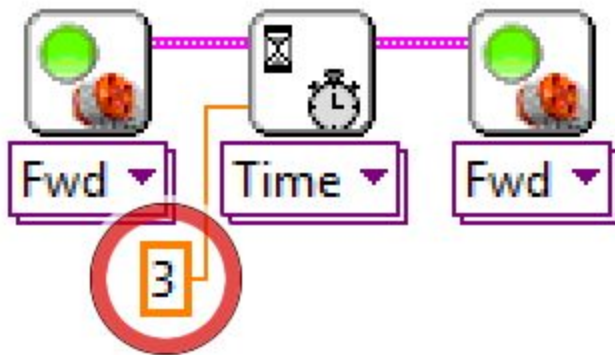
25. How do you remove a wire?

- Drag the blocks apart until the wire breaks
 - Click on the wire and press delete
 - Use the scissors tool to cut the wire
 - Hold down the mouse button and scratch it out
-

26.

What does the Sequence Structure do?

- Let the program choose between multiple "frames" of code to run
 - Let the program repeat "frames" of code more than once
 - Let you hide code that you don't want to run
 - Allow "phases" of code to run in sequence even if individual phases involve parallelism



27. What is the value of this Constant circled in red above?

- 0
 - 3
 - 4
 - No value

27.28 How is the circled Constant being interpreted by the program?

- As a command to wait
 - As number of port
 - As a number of rotations
 - As number of seconds

28. Why is it being interpreted this way?

- Because it is providing its value to the Wait Block
 - Because it is providing its value to the "Seconds" terminal on the Wait Block
 - All constants are interpreted the same way
 - Because the value is an integer

29. What does the Light Sensor detect?

- Length of darkness
 - Intensity of red light
 - Robot's weight
 - Robot's speed

30. Which would produce a HIGHER light sensor reading with a light sensor pointed at it: a dark surface or a light surface?

- The light surface
 - The dark surface
 - Both the same
 - No reliable pattern

31.

How do you view the numeric values coming from the sensor?

- Attach a digital lead to the robot
 - Use the View Mode on the NXT screen
 - Click on the Sensor Block in LabVIEW
 - Look closely at the back of the sensor

32. What Block tells the robot to wait for a Light Sensor reading lower than a certain cutoff threshold?

- Wait Block set to Wait for Light > Darkness
 - Sensor Block set to Light Sensor > Darkness
 - Wait Block set to Wait for Light > Darker
 - Wait Block set to Wait for Light > Lightness

33. How do you calculate a suitable Light Sensor threshold value?

- Use the value from the Light surface
 - Use the value from the Dark surface
 - Use the Find Threshold Block in LabVIEW
 - Halfway between Light and Dark values

34. How do you specify the cutoff value for determining "Dark" from "Light"?

- With a Light Sensor Modifier attached to the Threshold wiring node on the Motor Stop Block
 - Activating View Mode automatically stores the correct value

- With a Constant Modifier attached to the "Darkness" wiring node on the Wait Block
- By clicking the Wait Block and typing in the value

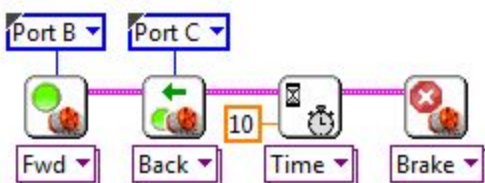
35. What does the Sound Sensor measure?

- Sound wavelength (pitch)
 - Sound intensity (volume)
 - Sound frequency (pitch)
 - Distance to the nearest object
-

36. How do you specify the cutoff value for determining "Loud" from "Quiet"?

- With a Constant Modifier attached to the "Loudness" wiring node on the Wait Block
 - Activating View Mode automatically stores the correct value
 - With a Sound Sensor Modifier attached to the Threshold wiring node on the Motor Stop Block
 - By clicking the Wait Block and typing in the value
-

37. Describe this program, block by block.

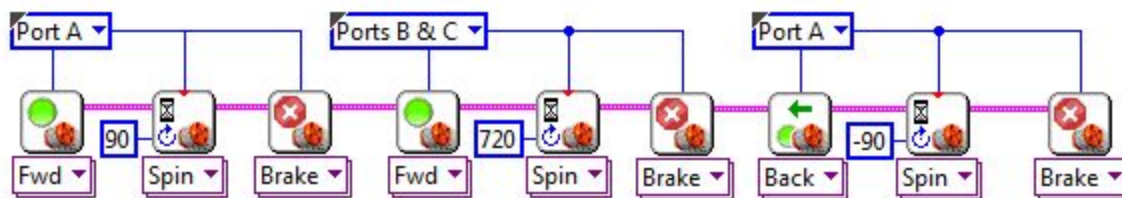


- Move forward on Port B, move reverse on Port C, wait for 10 seconds, stop
 - Move reverse on Port B, move forward on Port C, wait for 10 seconds, stop
 - Move forward on Port C, move reverse on Port B, wait for 10 seconds, stop
 - Move forward on Port B, move reverse on Port C, wait for 10 milliseconds, stop Port A

38. What will the program do to the robot?

- Move reverse for 10 seconds
 - Move forward for 10 seconds
 - Swing turn for 10 seconds
 - Point turn for 10 seconds
-

39. Describe this program, by sequence.

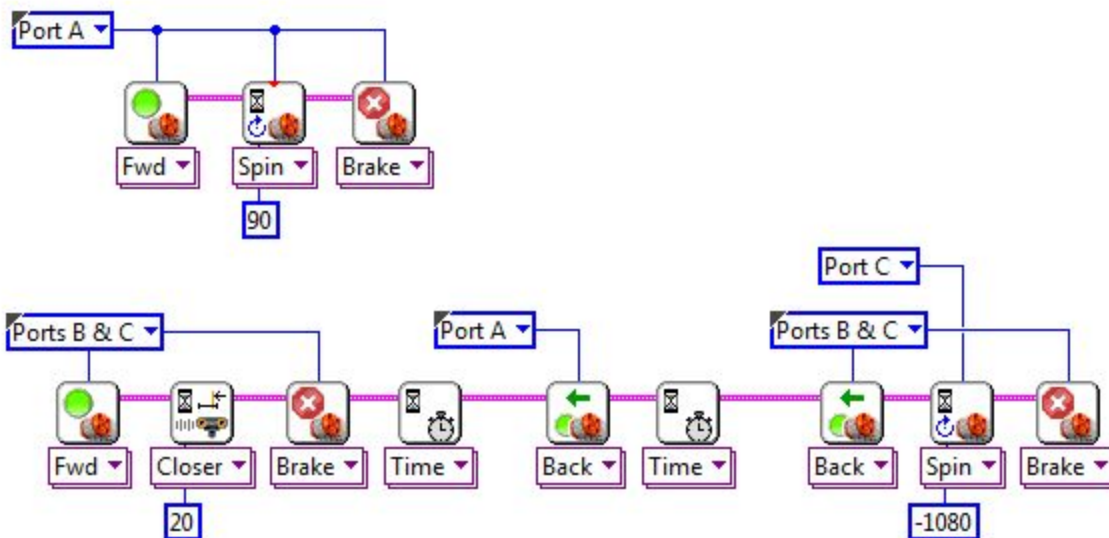


- Closes claws, move forward for 2 rotations, then opens claw
 - Opens claws, move forward for 2 rotations, then closes claw
 - Opens claws, move backwards for 2 rotations, then closes claw
 - Opens claws, move forward for 2 degrees rotation, then closes claw
-

40. What does it mean for two strands of code to run "in parallel"?

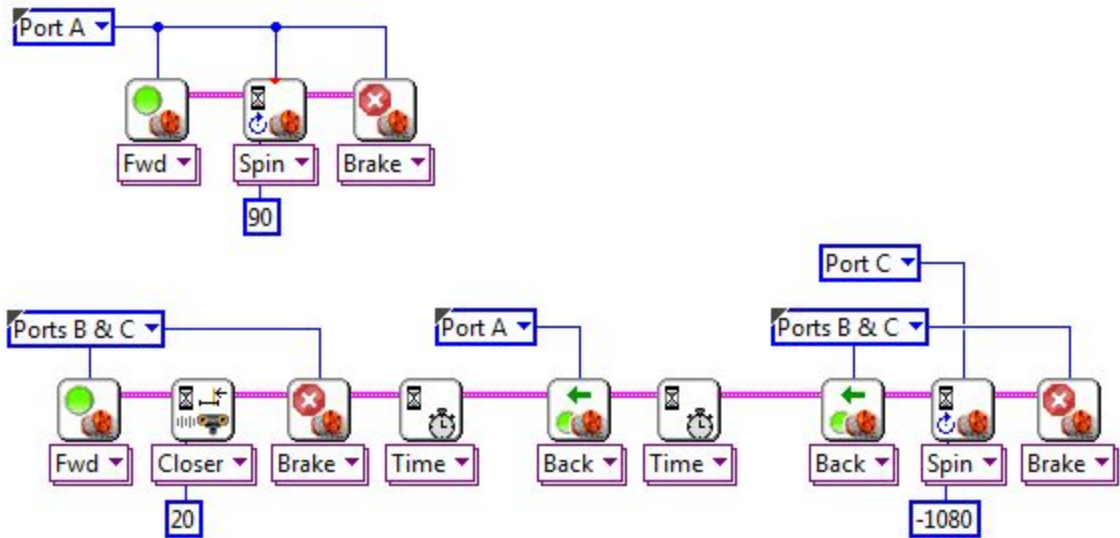
- They are placed side-by-side on the diagram
 - They both START running at the same time
 - They both START AND STOP running together
 - They take turns running blocks

41. These two strands of code run in parallel because



- They both contain Motor Blocks
 - They are placed side-by-side on the diagram
 - Both are independent strands with no wire leading into them

42. When this first strand of code finishes, the second strand:



- Is unaffected because the two are independent
 - Stops immediately
 - Starts running twice as fast
 - Skips ahead to the last block in its strand

43. What does the Sequence Structure do?

- Let the program choose between multiple "frames" of code to run
 - Let the program repeat "frames" of code more than once
 - Let you hide code that you don't want to run
 - Allow "phases" of code to run in sequence even if individual phases involve parallelism