Screen Update SubVI Programming Guide (LabVIEW™ for LEGO® MINDSTORMS®)

Objective:
This guide explains how to create the Screen Update SubVI so that the NXT brick can display sensor values on its display as the robot executes code. This guide is for use with the LabVIEW™ for LEGO® MINDSTORMS® programming language. This code is used in the following extensions:
- Arm and Gripper
- Harvester and Transporter
- Dispenser
- Launcher

Getting Started:
1. Open LabVIEW for LEGO MINDSTORMS and create a new VI, either from an existing Robot Project or by browsing to the File menu and selecting New VI.

Read from the Sensors:
2. On the Block Diagram, place the Read Light (LED On) SubVI and the Read Ultrasonic (cm) SubVI.
   a. Navigate to the Functions palette >> NXT I/O, and place two Read Sensor functions on the block diagram. The Read Sensor function should appear as a Read Touch (Pressed) SubVI by default.
   b. On the left, click the arrow beside “Pressed,” hover over Read Light, and select LED On.
   c. On the right, click the arrow beside “Pressed” and select Read Ultrasonic.
   d. Set the port of the Read Light (LED On) SubVI to 3.
   e. Set the port of the Read Ultrasonic (cm) SubVI to 2.
   f. Right-click the NXT input of the Read Light (LED On) SubVI and create a control.
   g. Wire the Read Light (LED On) SubVI and the Read Ultrasonic (cm) SubVI as shown below.

3. Set up Display functions to display text on specific lines of the NXT brick display.
   a. Navigate to the Functions palette >> NXT I/O, and place four Display functions.
   b. Right-click the line input of each Display control and create a constant. The constants should be 1, 3, 5, and 6, respectively.
   c. Right-click the NXT output of the Display control for line 6 and create an indicator.
   d. Lastly, wire the Read Ultrasonic (cm) SubVI and Display controls as shown below.
4. Create indicators for both the Read Light (LED On) SubVI and the Read Ultrasonic (cm) SubVI.
   a. Right-click the Scaled Value output of the Read Light (LED On) SubVI and create an indicator. Name it “Light Sensor Scaled Value.”
   b. Right-click the Scaled Value output of the Read Ultrasonic (cm) SubVI and create an indicator. Name it "Sonar Distance (cm)."
   c. Position the indicators as shown.

5. Display the Read Light (LED On) SubVI’s value on line 1 of the NXT display.
   a. Navigate to the Functions palette>>NXT Programming>>String>>String/Number Conversion, and place a Number to String function beside the Scaled Value output wire of the Read Light (LED On) SubVI.
   b. Wire the Scaled Value output of the Read Light String (LED On) SubVI to the input of the Number to String function.
   c. From the Functions palette>>NXT Programming>>String, place a Concatenate Strings function to the right of the Number to String function.
   d. Wire the output of the Number to String function to the lower input of the Concatenate Strings function.
   e. Right-click the other input of the Concatenate Strings function and create a constant of “Light Value:.”
   f. Wire the output of the Concatenate Strings function to the input of the line 1 Display function, as shown.
6. Display the Read Ultrasonic (cm) SubVI’s value on line 3 of the NXT display.
   
   a. Navigate to the Functions palette>>NXT Programming>>String>> String/Number Conversion, and place a Number to String function beside the Scaled Value output wire of the Read Ultrasonic (cm) SubVI.
   
   b. Wire the Scaled Value output of the Read Ultrasonic (cm) SubVI to the input of the Number to String function.
   
   c. From the Functions palette>>NXT Programming>>String, place a Concatenate Strings function to the right of the Number to String function.
   
   d. Wire the output of the Number to String function to the lower input of the Concatenate Strings function.
   
   e. Right-click the other input of the Concatenate Strings function and create a constant of “Sonar Value:.”
   
   f. Wire the output of the Concatenate Strings function to the input of the line 3 Display function, as shown.

7. Create controls for lines 5 and 6 on the NXT display.
   
   a. Right-click the text input of the line 5 Display control and create a control. Label the control “Line 5 Text.”
   
   b. Right-click the text input of the line 6 Display control and create a control. Label the control “Line 6 Text.”
   
   c. Position the controls as shown.

8. Create the Icon and select the connector pattern.
   
   a. Navigate to the front panel by selecting Window>>Show Front Panel. If necessary, rearrange the controls and indicators so they appear as shown.
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b. Right click in the icon in the top right of the front panel, and select Edit Icon... From the screen which appears, create a custom icon for the subVI. Press Help to access the online Icon Editor help.

c. Click OK when done.

d. Right click again on the icon in the top right of the front panel, and select Show Connector.

e. From the Patterns menu select the pattern shown:

f. Right click again on the connector, and select Rotate 90 Degrees, and then Flip Vertical. The pattern should now be as shown.

9. Map the Controls and Indicators

a. Click once on the top left terminal in the connector. The cursor will change into the wiring tool. Next, click on the NXT 1 Control. This will map the control.

b. Repeat this process for the remainder of the controls and indicators in the following positions:

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Screen Update SubVI.vi
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NXT 1  N NXT 2
Line 5 Text  
Line 6 Text  
Sonar Distance (cm)  
Light Sensor: Scaled Value

11. Save the VI as Screen Update SubVI.