Information for the Workshop Participant:

Directions:
Complete the assignment below, and then ask your reviewer to use the attached instructions to check your work. You may attempt the project as many times as you would like; remember the purpose is to expand on what you have learned.

Additional Notes:
Before attempting this project assignment, we recommend that you
1. Try out the programs shown in the videos for yourself. Make sure that you understand how to write them yourself, and that when you download them to your NXT it behaves as expected.
2. Try writing the programs shown in the videos again, from scratch, again and again, until you get to the point where you can do so without peeking at the video or at your previous program.
3. Complete the previous assignment – Robot Project 1.
4. Complete the following optional troubleshooting tasks to help you prepare:
   a. Experiment with the move block to move based on seconds. Figure out how many seconds it takes for your robot to move forward roughly 50 centimeters at full power.
      (Note: this may vary depending on how fully charged your battery is!)
   b. Experiment with the move block to move based on rotations of the motor. Figure out how many rotations of the motor it takes for your robot to move forward roughly 50 centimeters.
      (Note: for most robots 50cm won’t be traveled using a whole number and a decimal value will most likely be necessary)
   c. Experiment with the move block to move based on degrees. Figure out how many degrees your motor has to rotate in order to move your robot forward roughly 50 centimeters.
      (Note: remember that “degrees” refers to the number of degrees that the motor rotates. Since one full rotation of the motor is 360 degrees, your answer for this problem should be roughly 360 times the number of motor rotations you did in part b!)
   d. Write a program that causes your robot to drive forward roughly 50 centimeters, and then make a 90-degree turn to the right. Note that we want the robot to make a 90-degree right turn. For most robots, this is very different from instructing the motor to turn 90-degrees on the right side.
      (Note: It’s probably preferable to do both the move forward and the turn right using a duration based on motor rotations or degrees rather than time so that your movements are not dependent on the charge level of your batteries).

While we strongly recommend that you complete the above tasks, they are all optional and do not need to be reviewed.

Assignment:
Create a new program called Project2 and write a program that performs the tasks shown in the “Information for the Project Reviewer” section below.
In this project, the robot will move, display images, and play sounds.

The following is an overview of the robot’s movement:
- Start at point 1
- Move approximately 90 cm to point 3
- Turn around to face point 2 (the robot may rotate in place or loop around and back to point 3)
- Move approximately 60 cm to point 2
- Move approximately 30 cm to point 1

Please note:
- There is no physical path for the robot to follow, nor is the robot actually drawing a line.
- While the LEGO robotics equipment is surprisingly high quality given its price, it is not faultless – you should expect that the robot will not drive perfectly straight, and that the robot will not return perfectly to its starting point.
- Different surfaces can affect robot performance, and so we encourage the workshop participant to set up a “test area” on a table or on the floor with tape indicating points 1, 2, and 3. The participant should practice on that area before demonstrating their project to you on that same test area. The tape on this test area will give you and the workshop participant a visual reference for approximate start and stop locations. Because very small changes in the starting orientation of the robot can result in the robot heading off at different angles, you should expect that the robot will not end up on the tape designating points 2 and 3. This is OK – our goal is for the participant to practice programming, not to practice perfect robot alignment!

Step-by-step details:

<p>| | |</p>
<table>
<thead>
<tr>
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| 1 | ![Warning](image1.png)  
Say “Start” while displaying the picture shown on the left. |
| 2 | ![Warning](image2.png)  
Move approximately 90 cm in a straight line, roughly towards “point 3” while continuing to display this picture |
<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
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<tbody>
<tr>
<td>3</td>
<td>Stop, display the picture shown on the left, and wait for approximately 2 seconds.</td>
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<tr>
<td>4</td>
<td>Turn to face “point 2” while displaying the picture shown on the left. <em>The robot may turn in place or loop around</em></td>
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<tr>
<td>5</td>
<td>Display the picture shown on the left while waiting for approximately 1 second.</td>
</tr>
<tr>
<td>6</td>
<td>Display the picture shown on the left while waiting for approximately 1 second.</td>
</tr>
<tr>
<td>7</td>
<td>Display the picture shown on the left while driving approximately 60 cm to “point 2.”</td>
</tr>
<tr>
<td>8</td>
<td>Stop at “point 2,” display the picture shown on the left, and wait for approximately 1 second.</td>
</tr>
<tr>
<td>9</td>
<td>Display the picture shown on the left while waiting for approximately 1 second.</td>
</tr>
<tr>
<td>10</td>
<td>Return to point 1 while displaying the picture shown on the left.</td>
</tr>
<tr>
<td>11</td>
<td>Stop at “point 1,” display the image shown on the left, and say “Stop.”</td>
</tr>
</tbody>
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