assignment IV: event-driven programming

Name:

information

- You will have three class periods to work on this assignment: Wed Oct 17, Wed Oct 24 and Mon Oct 29. **The assignment is due in class (HARD COPY) on WED OCT 31.**

- The first few pages are LAB work to help you learn about LEGO robots and the RoboLab programming environment. TAKE GOOD NOTES! They will help you complete the last part of the assignment, which is where you earn points toward your term grade.

- The assignment is worth **10 points** or **10% of your term grade.**

new terminology

- *hardware:* RCX, motor, wire, communication tower

- *software:* RoboLab, canvas, icon, function palette, tools palette

materials

Make sure you have all of the following materials before you start the lab:
- LEGO RCX robot kit
- communications tower
- laptop with RoboLab

first time using RoboLab

1. **start up RoboLab**

   - Find the **RoboLab** icon on your computer and double-click on it to start it up.

   - Click on **PROGRAMMER**. Double-click on **INVENTOR 4**. Your screen will look like this:

   - Now you are ready to start programing in **RoboLab**!

2. **find the icons**

   - Locate the **functions palette**. See if you can find each of the following **icons**. Make a note of which sub-palette each icon belongs to. As you learn what each icon does, write down its function in the boxes below.

3. **create your first program**

   - Use the mouse to select, drag and drop RoboLab **icons** onto your canvas and **wire** them together, creating the following program:

   - What do you think it will do? How do you think your robot will behave when it runs this program? i.e., what will your robot do? Write down your ideas below:

4. **download your program**

- Find the **communication tower**, which looks like this:
- Connect it to your computer's USB port (ask if you need help finding it).
- Place your robot next to the tower.

- Find the **download arrow** in your RoboLab window that looks like this:
  It's up near the top, just under "File Edit" menu options. Click on it, and your program will **download** onto your robot!
- If the download works, then the RCX will sing a happy tune :-)
- If you have trouble, check these things:
  1. The RCX must be turned on during the download.
  2. The black part of the RCX should be turned towards your tower.
  3. If there is a lot of light in the room, try covering your RCX and the tower with a piece of paper.
  4. If your download arrow is broken, then you have an error in your program. Make sure that you copied all the icons correctly and that the wires all start and end in the right places.
  5. Make sure the **touch sensor** is connected to **port 1**.

5. **run the program**

- After the program downloads successfully, put your robot on the floor and turn it on.
- Then press **RUN**.
- What did your robot do? Is that what you expected? Write your answer below.

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6. **modify the program**

- Now change the program to make your robot go in a straight line for 6 seconds and then stop. **Edit** the program in RoboLab, **download** it again and **test** it.
  Repeat this process until it works!
- Then in the box below, draw your code:

programming assignment (TO BE DONE WITH A PARTNER)

- MY PARTNER'S NAME IS: [   ]

- After you get each program to work, draw the code in the boxes provided.

1. Program the robot to go forward for 2 seconds and then go backward for 2 seconds and then stop.
   Is it back where it started from? If no, why do you think it isn't?
   (1 point)

2. Program the robot to go in a square.
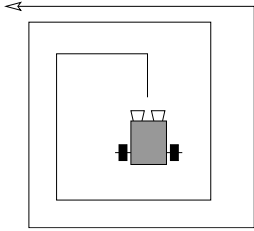   Is it back where it started from? If no, why do you think it isn't?
   (1 point)

3. Program the robot to go forward until its touch sensor is pushed, and then stop.
   (1 point)

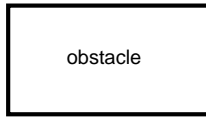4. Program the robot to go in a spiral pattern like this:

(2 points)

Design your code before you start programming. Write your *algorithm* below:
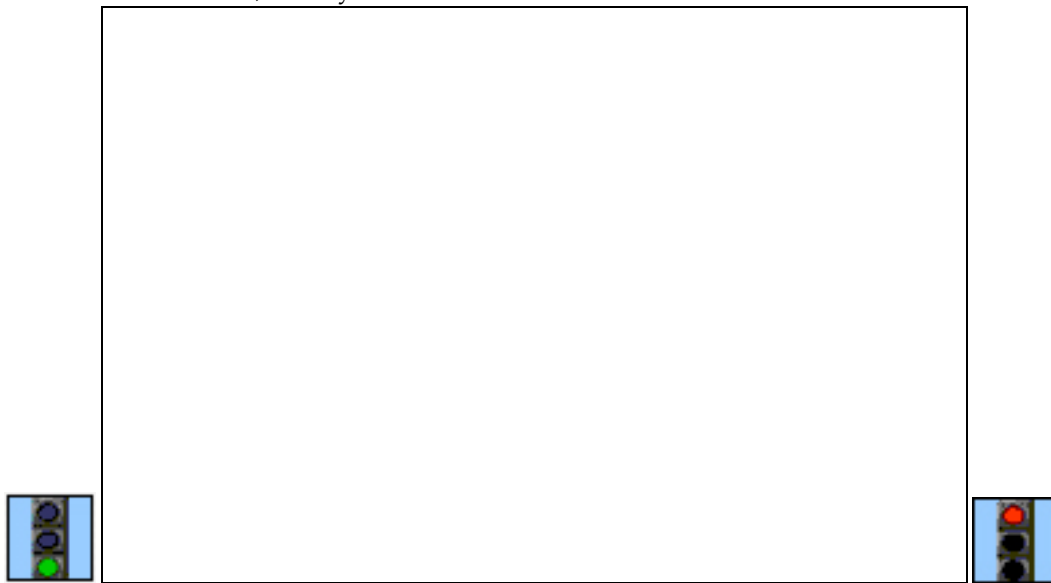
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Now in the box below, draw your **code**:

5. Program the robot to do "wall-following" in order to navigate around an obstacle:
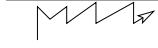
obstacle

(2 points)

Design your code before you start programming. Write your *algorithm* below:

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Now in the box below, draw your **code**:

written assignment (TO BE DONE ALONE!)

1. Describe what each of the following icons represents or causes to happen *(1 point total)*:

2. Explain the two methods we discussed in class for getting your robot to turn. Feel free to draw sketches to aid your description. *(1 point)*

3. What worked well during lab? What failed? *(0.25 points)*

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4. What did you run out of time to do in the lab? *(0.25 points)*

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5. What did you learn from the lab? *(0.25 points)*

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6. Describe a particularly challenging hardware or software problem you had during lab and explain how you solved the problem. *(0.25 points)*

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