Command Your Own Robot!

Maze Program Instructions

Follow the steps outlined below to learn how your robot works and command it to compete in a maze against your friends' robots!

What Do the Lights Mean?
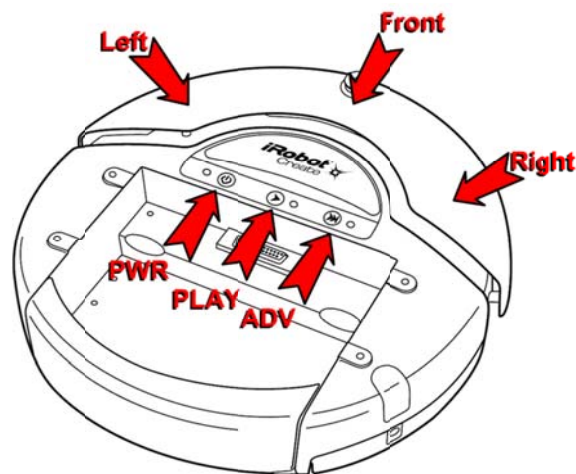
Robot On

Execute Mode

Input Mode

Input Acknowledgement – Flashes & Beeps

How can We Communicate with the Robot?

- PWR – Turns the power on/off – DO NOT TURN ROBOT OFF!
- PLAY & ADV – Allow you to tell the robot to change modes, pause, start and restart. Also tell robot how to move
- Left, Right, & Front – Tell the robot how to move
- Pick up the robot – Clears the last input

1) Let's Command Our Robot!

Allow a workshop leader to start the robot for you. The robot will make a sequence of beeps and display the lights below:

A. Input Mode
1. Press the PLAY and ADV buttons *at the same time* to enter the Input Mode.

    o Make sure you hear the robot beep and flash the lights below to acknowledge the input. The robot will perform some sort of acknowledgement anytime you press a valid button.

    o The lights should change to those displayed below, telling you that the robot is in the Input Mode.

2. Press a bump sensor (Left, Right, or Front), the PLAY button, or the ADV button to give it a command.
3. To enter in an entire sequence of commands, continue pressing bump sensors or PLAY and ADV buttons. In this fashion, the robot can be commanded to follow a complex path.
4. If you make a mistake, pick up the robot to erase the last command. The robot will beep and the light below will be displayed to tell you that the command has been cleared.

5. When finished, press the PLAY and ADV buttons *at the same time* to exit the Input Mode and enter the Execute Mode.

B. Execute Mode
1. The lights will tell you that the robot is in the Execute Mode by displaying the following:

2. Place the robot at the desired starting location.
   Press PLAY to tell the robot to start your program!

o When the robot has finished, it will reset to the beginning of the command sequence. If you would like the robot to run the program again, simply press the PLAY button.
3. To pause the program at any time, press the PLAY button again.
   o To resume the program where you stopped it, press the PLAY button. It will repeat the command it ended on.
   o To restart the program from the beginning of your sequence, press the ADV button followed by the PLAY button.
4. If the robot hits something, or if it is lifted off the ground, it will stop, and the program will reset to the beginning of your sequence.
   o To start the program after the robot has stopped, press the PLAY button.
5. To return to the Input Mode at any time, press the PLAY and ADV buttons at the same time

2) Get to Know Your Robot

Now that you know how to interact with the robot, you need to experiment with each bump sensor or button to learn the robot's capabilities:

Test each bump sensor and button input individually, and record what they do in the table below. There is a ruler (in inches) and a protractor (in degrees) printed out for you to use to quantify each action. Make sure to place the robot in the correct position before testing each action.

HINT: Test each input multiple times and write down the *average* of the results (this is a common way scientists and engineers check for consistency).

In addition, write down the lights displayed for each bump sensor or button command acknowledgement in the table at the top of the next page. The first light will always be red, and that box in the *Lights* column has already been filled in for you. In the other two boxes, write down how many times that light blinks.

EXAMPLE		

This light stays off

This light blinks twice

	0	2

REMINDER: If you press the wrong button, pick up the robot to delete the last command

Bump Sensor/Button	Action Observed (Detail the Angle Turned or Distance Driven)	Lights (See Example)		
Left		🔴		
Front		🔴		
Right		🔴		
PLAY		🔴		
ADV		🔴		

Using these results you will be able to design a sequence of commands that you will later program into the robot to navigate a path through the maze.

Once done filling out the table above, program your robot to follow the simple path taped onto the floor at your station. Raise your hand once your robot has successfully followed this path, and we will give you a map so you can move on to the maze!

3) Navigate Through the Maze!

When you get to this step ask the instructors for a map of the maze.

Using the robot's available actions and the maze dimensions given on the map, plan out a path of how the robot will navigate the maze. In the table on the next page, write down the sequence of commands you think you'll need to follow the path. Now program your robot using the written sequence. Once you think the robot is ready, bring the robot and your sequence of commands over to the maze and see how the robot performs!

If the robot does not complete the maze, mark down in the table where the sequence failed. You can modify the sequence and re-program your robot to try again.

4) How can I Program More Robots?

- LEGO Mindstorms:
  http://mindstorms.lego.com

- FIRST Robotics:
  http://www.usfirst.org/

- Science Olympiad:
  http://soinc.org/

- Cornell Curie Academy:
  http://www.engineering.cornell.edu/diversity/summer/high_school/curie/index.cfm

	Attempt 1	Attempt 2	Attempt 3	Attempt 4
	Input	Input	Input	Input
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