

COMP 329 2014 Lab 01

There are two ways to use LeJOS, one is through Eclipse, the other is running the compiler/linker/downloader from the command line.

These instructions tell you how to do things using Eclipse, and so you will need to go through the sheet "Installing the Eclipse LeJOS plugin" before starting this.

If you want to run LeJOS from the command line, follow the instructions on the sheet "Running a first LeJOS program from the command line".

1. Log onto a computer using your usual computer science login.

2. Write your first LeJOS program.

- Start Eclipse and create a new Java project:

File > New > LeJOS Project

- Add a file and include the content

```
import lejos.nxt.Button;

public class HelloWorld {
    public static void main (String[] args) {
        System.out.println("Hello World");
        Button.waitForAnyPress();
    }
}
```

- When you "run" this program:

Run > Run

Eclipse will try to download the program to the NXT. Use the USB cable in the back of the computer to connect the robot to the computer, make sure the robot is switched on, and hit the "Run" button. The console will show the progress of the download, and it should end with the robot making its happy "you-have-just-downloaded correctly" sound.

3. Run the program on the robot.

- Use the arrow buttons to navigate through the top level menu until you get to "Files".
- Hit the Enter (orange) button.
- Use the arrow keys to select your program.
- Hit the Enter button to run the program.

When you are done, the Escape (grey) button will take you back to the File menu.

See next page

4. Recalling the programs `SimpleDriver` and `SimpleSensor` from last week, write a program so that the robot:

- Waits for the Enter button to be pressed.
- Starts up both drive motors going forward.
- Stops both motors as soon as either touch sensor is activated.
- The program should quit at any time if the Escape button is pressed.

If you need to look at `SimpleDriver` and `SimpleSensor`, you can find them at:

http://http://cgi.csc.liv.ac.uk/~rmw/329_labs.php

5. Write a program that drives the robot in a square. The robot should:

- Drive for about a foot in a straight line.
- Turn through 90 degrees.
- Repeat the above actions 3 times.

The robot should wait for a button to be pressed to start, and the program should exit when the square is complete.

6. Write a program that drives the robot around avoiding obstacles. The robot should:

- Wait for the Enter button to be pressed.
- Drive forward until one of the touch sensors is activated.
- Reverse for a few seconds.
- Turn away from the obstacle. That is, if the right sensor was activated, turn to the left.
- Stop if the Escape button is pressed.

Let the robot roam around its area for a while, checking that it can always avoid getting stuck. You may need to adjust the amount it backs up and the amount it turns to make this happen.

7. Rework the `HelloWorld` program to use the LCD object which makes it possible to send text and graphics to the screen. The interface for the LCD object can be found in the LeJOS API:

<http://www.lejos.org/nxt/nxj/api/index.html>

8. Rework the obstacle avoidance program to use the Sonar sensor.

- To use the sonar you first need to link the right library:

```
import lejos.nxt.UltrasonicSensor;
```
- Then you need to create an instance of the sensor:

```
UltrasonicSensor us = new UltrasonicSensor(SensorPort.S1);
```


(make sure you use the right port for your robot).
- Then you can read the distance of the nearest object in front of the robot:

```
us.getRange();
```

and use this information to have the robot turn away from any obstacle before it hits it.

Again, the API will tell you what other functions can be called on the sonar.

9. Write a program that reads the color sensor and uses this to stop the obstacle avoiding robot.

- To link the right library you will need:

```
import lejos.nxt.addon.ColorHTSensor;
```

- Create an instance of the sensor using:

```
ColorHTSensor cs = new ColorHTSensor(SensorPort.S2);
```

making sure you use the appropriate port, then read the sensor using:

```
cs.getColorID();
```

- Print the value you get from the sensor on the LCD screen and experiment with the values you get at different places in the robot arena.
- Modify the obstacle avoidance program to make the robot stop when it is on one of the coloured patches.