1001ICT Introduction To Programming 2013-2
Laboratory 2

School of Information and Communication Technology
Griffith University

July 30, 2013

When	Teaching week 3
Goals	In this laboratory class we introduce the NXT, the commands to compile and run MaSH programs for it, and practice with console programs some more.
Marks	2
Robot	Tricorder

1   Preparation

Before your lab class:

- Print these lab notes. You need to refer to them *a lot* before the lab class and during it.

- Make sure you are properly enrolled and have access to the PC lab where your class is held and that you can log into those PCs.

- Read all of this document.

- Review the lecture notes, at least, up to section 7.

- Find and read the web page on the course web site describing the Tricorder robot.

- Find and read the lecture notes appendices on using the Windows Command Prompt and the Mac OS X Terminal.

- If you have not already done so, complete the workplace health and safety training and test on Learning@Griffith. Print the certificate and bring it to your lab class.

- Complete the pre-laboratory questions.

2   Pre-laboratory questions (0.5 marks)

Answer the following questions in the space provided, *before your laboratory class.*

1. What is plugged into port 2 of the Tricorder? _____

2. What is plugged into port B of the Tricorder? _____

3. What is the DOS (and Unix) command for changing the current working directory? _____

4. The command to compile a Java program for the NXT (doing nothing else) is _____ .

5. The command to link and upload a Java program for the NXT (doing nothing else) in one step is

   _____ .

6. The shortcut batch file for Windows that does all of the steps required to compile and upload a MaSH NXT program is _____ .

7. The shortcut bash script for Mac OS X and Linux that does all of the steps required to compile and upload a MaSH NXT program is _____ .

8. What special character escape sequence is required to put a double quote character in a string literal? _____ .

3 Laboratory activities

3.1 Making sensor measurements (0.5 marks)

It is OK to work in small groups for this activity, so long as you all write down the results for future reference.

- Download the program `Tricorder.mash`. It is available on the Tricorder's web page, in the robots section of the course web site.

- Compile and upload the program to the NXT.

- The Tricorder program uses all of the sensors and all of the buttons. Play with them to see what happens.

- Answer all these questions. Show the results to a tutor.

  1. Sound sensor:

     (a) What is the lowest value you have seen the sensor report? _____

     (b) What is the highest value you have seen the sensor report? (Yell at it!) _____

     (c) What value does it report if you clap 30 cm away from the sensor? _____

  2. Light sensor:

     (a) What is the lowest value you have seen the sensor report? _____

     (b) What is the highest value you have seen the sensor report? (Point it right at the sun or a room light.) _____

     (c) With the floodlight on, what does the sensor register about 2 to 4 mm from the black paper below? (*Paper*, not a screen!) _____

     (d) With the floodlight on, what does the sensor register about 2 to 4 mm from the white paper above? _____

  3. Ultrasonic proximity sensor:

     (a) What is the lowest value you have seen the sensor report? _____

(b) What is the highest value you have seen the sensor report? _____

(c) What value does it report when there is nothing within 3 m? _____

(d) What is the highest value you can obtain that is less than the previous answer? _____

(e) What units does the sensor measure distance in? _____

3.2 NXT program (0.5 marks)

- Download the file `HelloNXT.mash`.

- Modify `HelloNXT.mash` so that it prints the words with a box around them like this:

```
+-------------+
| Hello, NXT. |
+-------------+
```

- Hint: The numbers in the `drawString` calls are the column and line numbers respectively where the string starts.

- Show your program and its output to your tutor.

3.3 Console program (0.5 marks)

This problem will be revealed during the laboratory class.

3.4 Extra activities

- If the lab you are in is equipped with dual-boot Macs, repeat the activities on the OS you did not use above.

- Find the documentation for the MaSH environments `console` and `nxt`. You will find these are a faster place to find the procedures you'll want to be using in future exercises.

- It is not required that you have your own computer at home, but if you do, why not equip yourself with the software so that you can practice programming at home? The course home page has links to MaSH and Java resources. Appendices E and F of the lecture notes are instructions installing Java and MaSH. All of the editors we have mentioned above are free and available for download on the internet. If you have questions about installing or using these packages, the common times are the best place to ask. Bring your laptop.

4 After the Laboratory

- Organize the work you have done into folders on your network drive.