UNIVERSITY OF TECHNOLOGY SYDNEY

FACULTY OF ENGINEERING

Subject: ***48623 – Mechatronics 2 – Autumn 2016***

Assessment #: ***2***

Assessment Title: ***System Integration***

Group:	
Student Number:	
Family Name:	
First Name:	

Declaration of Originality

The work contained in this assignment, other than that specifically attributed to another source, is that of the author(s). It is recognised that, should this declaration be found to be false, disciplinary action could be taken and the assignment of the student involved will be given zero marks. In the statement below, I have indicated the extent to which I have collaborated with other students, whom I have named.

Statement of Collaboration

Signature(s)

Marks

IR & Scanner	/½
Line and Square	/½
Wall Follow	/1
Characterization graphs	/½
Discussion of graphs	/½
Flowchart	/½
Block Diagram	/½
Well Structured Code	/1
TOTAL	/5

✂

Mx2 Assessment 2 Demonstration Receipt

Assessment Title:	***System Integration***
Group Name:	
Demonstration Date:	
Tutor Signature:	

Aim

The aim of this assessment is to integrate the modules created in Assessment 1 with a robot to carry out basic tasks.

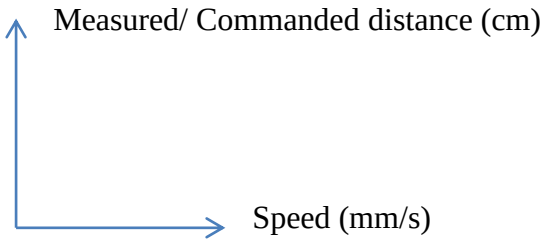
Requirements

You will be required to write source code for the PIC 16F877A micro-controller to:

- Flash a heartbeat LED at 1Hz
- Continuously read the IR sensor and display the range in cm on the LCD
- On a button press, scan the IR sensor CW through 360 degrees taking readings at each half step. At the conclusion of the scan, rotate CCW to point the sensor towards the closest obstacle.
- On a button press, drive iRobot Create 4m in a straight line (straight line manoeuvre) while continuously displaying the total linear distance travelled on the LCD since the button press.
- On a button press, drive the iRobot Create in a "square" shaped trajectory (square-shaped manoeuvre) with 1m each side (taking either left or right turns) while continuously displaying the total linear distance travelled on the LCD since the button press.
- On a button press, scan the IR sensor CCW to find the wall closest to it. Drive the iRobot Create along the wall maintaining a constant distance (without colliding with the wall) and stopping when a bump sensor or cliff sensor is triggered. The iRobot needs to frequently check and adjust its distance from the wall. At the start of the wall following manoeuvre, the Create will be positioned near but not parallel to the wall to be followed.

One student is required to upload a soft copy of a report which should include:

- A block diagram of the system
- A flow chart of the program
- Characterisation graphs of your robotic platform including
  - Graph 1: Straight line manoeuvre performed at different speeds: Drive the robot 4m on a straight line at speeds, -100mm/s, 100mm/s, 200mm/s, 300mm/s and 400mm/s. Repeat each run five times. Draw a scatter plot on the measured drive distance and commanded drive distance for each speed. **Discuss the reasons for selecting an appropriate operational speed in the report.**



  - Graph 2: Straight line manoeuvre for different distances: Drive the robot on a straight line at 200mm/s. Command for 0.5m, 1m, 1.5m, 2m, 2.5m and 3m. Repeat each run five times. Draw on the same graph (scatter plot), measured drive distance Vs commanded drive distance.

- Graph 3: Square-shaped manoeuvre (1 meter each side): Draw on the same graph, the robot's accumulated orientation error (angle between the final robot orientation and expected final orientation) Vs trial number (for 10 trials). **What factors have caused the errors in orientation of the robot?**

- A well commented complete **soft copy** of your source code(s) should be submitted separately in turnitin by the due date. Follow the naming convention *"Integration_report_<Group_name>"* for report and "*Integration_code_< Group_name >"* for code.
- Please submit only one softcopy of the report and code per group. Indicate names and student numbers of your group members on the first page.
- A completed and signed **cover sheet** must be submitted at the demonstration.

Notes:

- **To receive data from the Create you will need to disable SPE transmissions in Kirra. If transmissions are enabled the data lines from the PC and Create will conflict. You also need to configure some SPE settings using Kirra. Refer to UTS online DSXOnline to find out more information.**
- **This is a group assignment which should be completed/demonstrated in groups.**
- **Please contact subject coordinator if you have any group related issues.**
- **Please submit only one copy of the code and report per group to Turnitin**

Support and Assistance

Support and assistance for this assignment will be available by posting questions on the "Tutorials and Assignments" forum on UTSOnline. This forum is monitored electronically and as such will have the same response time as a direct email. Please use the forum so that other students may benefit from the answers given.

Face to face support is available during the lecture and/or tutorial timeslot. Please email to make an appointment.

Due Date

The assignment is due **during your lab time on 3rd May, 2016**. The demonstration will take place at the beginning of the scheduled lab class.

Rules for Demonstration

1. You must demonstrate using one or more group members kit(s)

2. You must have the kit(s) programmed and wired BEFORE attending the demonstration.

**** Bring a copy of the assessment cover sheet for the marking session.**

Students with difficulty meeting assessment requirements

Students who experience **significant** difficulty, or anticipate that they will experience significant difficulty, in meeting assessment requirements must submit an "Application for Special Consideration form" (available at http://www.sau.uts.edu.au/assessment/consideration/online.html) to the Registrar **before** the due date of the assessment item. Significant difficulty means

i. Serious illness or psychological condition.
ii. Loss or bereavement
iii. Hardship/trauma

Note also that students may apply for special consideration because of illness or other circumstances (**not work related**) beyond their control. The "Application for Special Consideration form" has a section that must be filled in by a doctor, counsellor or other relevant professional authority. A medical certificate alone is not adequate and will not be accepted.
Note that it is up to the students to provide adequate information about their circumstances. University staff will not chase additional information and the Subject Coordinator has the right to reject applications that lack sufficient information.

It is the student's responsibility to contact the Subject Coordinator to find out what action has been taken and to obtain details of any additional assessment required or learning and assessment special arrangements.

For further details please refer to section 4.6 of the "Coursework Assessment Policy and Procedures Manual".