UNIVERSITY OF TECHNOLOGY SYDNEY

FACULTY OF ENGINEERING

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

Assessment #: ***3***

Assessment Title: ***Demonstration and Competition***

Group Number:	
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

Maze attempt 1	
Maze attempt 2	

TOTAL /22

Tutor use only

✂

Mx2 Assessment 3 Demonstration

Assessment Title:	***Demonstration and Competition***
Group Name:	
Demonstration Date:	
Tutor Signature:	

Aim

This assessment requires the students to apply all the techniques and skills they have learned throughout the subject to find a 'source' in a maze area. The specifications have been designed to allow multiple solutions and the students are encouraged to develop new and innovative methods. The students will need to develop a suitable solution and demonstrate it in a real scenario

Requirements

You will be required to develop a robotic platform to:

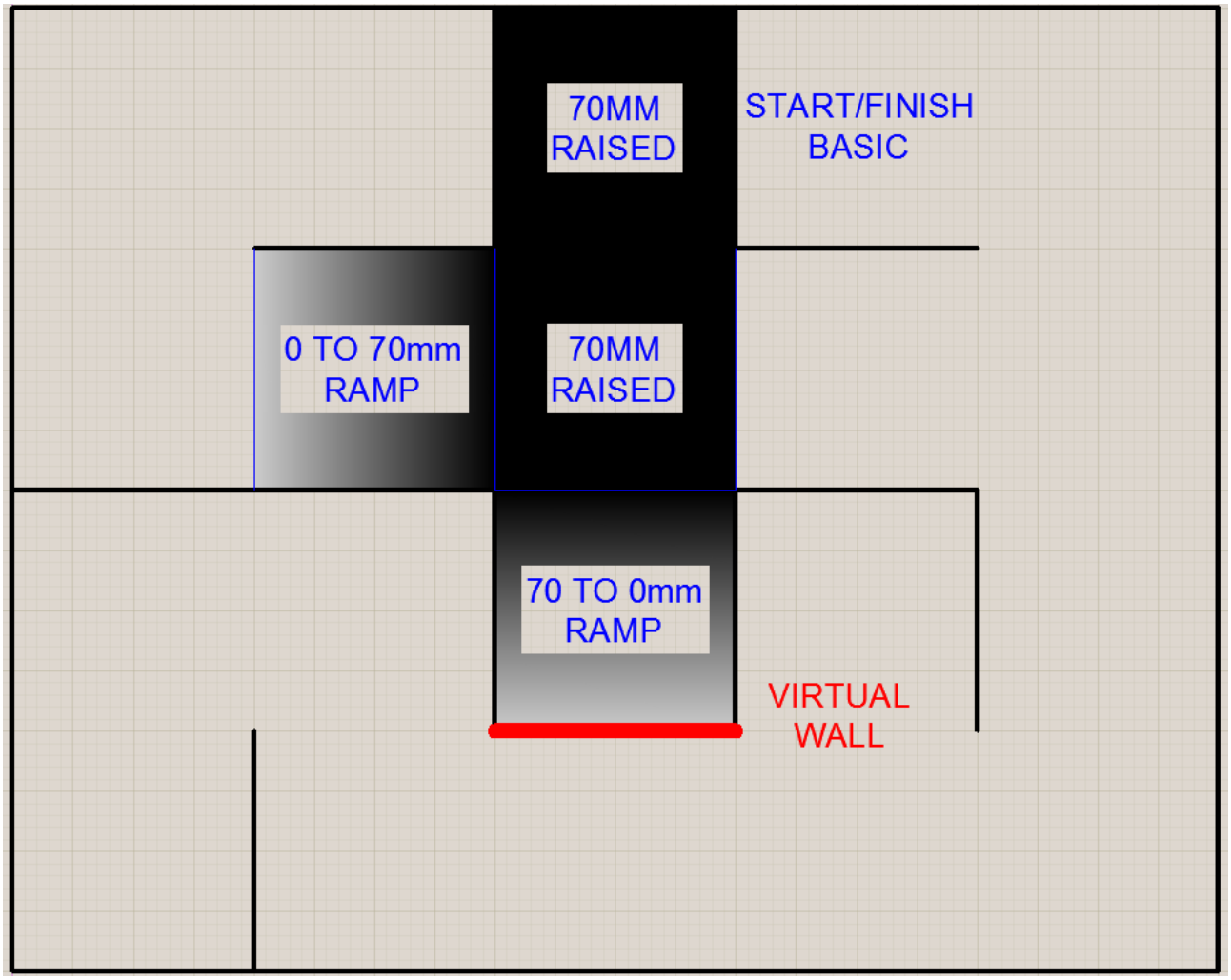
- Complete a basic or advanced maze configuration.
- Operate autonomously during the mission. There should be no user intervention or control other than pressing the start button.
- Search for and locate ‘victims’ within the maze. The victims will be implemented by the home-base beacons, but their location is otherwise unknown.
- After locating a victim, play a song to indicate that the victim has been found. The robot should resume exploring the maze to find the second victim.
- Once the second victim has been located, a different song should be played to indicate that the second victim has been found. The first victim must not be mistaken for the second victim should you pass the first victim’s location more than once.
- After finding the second victim, the robot should return to the starting location by taking the shortest path.
- Avoid walls and respond appropriately to virtual walls while carrying out the tasks required for each mission.

Demonstration

There will be two maze configurations available for the demonstration; basic and advanced. You will be allowed **two** runs and the run which scores the most marks will be recorded. You may also attempt different mazes with each one; for example you may attempt the basic maze to ensure you get some marks and then try the advanced, or have two attempts on the same maze. All maze walls higher than 100mm should be avoided. The sides of the raised platform may be detected using the bump sensors if required. The size of the maze grids are approximately 1m x1m and the walls are 400mm tall.

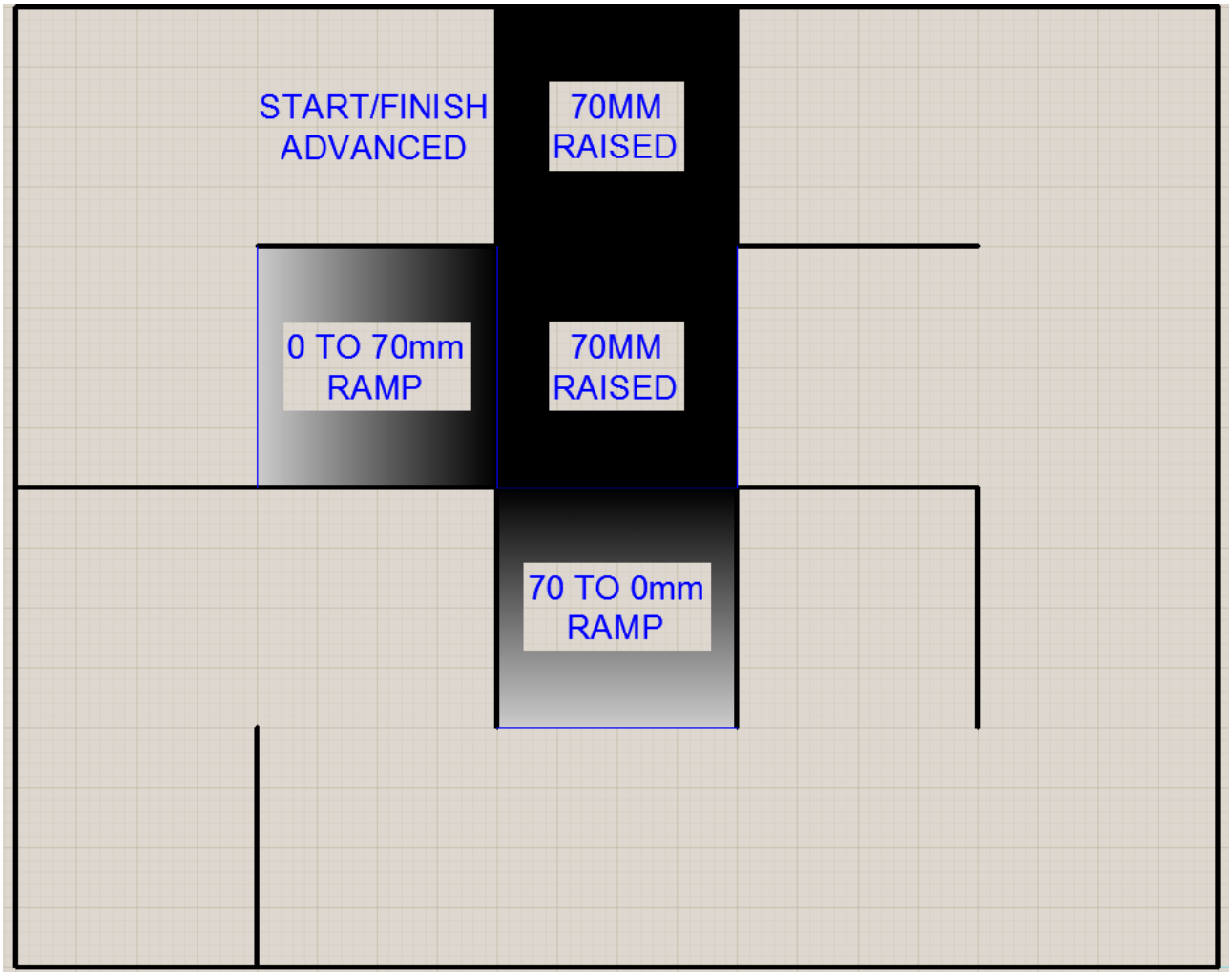
Basic Maze

The basic layout of this maze allows for a simpler exploration approach. It removes the ramp from the search space, using a virtual wall, which reduces not only the size of the maze, but also the risk of falling off the cliff. Please see marking criteria for more information.



Advance Maze

The advance maze requires the robot to deal with the ramp, cliffs as well as a more complex exploration task. One or more virtual walls will be placed at variable locations in the maze before each run; therefore the robot must be capable of adapting to this obstacle. Furthermore, attempting the advanced maze allows for additional tasks to be implemented and assessed. Please see marking criteria for more information.



Notes

- All processing should be implemented on the DSX kit.
- The robot must operate autonomously without external control or intervention. The user interaction should be limited only to pressing a start button which can be located either on the robot or the DSX kit.
- During the run, no wireless data transfer should be implemented.
- The shortest path back should be taken after the second victim has been found.
- Homebase and virtual wall modules will be available for short term loan.
- The soft copy of the report must be submitted to Turnitin in .doc/docx or pdf format before the group presentations.
- Further, each group should submit a USB flash drive containing the report, source file and the video at the group presentations.

Important Note: This is a group assessment which should be completed in groups of five. Students must program one or more DSX kit(s) for the demonstration which must be securely mounted on the Create.
Please contact subject coordinator if you have any group related issues.
Please submit only one copy 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 lecture and/or tutorial timeslots. Please email to make an appointment.

Due Date

The competition will take place at during the allocated lab time on **31st May, 2016**.

Rules for Demonstration

1. You must demonstrate using one DSX kit securely mounted to the Create robot.

2. You must have the robotic system programmed and configured BEFORE the competition begins. No modifications will be allowed once the competition has started.

3. **Attempting the final competition** is a compulsory component of the subject requirements. Please refer to subject outline for more information (Not attempting means a guaranteed fail in the subject).

Marking Scheme

Maximum marks allocated for the competition is 22. Marks are determined by a panel consisting of at least of 2 academics and are based on the following criteria.

Attribute		Marks	
		Advanced	**Basic**
Exploration	Exploration ➢ Navigate all accessible areas until both victims are found ➢ Navigate and detect first victim ➢ Navigate and detect second victim - making sure that the first victim, if rediscovered, is not mistakenly re-identified as the second victim. The robot needs to indicate that it has located the victim (within 1m) by playing a song.	**3** **2** **4**	**-** **2** **4**
	Returns to start Full marks are given if the robot returns to the start position (within 1m), plays a song and turns off.	**3**	**3**
	Shortest Path Avoid re-visiting locations which are not on the shortest path on the return journey.	**3**	**0**
	Timing Total time taken for the exploration as well as the return journey. ➢ Completing the mission in less than or equal to 4 mins ➢ Completing the mission in (4 – 5] mins ➢ Completing the mission in (5 –6] mins ➢ More than 6 minutes	**2** **1** **0.5** **0**	**2** **1** **0.5** **0**
Sensing	Victim Identification Playing a song within 1m of the victim as an indication. The songs have to be unique to the victim i.e. you cannot play the same song for both victims	**1**	**1**
	Cliff Detection Full marks will be given if the robot does not fall off the 'cliff' (aka, edge of the ramp)	**1**	**0**
	Obstacle avoidance Full marks will be awarded if no obstacles are hit by the robot. A half mark will be deducted for each hit.	**2** **[-0.5/hit]**	**2** **[-0.5/hit]**
	Virtual wall Full marks will be awarded if the robot senses and responds appropriately to the virtual wall.	**1**	**1**
		22	**15**
Total			

Please bring a copy of the assignment cover sheet with you to the demonstration 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".