Module Leader: Mick Marriott		Level: 6
Module Name: Robotics		Module Code: 55-608216
Assignment Title: Robot Expo		
Individual	Weighting: 60%	Magnitude: *2000 words*
Submission date/time: Thursday 20th April 2023 at 3 PM	Blackboard submission	Format: Source code plus a demonstration.
Planned feedback date: Monday 27th May 2023	Mode of feedback: Blackboard	In-module retrieval available: No

Module Learning Outcomes

- LO1. Identify and critically assess the elements needed within a physical computing system
- LO2. Interface a programmable controller with peripheral devices such as sensors, switches, keypads, motors, lights, sound, displays and other input devices and actuators.
- LO3. Determine what types of devices are appropriate for various products and processes.
- LO4. Design and implement 'control' algorithms for the relevant hardware platforms.

Robotics Assessment Two

Definition

Dictionary.com defines a robot as:

A machine controlled by a computer that is used to perform jobs automatically:

- *The surgery can be carried out by robots.*
- *A bomb disposal robot*

The task

In this task you must build a robot that will perform a repetitive, complex, task automatically and without the need for intervention or control from an operator. Examples of such tasks include, but are not limited to:

- Sorting and loading Lego bricks into a toy truck.
- Playing draughts by calculating moves and then moving the counters around the board.
- Playing Connect4.
- Picking up, identifying, and aligning Warhammer soldiers.
- Firing darts at a target.

Talk to Mick or Chris once you have an idea of the type of project that you wish to implement. They will give you advice on its suitability.

You can use any kit that you like. We can supply you with Arduino Uno, Pololu Zumo, and Raspberry Pi. We have a selection of sensors and actuators and may be able to acquire more. If you want to use other kits or sensors that you already own or are intending to buy, we are happy for you to do so. We may be able to help you to fabricate both physical parts using 3D-printing or laser cutting, and electronic circuits.

Your code may run solely on an Arduino[1], or may be split between the Arduino and a host PC. You'll choose the latter configuration if you are doing heavy image processing, for example, or if your sketch is too large to fit onto your device.

What to hand in…

You should submit, to Blackboard, by **3:00 PM on Thursday 20th April 2023**, a URL linking to a GIT repository. Your GIT repository must be accessible to the teaching team during the marking period.

That repository must contain:

1. Your code. This should be documented appropriately through in-code comments and a readme file. You will use many sources in programming this application. Include references to these sources in the readme file. The readme file needs to also contain instructions to build and use your program including performing each of the tasks mentioned above.
2. A video of the robot performing each of the tasks described earlier, and the recording of your screen while the robot performs it. You can do this with your mobile, whilst executing each of the tasks, or combining the recording of the screen and a camera.

[1] Or similar embeddable microcomputer.

The expo

You will demonstrate your completed solution at an expo in the week of **4th May, 2023**. You'll get details of this closer to the time.

Grading scheme

Your work will be graded on the following facets using the current level six version of the Common Grade Descriptor

Facet		Available marks	At pass level your work may look like	At a distinctive level your work may look like
The idea	**Complexity**	**5**	The idea for the submission is basic and does not stretch the limits of the students and/or technologies abilities.	An idea is presented that is both challenging and a test of the students and technologies abilities.
Functionality	**Completeness**	**10**	An attempt has been made to complete the robot and it is in a functional state.	The robot functions perfectly and looks a polished and professional offering.
	Error handling	**5**	Some error handling is present, but not all are caught and/or handled.	All errors are caught and handled appropriately. These need to be exhibited to the markers as they would otherwise not be detected in normal operation.
	Control systems	**10**	Basic controls are in place.	Control systems are complex and meaningful, not just there for the sake of it. Any control system needs to have a justification for its inclusion.
Quality of the implementation	**Complexity**	**10**	The implementation is basic and does not stretch the limits of the students and/or technologies abilities.	The implementation challenges and tests students and technologies abilities.
	Hardware	**10**	Basic choice and use of the hardware available.	Varied and innovative choice and use of hardware that adds value to the final product.
	Code quality	**10**	Sensible names. Some comments. Some structure.	Well-structured code. Meaningful comments throughout.
Demonstration		**30**	Poor quality demonstration. Little understanding of the solution is demonstrated	Good quality demonstration showing the robot working. Demonstrates edge cases and failure conditions. Good explanations, able to answer questions appropriately.
Peer review		**10**	Poor feedback from visitors to the expo around your work	Excellent feedback from expo visitors, a 'buzz' around your presentation.