UNIVERSITY OF Hull

DEPARTMENT OF COMPUTER SCIENCE AND TECHNOLOGY
ASSESSMENT DESCRIPTION 2019/20

MODULE DETAILS:

Module Number:	600085	Trimester:	1
Module Title:	Embedded Systems Development		
Lecturer:	YC		

COURSEWORK DETAILS:

Assessment Number:	1	of		1
Title of Assessment:	Green House Control System			
Format:	Program	Demonstration		Report
Method of Working:	Group			
Workload Guidance:	Typically, you should expect to spend between	40	and 70	hours on this assessment
Length of Submission:	This assessment should be **no** more than: *(over length submissions **will be** penalised as per University policy)*	2000 **words** *(excluding diagrams, appendices, references, code)*		

PUBLICATION:

Date of issue:	30/10/2019

SUBMISSION:

ONE copy of this assessment should be handed in via:	Canvas	If Other (state method)		
Time and date for submission:	**Time**	2pm	**Date**	13/12/2019
If **multiple hand–ins** please provide details*:*				
Will submission be scanned via TurnitinUK?	No	If submission is via TurnitinUK, these should be one of the allowed types e.g. Word, RT, PDF, PPT, XLS etc. Specify any particular requirements in the subumission details		

The assessment must be submitted **no later** than the time and date shown above, unless an extension has been authorised on a *Request for an Extension for an Assessment* form: search 'student forms' on https://share.hull.ac.uk.

Canvas allows multiple submissions: only the **last** assessment submitted will be marked and if submitted after the coursework deadline late penalties will be applied.

MARKING:

Marking will be by:	Student Name

ASSESSMENT:

The assessment is marked out of:	100	and is worth	50	% of the module marks
N.B If multiple hand-ins please indicate the marks and % apportioned to each stage above (i.e. Stage 1 – 50, Stage 2 – 50). It is these marks that will be presented to the exam board.				

ASSESSMENT STRATEGY AND LEARNING OUTCOMES:

The overall assessment strategy is designed to evaluate the student's achievement of the module learning outcomes, and is subdivided as follows:

LO	Learning Outcome	Method of Assessment {e.g. report, demo}
2	*Construct and deploy software applications for constrained resource processors, using low level assembler and generating appropriately timed and sequenced signals for successful communication with external peripheral devices.*	Report & Demonstration
3	*Use available resources (datasheets and specifications) to design and create software which serves as driver for given hardware device and expose hardware behaviours via an appropriately designed Application Programmer Interface (API).*	Report & Demonstration
4	*Work within a team to create a fully functional embedded appliance that makes use of a number of different peripheral interfaces to deliver a consumer-ready product*	Report & Demonstration

Assessment Criteria	Contributes to Learning Outcome	Mark
A1 : Understanding of hardware/software interfacing	2,3	20
A2 : Software development to a given specification	2,3,4	60
A3 : Appropriate driver architecture design	3	20

FEEDBACK

Feedback will be given via:	Verbal (via demonstration)	Feedback will be given via:	Feedback Sheet
Exemption (staff to explain why)			
Feedback will be provided no later than 4 'teaching weeks' after the submission date.			

This assessment is set in the context of the learning outcomes for the module and does not by itself constitute a definitive specification of the assessment. If you are in any doubt as to the relationship between what you have been asked to do and the module content you should take this matter up with the member of staff who set the assessment as soon as possible.

You are advised to read the **NOTES** regarding late penalties, over-length assignments, unfair means and quality assurance in your student handbook, which is available on Canvas.

In particular, please be aware that:

- Up to and including 24 hours after the deadline, a penalty of 10%
- More than 24 hours and up to and including 7 days after the deadline; either a penalty of 10% or the mark awarded is reduced to the pass mark, **whichever results in the lower mark**
- More than 7 days after the deadline, a mark of zero is awarded.

- The overlength penalty applies to your written report (which includes bullet points, and lists of text. It does not include contents page, graphs, data tables and appendices). 10-20% over the word count incurs a penalty of 10%. Your mark will be awarded zero if you exceed the word count by more than 20%.

Please be reminded that you are responsible for reading the University Code of Practice on Academic Misconduct through the Assessment section of the Quality Handbook (via the SharePoint site). This govern all forms of illegitimate academic conduct which may be described as cheating, including plagiarism. The term 'academic misconduct' is used in the regulations to indicate that a very wide range of behaviour is punishable.

In case of any subsequent dispute, query, or appeal regarding your coursework, you are reminded that it is your responsibility to produce the assignment in question.

Green House Control System

Create a Green House Control system using the PIC QL200 development board. This system will contain a Time of Day clock and provide the following features and displays:

- Setting of current time, date and week day
- Display of current temperature
- Display of current time, date and week day
- Entry of trigger temperatures (temperature thresholds)
- Two output controls, one for a heating circuit and one for air circulating:

    o When the temperature drops below the set low temperature threshold, the heating control output will be turned on. If the temperature continues to drop an alarm signal is produced. The user should be able to clear an alarm by pressing a button on the device.

    o When the temperature rises above the set high temperature threshold the heating control output will be turned off and the air venting control should be turned on to cool the temperature down. If the temperature continuses to rise and alarm signal is produced. The user should be able to clear the alarm by pressing a button.

- There should be a day time and a night time operation modes. The day time should begin at 6:30 am in the morning and end at 7:30 pm; outside this time is night time mode. The system should allow to configure different temperature settings for day time and night time modes.

    The output control status can be indicated by LEDs.
    The resolution of temperature only need to be 1 decimal point.

PROJECT DELIVERABLES

The assessed deliverables for this work are as follows:

- A **system demonstration** showing the function features as described above
- A **group report** containing the deliverables outlined in the Coursework Assessment specification (Maximum 2000 words excluding diagrams, appendices, references, code)
- An **individual report** containing the deliverables outlined in the Coursework Assessment specification (Maximum 2000 words excluding diagrams, appendices, references, code)

GROUP ORGANISATION

The group must organise itself into two members who are each responsible for one or more of the interfaces required. The interfaces are as follows:

- Real time clock
- Temperature Sensor
- LCD panel
- Input switches
- Sounder
- I/O ports

Once a member has been allocated an interface they must perform the following for that interface:

- Create low level driver code to interface with the device
- Design an application program interface (api) to allow other developers to use the device from their code. This should contain functions that can be used to initialise the device and perform a set of relevant activities with it.

Once the low level drivers have been created the group must then work together to produce the system with the required behaviours. Each member of the group must be allocated at least one part of the development project.

In the situation that we have odd number of people in our cohort, one group can be voluntarily organised into three members with additional tasks or one member group with reduced tasks:
For the three members group, the following additional tasks should be completed:
- Use the stepper motor to act as fan to bring the temperature down.
For the one member group, the real time clock is not required.

System Demonstration – 25% of the overall mark allocation

The demonstration should last no more than twenty minutes, with an additional five minutes for questions. It should demonstrate the overall functionality of the system that has been produced by the group. The following behaviours should be demonstrated:

- Set the date and time
- Displaying the current time
- Setting the trigger temperature
- Indicative beeps produced when heating triggered
- Heating output disabled according to the schedule

The demonstration should be structured and managed by the development group. The demonstration should show the proper operation of the device during all conditions. The system should provide additional behaviours to simulate clock and temperature inputs which will enable all the behaviours to be demonstrated.

All members of the group should take part in the demonstration and explain the part of the system for which they had responsibility.

At the end of the presentation there will be five minutes set aside for questions from the audience.

Group Report – 50% of the overall mark allocation

The group should prepare a single report which describes the overall system and how to use the devices that are part of it. In another word, the overall system resources allocations,listtings of codes, I/O pins configurations, how the drivers are integrated, main logic flows, and a user manual. The report should include the following sections:

- Overall System: A description of the complete application and listings of the code created by the group.
- System hardware components and their configruations pins mappings
- Lists of drivers and their signatures called by the system
- System logic flows

- Critical Evaluation: Conclusions drawn, lessons learnt, role of each group member in the development
- Individual contribution: The amount each individual contributed to the overall development. This breakdown must be agreed by the entire group.
- System operating manual

Program source should be supplied in a ZIP archive along with the report.

Individual Report – 25% of the overall mark allocation

Each member of each team should produce an individual report which describes their part in the system development. The report should include the following sections:
- Artefacts produced: design, code and test output that you were involved with
- Drivers you created and their specifications.
- Testing performed: how the sub systems that you created were verified and validated
- Critical Evaluation: Conclusions drawn, usefulness of techniques, lessons learnt

600085 Embedded Systems Development Demonstration Marking Form

Assessor: _____

Presentation Assessment

Assessment Item	Comments	Weight
System Demonstration (A2) • Setting of current time, day and date • Display of temperature • Display of current time, day and date • Entry of threshold temperatures • Output control for a heating circuit • Output control for ventilation • Timed control (two modes) • Sounder • Simulation of time and temperature inputs • Sanity checks (e.g. leap years) • Persistant configurations • System responsiveness		60%
System Implementation (A1,A3) • Implementation of the interface • Device Driver API • Documentation of codes		20%
System Design (A3) • Driver Architecture		20%

Overall Comments

_____

_____

_____

Mark Awarded: _____   Date: _____ Signed: _____

600085 Embedded Systems Development Group Marking Form

Assessor: _____   **Team:** _____

Report Assessment

Assessment Item	Comments	Weight

System Deliverables should at least cover these points: (A1,A2)
 	
   • requirements and specifications
   • overall system design
   • interfaces and pin mappings
   • listing of drivers
   • functions and features
   • control flow
   • operating manual
		50%

Software Design: (A3)
   • Appropriate device driver design
   • Code documentation and comments
		20%

Implementation and Test: (A3) • Testing performed		20%

Critical Evaluation and Group effectiveness: (A2)
   • Conclusions drawn
   • Lessons learnt
   • Role of each group member in the development.
		10%

Overall Comments

_____

_____

Mark Awarded: _____   Date: _____ Signed: _____

600085 Embedded Systems Development Individual Marking Form

Assessor: _____

Report Assessment　　　　　　　**Student:** _____

Assessment Item	Comments	Weight
Artefacts produced: (A1, A2, A3) 　• 　Software listings 　• 　Application Programmer Interface (API) description 　• 　Test reports		70%
Critical Evaluation: (A2) 　• 　Conclusions drawn 　• 　Usefulness of techniques 　• 　Lessons learnt		30%

Overall Comments

_____

_____

Mark Awarded: _____　　　Date: _____ Signed: _____