



Final mark awarded \_\_\_\_\_

**UNIVERSITY OF GLAMORGAN**  
**Assessment Cover Sheet and Feedback Form**  
**2010/11**

<b>Module Code:</b> EE4S20	<b>Module Title:</b> Embedded Hardware Operating Systems	<b>Lecturer:</b> R. PATZ
<b>Assignment No:</b> 1	<b>No. of pages in total including this page:</b>	<b>Maximum Word Count:</b>
<b>Assignment Title:</b> Keypad Scanning Task		
<b>Tasks:</b> see attached		

**Section A: Record of Submission**

**Record of Submission and Plagiarism Declaration**

I declare that this assignment is my own work and that the sources of information and material I have used (including the internet) have been fully identified and properly acknowledged as required in the referencing guidelines provided.

**Student Number:**

You are required to acknowledge that you have read the above statement by writing your student number(s) above.

(If this is a group assignment, please provide the student numbers of **ALL** group members)

**Details of Submission**

Note that all work handed in after the submission date and within 5 working days will be capped at 40%. No marks will be awarded if the assignment is submitted after the late submission date unless mitigating circumstances are applied for and accepted.

- IT IS YOUR RESPONSIBILITY TO KEEP A RECORD OF ALL WORK SUBMITTED.
- An electronic copy of your work should be submitted via Blackboard.
- Work should also be submitted to the member of academic staff responsible for setting your work.
- Work not submitted to the lecturer responsible may, **exceptionally**, be submitted (on the submission date) to the reception of the Faculty of Advanced Technology, which is on the 2nd floor of G block (Room G221) where a receipt will be issued.

**Mitigating Circumstances:** if there are any exceptional circumstances which may have affected your ability to undertake or submit this assignment, make sure you contact the Faculty Advice Shop on 01443 482540 (G221).

<b>Section B : Marking and Assessment</b>		
This assignment will be marked out of 100% This assignment contributes to 25% of the total module marks. This assignment is bonded / non- bonded. Details :		It is estimated that you should spend approximately ____15-20____ hours on this assignment.
<b>Date Set: 09/11/2010</b>	<b>Submission Date: 17/12/2010</b>	<b>Feedback Date: 21/01/2011</b>

<b>Learning Outcomes</b>		
<b>This assignment addresses the following learning outcome(s) of the module:</b>  LO1 - A concrete understanding of the principles of embedded hardware operating systems and analyse the benefits of their usage.  LO2 - To be able to critically evaluate different complex embedded hardware software techniques.		
<b>Marking Scheme</b>	<b>Marks Available</b>	<b>Marks Awarded</b>
1. Introduction	5	
2. Key scanning explanation and implementation	25	
3. Explanation of Inter-task communication	20	
4. Design parameters (priority, size, etc)	10	
5. Test strategy/procedure	20	
6. Conclusion	10	
7. Presentation, referencing, spelling and grammar	10	
<b>Total</b>	<b>100</b>	

<b>Assessment Criteria</b>	
<b>Performance Level</b>	<b>Criteria</b>
Fail ( < 40%)	Report contains very little relevant information and little or no conclusion.
3rd Class / PASS (40% - 49%)	Report contains the bare minimum information. Little work done in researching around the subject. A basic, but limited, system has been implemented. Explanation of choices is limited or incomplete.
Lower 2nd Class / PASS (50% - 59%)	Report contains basic information. Report shows that research has been undertaken in the subject area. A basic system has been implemented. Explanation of choices covers the basics.
Upper 2nd Class / MERIT (60% - 69%)	Report addresses all parts of the assignment, and demonstrates that research has been done in the area and clearly shows its relevance. A system covering most aspects has been implemented. Explanation of choices covers the assignment

	question.
1st Class / DISTINCTION (70% +)	Report addresses all parts of the assignment, and demonstrates that extensive research has been done in the area. A system covering all aspects has been implemented. The report provides an explanation of choices including the outlook to a more complex system.

## Section C : Marker's Feedback

**Lecturer's Comments:**

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**Areas to concentrate on next time:**

Report structure

Research

Content

Team work

Referencing

Presentation

**Lecturer's signature:**

**Date:**

**Mark awarded:**

**All marks are subject to confirmation by the Board of Examiners**

## ASSESSMENT – DETAILED REQUIREMENTS

The aim of this assignment is to develop and implement a keypad scanning task with debounce and auto-repeat function.

The new task can be integrated into the existing example application that is provided with the uC/OS-II OS in HEW. The keypad scanning task is to replace the existing keypad scanning routines. The following features need to be implemented in the task:

- A column and row scanning algorithm.
- A trigger mechanism for the task. This can either be via an interrupt or using polling via a delay.
- Key debounce
- Auto-repeat, i.e. the pressing and holding down of a key will repeat the key. A possible time before starting to auto-repeat is 2 seconds.
- Decoding
- Communication of the key press to other tasks

The keypad is connected to the port 10 of the M16C. The lower four bit are driving the rows while the top four bits are pulled high and are read the columns. Figure 1 shows the interface.

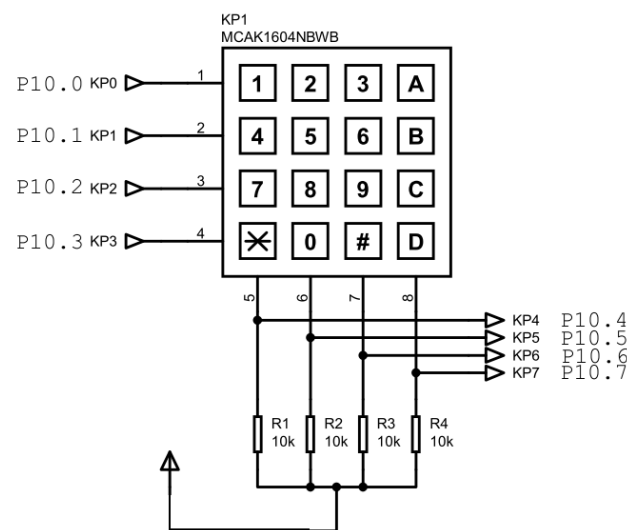


Figure 1: Keypad interface.

You need to develop an initialisation function as well as the keypad scanning task. The output of the key scanning task, i.e. the key, can be displayed on the display similar to the way it is done in the example application. Please note, the key scanning task does not display anything on the display. This done by another task; you can use the existing task.

For the report you need to include the following,

- Introduction and conclusion.
- Description of the key scanning method/principle. This can be supported by a graphic.
- Description of the trigger mechanism and the communication of the key press to other tasks.

- Design choices made, e.g. priority chosen, size of any queues, mailboxes, memory partitions etc (if used).
- How has it been tested.
- Source code of the new task and its functions. There is no need to include the source code of the whole program. You should however list the code segment of any task that receives the key press.

As an option you can also implement a shift key (\*).

All references have to be acknowledged. Please use the IEEE referencing standard. You may not use any or only few references in this assignment.

The assignment report aims at documenting and explaining the implemented task. It is not a report to explain the general features of the uC/OS-II RTOS. However, you may need to explain why you have used certain mechanisms. The report is not about quantity, but quality.

Please note that an introduction is not the repetition of the assignment question.

### **Submission details:**

The assignment report **must** be submitted via the TurnItIn facility on Blackboard. If you have any problems finding the link to submit your file please contact me in advance of the submission deadline. You will be able to re-submit your assignment until the deadline. It will not be possible to submit after the deadline unless this is your first report submission, i.e. you did not submit before the deadline at all. Please note the University guideline for late submissions applies.