

Embedded Systems Lab Project Summer 2011

Project Title	Mobile phone Keypad
Preferred Group Size	2 from the same class (recommended), 2 from in between classes (allowed but highly discouraged)
Grading	15 Marks counted as part of the final examination
Project Due Date	Week starting 7 th August 2011

Project Idea

In this lab course project, you are required to build a functional keypad which works as the one that is used in mobile phones.

A mobile phone keypad refers to the number and letters buttons found on a mobile phone, for the purposes of dialing and typing.

Project Description and Requirements

You are required to build and design a keypad to function similar to the one found in mobile phones. The project consists of a microcontroller with a numeric keypad and an LCD screen.

The keypad needs to work like a mobile phone keypad where a single key is mapped to different values; there are usually 12 keys in mobile phones which are used to enter text. This limited number of keys is used to enter 26 English alphabets, 10 decimal characters and special characters. In mobile phones, when we write a text message, each key is used to enter 3 or 4 alphabets and a decimal number. For example, phone key number 2 can display the letters A, B, C in addition to the numeric value it holds. In a similar fashion, key number 3 also displays the letters D, E, F. The character and numbers will be displayed on the LCD.

To select a desired character, we press the key multiple times, yet note that if you wait for a long time before pressing, the key returns to its default original value.



To illustrate, consider that we have to enter the character “B”, we do it by simply pressing the “A” key twice. This also depends on the delay. Now,

1. If the time between the letter “A” presses is short, then “B” is displayed.
2. If the time between the letter “A” presses is long, then “A” is displayed.

Keypad Keys functions:

- The keys will display letters according to the following pattern:

2 = ABC

3 = DEF

4 = GHI

5 = JKL

6 = MNO

7 = PQRS

8 = TUV

9 = WXYZ

- “0” “this key doesn’t display letters; it works as space key in the keypad.
- “1” “this key doesn’t display letters.
- “#” Hash key: This key is used to toggle the keypad entry mode between numbers, capital letter characters, and small letter characters. By default the keypad inputs numerals, pressing the # selects Capital letters mode, pressing # again, selects small letters mode, a third press returns to numerals mode.
- “*” Star key: This key will have a function similar to the Backspace key in the keyboard, that is to delete the last character that has been inserted and viewed on the LCD screen.
- No special characters or smiley’s are required!

Important Notes:

- ❖ Start as early as possible on your project, though the project description sounds simple, there is inherent complexity in both hardware and software aspects, so do not underestimate the time it needs, you will have many problems along the way which you will have to resolve!
- ❖ Never think of buying a model or commissioning someone to do it for you, not only will you get a zero in the project, but also your act will be considered as a direct violation to JU laws and your actions shall be reported as cheating in the final exam!
- ❖ Code sharing between groups is not allowed!
- ❖ If you acquire a **part** of your software from a book, website, etc ... kindly reference it properly, else it will be considered as plagiarism.

- ❖ You are free to use any material to build the model and the holding structure for the hardware devices you use. (You might use LEGO parts, wood, strengthened cartoon or even metallic components!!)
- ❖ All programming must be done in **PIC ASSEMBLY** language only; using high level languages in the project will get you a Zero.
- ❖ Your submitted work must be professional:
 - Hardware: you are submitting a product, all electrical and electronic components must be hidden from the user, only user-accessed components are visible, hide the wiring, be neat. ***Still, the instructor should be easily able to examine the internal components at the time of discussion when required!***
 - Software: your work should be fully documented, all inputs/outputs should be listed, and each subroutine/macro should be fully documented! Use functional comments! Refer to the last section in experiment 3 regarding documentation.
- ❖ You should submit two types of flowcharts:
 - An abstract general flowchart of the whole program.
 - A flowchart for each of your written subroutines/macros (LCD, keypad and/or those software codes taken from the lab experiments **ARE NOT** required)
- ❖ Students are not allowed to move between groups once they are formed, so choose your group carefully from the beginning! ***We are not responsible if your colleagues in the group chose to drop the class, we will not allow you to join another group!***
- ❖ Divide the work such that each student is responsible for a specific task, **YET EVERY** student is required to answer for **ANY QUESTIONS** in relation to any submitted work of the project.

Report Guidelines

You should submit your report as a hard copy.

Submission due date is on in your discussion time

Your e-report should contain:

1. The flowcharts (as described above in the notes section)
2. Circuit diagram of your hardware (use Multisim or Proteus to draw the circuit, include the file as well)
3. Any figures, tables which you find useful to include
4. The contribution of each student in the project!

Other Project Proposals

If you have another project idea which you would like to do instead! You should hand in a proposal (printed) describing in details the idea of your project, the hardware components you think you might use, number of students in this project to your direct engineer ONLY! He/She will notify you of the status of proposal acceptance/refusal!

Proposals submissions deadline is July 17th, 2011. Late proposal submissions will be turned down.

If you submit a project which has not been approved you will get a mark of Zero

☺Good Luck and Have Fun Building the Project☺