**Homework 4**

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| **ECE 346 Microcontrollers - Spring 2009**  **Homework 4**  **Due: Wednesday, April  15, 2009 @ Noon**  **Program:**      Write a program which will drive a timer on the LCD screen based on an input from a potentiometer and a push button.      When your program starts it will continuously scan the input from a potentiometer, and based on the input voltage the LCD screen should display one of three operational modes:   1. Pause 2. Up/Down 3. Reset       on the top portion of your LCD. On the bottom portion your program should display the word "Mode".      When the user presses the push button, the top part of the LCD will contain one of the selected modes, and the bottom part of the LCD will display a timer.      The timer in each one of the modes is to start from zero displaying "0m 00.0s" and will count upwards in one hundred millisecond increments.      The operational mode will dictate the functionality of the pushbutton. In each of the modes the push button should do the following:   1. Pause :    Pause the timer at the time the button has been pushed.  Continue counting when the button is pushed again. 2. Up/Down :   Count downwards once the button has been pushed. Count upwards when the button is pushed again. 3. Reset :     Reset the counter to zero and start counting again.       When the user presses the Reset button on the EVBU board, the program should once again scan the input from the potentiometer and display the mode selection menu.      Your program must run from the EEPROM and should be fully functional both after a reset and a power up.  **Details:**      The timer on the LCD should be able to count up to 9m 59.9s, after which it will revert to 0m 00.0s.      If counting down in the UP/DN mode your counter should go to 9m 59:9s after it reaches the 0 mark.  **A/D:**        The A/D conversion of the input voltage supplied by the potentiometer must be done in continuous mode on PE\_3 until the user presses the push button.      With this, the LCD top half must be updated to reflect the user mode selection.      The following are the A/D ranges corresponding to the operational modes above:   1. Pause :        $00 - $54 2. Up/Down :   $55 - $AA 3. Reset :         $AB - $FF   **Push Button:**      The push button operation must be interrupt driven on IC3, such that the interrupt will detect rising edges.      Note that there are two distinct occasions when  the user is expected to press the button.      Set up (enable/disable) your interrupt accordingly.  **EEPROM:**      Your program has to reside in the EEPROM and must be able to execute correctly even after a reset or power-up.      This means that all data residing in RAM must be properly initialized.      Your program's starting location must be $B600.  **Example Display:**  [http://sites.google.com/site/ece346s09/_/rsrc/1239174234485/homeworks/homework-4/Hw4.jpg](http://sites.google.com/site/ece346s09/homeworks/homework-4/Hw4.jpg?attredirects=0) |