Embedded Systems diploma by Sameh Afifi

Interfacing Assignment

DIO & external interrupt:

1. Write a code to make led on when press on push button and make it off when press again on push button.

2. Write a code to make led 1 toggle every 100 ms when press push button first time and make the led toggle every 500 ms when press again on push button and toggle again every 100 ms when pressing again on push button use external interrupt

3. Write a code using external interrupt to make a LED on when pressing on button and off when releasing the button.

4. Write a code to use external interrupt to make led on when press on push button and off when pressing again.

LCD

1. Display a single character on LCD

2. Display a single digit number on LCD

3. Display a counter on LCD that count from 0 to 255 every 1 second

4. Write a code to display your name on LCD then, if you press on

   • button 1 the name will shift lift by one step.

   • button 2 the name will shift right by one step.

   • button 3 the name will shift up by one step.

   • button 4 the name will shift down by one step.

EEPROM

• Display a counter on LCD that count from 0 to 255 every 1 second, try to turn off the board during the counting of counter then turn the board on and make sure that it will continue its count.

Keypad

1. Try to write a code to use keypad for writing your name.

2. Display your name on LCD then try to up –down – left –right your name using 4 keys from keypad

3. Design a simple calculator which can + - / * 1 digits with only one mathematical operation

   e.g: 1 + 9 =

       5 * 2 =
       7 / 3 =
       2 / 0 = wrong entry

Seven segment

1. Display a single digit in one seven segment.

2. Display a double digits like 35 on both seven segment.

3. Map the value from ADC that is from 0 to 1023 to be 0 to 99 and display it on seven segment

4. Display the Counter value count from 0 to 99, count up every 1 second.

5. Use two push button one to increment and the other for decrement a value displayed on seven segment.

Timer

1. Use timer (normal mode with / without prescaler) to blink a led every 500 ms.

2. Use timer (compare mode with / without prescaler) to blink a led every 500 ms.

3. Use timer to increment a counter every 300ms and print the value of it on LCD and seven segment.

4. Use timer in compare mode to generate a frequency which have period 100 msec

5. Use timer in compare mode to generate a signal which is 100 msec low and 50 msec high

6. Use external i/o interrupt and timer to measure the frequency of a signal.

PWM:

1. Increase the brightness by 1 % every 30 mille second until reach 100% then decrease by 1% until reach 0% and repeat it again.

2. Control the brightness of the Led connected to PWM using 2 push button, one to increase the brightness 10% and another to decrease the brightness 10%

Input capture:

1. Write a code to measure Frequency and Duty Cycle of PWM signal using input capture mode.

ADC:

1. Use ADC0 to read analog data from variable resistance and display the value of it on LCD.
2. Try to display the voltage of the input data on the second line of LCD.
3. Write a code to on the led If the ADC value is more than 512 else the led is off.
4. Use ADC0 and PWM to control the brightness of a led.

UART

1. Connect Rx to Tx on your board and try to send a character and receive it then print the receiving data on LCD
2. Send ADC value from Tx and receive it from Rx then print the received value on LCD

SPI

1. Write 2 codes one for master and one for slave and send a character from master to slave and print the coming value to LCD.

2. Use 2 slaves and send from master odd number to one of them and even number to the other one and print on LCD.

I2C:

1. Send a single character from master to slave.
2. Send even number to the slave which have ID 0x50 and odd to the slave with ID 0x60.