EE212-Microprocessors Project 2 Assignment

Ömer Faruk Ünal & Ali Necat Karakuloğlu

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1 Introduction

In this project you will use interrupts and SysTick timer of KL25z board. For this purpose, you will implement two interrupt routine. First interrupt will control the onboard RGB LED and the second one will control 4 external LEDs connected to the GPIO ports of the microcontroller.

2 Implementation

2.1 Interrupt Service Routine 1 (ISR1)

For this ISR you will use on board RGB LED and allocate 2 buttons to choose the color of LED or halt the blinking of the LED. functionality of the buttons are as follows;

- Button 1: Turn LED color to green. Blink 5 times.
- Button 2: Halt blinking for 2 seconds.

2.2 Interrupt Service Routine 2 (ISR2)

This ISR drives LEDs connected to the GPIO ports of the board. In this ISR you will implement a 4-bit binary counter. When the button is pressed for the first time, LED representing the least significant bit should turn on. Binary value represented by the LEDs should always increase (after 15 press, the value start from 0).

- Button 3: Increase LED counter

2.3 Main Function

Blinks the on board RGB led **T**s on and **T**s off in an infinite loop. The color should be red. **T** should be set within the code as follows;

$$\mathbf{T} = 0.5 + \mathbf{LastDigitOfID} * 0.1$$

2.4 Required Functionalities

- **When no button is pressed, red LED on the board should blink with 1s period and 50% duty cycle.**
- **If button 1 is pressed, Turn on onboard LED to green for 5 times. At this time, if button 3 is pressed, increase the 4-bit binary counter as well.**
- **If button 2 is pressed, Turn off onboard LED for 2 seconds. At this time, if button 3 is pressed, increase the 4-bit binary counter as well.**
- **After ISR is completed, red LED on the board should blink with 2Ts period and 50% duty cycle again.**
- **You have to use SysTick timer of the microprocessor for delays and blinking functionality.**

2.5 Required Components

- 4 LEDs (color is not important)
- 3 push buttons
- Breadboard
- Jumper Cables
- KL25z Board

2.6 Suggestions

Note that this project can be done in several ways. One way to do it is by using falling-edge sensible interrupts. If you choose to use falling-edge, you can do your project by connecting one side of the button to the ground whereas the other side is connected to your interrupt pin. As another note, you should carefully select the correct priority order for 3 interrupts (SysTick, ISR1, ISR2)

3 Grading

- Implementation of ISR1 (*35 points*)
- Implementation of ISR2 (*35 points*)
- Implementation of main function (*10 points*)
- Enabling correct interrupt priority (*20 points*)
- Not using SysTick timer (*You get half of what you received from the previous items*)