IET WINTER 2016
Embedded Systems Design
LAB 5

Objective:

At completion of the lab, student will be able to:

1. Get basic understanding of interrupt functionality
2. Understand and program external interrupts of Atmega 16/32.

Components Required for the Lab:

1. Development Board from MikroElectronika
2. USB cable for programming Atmega 16
3. Breadboard
4. LEDs
5. Resistors
6. Push Buttons
7. Assorted wires
8. Connectors (for development board to breadboard connections)

LAB -4 Resources:

1. Basic understanding of Atmega Interrupts
2. Atmega 16 datasheet Page No: 68-70
3. External Interrupts in AVR atmega16 microcontroller

Some useful Registers for this lab:

GIFR – General Interrupt Flag Register
GICR – General Interrupt Control Register
MCUCR – MCU Control Register
SREG – Status Register
MCUCSR- MCU Control and Status Register

Lab Assignment:

Write and test following programs:

1. Pilot

Blink LED at 1st pin of PORTB at 0.25Hz. When an external interrupt occurs at 1st pin of PORTD, it blinks LED at 1st pin of PORTA for 2 times (@ 1Hz). After completion of this operation, it resumes to its normal task of blinking 1st pin of PORTB.

2. Dancing LEDs

Design a program that turns ON LED one by one at a port with 0.5 second of delay from Right to Left. One can change this direction by using Push Button R, which will shift LED from Left to Right. One can resume to left shift operation by pressing Push Button (L). (Note:

- At any given instance only one LED will be ON.
- Once the 7th Pin is ON, Right Shifting will cause 0th pin of the port ON.
- Also, once the 0th Pin is ON Left Shifting will cause 7th pin of the port ON)

3. 8- bit Counter Display

Write a program that counts and display the number of visitors at IET through 8-bit LED display. The doorkeeper presses the push button every time a new visitor enters and the count value is displayed at the dean's office in 8-bit LED display.

4. Toggle PORTB.0 at 0.5Hz frequency, by triggering external interrupt pin by software.

Hardware:

Use as required.