Dhaka University of Engineering & Technology (DUET), Gazipur

Department of Computer Science and Engineering (CSE)

Course Title: Microprocessor & Interfacing Sessional (CSE 3812)

Lab: 03

Group No - 10

Controlling the LEDs of MDA-8086 Kit

Objectives:

To interface LEDs with 8086 microprocessors by 8255 PPI

Basic Theory:

- **Controlling LEDs in MDA 8086 Kit:**

There are 4 LEDs namely RED (L1), GREEN (L2), Yellow(L3) and RED (L4) inside the MDA-8086 Trainer kit and can be modeled to design a simpler application. This requires 8255 PPI ports which are already connected to the 4 LEDs internally. Through a code we can access these ports and provide binary or hex values to switch on the required LED (on or OFF). In order to turn a particular LED ON, a logical '1' should be provided to a particular port. Note that only Port B of 8255A PPI is used in the following code to control the LEDs.

RED(L1)	GREEN(L2)
YELLOW(L3)	RED(L4)

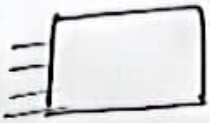
Different ports of programmable peripherals interface (PPI) 8255 is used for switching on LEDs, the addresses of the ports are:

Port A: 19h

Port B: 1Bh

Port C: 1Dh

Control register:1Fh



To control the LEDs, port B will be used for the value to select the LEDs and Port A and C will be set with constant values. In-case of Port B, pass a value of '11110001' to select the L1 LED and pass a value of '11110010' to select the L2 LED and so on.

Example Example code to illuminate LEDs with a sequence of L1, L2, L3 and L4.

```
CODE SEGMENT
ASSUME CS: CODE, DS: CODE

PPIC_C  EQU 1FH     ; Control register address
PPIC    EQU 1DH     ; Port C address
PPIB    EQU 1BH     ; Port B address
PPIA    EQU 19H     ; Port A address

        ORG     1000H           ;The code is placed at offset 1000h
        MOV     AL, 10000000B   ;Mode set for Control Word to control 8255 PPI
        OUT     PPIC_C, AL
        MOV     AL, 11111111B
        OUT     PPIA, AL
        MOV     AL, 00000000B
        OUT     PPIC, AL

L1:     MOV     AL, 11110001B
L2:     OUT     PPIB, AL        ; Select a L1 LED with AL value and make it ON
        CALL    TIMER
        SHL     AL,1
        TEST    AL, 00010000B   ; Perform Logical AND and set Zero Flag (ZF), SF, PF
        JNZ     L1
        OR      AL, 11110000B   ; Perform Logical OR and store the result in AL
        JMP     L2
        INT     3               ; Single-step interrupt

TIMER: MOV      CX,1
TIMER2: PUSH    CX
        MOV     CX,0
TIMER1:     NOP
            NOP
            NOP
            NOP
            LOOP TIMER1
```

```
        POP   CX
        LOOP  TIMER2
        RET

CODE ENDS
END
```

Experiment Procedure:

1. Write the above program in notepad and save the file as "filename.asm". Place this file in the folder where "masm.exe" exists.

2. Go to the command prompt and execute "masm.exe". You will see the following message
   Microsoft (R) Macro Assembler Version 5.10
   Copyright (C) Microsoft Corp 1981, 1988. All right reserved
   Source filename [.ASM]

3. Follow the procedure given below to prepare machine code for your program:
   Source filename [.ASM]: filename Press ENTER
   Object filename [C: file name.OBJ]: Press ENTER
   Source listing [NUL.LST]: filename Press ENTER
   Cross reference [NUL.CRF]: Press ENTER

4. Execute "LOD186.exe". You will see the following
   message Paragon LOD186 Loader-Version 4.0h
   Copyright (C) 1983 - 1986 Microtec Research Inc.
   ALL RIGHT RESERVED
   Object/Command File [.OBJ]:

5. Follow the procedure given below to prepare HEX (ABS) file for your program:

Object/Command File	[.OBJ]: filename	Press ENTER
Output Object File	[C:filename.ABS]:	Press ENTER
Map Filename	[C:NUL.MAP] :	Press ENTER

   **LOAD COMPLETE

6. Turn on the 8086 microprocessor kit.
7. Open the "Wincomm" window. Press "L" then "Enter". You will see the following message:

   ** Serial Monitor 1.0 **
   ** Midas 335-0964/5 **
   8086 >L. Press ENTER
   Down load start!!

8. Strike PgUp or F3 key of your keyboard. A new window will appear. Locate the "filename.ABS" file and open it.

9. You will observe that file download has started. A message like the following one will be shown:
   :14100000B800008ED88EC0BB00208B078A6F028A4F038BB6
   :10101400E8B5604268B76068B7E088B1E0A20CCCC
   :0E20000012345678ABCDF0146853B1C41020E2
   :00000001FF
   OK completed!!

10. After loading the program, run the program in (press G from the keyboard, then press enter) in MDA-8086 kit and ensure the display output.

Task to do:

Write a program to illuminate LEDs for implementation of Simple Traffic Control Light Signaling model. Vehicles will be STOP (with red color), WAIT (with yellow color) & GO (i.e., with green color) states for a moderately long time and vive-versa.