MPI LAB PROJECT REPORT

19L-1316
19L-1252

INTRODUCTION

The end of semester project for Microprocessor Interfacing and Programming Lab was given to us via a Project statement. The objective of the project was to design and implement a Digital Clock with a 2x16 LCD for displaying messages and a 5x7 Dot Matrix, along with a 4x3 Keypad for data entry.

The aforementioned digital clock was to have a number of additional function besides displaying the current time. Upon pressing the '*', an option to update the current time was to be shown. The user would then enter the time and the time would be changed. Furthermore, pressing the '#' key would initiate an option to set the time for the alarm. When the timer would reach the set time, a message indication the alarm going off would be shown on the 2x16 LCD.

The project was performed in groups of two. One member was given the responsibility of handling the timer isr and the keypad while the other was tasked with interfacing the 2x16 LCD and the 5x7 Dot Matrix display. Since the project statement was handed over weeks ahead of time, ample time was available to work on the project. However, do to unforeseen closure of the University and hence the lab, the circuit was simulated on Proteus 8.

PROCEDURE:

The crux of the Digital Clock was the timer0 in the 8051 microcontroller, which counts the time passed. The ISR involved setting the values of the TH0 and TL0 values which combined to form a 16 bit value. After every 60 seconds or 1 minute, the values in the register R5, which represented the rightmost digit, was incremented until it reached 9. At this point the value in the next register R4, which represented the next digit from the right was incremented, and so on with the hours.

```
ORG OBH
MOV TL0,#07H                              ;
MOV TH0,#4CH
DJNZ R0,BACK  ;1 SEC
MOV R0,#20
DJNZ R1,BACK  ; 60 SECONDS
MOV R1,#60
INC R5    ;INCREMENT MIN
CJNE R5,#10,BACK
MOV R5,#0
INC R4
CJNE R4,#6,BACK
MOV R4,#0
INC R3
CJNE R2,#2,BACK
JMP TMS
HRST:
CJNE R3,#10,BACK
MOV R3,#0
INC R2
TMS:
CJNE R2,#2,BACK
CJNE R3,#4,BACK
MOV R3,#0
MOV R2,#0
BACK:
    RETI
```

The LCD and the Dot matrix displays were then used to show the messages and the current time respectively. The following piece of code shows part of the LCD interfacing:

```
DISP_ENTER:
MOV A,#38H
CALL CMDWRT
CALL DELAY
MOV A,#0EH
CALL CMDWRT
CALL DELAY
MOV A,#01H
CALL CMDWRT
CALL DELAY
MOV A,#06H
CALL CMDWRT
CALL DELAY
MOV A,#80H
CALL CMDWRT
CALL DELAY
MOV A,#'E'
CALL DATWRT
CALL DELAY
MOV A,#'n'
CALL DATWRT
CALL DELAY
MOV A,#'t'
CALL DATWRT
CALL DELAY
MOV A,#'e'
CALL DATWRT
CALL DELAY
MOV A,#'r'
CALL DATWRT
CALL DELAY
```

Furthermore the next portion of the code shows the interfacing of the Dot matrix display:

```
MOV 40H,#3
LOOP1:MOV 41H,#255
LOOP2:MOV 42H,#255
LOOP3:
MOV P3,#10000000B
MOV P2,#10000000B
DJNZ 42H,LOOP3
DJNZ 41H,LOOP2
DJNZ 40H,LOOP1
RET
TWO:
MOV 40H,#50
LOOP4:
MOV P3,#10110110B
MOV P2,#01110000B
CALL DELAY
MOV P3,#11111001B
MOV P2,#10000000B
CALL DELAY
MOV P3,#10001111B
MOV P2,#00001000B
CALL DELAY
DJNZ 40H,LOOP4
RET
THREE:
MOV 40H,#100
LOOP5:
MOV P3,#10110110B
MOV P2,#01111000B
CALL DELAY
MOV P3,#11001001B
MOV P2,#10000000B
CALL DELAY
DJNZ 40H,LOOP5
RET
FOUR:
MOV 40H,#50
```

CONCLUSION:

While we were unable to implement the alarm function of the Digital clock, we were able to get the displays and the time setting function of the clock to work as intended.