1.OVERVIEW

1.1 INTRODUCTION:

The Title of the project is "DIGITAL CALENDAR" which is an embedded based project.

An embedded project is a combination of hardware and software. Microprocessors and microcontrollers are widely used in such embedded system products. Each embedded system is unique and highly customized to the application at hand .
The main basics that includes in embedded programming are either assembly Programming or it may be high level languages such C , C++ or embedded C.

This project "DIGITAL CALENDAR" using microcontroller is an advanced digital calendar , which displays the seconds , minutes, hours , date day, month over the LCD displays.
It has advantage of setting these features. It has an 8-bit microcontroller which runs on the program embedded on its ROM.

1.2 PROBLEM STATEMENT:

Digital Calendar Using 8051

A digital calendar is one that displays time and date digitally. The project explained here, displays time on a 16×2 LCD module. A keypad 4×3 matrix is used to set it.
This circuit can be used in cars, houses, offices etc.

1.3 OBJECTIVES:

The main objective of the project is designing a "DIGITAL CALENDAR" by Interfacing microcontroller with RTC , in which time , date, day of the week , name of the month , can be reset , displayed and updated.

1.4 SOFTWARE AND HARDWARE REQUIREMENT

In this project we used **keil microvision** for writing code and **Proteus** software for simulation.

1.5 SYSTEM DESIGN

BLOCK DIAGRAM

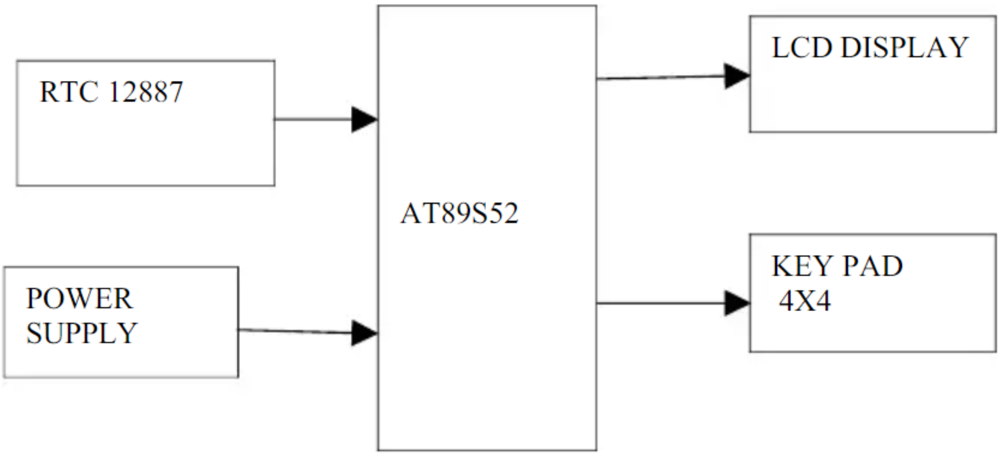


FIGURE 1 : BLOCK DIAGRAM

This project “DIGITAL CALENDAR” using microcontroller is an advanced digital calendar, which displays the seconds, minutes , hours, date, day, months over the LCD displays. It has the advantage of setting these features. It has an 8- bit microcontroller which runs on the program embedded on its ROM.

This clock works in 12 hour mode and is configured by programming the microcontroller. The program uses a delay function for producing a delay of 1 second.

1.6Methodology:

This project consist of seven major blocks . They are

1) Power Supply
2) Microcontroller
3) Rtc
4) Keypad
5) Lcd display

1.7 SPECIFICATION

- The possibility of setting time and date

- Simple circuit and min components
- Acting as real time clock

1.8 EXPLAINATION

This clock works in 12 hour mode and is configured by programming the microcontroller. The program uses a delay function for producing a delay of 1 second.

On reset, the LCD prompts the user to set time first. The hour and minute components can be set by entering the corresponding valid values using the keypad.

The AM/PM mode is set by entering 1 or 2. Give 1 for am while 2 for pm. After that the LCD prompts the user to set date components which is day, month and year.

The set time and date is displayed on LCD screen and changes as the time passes on. Seconds are increased after every one second by making use of delay function uses timer 0 with mode 1.

As second reaches 59, minute is incremented by one and second is reset to 0. Similarly, as minute reaches 59, hour is increased by one and minute is set to 0.

After hour reaches 11, minute reaches 59 and second reaches 59, the AM/PM mode is changed accordingly.

The date is changing by the same concept taking into account the difference values for its components.

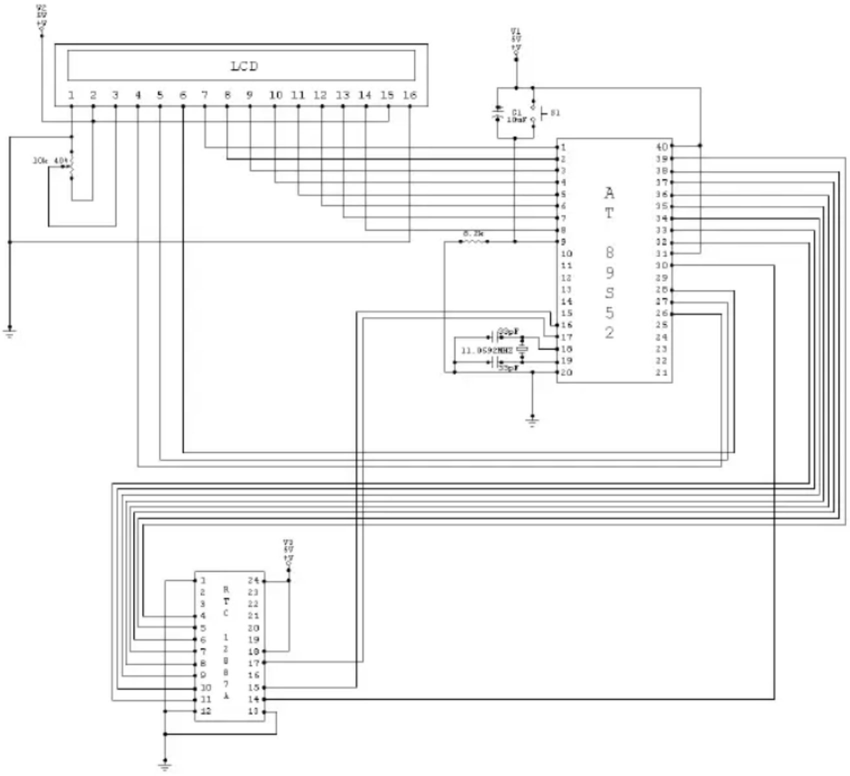


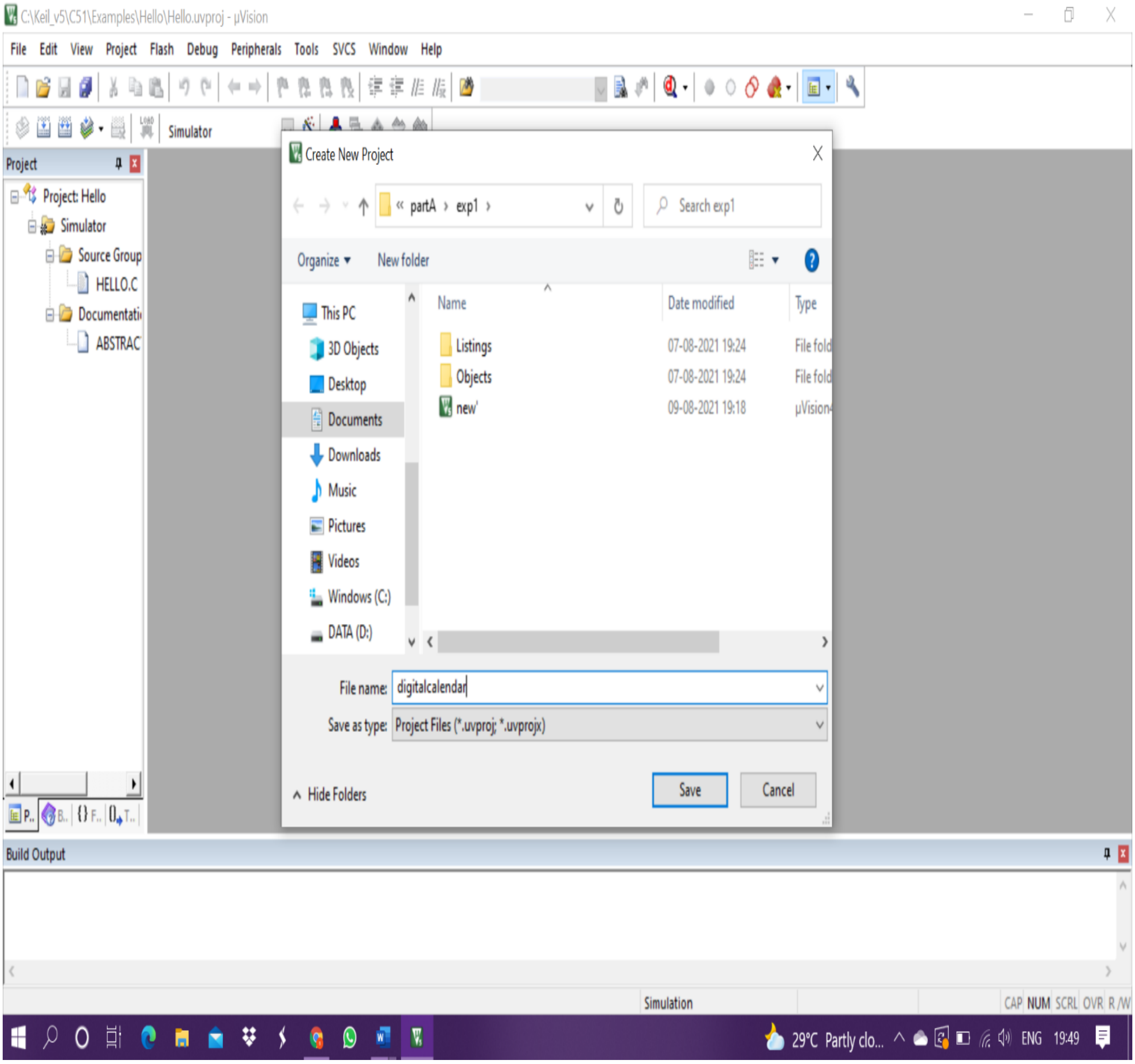
FIGURE 2 : PROJECT LAYOUT

CODE FOR DIGITAL CALENDAR

Procedure For Keil Compiler

STEP1:

Create New Project Named DIGITALCALENDAR



C:\Keil_v5\C51\Examples\Hello\Hello.uvproj - µVision

Create New Project

« partA › exp1 ›

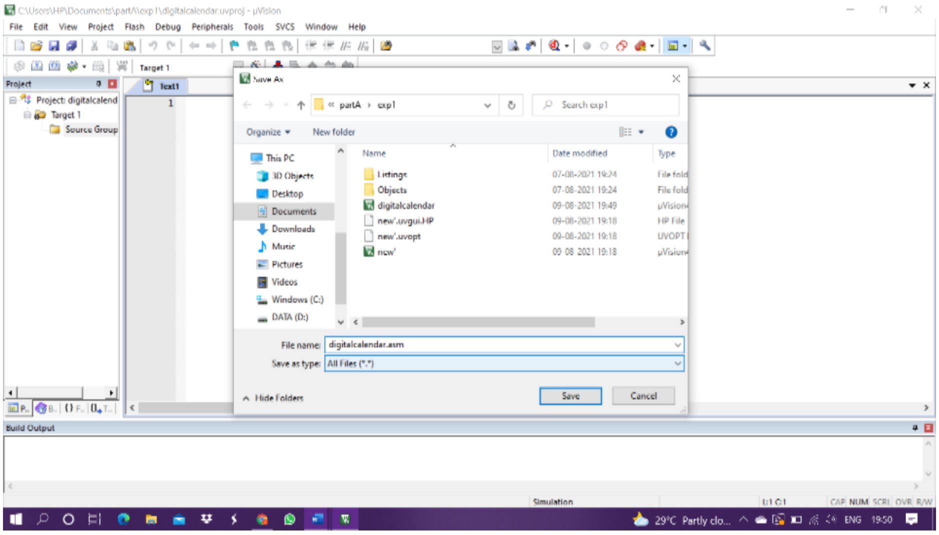
Name	Date modified	Type
Listings	07-08-2021 19:24	File fold
Objects	07-08-2021 19:24	File fold
new'	09-08-2021 19:18	µVision

File name: digitalcalendar

Save as type: Project Files (*.uvproj; *.uvprojx)

STEP 2

Create New Source File



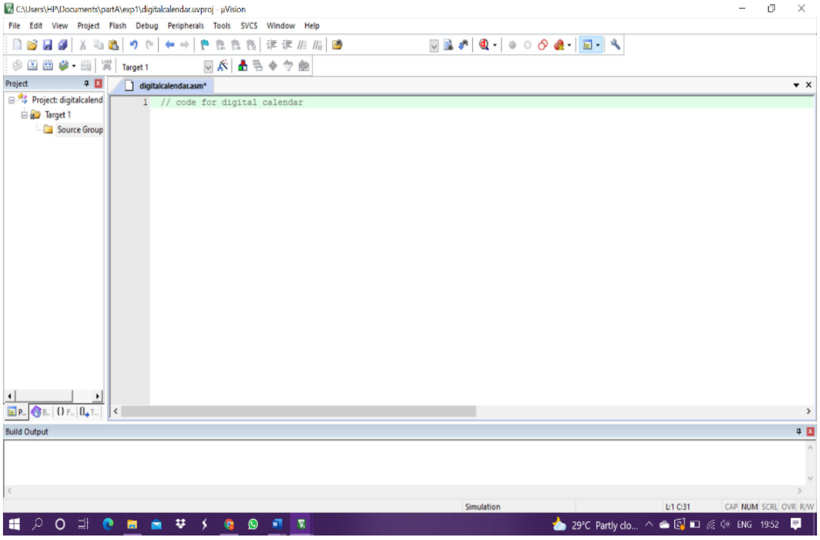
Name	Date modified	Type
Listings	07-08-2021 19:24	File fold
Objects	07-08-2021 19:24	File fold
digitalcalendar	09-08-2021 19:49	µVision
new'.uvgui.HP	09-08-2021 19:18	HP File
new'.uvopt	09-08-2021 19:18	UVOPT
new'	09-08-2021 19:18	µVision

File name: digitalcalendar.asm

Save as type: All Files (*.*)

STEP 3

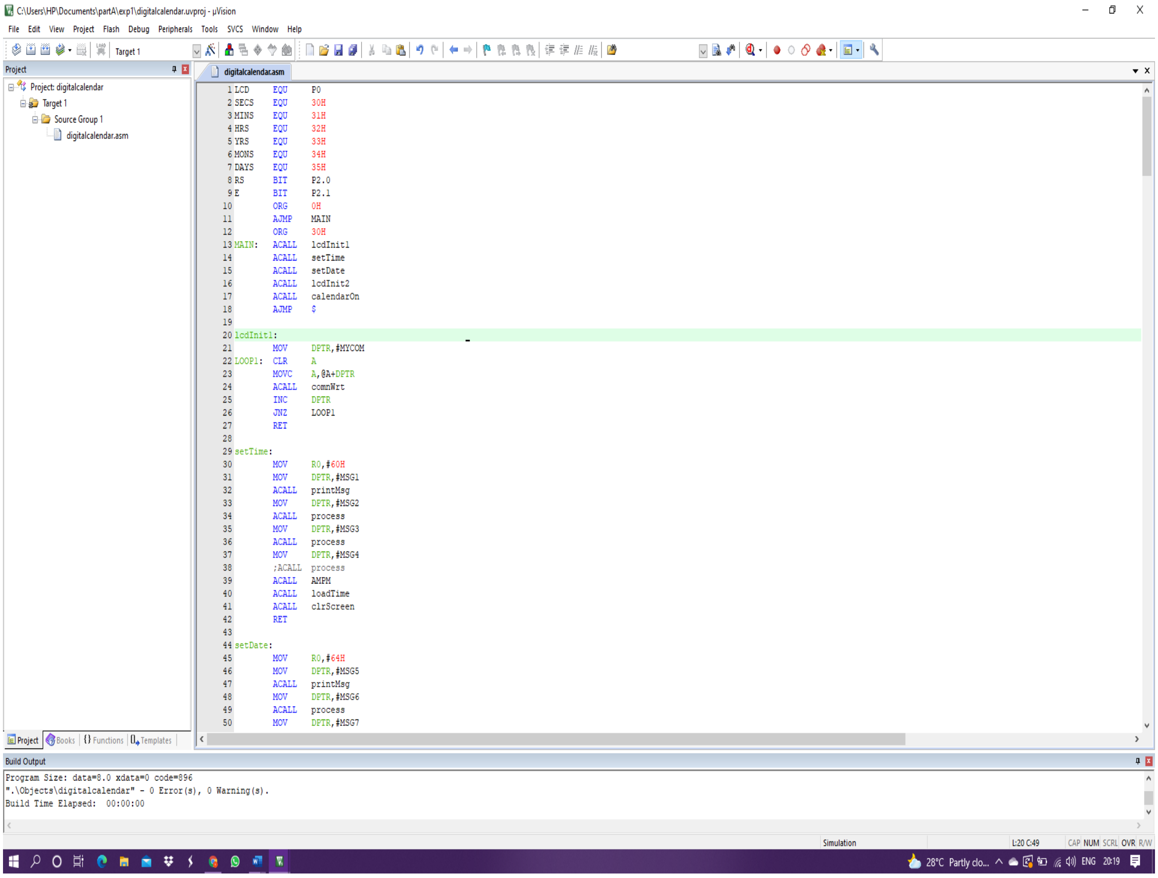
Writing Code for digital calendar



```
// code for digital calendar
```

STEP 4

Program For Digital Calendar



C:\Users\HP\Documents\partA\exp1\digitalcalendar.uvproj - µVision
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28°C Partly clo...
ENG
20:19

```
LCD     EQU     P0
SECS    EQU     30H
MINS    EQU     31H
HRS     EQU     32H
YRS     EQU     33H
MONS    EQU     34H
DAYS    EQU     35H
RS      BIT     P2.0
E       BIT     P2.1
        ORG     0H
        AJMP    MAIN
        ORG     30H
MAIN:   ACALL   lcdInit1
        ACALL   setTime
        ACALL   setDate
        ACALL   lcdInit2
        ACALL   calendarOn
        AJMP    $

lcdInit1:
        MOV     DPTR,#MYCOM
LOOP1:  CLR     A
        MOVC    A,@A+DPTR
        ACALL   comnWrt
        INC     DPTR
        JNZ     LOOP1
        RET

setTime:
        MOV     R0,#60H
        MOV     DPTR,#MSG1
        ACALL   printMsg
        MOV     DPTR,#MSG2
        ACALL   process
        MOV     DPTR,#MSG3
        ACALL   process
        MOV     DPTR,#MSG4
        ;ACALL  process
        ACALL   AMPM
        ACALL   loadTime
        ACALL   clrScreen
        RET

setDate:
        MOV     R0,#64H
        MOV     DPTR,#MSG5
        ACALL   printMsg
        MOV     DPTR,#MSG6
        ACALL   process
        MOV     DPTR,#MSG7
```

```
Program Size: data=8.0 xdata=0 code=896
".\Objects\digitalcalendar" - 0 Error(s), 0 Warning(s).
Build Time Elapsed:  00:00:00
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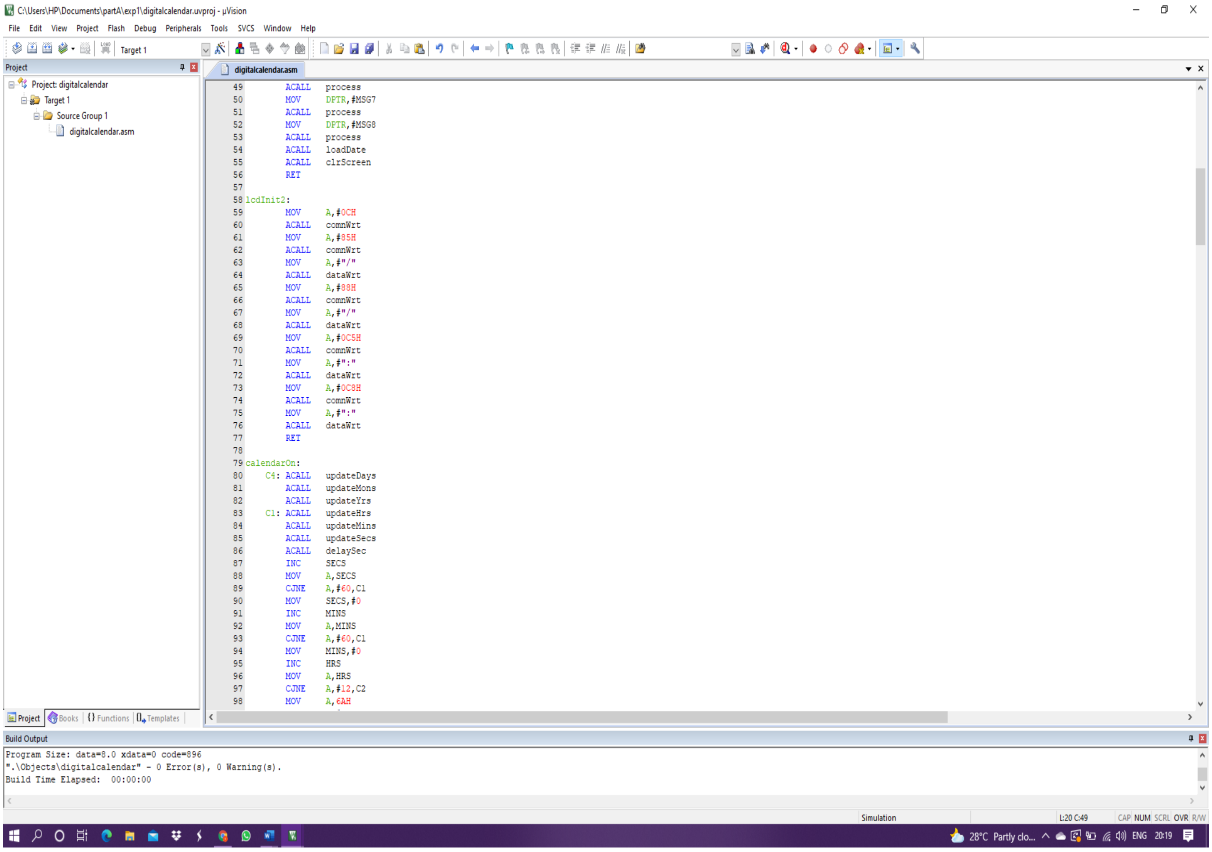
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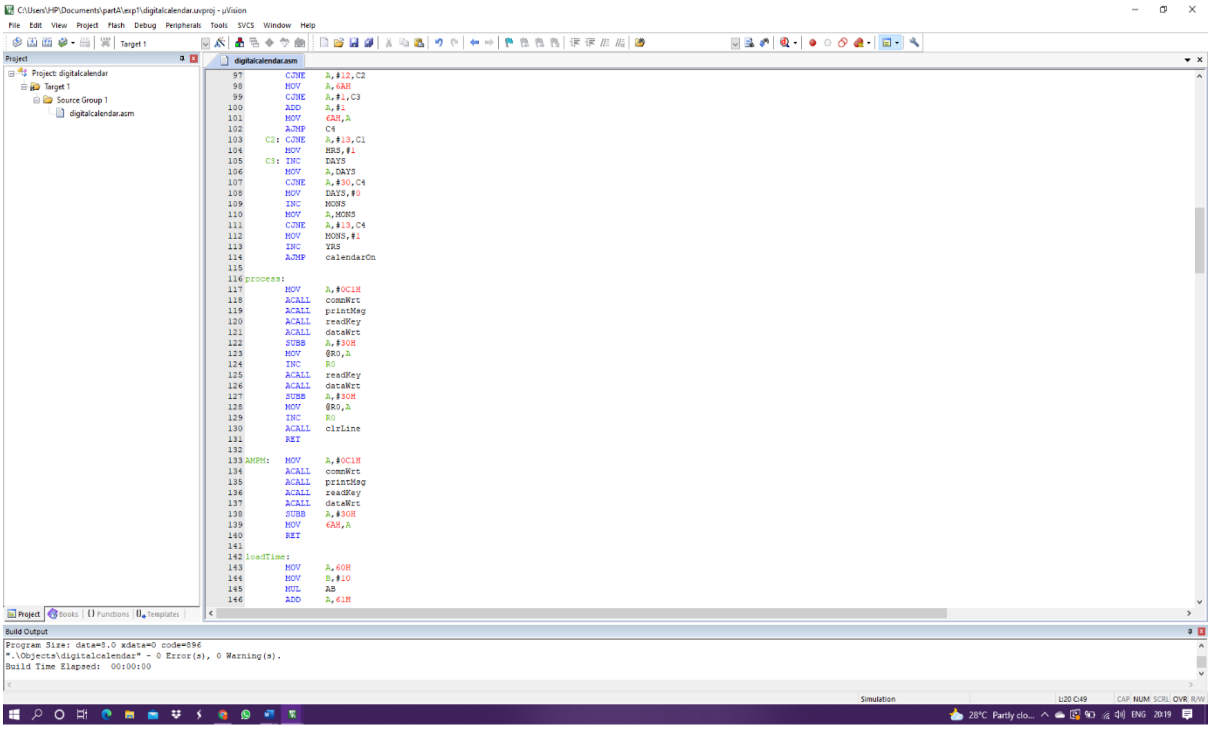
```
        ACALL   process
        MOV     DPTR,#MSG7
        ACALL   process
        MOV     DPTR,#MSG8
        ACALL   process
        ACALL   loadDate
        ACALL   clrScreen
        RET

lcdInit2:
        MOV     A,#0CH
        ACALL   comnWrt
        MOV     A,#85H
        ACALL   comnWrt
        MOV     A,#"/"
        ACALL   dataWrt
        MOV     A,#88H
        ACALL   comnWrt
        MOV     A,#"/"
        ACALL   dataWrt
        MOV     A,#0C5H
        ACALL   comnWrt
        MOV     A,#":"
        ACALL   dataWrt
        MOV     A,#0C8H
        ACALL   comnWrt
        MOV     A,#":"
        ACALL   dataWrt
        RET

calendarOn:
    C4: ACALL   updateDays
        ACALL   updateMons
        ACALL   updateYrs
    C1: ACALL   updateHrs
        ACALL   updateMins
        ACALL   updateSecs
        ACALL   delaySec
        INC     SECS
        MOV     A,SECS
        CJNE    A,#60,C1
        MOV     SECS,#0
        INC     MINS
        MOV     A,MINS
        CJNE    A,#60,C1
        MOV     MINS,#0
        INC     HRS
        MOV     A,HRS
        CJNE    A,#12,C2
        MOV     A,6AH
```

```
Program Size: data=8.0 xdata=0 code=896
".\Objects\digitalcalendar" - 0 Error(s), 0 Warning(s).
Build Time Elapsed:  00:00:00
```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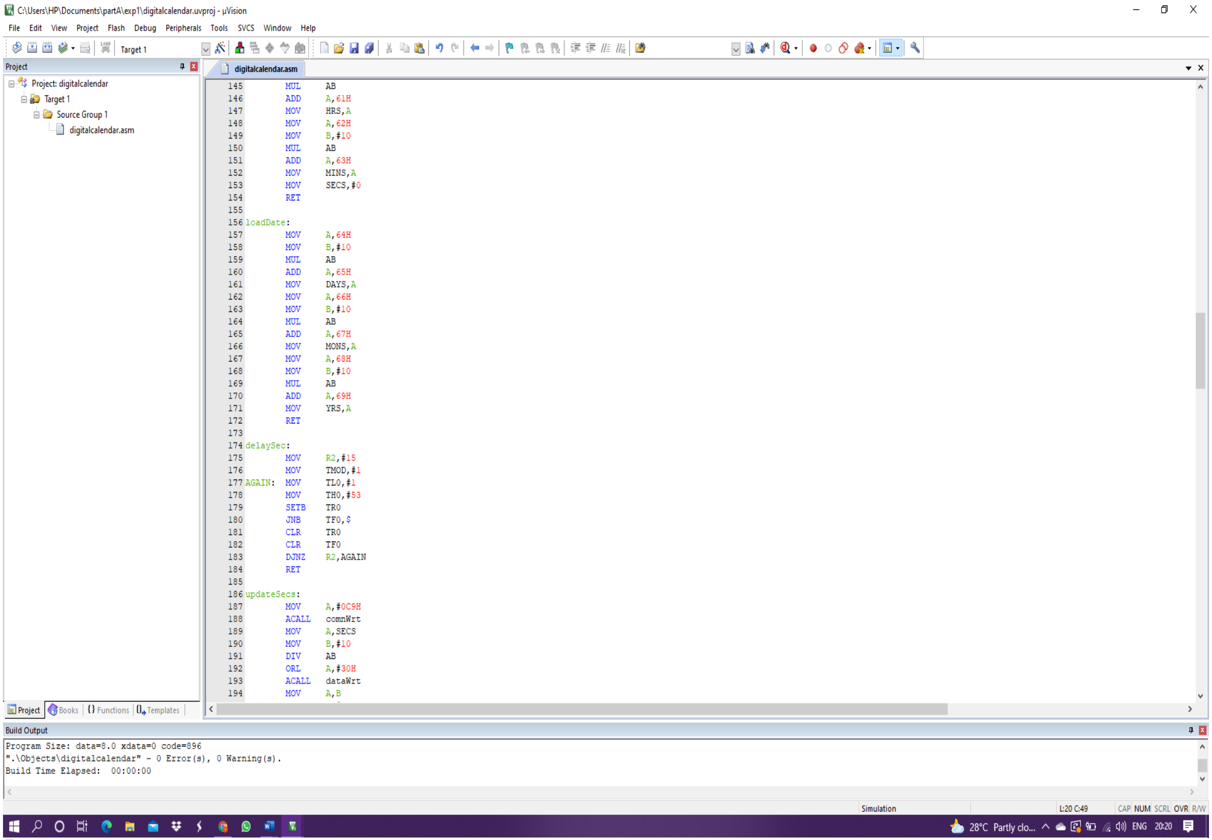
```
        CJNE    A,#12,C2
        MOV     A,6AH
        CJNE    A,#1,C3
        ADD     A,#1
        MOV     6AH,A
        AJMP    C4
    C2: CJNE    A,#13,C1
        MOV     HRS,#1
    C3: INC     DAYS
        MOV     A,DAYS
        CJNE    A,#30,C4
        MOV     DAYS,#0
        INC     MONS
        MOV     A,MONS
        CJNE    A,#13,C4
        MOV     MONS,#1
        INC     YRS
        AJMP    calendarOn

process:
        MOV     A,#0C1H
        ACALL   comnWrt
        ACALL   printMsg
        ACALL   readKey
        ACALL   dataWrt
        SUBB    A,#30H
        MOV     @R0,A
        INC     R0
        ACALL   readKey
        ACALL   dataWrt
        SUBB    A,#30H
        MOV     @R0,A
        INC     R0
        ACALL   clrLine
        RET

AMPM:   MOV     A,#0C1H
        ACALL   comnWrt
        ACALL   printMsg
        ACALL   readKey
        ACALL   dataWrt
        SUBB    A,#30H
        MOV     6AH,A
        RET

loadTime:
        MOV     A,60H
        MOV     B,#10
        MUL     AB
        ADD     A,61H
```

```
Program Size: data=8.0 xdata=0 code=896
".\Objects\digitalcalendar" - 0 Error(s), 0 Warning(s).
Build Time Elapsed:  00:00:00
```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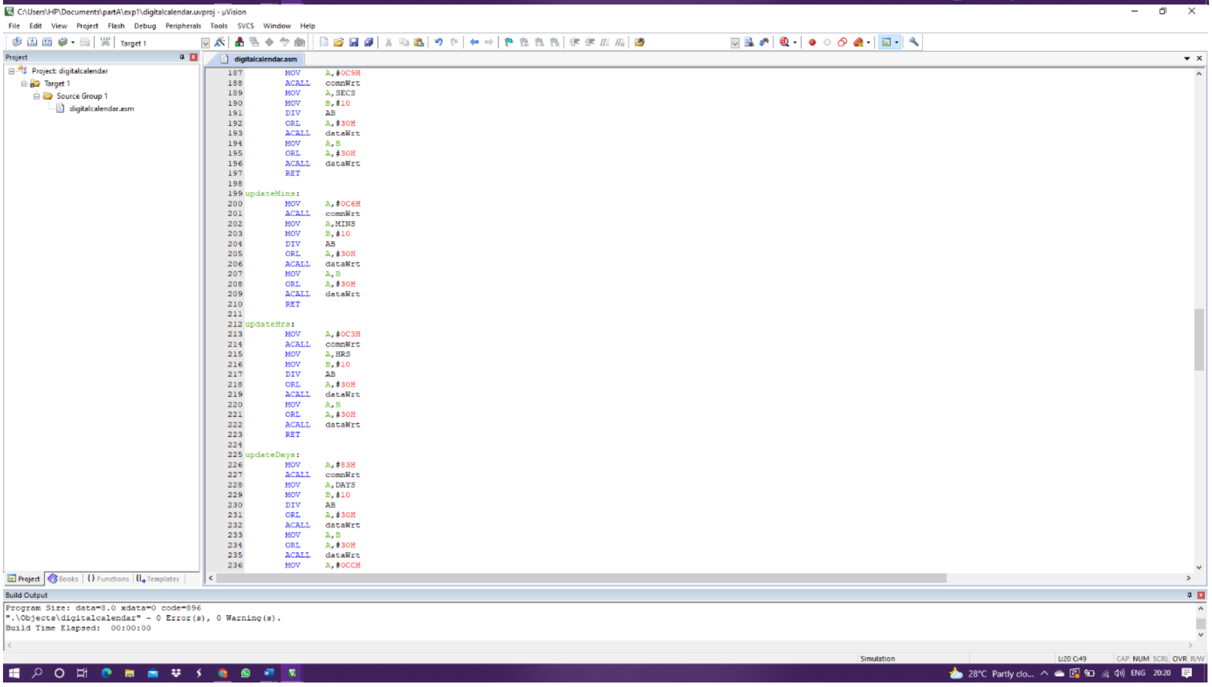
```
        MUL     AB
        ADD     A,61H
        MOV     HRS,A
        MOV     A,62H
        MOV     B,#10
        MUL     AB
        ADD     A,63H
        MOV     MINS,A
        MOV     SECS,#0
        RET

loadDate:
        MOV     A,64H
        MOV     B,#10
        MUL     AB
        ADD     A,65H
        MOV     DAYS,A
        MOV     A,66H
        MOV     B,#10
        MUL     AB
        ADD     A,67H
        MOV     MONS,A
        MOV     A,68H
        MOV     B,#10
        MUL     AB
        ADD     A,69H
        MOV     YRS,A
        RET

delaySec:
        MOV     R2,#15
        MOV     TMOD,#1
AGAIN:  MOV     TL0,#1
        MOV     TH0,#53
        SETB    TR0
        JNB     TF0,$
        CLR     TR0
        CLR     TF0
        DJNZ    R2,AGAIN
        RET

updateSecs:
        MOV     A,#0C9H
        ACALL   comnWrt
        MOV     A,SECS
        MOV     B,#10
        DIV     AB
        ORL     A,#30H
        ACALL   dataWrt
        MOV     A,B
```

```
Program Size: data=8.0 xdata=0 code=896
".\Objects\digitalcalendar" - 0 Error(s), 0 Warning(s).
Build Time Elapsed:  00:00:00
```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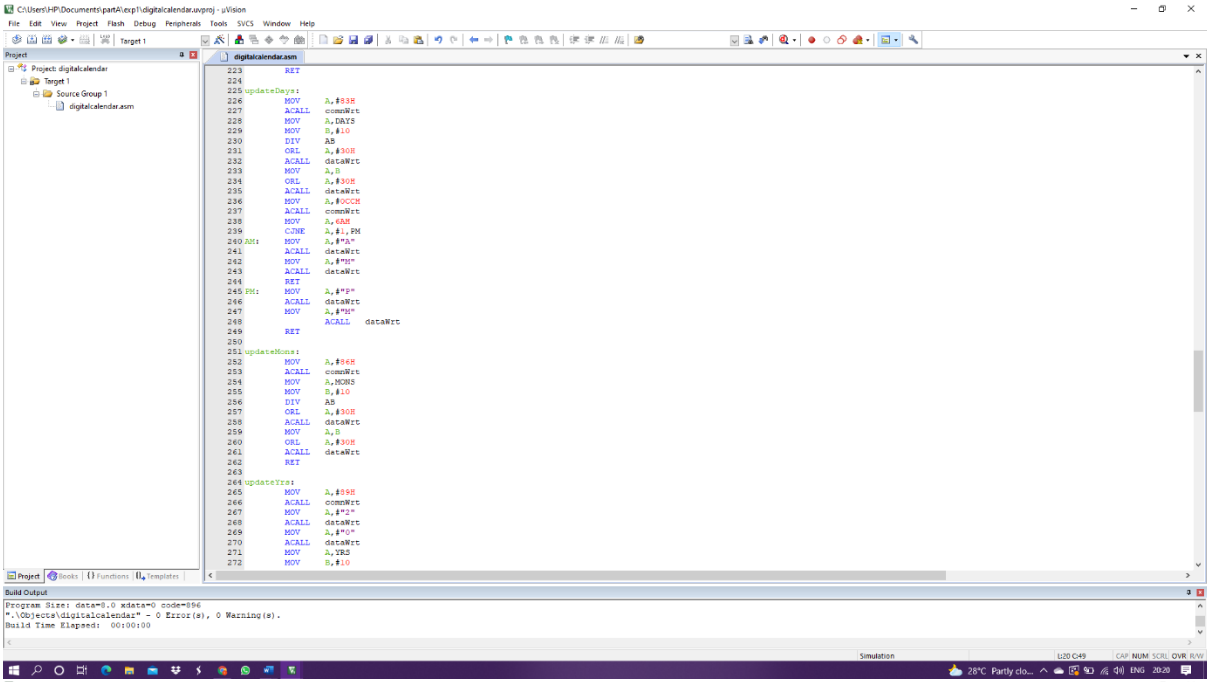
```
        MOV     A,#0C9H
        ACALL   comnWrt
        MOV     A,SECS
        MOV     B,#10
        DIV     AB
        ORL     A,#30H
        ACALL   dataWrt
        MOV     A,B
        ORL     A,#30H
        ACALL   dataWrt
        RET

updateMins:
        MOV     A,#0C6H
        ACALL   comnWrt
        MOV     A,MINS
        MOV     B,#10
        DIV     AB
        ORL     A,#30H
        ACALL   dataWrt
        MOV     A,B
        ORL     A,#30H
        ACALL   dataWrt
        RET

updateHrs:
        MOV     A,#0C3H
        ACALL   comnWrt
        MOV     A,HRS
        MOV     B,#10
        DIV     AB
        ORL     A,#30H
        ACALL   dataWrt
        MOV     A,B
        ORL     A,#30H
        ACALL   dataWrt
        RET

updateDays:
        MOV     A,#83H
        ACALL   comnWrt
        MOV     A,DAYS
        MOV     B,#10
        DIV     AB
        ORL     A,#30H
        ACALL   dataWrt
        MOV     A,B
        ORL     A,#30H
        ACALL   dataWrt
        MOV     A,#0CCH
```

```
Program Size: data=8.0 xdata=0 code=896
".\Objects\digitalcalendar" - 0 Error(s), 0 Warning(s).
Build Time Elapsed:  00:00:00
```



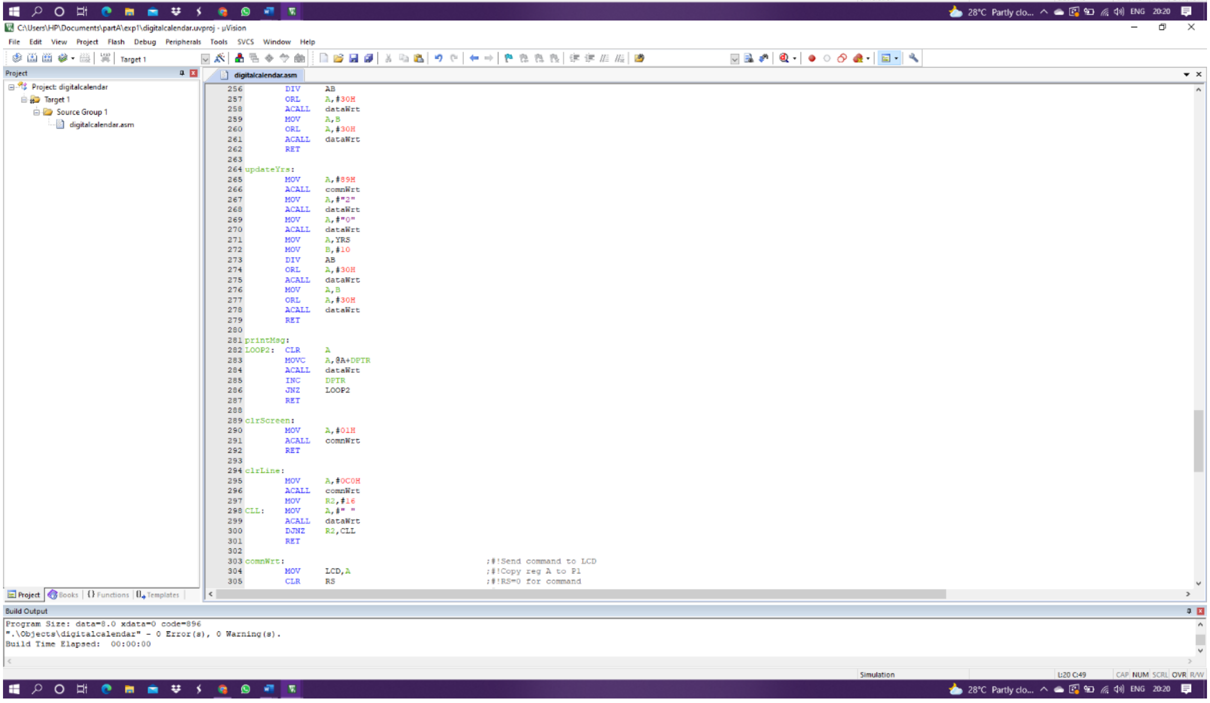
```
        RET

updateDays:
        MOV     A,#83H
        ACALL   comnWrt
        MOV     A,DAYS
        MOV     B,#10
        DIV     AB
        ORL     A,#30H
        ACALL   dataWrt
        MOV     A,B
        ORL     A,#30H
        ACALL   dataWrt
        MOV     A,#0CCH
        ACALL   comnWrt
        MOV     A,6AH
        CJNE    A,#1,PM
AM:     MOV     A,#"A"
        ACALL   dataWrt
        MOV     A,#"M"
        ACALL   dataWrt
        RET
PM:     MOV     A,#"P"
        ACALL   dataWrt
        MOV     A,#"M"
                ACALL   dataWrt
        RET

updateMons:
        MOV     A,#86H
        ACALL   comnWrt
        MOV     A,MONS
        MOV     B,#10
        DIV     AB
        ORL     A,#30H
        ACALL   dataWrt
        MOV     A,B
        ORL     A,#30H
        ACALL   dataWrt
        RET

updateYrs:
        MOV     A,#89H
        ACALL   comnWrt
        MOV     A,#"2"
        ACALL   dataWrt
        MOV     A,#"0"
        ACALL   dataWrt
        MOV     A,YRS
        MOV     B,#10
```

```
Program Size: data=8.0 xdata=0 code=896
".\Objects\digitalcalendar" - 0 Error(s), 0 Warning(s).
Build Time Elapsed:  00:00:00
```



```
        DIV     AB
        ORL     A,#30H
        ACALL   dataWrt
        MOV     A,B
        ORL     A,#30H
        ACALL   dataWrt
        RET

updateYrs:
        MOV     A,#89H
        ACALL   comnWrt
        MOV     A,#"2"
        ACALL   dataWrt
        MOV     A,#"0"
        ACALL   dataWrt
        MOV     A,YRS
        MOV     B,#10
        DIV     AB
        ORL     A,#30H
        ACALL   dataWrt
        MOV     A,B
        ORL     A,#30H
        ACALL   dataWrt
        RET

printMsg:
LOOP2:  CLR     A
        MOVC    A,@A+DPTR
        ACALL   dataWrt
        INC     DPTR
        JNZ     LOOP2
        RET

clrScreen:
        MOV     A,#01H
        ACALL   comnWrt
        RET

clrLine:
        MOV     A,#0C0H
        ACALL   comnWrt
        MOV     R2,#16
CLL:    MOV     A,#" "
        ACALL   dataWrt
        DJNZ    R2,CLL
        RET

comnWrt:                                        ;#!Send command to LCD
        MOV     LCD,A                           ;#!Copy reg A to P1
        CLR     RS                              ;#!RS=0 for command
```

```
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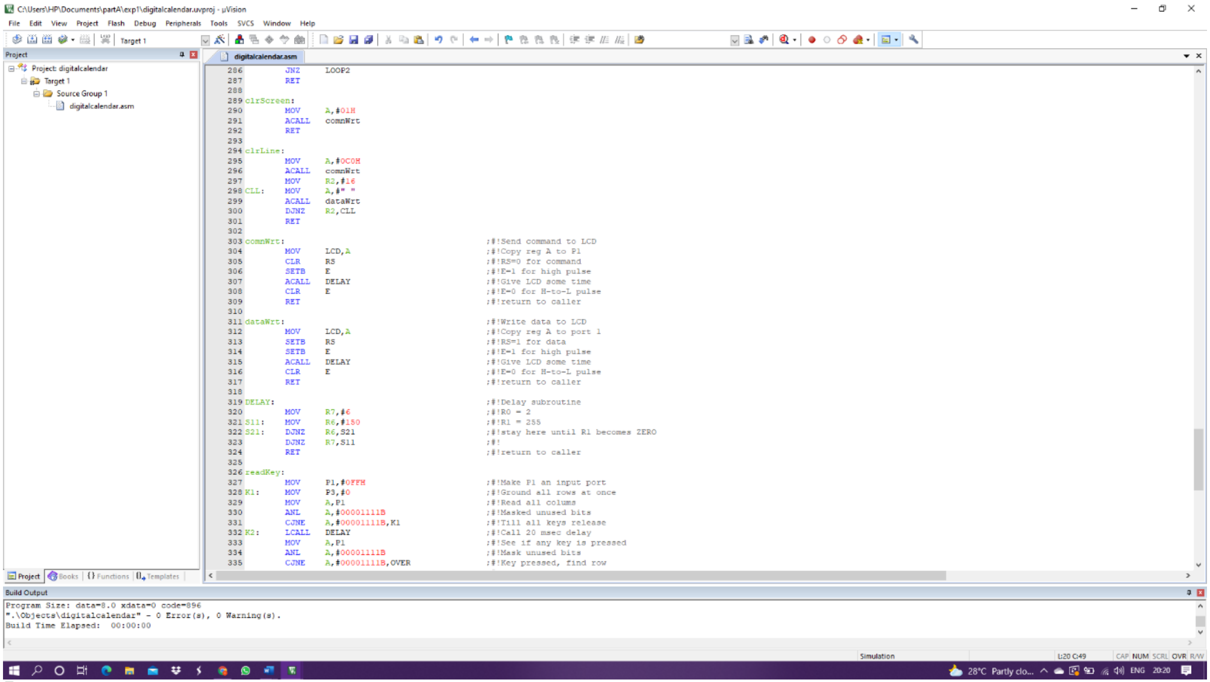
".\Objects\digitalcalendar" - 0 Error(s), 0 Warning(s).
Build Time Elapsed:  00:00:00
```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```
        JNZ     LOOP2
        RET

clrScreen:
        MOV     A,#01H
        ACALL   comnWrt
        RET

clrLine:
        MOV     A,#0C0H
        ACALL   comnWrt
        MOV     R2,#16
CLL:    MOV     A,#" "
        ACALL   dataWrt
        DJNZ    R2,CLL
        RET

comnWrt:                                        ;#!Send command to LCD
        MOV     LCD,A                           ;#!Copy reg A to P1
        CLR     RS                              ;#!RS=0 for command
        SETB    E                               ;#!E=1 for high pulse
        ACALL   DELAY                           ;#!Give LCD some time
        CLR     E                               ;#!E=0 for H-to-L pulse
        RET                                     ;#!return to caller

dataWrt:                                        ;#!Write data to LCD
        MOV     LCD,A                           ;#!Copy reg A to port 1
        SETB    RS                              ;#!RS=1 for data
        SETB    E                               ;#!E=1 for high pulse
        ACALL   DELAY                           ;#!Give LCD some time
        CLR     E                               ;#!E=0 for H-to-L pulse
        RET                                     ;#!return to caller

DELAY:                                          ;#!Delay subroutine
        MOV     R7,#6                           ;#!R0 = 2
S11:    MOV     R6,#150                         ;#!R1 = 255
S21:    DJNZ    R6,S21                          ;#!stay here until R1 becomes ZERO
        DJNZ    R7,S11                          ;#!
        RET                                     ;#!return to caller

readKey:
        MOV     P1,#0FFH                        ;#!Make P1 an input port
K1:     MOV     P3,#0                           ;#!Ground all rows at once
        MOV     A,P1                            ;#!Read all colums
        ANL     A,#00001111B                    ;#!Masked unused bits
        CJNE    A,#00001111B,K1                 ;#!Till all keys release
K2:     LCALL   DELAY                           ;#!Call 20 msec delay
        MOV     A,P1                            ;#!See if any key is pressed
        ANL     A,#00001111B                    ;#!Mask unused bits
        CJNE    A,#00001111B,OVER               ;#!Key pressed, find row
```

```
Program Size: data=8.0 xdata=0 code=896
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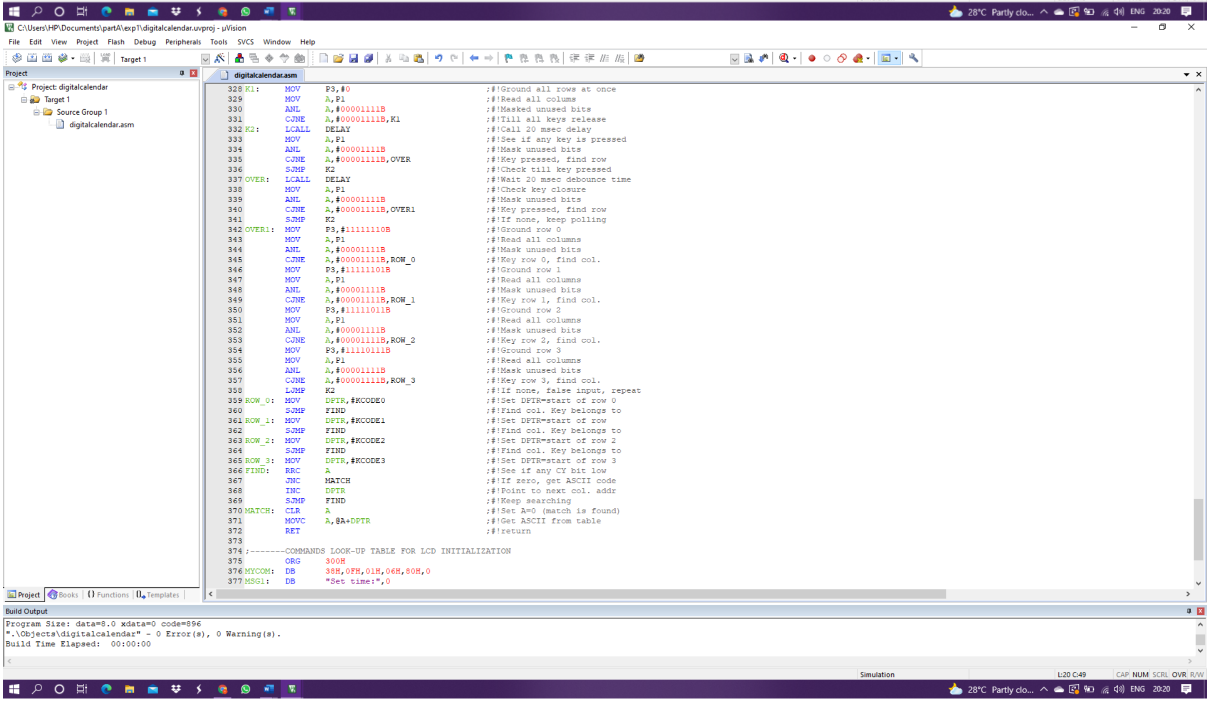
Build Time Elapsed:  00:00:00
```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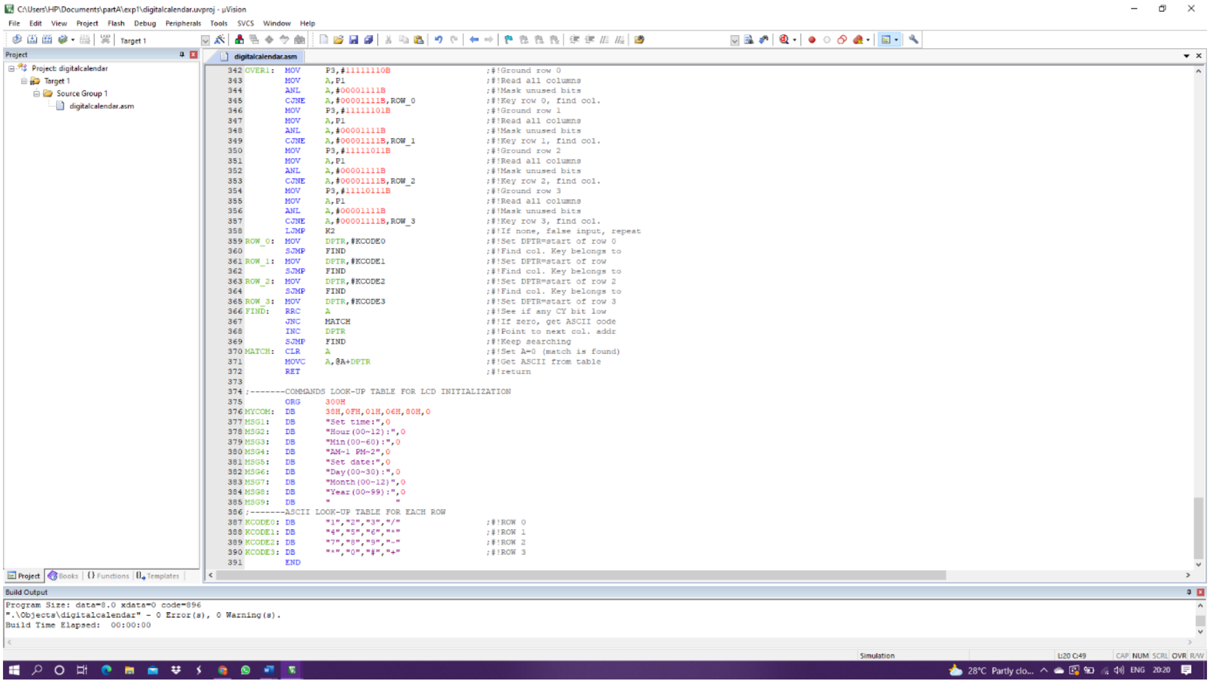
```
K1:     MOV     P3,#0                           ;#!Ground all rows at once
        MOV     A,P1                            ;#!Read all colums
        ANL     A,#00001111B                    ;#!Masked unused bits
        CJNE    A,#00001111B,K1                 ;#!Till all keys release
K2:     LCALL   DELAY                           ;#!Call 20 msec delay
        MOV     A,P1                            ;#!See if any key is pressed
        ANL     A,#00001111B                    ;#!Mask unused bits
        CJNE    A,#00001111B,OVER               ;#!Key pressed, find row
        SJMP    K2                              ;#!Check till key pressed
OVER:   LCALL   DELAY                           ;#!Wait 20 msec debounce time
        MOV     A,P1                            ;#!Check key closure
        ANL     A,#00001111B                    ;#!Mask unused bits
        CJNE    A,#00001111B,OVER1              ;#!Key pressed, find row
        SJMP    K2                              ;#!If none, keep polling
OVER1:  MOV     P3,#11111110B                   ;#!Ground row 0
        MOV     A,P1                            ;#!Read all columns
        ANL     A,#00001111B                    ;#!Mask unused bits
        CJNE    A,#00001111B,ROW_0              ;#!Key row 0, find col.
        MOV     P3,#11111101B                   ;#!Ground row 1
        MOV     A,P1                            ;#!Read all columns
        ANL     A,#00001111B                    ;#!Mask unused bits
        CJNE    A,#00001111B,ROW_1              ;#!Key row 1, find col.
        MOV     P3,#11111011B                   ;#!Ground row 2
        MOV     A,P1                            ;#!Read all columns
        ANL     A,#00001111B                    ;#!Mask unused bits
        CJNE    A,#00001111B,ROW_2              ;#!Key row 2, find col.
        MOV     P3,#11110111B                   ;#!Ground row 3
        MOV     A,P1                            ;#!Read all columns
        ANL     A,#00001111B                    ;#!Mask unused bits
        CJNE    A,#00001111B,ROW_3              ;#!Key row 3, find col.
        LJMP    K2                              ;#!If none, false input, repeat
ROW_0:  MOV     DPTR,#KCODE0                    ;#!Set DPTR=start of row 0
        SJMP    FIND                            ;#!Find col. Key belongs to
ROW_1:  MOV     DPTR,#KCODE1                    ;#!Set DPTR=start of row
        SJMP    FIND                            ;#!Find col. Key belongs to
ROW_2:  MOV     DPTR,#KCODE2                    ;#!Set DPTR=start of row 2
        SJMP    FIND                            ;#!Find col. Key belongs to
ROW_3:  MOV     DPTR,#KCODE3                    ;#!Set DPTR=start of row 3
FIND:   RRC     A                               ;#!See if any CY bit low
        JNC     MATCH                           ;#!If zero, get ASCII code
        INC     DPTR                            ;#!Point to next col. addr
        SJMP    FIND                            ;#!Keep searching
MATCH:  CLR     A                               ;#!Set A=0 (match is found)
        MOVC    A,@A+DPTR                       ;#!Get ASCII from table
        RET                                     ;#!return

;-------COMMANDS LOOK-UP TABLE FOR LCD INITIALIZATION
        ORG     300H
MYCOM:  DB      38H,0FH,01H,06H,80H,0
MSG1:   DB      "Set time:",0
```

```
Program Size: data=8.0 xdata=0 code=896
".\Objects\digitalcalendar" - 0 Error(s), 0 Warning(s).
Build Time Elapsed:  00:00:00
```


C:\Users\HP\Documents\partA\exp1\digitalcalendar.uvproj - µVision
File Edit View Project Flash Debug Peripherals Tools SVCS Window Help
Target 1
Project
Project: digitalcalendar
Target 1
Source Group 1
digitalcalendar.asm
Project Books Functions Templates
Build Output
Simulation
L:20 C:49
CAP NUM SCRL OVR R/W
28°C Partly clo...
ENG 20:20

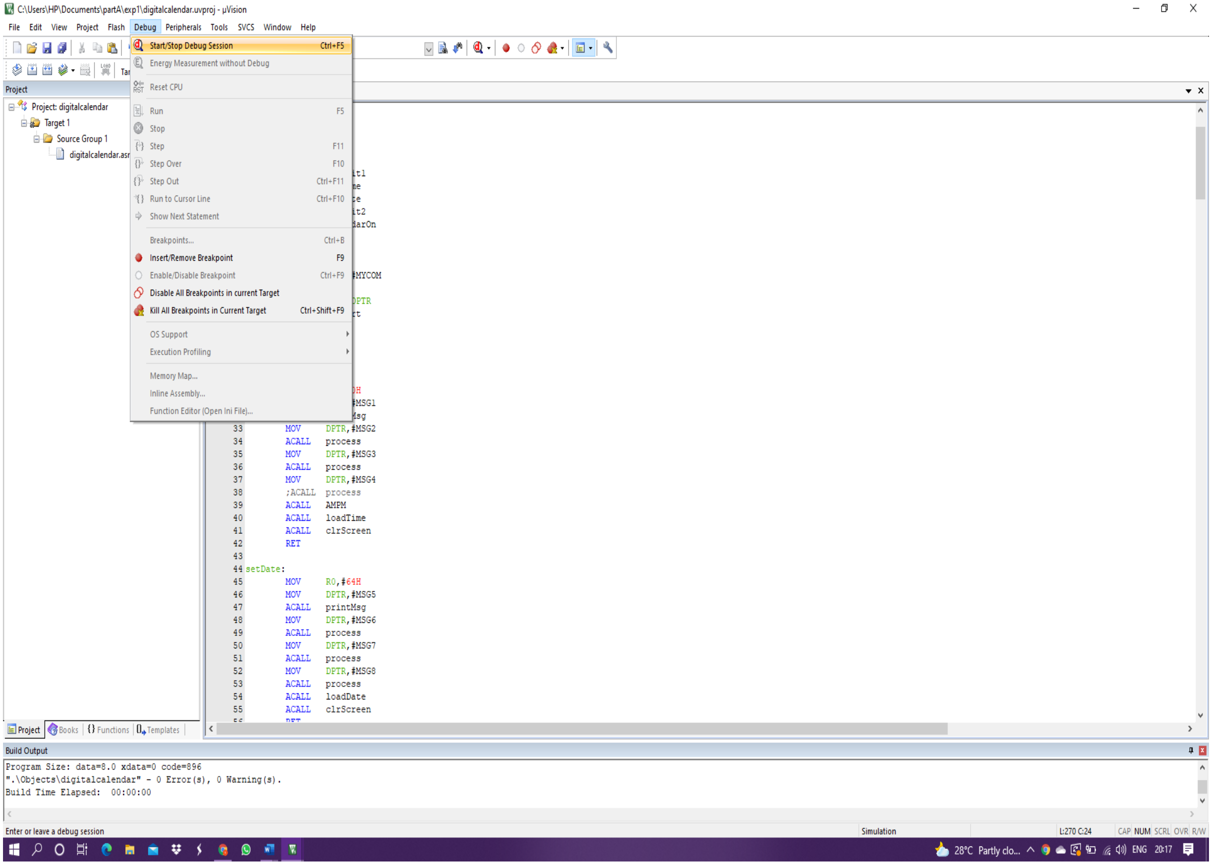
```
OVER1:  MOV     P3,#11111110B                   ;#!Ground row 0
        MOV     A,P1                            ;#!Read all columns
        ANL     A,#00001111B                    ;#!Mask unused bits
        CJNE    A,#00001111B,ROW_0              ;#!Key row 0, find col.
        MOV     P3,#11111101B                   ;#!Ground row 1
        MOV     A,P1                            ;#!Read all columns
        ANL     A,#00001111B                    ;#!Mask unused bits
        CJNE    A,#00001111B,ROW_1              ;#!Key row 1, find col.
        MOV     P3,#11111011B                   ;#!Ground row 2
        MOV     A,P1                            ;#!Read all columns
        ANL     A,#00001111B                    ;#!Mask unused bits
        CJNE    A,#00001111B,ROW_2              ;#!Key row 2, find col.
        MOV     P3,#11110111B                   ;#!Ground row 3
        MOV     A,P1                            ;#!Read all columns
        ANL     A,#00001111B                    ;#!Mask unused bits
        CJNE    A,#00001111B,ROW_3              ;#!Key row 3, find col.
        LJMP    K2                              ;#!If none, false input, repeat
ROW_0:  MOV     DPTR,#KCODE0                    ;#!Set DPTR=start of row 0
        SJMP    FIND                            ;#!Find col. Key belongs to
ROW_1:  MOV     DPTR,#KCODE1                    ;#!Set DPTR=start of row
        SJMP    FIND                            ;#!Find col. Key belongs to
ROW_2:  MOV     DPTR,#KCODE2                    ;#!Set DPTR=start of row 2
        SJMP    FIND                            ;#!Find col. Key belongs to
ROW_3:  MOV     DPTR,#KCODE3                    ;#!Set DPTR=start of row 3
FIND:   RRC     A                               ;#!See if any CY bit low
        JNC     MATCH                           ;#!If zero, get ASCII code
        INC     DPTR                            ;#!Point to next col. addr
        SJMP    FIND                            ;#!Keep searching
MATCH:  CLR     A                               ;#!Set A=0 (match is found)
        MOVC    A,@A+DPTR                       ;#!Get ASCII from table
        RET                                     ;#!return

;-------COMMANDS LOOK-UP TABLE FOR LCD INITIALIZATION
        ORG     300H
MYCOM:  DB      38H,0FH,01H,06H,80H,0
MSG1:   DB      "Set time:",0
MSG2:   DB      "Hour(00~12):",0
MSG3:   DB      "Min(00~60):",0
MSG4:   DB      "AM~1 PM~2",0
MSG5:   DB      "Set date:",0
MSG6:   DB      "Day(00~30):",0
MSG7:   DB      "Month(00~12)",0
MSG8:   DB      "Year(00~99):",0
MSG9:   DB      "                "
;-------ASCII LOOK-UP TABLE FOR EACH ROW
KCODE0: DB      "1","2","3","/"                 ;#!ROW 0
KCODE1: DB      "4","5","6","*"                 ;#!ROW 1
KCODE2: DB      "7","8","9","-"                 ;#!ROW 2
KCODE3: DB      "*","0","#","+"                 ;#!ROW 3
        END
```

```
Program Size: data=8.0 xdata=0 code=896
".\Objects\digitalcalendar" - 0 Error(s), 0 Warning(s).
Build Time Elapsed:  00:00:00
```

STEP 5:

Debugging the code


C:\Users\HP\Documents\partA\exp1\digitalcalendar.uvproj - µVision
File Edit View Project Flash Debug Peripherals Tools SVCS Window Help
Start/Stop Debug Session Ctrl+F5
Energy Measurement without Debug
Reset CPU
Run F5
Stop
Step F11
Step Over F10
Step Out Ctrl+F11
Run to Cursor Line Ctrl+F10
Show Next Statement
Breakpoints... Ctrl+B
Insert/Remove Breakpoint F9
Enable/Disable Breakpoint Ctrl+F9
Disable All Breakpoints in current Target
Kill All Breakpoints in Current Target Ctrl+Shift+F9
OS Support
Execution Profiling
Memory Map...
Inline Assembly...
Function Editor (Open Ini File)...
Project
Project: digitalcalendar
Target 1
Source Group 1
digitalcalendar.asm
Project Books Functions Templates
Build Output
Enter or leave a debug session
Simulation
L:270 C:24
CAP NUM SCRL OVR R/W
28°C Partly clo...
ENG 20:17

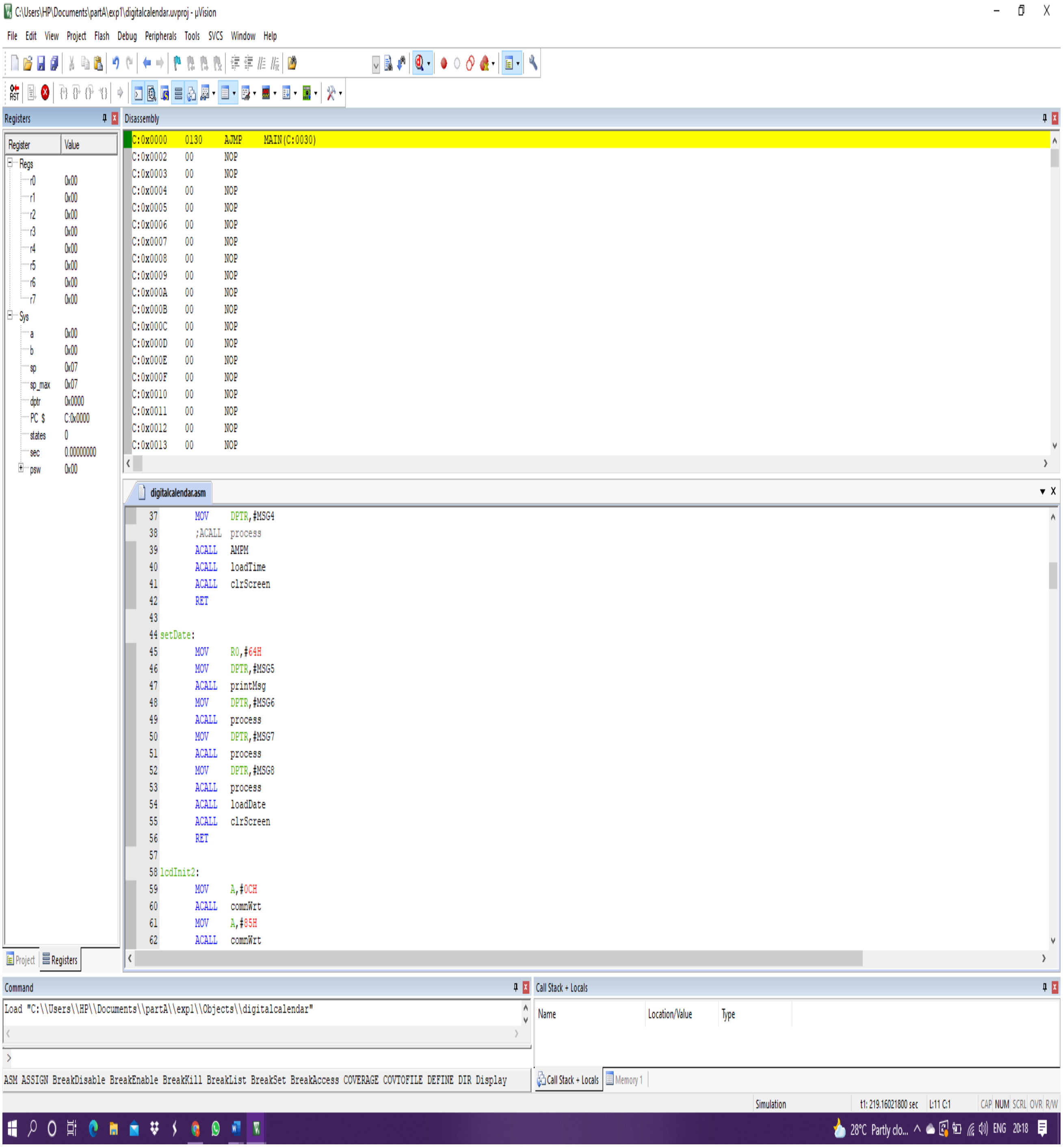
```
        MOV     DPTR,#MSG2
        ACALL   process
        MOV     DPTR,#MSG3
        ACALL   process
        MOV     DPTR,#MSG4
        ;ACALL  process
        ACALL   AMPM
        ACALL   loadTime
        ACALL   clrScreen
        RET

setDate:
        MOV     R0,#64H
        MOV     DPTR,#MSG5
        ACALL   printMsg
        MOV     DPTR,#MSG6
        ACALL   process
        MOV     DPTR,#MSG7
        ACALL   process
        MOV     DPTR,#MSG8
        ACALL   process
        ACALL   loadDate
        ACALL   clrScreen
```

```
Program Size: data=8.0 xdata=0 code=896
".\Objects\digitalcalendar" - 0 Error(s), 0 Warning(s).
Build Time Elapsed:  00:00:00
```

OUTPUT:

Output of the code shown below :



C:\Users\HP\Documents\partA\exp1\digitalcalendar.uvproj - µVision

Register	Value
Regs	
r0	0x00
r1	0x00
r2	0x00
r3	0x00
r4	0x00
r5	0x00
r6	0x00
r7	0x00
Sys	
a	0x00
b	0x00
sp	0x07
sp_max	0x07
dptr	0x0000
PC $	C:0x0000
states	0
sec	0.00000000
psw	0x00

```
C:0x0000    0130    AJMP    MAIN(C:0030)
C:0x0002    00      NOP
C:0x0003    00      NOP
C:0x0004    00      NOP
C:0x0005    00      NOP
C:0x0006    00      NOP
C:0x0007    00      NOP
C:0x0008    00      NOP
C:0x0009    00      NOP
C:0x000A    00      NOP
C:0x000B    00      NOP
C:0x000C    00      NOP
C:0x000D    00      NOP
C:0x000E    00      NOP
C:0x000F    00      NOP
C:0x0010    00      NOP
C:0x0011    00      NOP
C:0x0012    00      NOP
C:0x0013    00      NOP
```

```
        MOV     DPTR,#MSG4
        ;ACALL  process
        ACALL   AMPM
        ACALL   loadTime
        ACALL   clrScreen
        RET

setDate:
        MOV     R0,#64H
        MOV     DPTR,#MSG5
        ACALL   printMsg
        MOV     DPTR,#MSG6
        ACALL   process
        MOV     DPTR,#MSG7
        ACALL   process
        MOV     DPTR,#MSG8
        ACALL   process
        ACALL   loadDate
        ACALL   clrScreen
        RET

lcdInit2:
        MOV     A,#0CH
        ACALL   comnWrt
        MOV     A,#85H
        ACALL   comnWrt
```

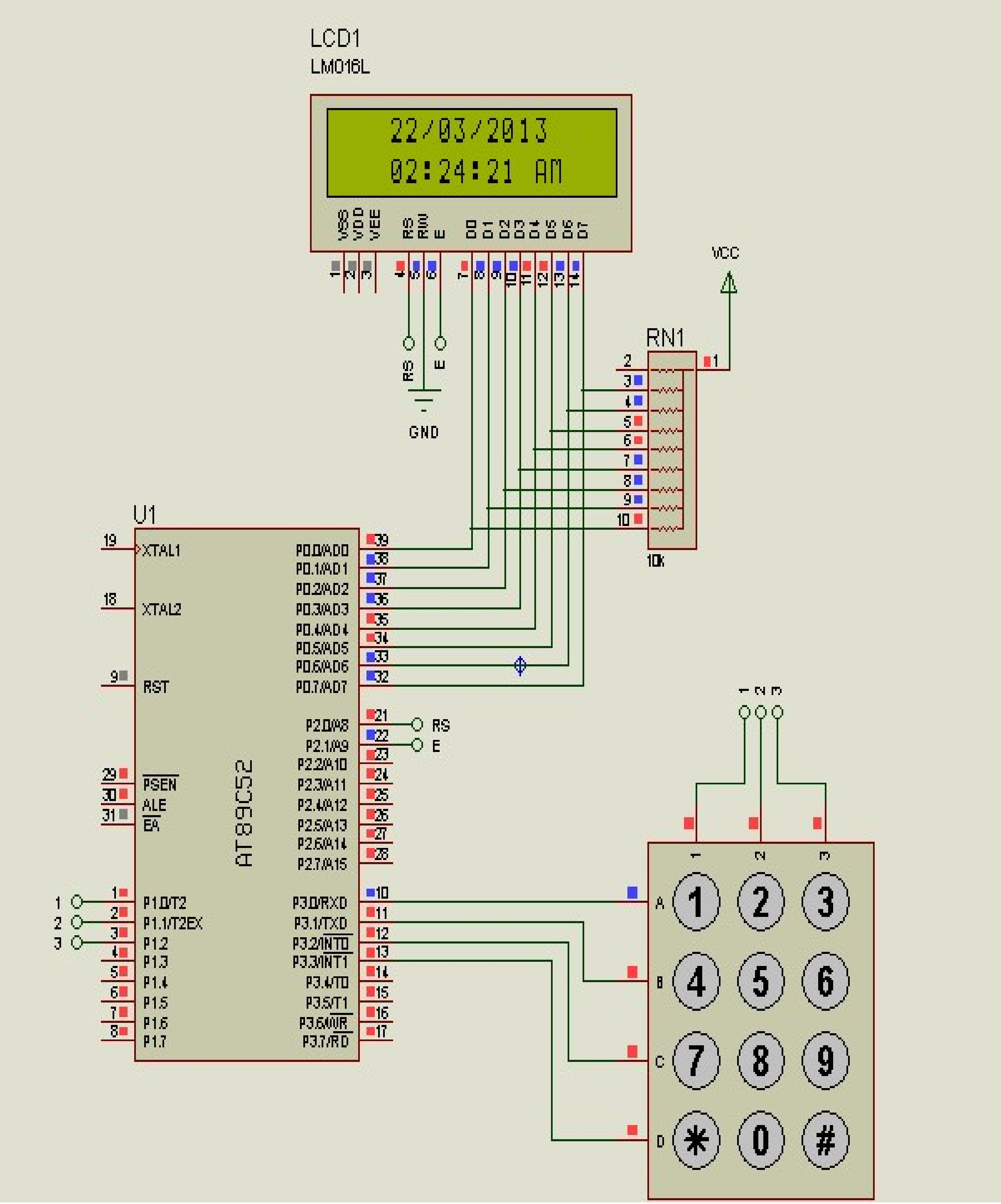
```
Load "C:\\Users\\HP\\Documents\\partA\\exp1\\Objects\\digitalcalendar"
```

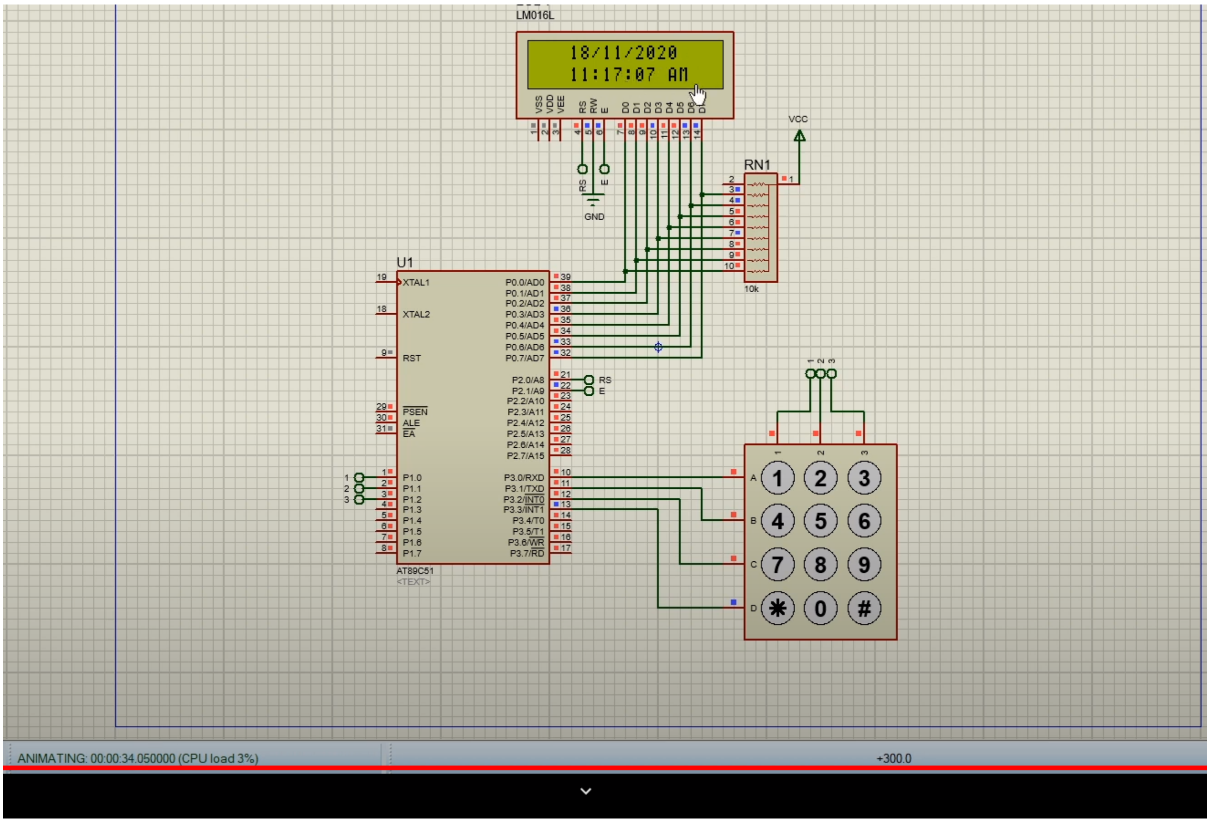
```
ASM ASSIGN BreakDisable BreakEnable BreakKill BreakList BreakSet BreakAccess COVERAGE COVTOFILE DEFINE DIR Display
```

Simulation   t1: 219.16021800 sec   L:11 C:1

SIMULATION

Simulation of Digital Calendar is simulate on Proteus Software which is Depicted Below





ANIMATING: 00:00:34.050000 (CPU load 3%)

+300.0

CONCLUSION

Embedded systems are emerging as a technology with high potential. In the past decades microcontrollers based embedded system ruled the market .The last decade witnessed the revolution of Microcontroller based embedded systems.

We can broadly define an embedded system as a microcontroller-based, software-driven, reliable, real-time control system, designed to perform a specific task.

It can be thought of as a computer hardware system having software embedded in it. An embedded system can be either an independent system or a part of a large system.

With regards to the reqirements gathered the manual work and the complexity in counting can be achieved with the help of electronics devices

REFERENCES

[1] **T**he 8051 Microcontroller and Embedded Systems Using Assembly and C Second Edition Muhammad Ali Mazidi Janice Gillispie Mazidi.
[2] WWW.Knowledgebase.com
[3] www.electonicsforu.com
[4] Datasheet of 8051
[5] www.alldatasheets.com
[6] www.8051projectinfo.com