BLINKING OF LED USING 8051 MICROCONTROLLER USING PROTEUS

AIM:

To Write an assembly language program to LED blink using 8051

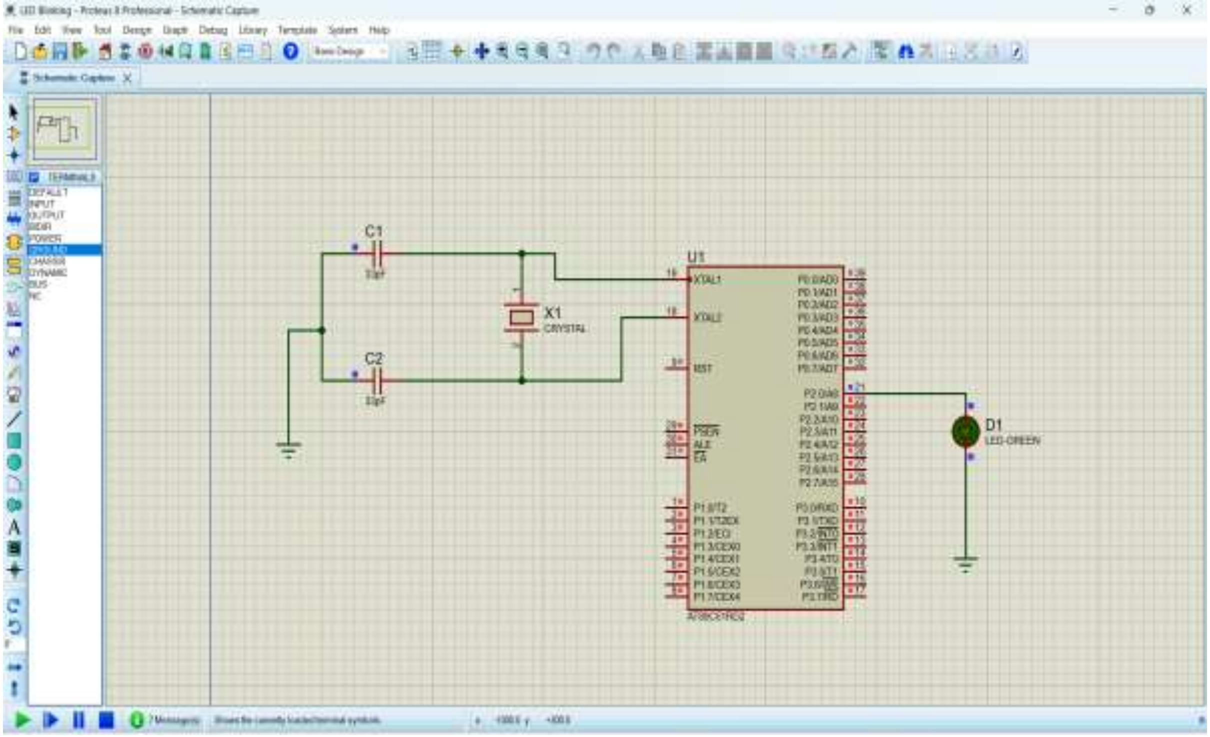
SOFTWARES REQUIRED:

- Proteus software

PROGRAM

```
            ORG 0000H
      UP: SETB P2.0
            ACALL DELAY
            CLR P2.0
            ACALL DELAY
            SJMP UP
DELAY: MOV R4,#35
      H1:MOV R3,#255
      H2:DJNZ R3,H2
           DJNZ R4,H1
           RET
           END
```

CIRCUIT DIAGRAM:



RESULT

Thus the program has been successfully verified and executed.

LED TOGGLE USING 8051 USING PROTEUS

AIM:

Write an assembly language program for LED Toggle Using 8051 using Keil and Proteus

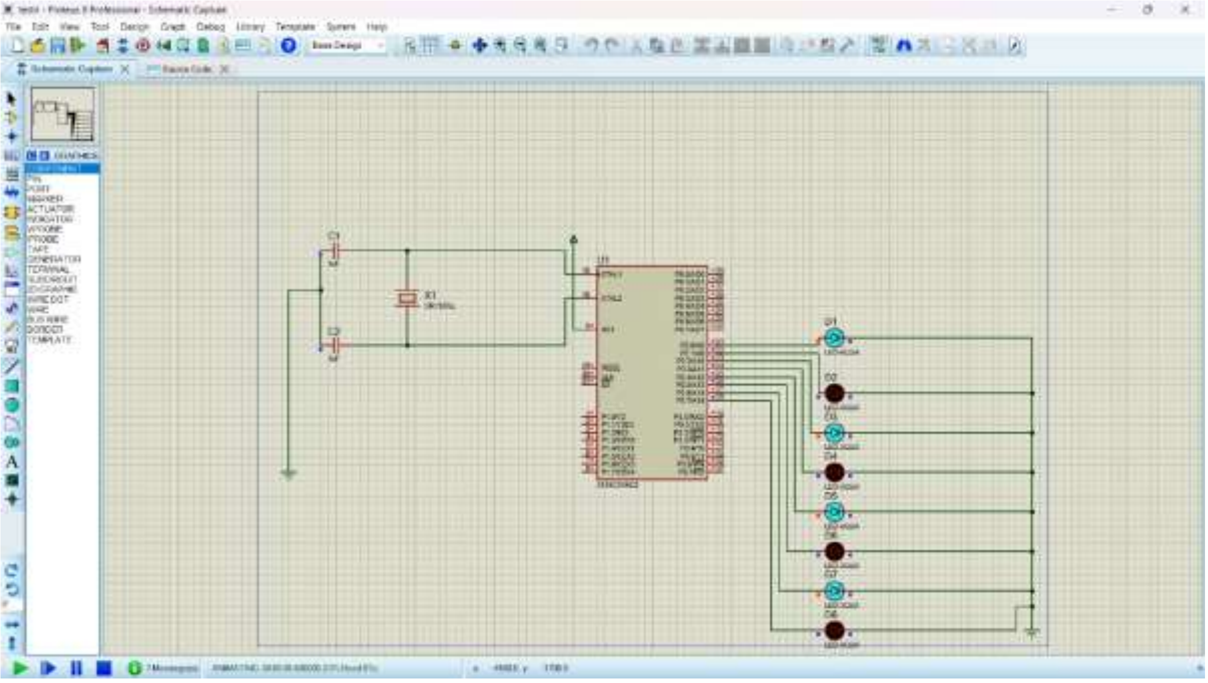
SOFTWARE REQUIRED:

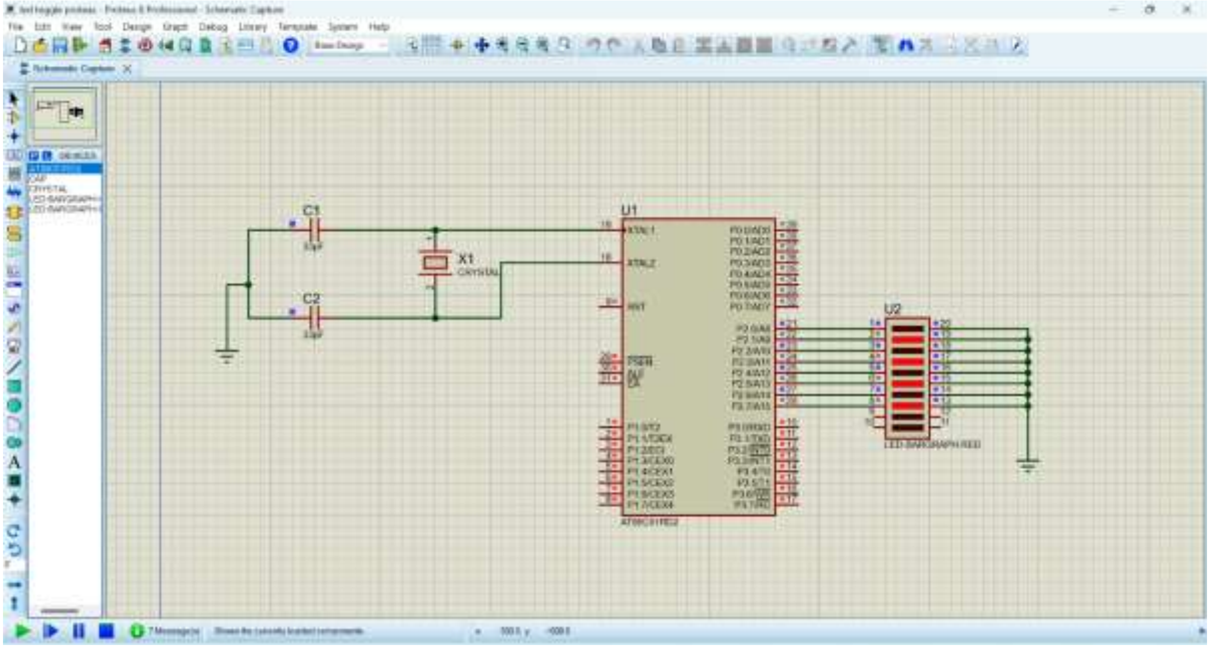
- Proteus 8 software.

PROGRAM:

```
ORG 0000H
UP: MOV P2,#55H
ACALL DELAY
MOV P2,#0AAH
ACALL DELAY
SJMP UP

DELAY:MOV R4,#10
H1:MOV R3,#255
H2:DJNZ R3,H2
DJNZ R4,H1
RET
END
```

CIRCUIT DIAGRAM:





RESULT:

Thus the program has been successfully verified and executed.

LED CHASER USING 8051 USING PROTEUS

AIM:

Write an assembly language program for LED Chaser Using 8051 using Keil and Proteus

SOFTWARE REQUIRED:

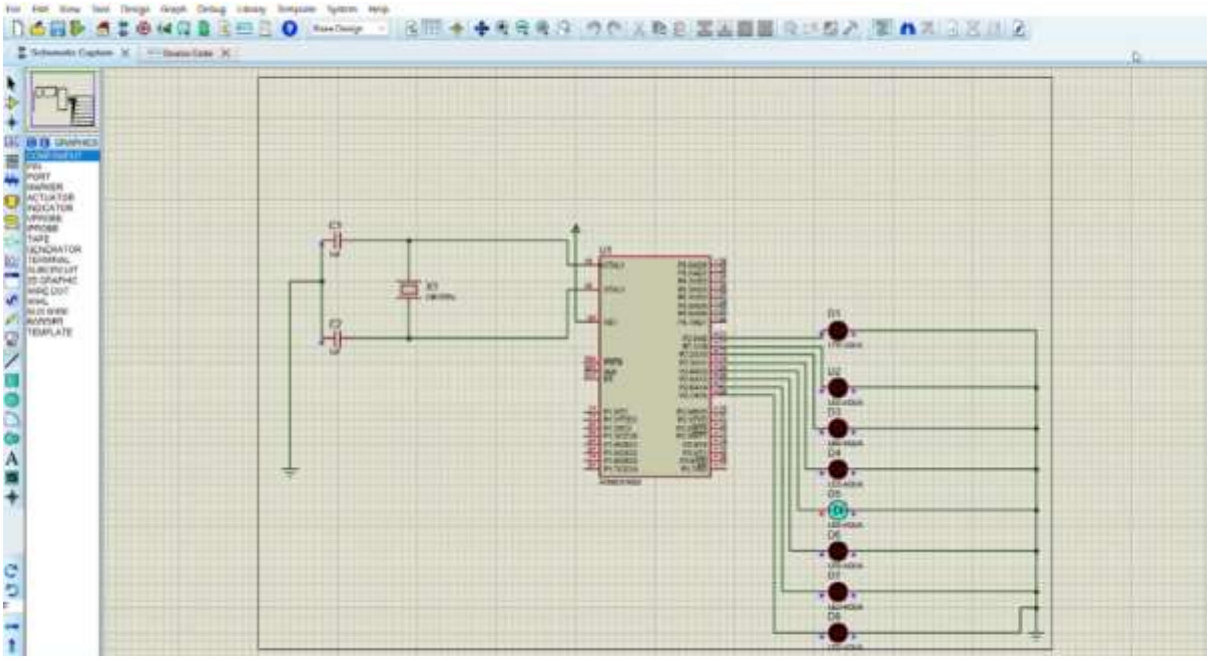
- Proteus 8 software.

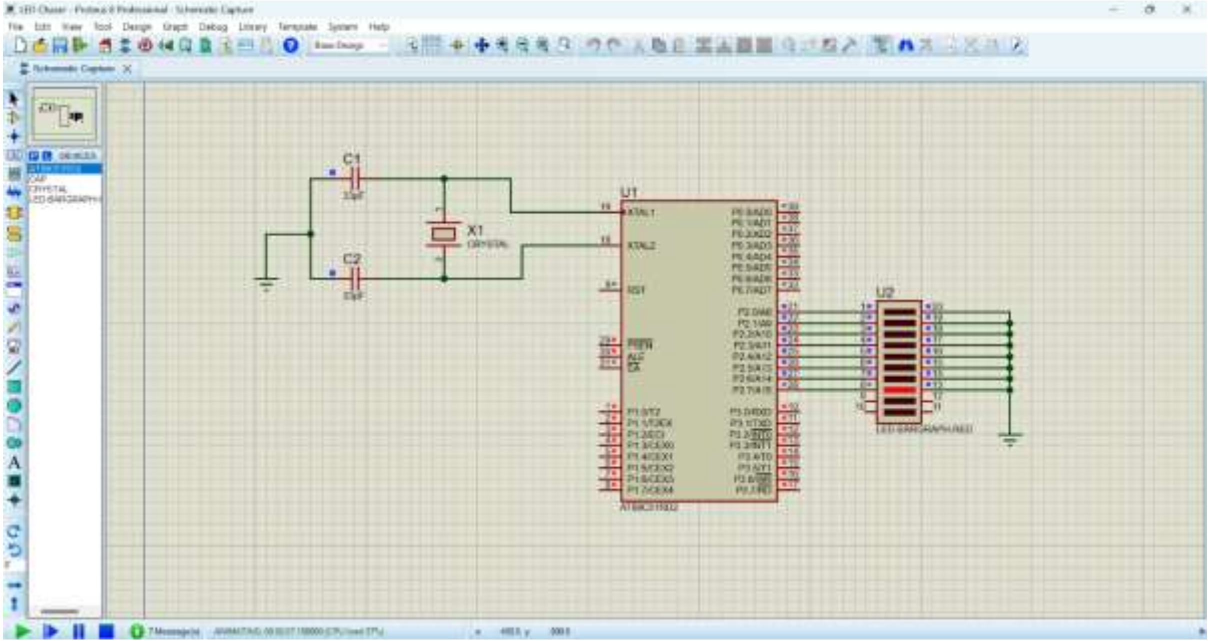
PROGRAM:

```
ORG 0000H
UP: MOV P2,#01H
ACALL DELAY
MOV P2,#02H
ACALL DELAY
MOV P2,#04H
ACALL DELAY
MOV P2,#08H
ACALL DELAY
MOV P2,#10H
ACALL DELAY
MOV P2,#20H
ACALL DELAY
```

```
MOV P2,#40H
ACALL DELAY
MOV P2,#80H
ACALL DELAY
SJMP UP

DELAY: MOV R4,#255
H1: DJNZ R4,H1
RET
END
```

CIRCUIT DIAGRAM:





RESULT:

Thus the program has been successfully verified and executed.

FADE IN FADE OUT OF LED USING 8051 USING PROTEUS

AIM:

To write an assembly language program for Fade in Fade out of LED Using 8051 using Keil and Proteus.

SOFTWARE REQUIRED:

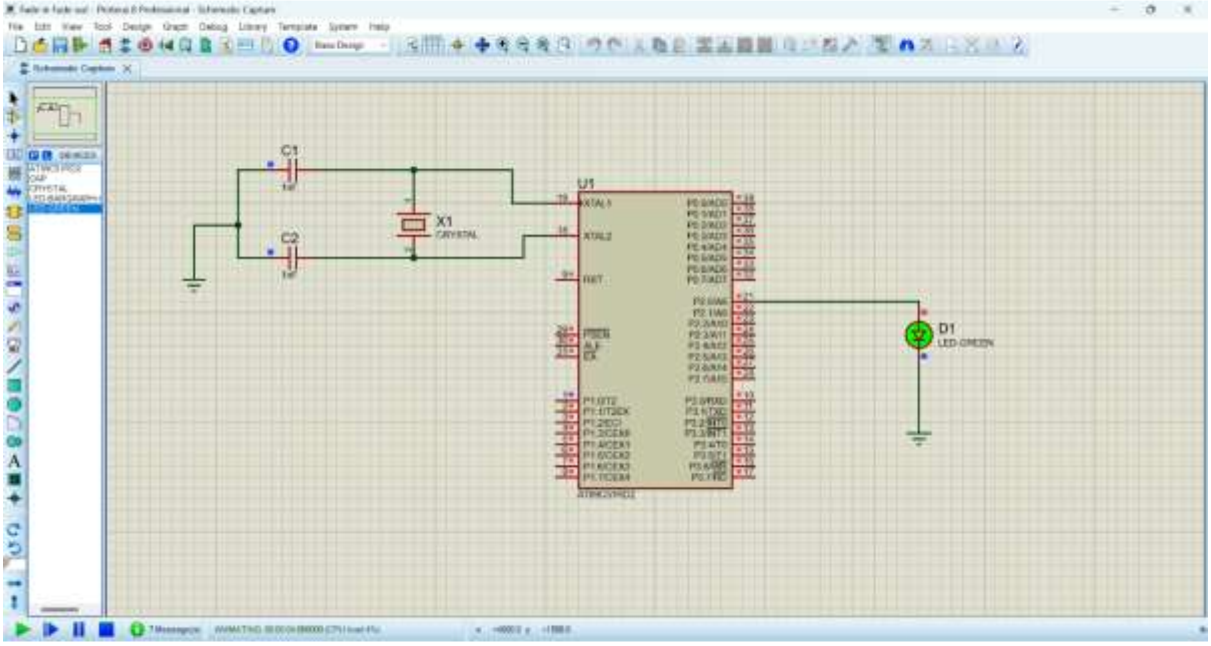
- Proteus 8 software.

PROGRAM:

```
ORG 00H             ; Start program at address 00H

MAIN:  MOV P2, #00H ; Initialize Port 2 (LED off)
       ACALL FADE_IN ; Call Fade In subroutine
       ACALL FADE_OUT ; Call Fade Out subroutine
       SJMP MAIN    ; Repeat forever

; Subroutine to Fade In the LED
FADE_IN:
       MOV R0, #00H ; Start with 0% duty cycle (LED off)
FADE_IN_LOOP:
       ACALL PWM    ; Call the PWM subroutine with the current duty cycle
       INC R0       ; Increase the duty cycle
       CJNE R0, #FFH, FADE_IN_LOOP ; Repeat until max brightness (100% duty cycle)
       RET
```

```
; Subroutine to Fade Out the LED
FADE_OUT:
      MOV R0, #FFH ; Start with 100% duty cycle (LED on)
FADE_OUT_LOOP:
      ACALL PWM    ; Call the PWM subroutine with the current duty cycle
      DEC R0       ; Decrease the duty cycle
      CJNE R0, #00H, FADE_OUT_LOOP ; Repeat until min brightness (0% duty cycle)
      RET

; PWM subroutine
PWM:
      MOV A, R0     ; Load duty cycle value
      MOV B, #FFH   ; Set maximum period
      MOV P1, #00H  ; LED ON (active-low, so writing 0 turns on the LED)
PWM_ON_LOOP:
      DJNZ A, PWM_ON_LOOP ; Delay based on duty cycle (LED ON time)
      MOV P1, #01H  ; LED OFF
PWM_OFF_LOOP:
      DJNZ B, PWM_OFF_LOOP ; Delay for the rest of the period (LED OFF time)
      RET          ; Return from subroutine

END
```

CIRCUIT DIAGRAM:



OUTPUT:

The brightness of the LED is gradually increasing and decreasing with 1000ms delay.

RESULT:

Thus, the program has been successfully verified and executed

GENERATION OF SQUARE WAVE USING PROTEUS

AIM:

To write an assembly language program to generate square wave using 8051.

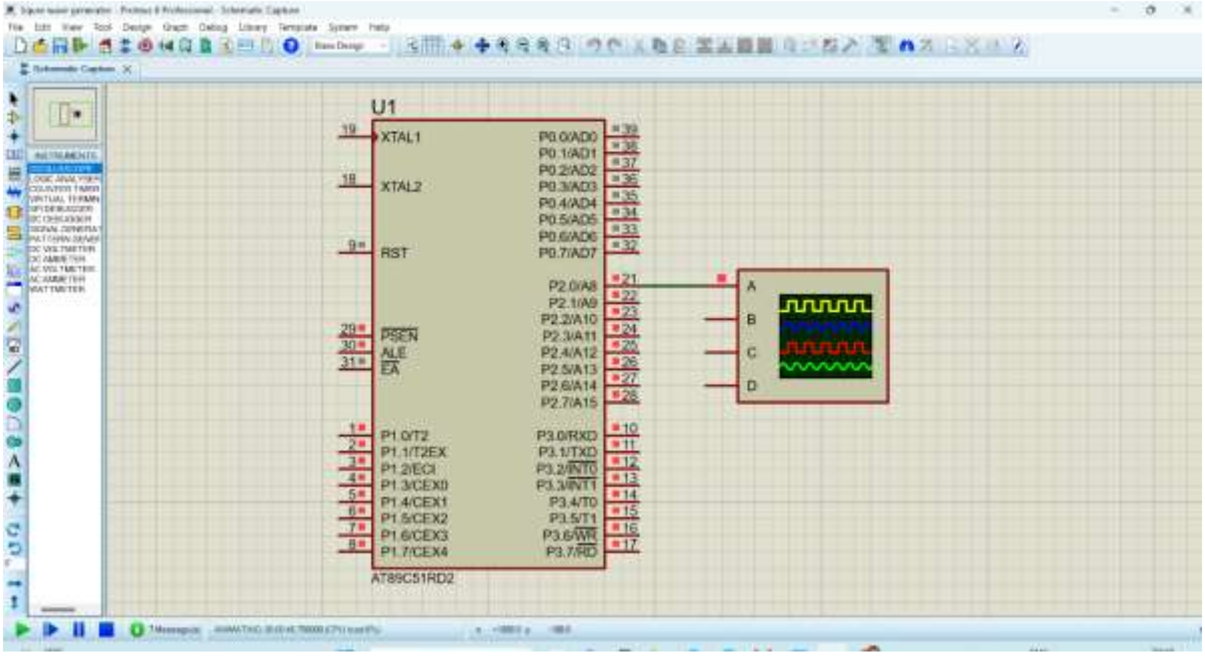
SOFTWARE REQUIRED:

- Proteus 8 software.

PROGRAM

```
            ORG 0000H
        UP: SETB P2.0
            ACALL DELAY
            CLR P2.0
            ACALL DELAY
            SJMP UP
DELAY: MOV R4,#35
        H1: MOV R3,#255
        H2: DJNZ R3,H2
            DJNZ R4,H1
           RET
           END
```

CIRCUIT DIAGRAM:



GENERATION OF TRIANGULAR WAVE USING PROTEUS

AIM:

To write an assembly language program to generate triangular wave using 8051.

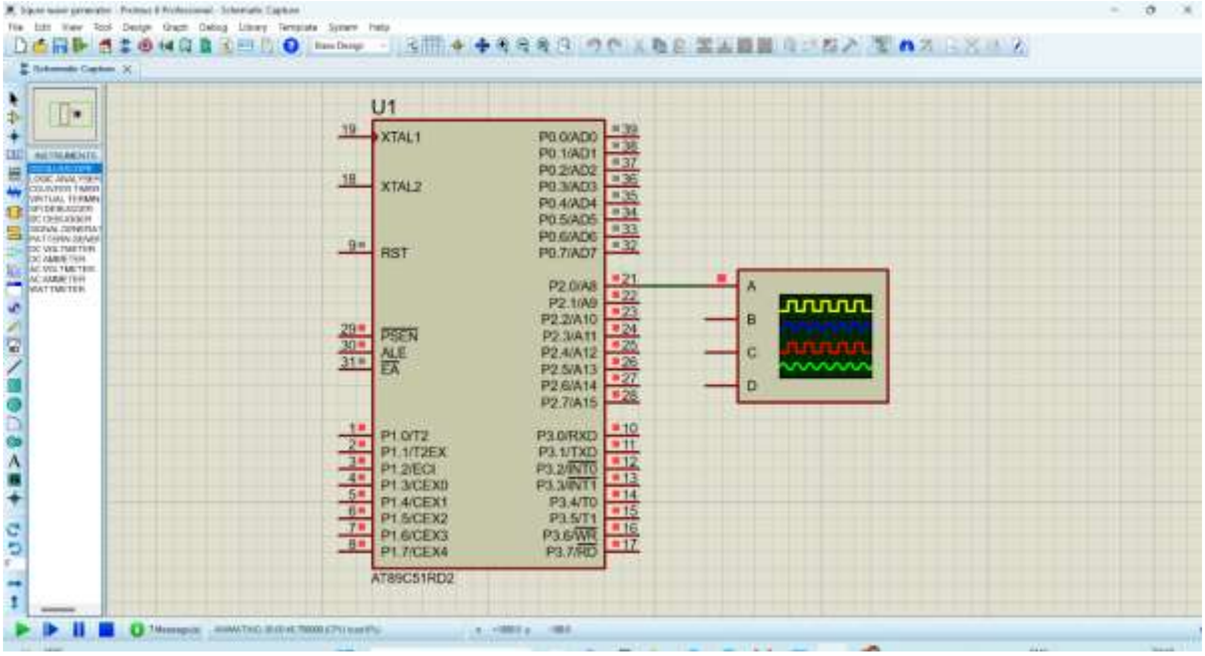
SOFTWARE REQUIRED:

- Proteus 8 software.

PROGRAM

```
ORG 00H              ; Start of the program
MOV P2.0, #00H         ; Clear Port 1 (connected to DAC0808)
MOV A, #00H          ; Initialize accumulator to 0 (starting value)
MOV R0, #00H          ; Initialize R0 for increment step
UPWARD:
   INC A             ; Increment the value in the accumulator (rising edge of triangle)
   MOV P1, A         ; Send the incremented value to Port 1 (connected to DAC)
   ACALL DELAY       ; Call delay for waveform frequency control
   CJNE A, #0FFH, UPWARD ; Continue incrementing until the maximum value (0xFF)
DOWNWARD:
   DEC A             ; Decrement the value in the accumulator (falling edge of triangle)
   MOV P1, A         ; Send the decremented value to Port 1
   ACALL DELAY       ; Delay for waveform frequency control
   CJNE A, #00H, DOWNWARD ; Continue decrementing until it reaches 0
SJMP UPWARD          ; Repeat the process indefinitely to generate a continuous waveform

; Delay Subroutine
DELAY:
   MOV R1, #255      ; Outer loop for delay
DELAY_LOOP1:
   MOV R2, #255      ; Inner loop for delay
DELAY_LOOP2:
   DJNZ R2, DELAY_LOOP2 ; Decrement inner loop
   DJNZ R1, DELAY_LOOP1 ; Decrement outer loop
   RET               ; Return from delay
END
```

CIRCUIT DIAGRAM:



ANTICLOCKWISE ROTATION OF STEPPER MOTOR USING 8051 USING PROTEUS

AIM:

To write an assembly language program to rotate the Stepper Motor in anti-clockwise direction in 8051 using Proteus

SOFTWARE REQUIRED:

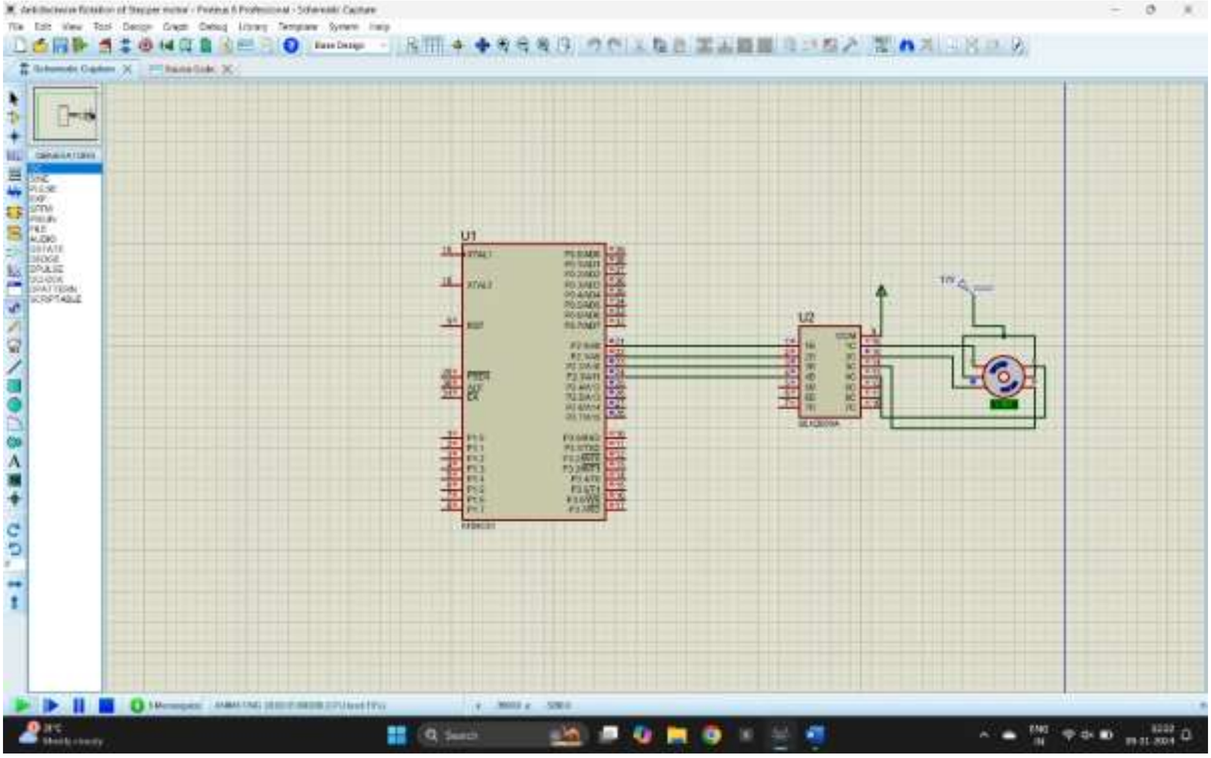
- Proteus 8 software.

PROGRAM:

```
        ORG 00H             ; Start program at address 0x00
MAIN:  MOV P2, #0F0H  ; Initialize Port 2 as output (upper nibble)
         ACALL COUNTERCLOCKWISE ; Rotate stepper motor in counterclockwise direction
     ACALL DELAY     ; Call delay
     SJMP MAIN      ; Repeat forever
; Subroutine to rotate stepper motor counterclockwise
COUNTERCLOCKWISE:
     MOV A, #08H    ; Load step 4 (1000)
```

```
    MOV P2, A
    ACALL DELAY
    MOV A, #04H    ; Load step 3 (0100)
    MOV P2, A
    ACALL DELAY
    MOV A, #02H    ; Load step 2 (0010)
    MOV P2, A
    ACALL DELAY
    MOV A, #01H    ; Load step 1 (0001)
    MOV P2, A
    ACALL DELAY
    RET            ; Return from subroutine
; Subroutine to generate a delay
DELAY:
    MOV R1, #0FFH  ; Load delay counter (outer loop)
DELAY_LOOP1:
    MOV R2, #0FFH  ; Load delay counter (inner loop)
DELAY_LOOP2:
    DJNZ R2, DELAY_LOOP2 ; Decrement inner loop counter
    DJNZ R1, DELAY_LOOP1 ; Decrement outer loop counter
    RET            ; Return from subroutine
END
```

CIRCUIT DIAGRAM:



OUTPUT:

The stepper motor is rotating in clockwise direction in steps.

RESULT:

Thus, the program has been successfully verified and executed.

CLOCKWISE ROTATION OF STEPPER MOTOR USING 8051 USING PROTEUS

AIM:

To write an assembly language program to rotate the Stepper Motor in clockwise direction in 8051 using Proteus

SOFTWARE REQUIRED:

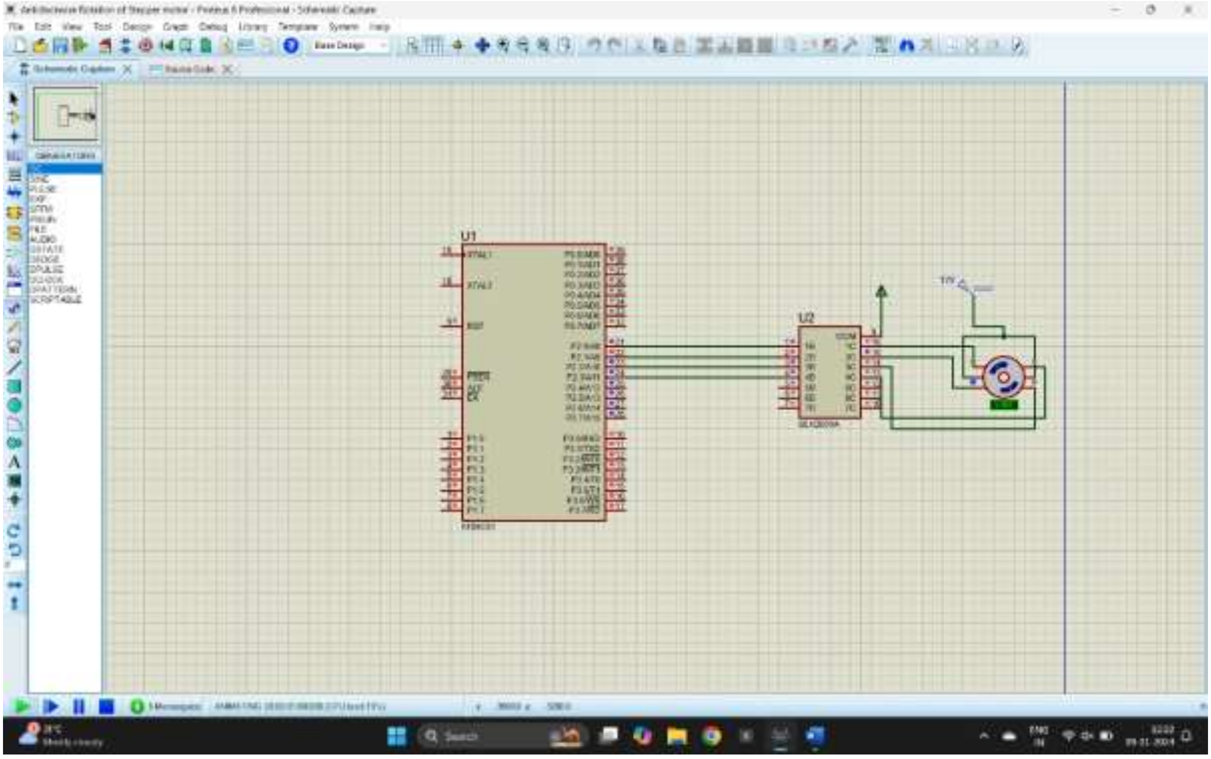
- Proteus 8 software.

PROGRAM:

```
       ORG 0000H
   UP: MOV P2,#09H
       ACALL DELAY
       MOV P2,#0CH
       ACALL DELAY
       MOV P2,#06H
       ACALL DELAY
       MOV P2,#03H
       ACALL DELAY
       SJMP UP
```

```
DELAY:MOV R4,#18
      H1:MOV R3,#255
      H2:DJNZ R3,H2
            DJNZ R4,H1
            RET
            END
```

CIRCUIT DIAGRAM:


Anticlockwise Rotation of Stepper motor - Proteus 8 Professional - Schematic Capture
File Edit View Tool Design Graph Debug Library Template System Help
Base Design
Schematic Capture
Source Code
U1
U2
12V
AT89C51
ULN2003A

OUTPUT:

The stepper motor is rotating in clockwise direction in steps.

RESULT:

Thus, the program has been successfully verified and executed.

DIGITAL CLOCK ON LCD

AIM:

To write an assembly language program to display digital clock on LCD with using Proteus.

SOFTWARES REQUIRED:

- Proteus software

PROGRAM:

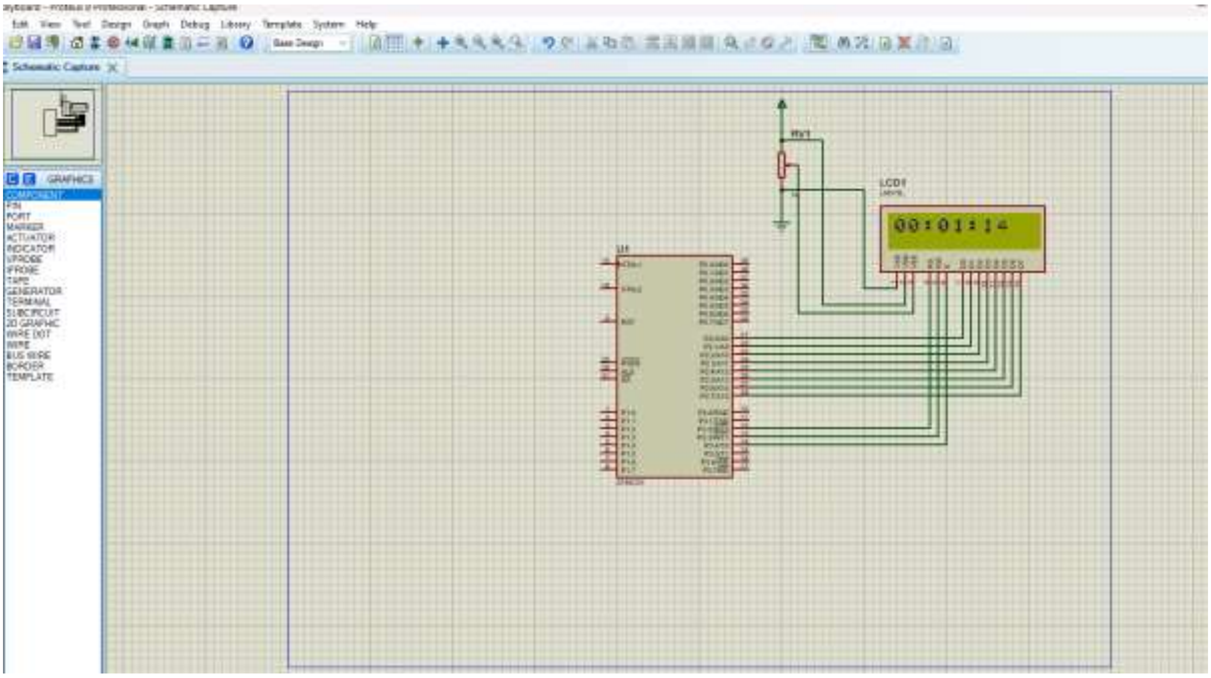
```
ORG 0000H           ; Start address of the program
```

```
MOV R7, #00H        ; Initialize hours (HH)
MOV R6, #00H        ; Initialize minutes (MM)
MOV R5, #00H        ; Initialize seconds (SS)

ACALL INIT_LCD      ; Initialize the LCD

MAIN_LOOP:
   ACALL UPDATE_LCD      ; Update the time on the LCD
   ACALL DELAY_1_SEC     ; Wait for 1 second
   ACALL INCREMENT_TIME  ; Increment time (HH:MM:SS)
   SJMP MAIN_LOOP        ; Repeat the process

; Subroutine to initialize the LCD
INIT_LCD:
   MOV A, #38H
   ACALL CMD_WRITE       ; 8-bit mode, 2 lines, 5x7 matrix
   ACALL DELAY_SHORT

   MOV A, #0CH
   ACALL CMD_WRITE       ; Display ON, Cursor OFF
   ACALL DELAY_SHORT

   MOV A, #06H
   ACALL CMD_WRITE       ; Auto-increment cursor
   ACALL DELAY_SHORT

   MOV A, #01H
   ACALL CMD_WRITE       ; Clear display
   ACALL DELAY_SHORT
   RET

; Subroutine to increment time
INCREMENT_TIME:
   INC R5              ; Increment seconds (SS)
   CJNE R5, #60, DONE_SEC ; If seconds < 60, continue
   MOV R5, #00H        ; Reset seconds to 00
   INC R6              ; Increment minutes (MM)
   CJNE R6, #60, DONE_SEC ; If minutes < 60, continue
   MOV R6, #00H        ; Reset minutes to 00
   INC R7              ; Increment hours (HH)
   CJNE R7, #24, DONE_SEC ; If hours < 24, continue
   MOV R7, #00H        ; Reset hours to 00
DONE_SEC:
   RET

; Subroutine to update the LCD with the current time
```

```
UPDATE_LCD:
    MOV A, #80H
    ACALL CMD_WRITE        ; Move cursor to the first line of the LCD

    MOV A, R7              ; Load hours (HH) into accumulator
    ACALL DISPLAY_TWO_DIGIT ; Display hours (HH)

    ACALL DISPLAY_COLON    ; Display ':'

    MOV A, R6              ; Load minutes (MM) into accumulator
    ACALL DISPLAY_TWO_DIGIT ; Display minutes (MM)

    ACALL DISPLAY_COLON    ; Display ':'

    MOV A, R5              ; Load seconds (SS) into accumulator
    ACALL DISPLAY_TWO_DIGIT ; Display seconds (SS)
    RET

; Subroutine to display two-digit numbers on the LCD
DISPLAY_TWO_DIGIT:
    MOV B, #10             ; Divide the value in A by 10
    DIV AB                 ; Quotient in A (tens), remainder in B (ones)

    ADD A, #30H            ; Convert tens digit to ASCII
    ACALL DISPLAY_CHAR     ; Display the tens digit

    MOV A, B               ; Move the remainder (ones digit) to A
    ADD A, #30H            ; Convert ones digit to ASCII
    ACALL DISPLAY_CHAR     ; Display the ones digit
    RET

; Subroutine to display colon ':' on the LCD
DISPLAY_COLON:
    MOV A, #3AH            ; ASCII value of ':'
    ACALL DISPLAY_CHAR     ; Display ':'
    RET

; Subroutine to display a character on the LCD
DISPLAY_CHAR:
    MOV P2, A              ; Send ASCII character to data pins (P2 connected to D0-D7 of LCD)
    SETB P3.2              ; Set RS to 1 (data register)
    CLR P3.3               ; Set RW to 0 (write mode)
    SETB P3.4              ; Set E to 1 (Enable high)
    NOP                    ; Small delay
    CLR P3.4               ; Set E to 0 (Enable low)
    ACALL DELAY_SHORT      ; Short delay after sending character
```

```
   RET

; Subroutine to write command to the LCD
CMD_WRITE:
   MOV P2, A            ; Send command to data pins (P2 connected to D0-D7 of LCD)
   CLR P3.2            ; Set RS to 0 (command register)
   CLR P3.3            ; Set RW to 0 (write mode)
   SETB P3.4            ; Set E to 1 (Enable high)
   NOP               ; Small delay
   CLR P3.4            ; Set E to 0 (Enable low)
   ACALL DELAY_SHORT     ; Short delay after sending command
   RET

; Short delay for LCD commands and data
DELAY_SHORT:
   MOV R0, #250         ; Adjust this value for a short delay
DELAY_SHORT_LOOP:
   DJNZ R0, DELAY_SHORT_LOOP
   RET

; Subroutine for 1-second delay
DELAY_1_SEC:
   MOV R3, #50          ; Outer loop for delay
DELAY_LOOP:
   MOV R4, #255         ; Inner loop for delay
DELAY_LOOP_INNER:
   DJNZ R4, DELAY_LOOP_INNER
   DJNZ R3, DELAY_LOOP
   RET

END
```

CIRCUIT DIAGRAM:



OUTPUT:

- When this program is run, the LCD will display the current time in the format HH:MM.
- Every second, the display will update to increment the seconds value.
- After reaching 59 seconds, the seconds will reset to 00, and the minutes will increment.
- Similarly, when the minutes reach 59 and increment again, they will reset to 00, and the hours will increment.
- The hours will increment from 00 to 23 in a 24-hour format. When the hours reach 23 and the next second occurs, the hours, minutes, and seconds will all reset to 00:00:00.

RESULT:

Thus, the assembly language program to display digital clock on LCD with using Proteus was executed.

INTERFACING OF RELAY AND LED WITH 8051 USING PROTEUS

AIM:

To write an assembly language program to interface relay and LED with 8051 using Proteus.

SOFTWARE REQUIRED:

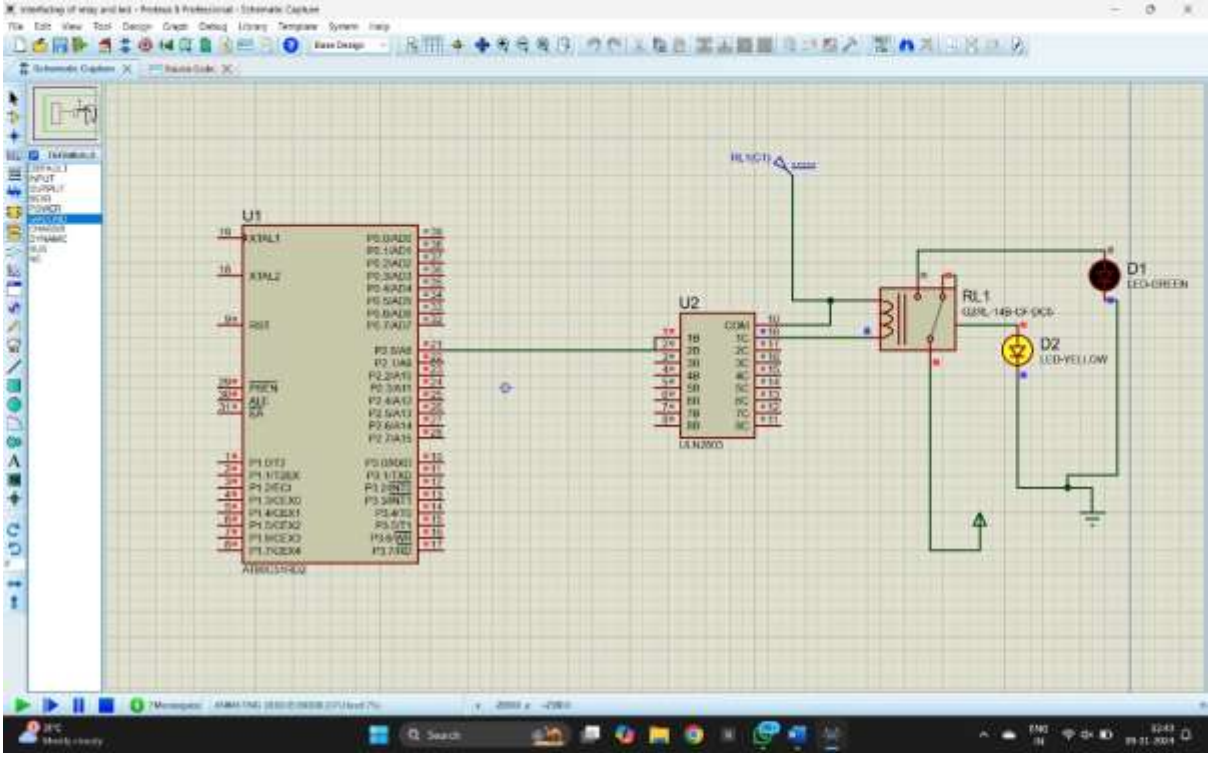
- Proteus 8 software.

PROGRAM:

```
        ORG 0000H       ; Start of program
; Initialize Port 1 as output port for relay control
```

```
MOV P1, #00H      ; Clear Port 1 (all pins low initially)
MAIN_LOOP:
   SETB P1.0     ; Set P1.0 HIGH (Relay ON, LED ON)
   ACALL DELAY   ; Call delay to keep the LED ON for some time
   CLR P1.0      ; Clear P1.0 (Relay OFF, LED OFF)
   ACALL DELAY   ; Call delay to keep the LED OFF for some time
   SJMP MAIN_LOOP; Repeat the process

; Delay subroutine for blinking speed
DELAY:
   MOV R1, #255  ; Outer loop
DELAY1:
   MOV R2, #255  ; Inner loop
DELAY2:
   DJNZ R2, DELAY2 ; Decrement inner loop
   DJNZ R1, DELAY1 ; Decrement outer loop
   RET           ; Return to main loop
END              ; End of program
```

CIRCUIT DIAGRAM:



OUTPUT:

- The LED connected through the relay will blink with a controlled ON and OFF duration.
- The relay acts as a switch controlled by the 8051 microcontroller, turning the LED ON when P1.0 is HIGH and OFF when P1.0 is LOW.
- The blinking rate of the LED can be adjusted by changing the delay subroutine.

RESULT:

Thus, the program has been successfully verified and executed.

7 SEGMENT DISPLAY USING 8051 USING PROTEUS

AIM:

Write an assembly language program for 7 Segment Display Using 8051 using Keil and Proteus

SOFTWARE REQUIRED:

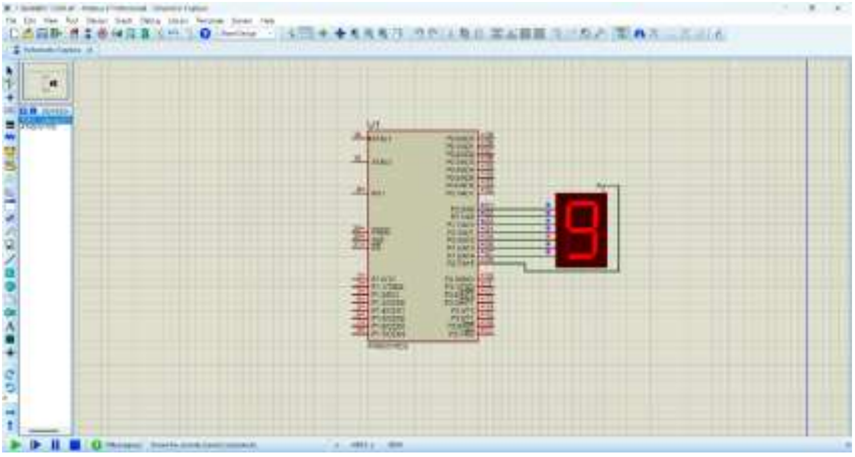
- Proteus 8 software.

PROGRAM:

```
ORG 000H
```

```
UP:MOV P2,#0C0H
ACALL DELAY
MOV P2,#0F9H
ACALL DELAY
MOV P2,#0A4H
ACALL DELAY
MOV P2,#0B0H
ACALL DELAY
MOV P2,#99H
ACALL DELAY
MOV P2,#92H
ACALL DELAY
MOV P2,#82H
ACALL DELAY
MOV P2,#0F8H
ACALL DELAY
MOV P2, #80H
ACALL DELAY
MOV P2,#90H
ACALL DELAY

DELAY: MOV R5,#10
H1:MOV R4,#180
H2:MOV R3,#255
H3:DJNZ R3,H3
DJNZ R4,H2
DJNZ R5,H1
RET
END
```

CIRCUIT DIAGRAM:



RESULT:

Thus the program has been successfully verified and executed.

TRAFFIC SIGNALS USING 8051 USING PROTEUS

AIM:

To write an assembly language program Traffic Signals Using 8051 using Keil and Proteus.

SOFTWARE REQUIRED:

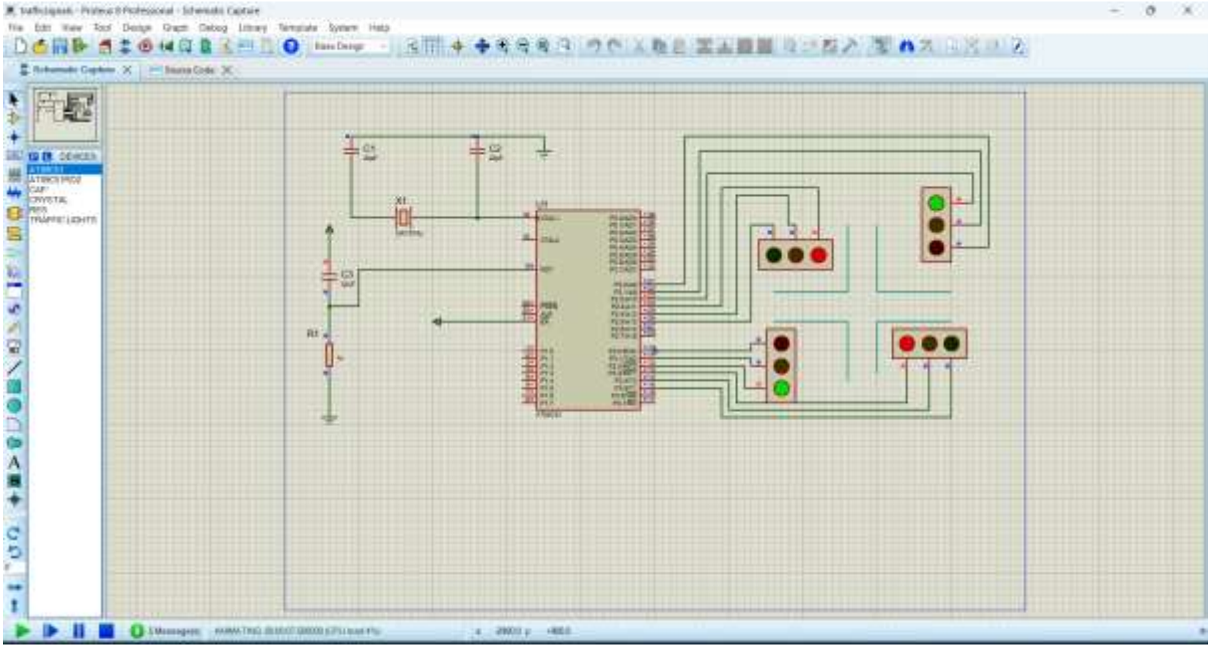
- Proteus 8 software.

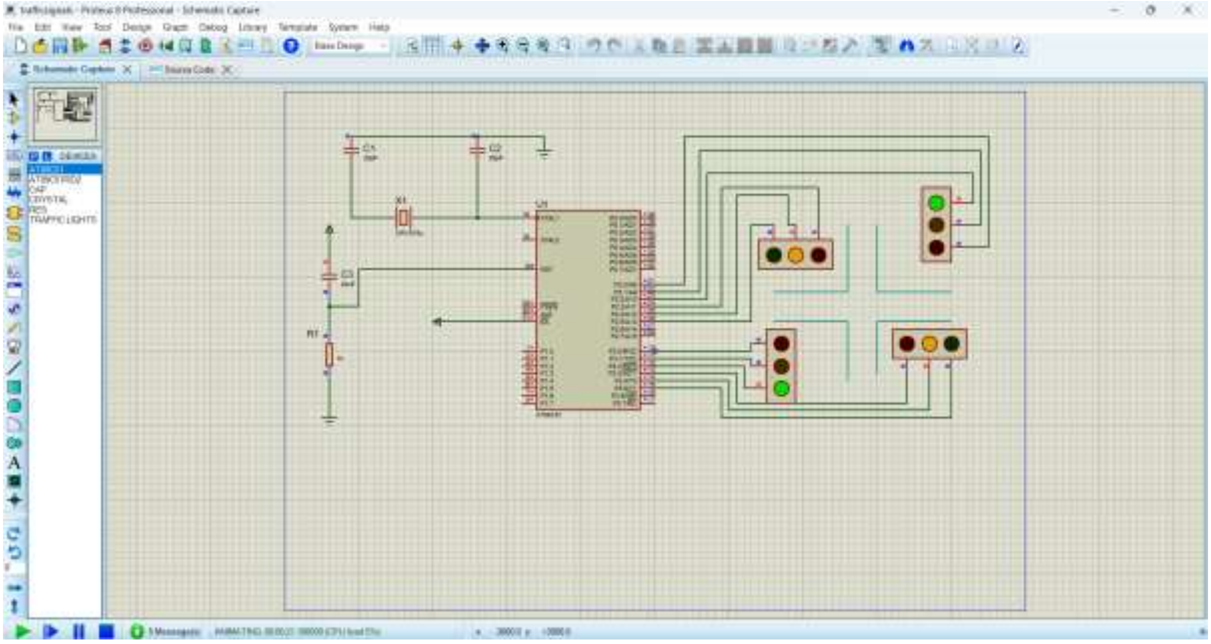
PROGRAM:

```
ORG 00H
MOV P2, #00H
MOV P3, #00H

MAIN:
   SETB P2.2
   SETB P3.2
   SETB P2.3
   SETB P3.3
   ACALL DELAY1

   SETB P2.4
   SETB P3.4
   CLR P2.3
   CLR P3.3
   ACALL DELAY2

   MOV P2, #00H
   MOV P3, #00H

   SETB P2.5
   SETB P3.5
   SETB P2.0
   SETB P3.0
   ACALL DELAY1

   SETB P2.1
   SETB P3.1
   CLR P2.0
   CLR P3.0
   ACALL DELAY2

   MOV P2, #00H
   MOV P3, #00H
```

```
    SJMP MAIN

DELAY1:
    MOV R0, #255D
D1_LOOP1:
    MOV R1, #255D
D1_LOOP2:
    MOV R2, #142D
D1_LOOP3:
    DJNZ R2, D1_LOOP3
    DJNZ R1, D1_LOOP2
    DJNZ R0, D1_LOOP1
    RET

DELAY2:
    MOV R0, #255D
D2_LOOP1:
    MOV R1, #142D
D2_LOOP2:
    MOV R2, #51D
D2_LOOP3:
    DJNZ R2, D2_LOOP3
    DJNZ R1, D2_LOOP2
    DJNZ R0, D2_LOOP1
    RET

END
```

CIRCUIT DIAGRAM:




trafficsignals - Proteus 8 Professional - Schematic Capture
File Edit View Tool Design Graph Debug Library Template System Help
Base Design
Schematic Capture
Source Code
DEVICES
AT89C51
AT89C51RD2
CAP
CRYSTAL
RES
TRAFFIC LIGHTS
C1
C2
C3
X1
R1
U1

RESULT:

Thus, the program has been successfully verified and executed