INSTITUTE OF TECHNOLOGY NIRMA UNIVERSITY

INVIGILATOR CLOCK

A report of special assignment for

MCI (2EC701)

Semester IV

Electronics and Communication Engineering

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INTRODUCTION

The invigilator clock system is designed to assist invigilators in monitoring examination durations accurately. It provides a centralized timekeeping system that synchronizes multiple clocks placed in examination rooms. The system utilizes the 8051 microcontroller for its reliability, low cost, and ease of programming.

WORKING FLOW

- Upon power-up, the microcontroller initializes the system, setting the time to a predefined value and displaying it on the LED.
- To start an examination session, the invigilator has to reset the system and then the circuit will start.
- During the examination, the system continuously updates the countdown timer and displays the remaining time on the LED.
- This circuit behaves as a down counter which gradually decreases the count as per our requirement.
- When the countdown timer of seconds reaches to zero it calls minute LED panel and decrements it by one, similarly when minute reaches to zero it makes hours LED to decrease by one.

FUNCTIONALITIES

- Timekeeping: The microcontroller keeps track of the current time, updating it continuously based on the crystal oscillator's pulses.
- Countdown Timer: Allows the invigilator to set a specific duration for the examination. Once started, the timer counts down, displaying the remaining time on the LED.
- Synchronization: This ensures all clocks display the same time.
- User Interface: The LED display presents the current time, countdown timer, and synchronization status.

COMPONENTS REQUIRED

- **8051 Microcontroller:** The heart of the system, responsible for timekeeping, synchronization, and control logic.
- **Crystal Oscillator:** Provides precise clock pulses to the microcontroller.
- **7 Segment LED Display:** Displays the current time, countdown timer, and synchronization status.
- **Power Supply:** To provide appropriate power supply of 5V.

BLOCK DIAGRAM

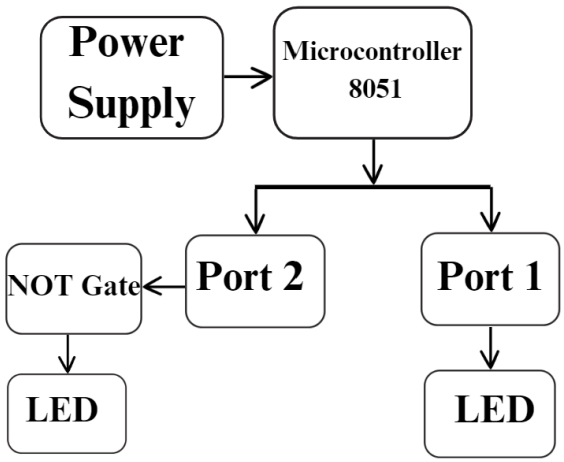

Fig: 1 Block Diagram

CIRCUIT DIAGRAM

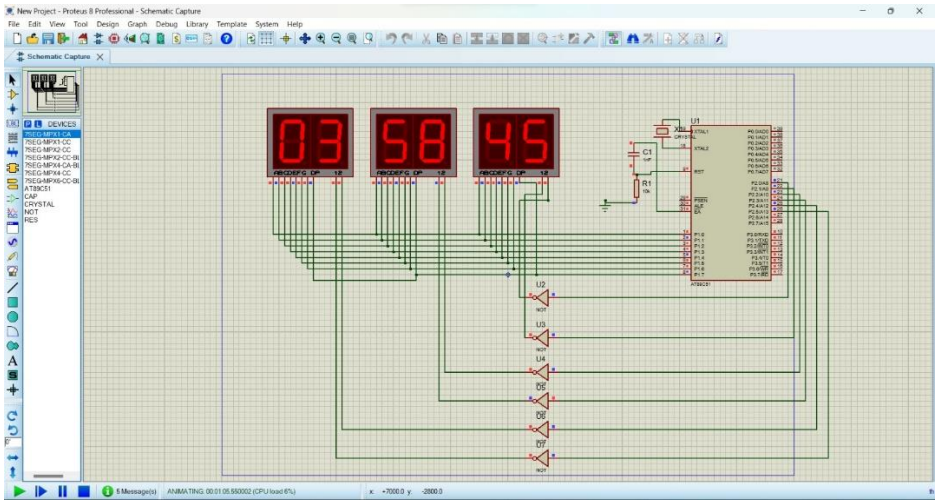

Fig 2: Circuit Diagram

FLOW CHART

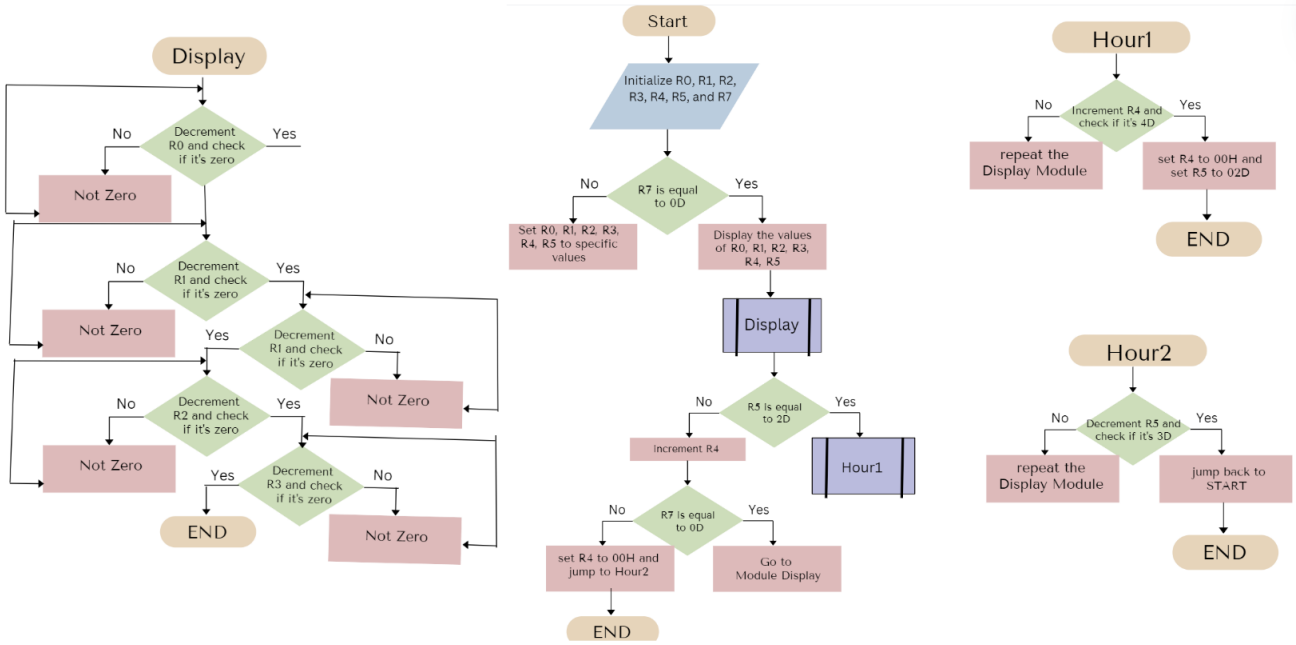

Fig 3: Main Flow Chart

ALGORITHM

- Initialization: The program starts at address 00H, where it jumps to the MAIN subroutine. The MAIN subroutine initializes the data pointers and registers R0-R5.
- Main Loop: The program then enters a loop labeled START, where it appears to initialize some registers with specific values. After that, it checks the value of register R7. If it's equal to 0, it jumps to the DISPLAY subroutine; otherwise, it sets some other values and resets R7.
- Displaying Data: The DISPLAY subroutine is responsible for displaying data. It starts by incrementing R7 and calling the SHOW subroutine. Then it decrements R0 and checks if it's zero; if not, it repeats the process for R1, R2, R3, and finally checks the value in R5. If it's not equal to 2, it increments R4 until it reaches 10. Then it jumps to Hour2. If it is equal to 2, it jumps to Hour1.
- Handling Hour1: In the Hour1 subroutine, it increments R4 and checks if it's equal to 4D. If not, it continues incrementing R5 until it reaches 3. Then it jumps back to START.

- Displaying Data (SHOW): The SHOW subroutine is responsible for actually displaying the data. It appears to be using a loop labeled REPEAT to iterate through the values in memory pointed to by DPTR. It moves the values in registers R0-R5 and then sends them to the output ports P2.0-P2.5 with some delays in between.
- Delay Function: The DELAY subroutine provides a delay mechanism for timing purposes. It sets a flag in PSW.4, then enters nested loops to create a delay, and finally clears the flag.
- Data: At address 300H, there's a block of data labeled MYDATA. This block seems to contain some data used for display purposes.

APPLICATION

- Examination Halls: It ensures accurate monitoring of examination durations, preventing any discrepancies or unfair advantages.
- Training Centers and Workshops: It helps trainers and instructors in managing session durations effectively, ensuring that each topic or activity is covered within the allocated time.
- Public Spaces: The system can be used to display accurate departure and arrival times for buses, trains, and other modes of transportation, improving passenger convenience.
- Sports and Athletic Events: In races and marathons, it provides precise timing information to participants and spectators, ensuring fair competition.

RESULT

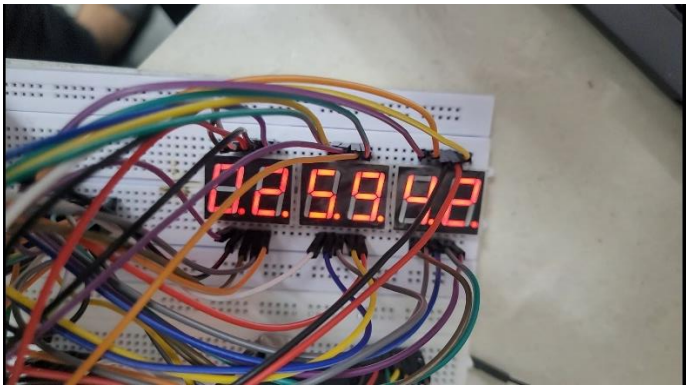

Fig: Result

As you can see it is down counting as time goes down, by providing proper delay it is working effectively and providing required outcome. First set of LED represent hours , second LED panel represent minutes and the third LED panel represent seconds.

CONCLUSION

The invigilator clock system based on the 8051 microcontroller provides a reliable and user-friendly solution for monitoring examination durations. Its functionalities, including timekeeping, countdown timer, synchronization, and user interface, cater to the specific needs of invigilators, enhancing the efficiency and fairness of examination administration.

BILL

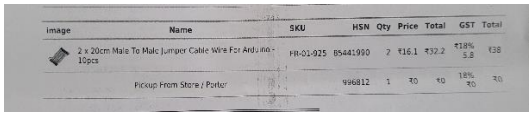

Image	Name	SKU	HSN	Qty	Price	Total	GST	Total
	2 x 20cm Male To Male Jumper Cable Wire For Arduino - 10pcs	FR-01-925	85441990	2	₹16.1	₹32.2	₹18% 5.8	₹38
	Pickup From Store / Porter		996812	1	₹0	₹0	18% ₹0	₹0

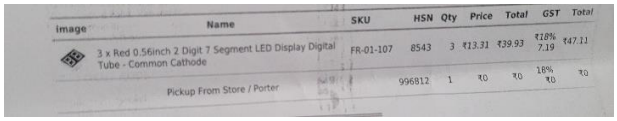

Image	Name	SKU	HSN	Qty	Price	Total	GST	Total
	3 x Red 0.56inch 2 Digit 7 Segment LED Display Digital Tube - Common Cathode	FR-01-107	8543	3	₹13.31	₹39.93	₹18% 7.19	₹47.11
	Pickup From Store / Porter		996812	1	₹0	₹0	18% ₹0	₹0

SET OF QUESTIONS

Q1) On what basis LED is configurated?

Q2) Provide the LOOK UP table for the 7 segment display.

Q3) What is the difference between crystal oscillators and ceramic resonators?

Q4) Describe the role of the DISPLAY label.

Q5) What does the MOV DPTR, #MYDATA instruction do?

CODE

```
ORG 00H
 LJMP MAIN
 ORG 30H
  MAIN:
 MOV DPTR , #MYDATA
 START:
 MOV R0,#00H
 MOV R1,#00H
 MOV R2,#00H
 MOV R3,#00H
 MOV R4,#00H
 MOV R5,#00H

 CJNE R7 ,#0D , DISPLAY
 MOV R0,#9
 MOV R1,#5
 MOV R2,#9
 MOV R3,#5
 MOV R4,#2
 MOV R5,#0
 MOV R7,#00H


 DISPLAY:
 INC R7
 ACALL SHOW
 BACK:
 DEC R0
 CJNE R0, #00H,DISPLAY
 MOV R0, #9
 DEC R1
 CJNE R1, #00H ,DISPLAY
 MOV R1, #5
 DEC R2
 CJNE R2,#00H,DISPLAY
 MOV R2,#9
 DEC R3
 CJNE R3,#00H,DISPLAY
 MOV R3,#5
 MOV A,R5
 XRL A, #2D
 JZ HOUR1
 JNZ XX
 XX:
 DEC R4
 CJNE R4,#00H,DISPLAY
 MOV R4,#10
 SJMP HOUR2
 HOUR1:
 DEC R4
 CJNE R4,#00H,DISPLAY
 MOV R4 ,#4
 MOV R5,#02D

 HOUR2:
 DEC R5
 CJNE R5,#3D,DISPLAY
 SJMP START

 SHOW:
 MOV R6,#82D
 REPEAT:
 MOV A,R0
 MOVC A,@A+DPTR
 SETB P2.0
 MOV P1,A
 ACALL DELAY
 CLR P2.0
 MOV A,R1
 MOVC A,@A+DPTR
 SETB P2.1
 MOV P1,A
 ACALL DELAY
 CLR P2.1
 MOV A,R2
 MOVC A,@A+DPTR
 SETB P2.2
 MOV P1,A
 ACALL DELAY
 CLR P2.2
 MOV A,R3
  MOVC A,@A+DPTR
  SETB P2.3
  MOV P1 ,A
  ACALL DELAY
  CLR P2.3
  MOV A,R4
  MOVC A,@A+DPTR
  SETB P2.4
  MOV P1,A
  ACALL DELAY
  CLR P2.4
  MOV A,R5
  MOVC A,@A+DPTR
  SETB P2.5
  MOV P1,A
  ACALL DELAY
  CLR P2.5
  DJNZ R6, REPEAT
  RET

  DELAY:
  SETB PSW. 4
  MOV R2,#10
  AGAIN2: MOV R3 ,#100
  AGAIN1:DJNZ R3,AGAIN1
  DJNZ R2 , AGAIN2
  CLR PSW. 4
  RET

  ORG 300H
   MYDATA:
   DB 3FH,06H,5BH,4FH,66H,6DH,7DH,07H,7FH,6FH
    END
```