



ERODE SENGUNTHAR ENGINEERING COLLEGE

(An Autonomous Institution)

Approved by AICTE, New Delhi, Permanently Affiliated to Anna University, Chennai &
Accredited by National Board of Accreditation (NBA), New Delhi,
National Accreditation Assessment Council (NAAC), Bangalore with A Grade
PERUNDURAI-638 057, TAMILNADU, INDIA



DEPARTMENT OF M.TECH COMPUTER SCIENCE AND ENGINEERING

Innovative Teaching Practices

Name of the Subject with Code : 21CS407 MICROCONTROLLER LABORATORY
Course Coordinator : P.Kumudham, AP/M.TECH-CSE
Academic Year : 2023-2024 / EVEN Semester
Year/ Semester : II / IV Semester
Branch : M.TECH - Computer Science and Engineering

Index

S.No	Content
1	Lesson plan with innovative practices and content beyond syllabus highlighted
2	Innovative teaching process evidence
3	Log book copies
4	Content beyond syllabus



Dr. V.VENKATACHALAN, B.S., M.Tech., Ph.D.,
PRINCIPAL
Erode Sengunthar Engineering College,
(Autonomous)
Thudupathi, Perundurai, Erode -638 057



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PERUNDURAI -638 057, TAMILNADU, INDIA.



DEPARTMENT OF M.TECH - COMPUTER SCIENCE AND ENGINEERING

LESSON PLAN

Name of the Subject with Code : 21CS407 MICROCONTROLLER LABORATORY
Course Coordinator : P.Kumudham, AP/M.TECH-CSE
Academic Year : 2023-24 / EVEN Semester
Year/Semester : II / IV Semester
Branch : M.TECH - Computer Science and Engineering

Course Objectives:

- Students will gain knowledge on architecture, accessing data and instruction from memory for processing.
- Ability to do programs with instruction set and control the external devices through I/O interface.
- Generate a system model for real world problems with data acquisition, processing and decision making with aid of micro controllers and advanced processors.

Course outcomes:

- Develop 8051 Assembly Language Programs for Arithmetic, Logic, Bit manipulation.
- Develop Assembly Language Program for String operations and Demonstrate an application for 8051 microcontroller using Traffic light controller, ADC & DAC interfacing boards.
- Demonstrate 8051 Embedded C Coding for Programming the GPIO, Timer, Interrupts & Serial Port.
- Write embedded C Coding for temperature monitoring using Arduino target Board.
- Develop communication skills and capability to work in team.

List of Experiments:

Cycle-I	
1.	Developing Assembly Language Programs using 8051 Microcontroller Kits in Data manipulating Operations and Delay Routines.
2.	Developing Assembly Language Programs using 8051 Microcontroller Kits in String operations.
3.	Developing Assembly Language Programs using 8051 Microcontroller Kits in Interfacing Traffic light controller.
4.	Developing Assembly Language Programs using 8051 Microcontroller Kits in Interfacing ADC.
5.	Developing Assembly Language Programs using 8051 Microcontroller Kits in Interfacing DAC.
6.	Interfacing of stepper motor using 8051 microcontroller (content beyond the syllabus)

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Cycle-II	
7.	Memory Data Transfer Operations & Input/output Port Programming Using IDE Tool for Microcontroller.
8.	Timer/Counter Programming Using IDE Tool for Microcontroller.
9.	Serial Port Programming Using IDE Tool for Microcontroller.
10.	Handling Interrupts Using IDE Tool for Microcontroller.
11.	Temperature monitoring using Arduino Target Board Using IDE Tool for Microcontroller.

BATCH -A				BATCH -B			
S. No.	Planned Date	Actually Conducted Date	EXP. No.	S. No.	Planned Date	Actually Conducted Date	EXP. No.
1.	26.02.2024	26. 2. 24	Introduction	1.	01.03.2024	1. 3. 24	Introduction
2.	04.03.2024	4. 3. 24	1	2.	08.03.2024	8. 3. 24	1
3.	11.03.2024	11. 3. 24	2	3.	15.03.2024	15. 3. 24	2
4.	18.03.2024	18. 3. 24	3	4.	22.03.2024	22. 3. 24	3
5.	25.03.2024	25. 3. 24	4	5.	05.04.2024	5. 4. 24	4
6.	01.04.2024	1. 4. 24	5	6.	12.04.2024	12. 4. 24	5
7.	08.04.2024	8. 4. 24	6(CBS)	7.	19.04.2024	19. 4. 24	6(CBS)
8.	15.04.2024	15. 4. 24	7	8.	26.04.2024	26. 4. 24	7
9.	22.04.2024	29. 4. 24	8	9.	03.05.2024	3. 5. 24	8
10.	29.04.2024	6. 5. 24	9	10.	10.05.2024	10. 5. 24	9
11.	06.05.2024	13. 5. 24	10	11.	17.05.2024	17. 5. 24	10
12.	13.05.2024	20. 5. 24	Model Practical	12.	24.05.2024	21. 5. 24	Model Practical
13.	20.05.2024	27. 5. 24	11	13.	31.05.2024	30. 5. 24	11
14.	27.06.2024	3. 6. 24	Revision	14.	07.06.2024	7. 6. 24	Revision

Tentative Dates of Events

Reopening Date	: 26.02.2024
Continuous Assessment Test – 1	: 25.03.2024 to 03.04.2024
Continuous Assessment Test – 2	: 24.04.2024 to 03.05.2024
Continuous Assessment Test – 3	: 27.05.2024 to 04.06.2024
Model Examination	: 12.06.2024 to 21.06.2024
Last Working Day	: 25.06.2024

Learning Resources:

Books:

1. Krishna Kant, "Microprocessor and Microcontroller Architecture, Programming and System Design using 8085, 8086, 8051, 8096", Prentice Hall of India, 1st Edition, 2011.
2. Soumitra Kumar Mandal "Microprocessors and Microcontrollers Architecture Programming and Interfacing using 8085 8086 & 8051" Tata McGraw Hill Publishing Co Ltd, 1st Edition, 2011.



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3. U.S.Shah, "Microprocessor & Application", Macmillan Publishers India Limited, 2nd Edition, 2011.
4. Kenneth J. Ayala, "The 8051 Microcontroller. Architecture, Programming and Applications", 3rd Edition, West publishing company 2014.
5. Myke Predko, "Programming and Customizing the 8051 Microcontroller", 1st Edition, 2012.

Web Learning Resources:

1. <https://onecompiler.com/c/3wdnfdurd>
2. <http://www.edsim51.com/>
3. <https://www.instructables.com/>

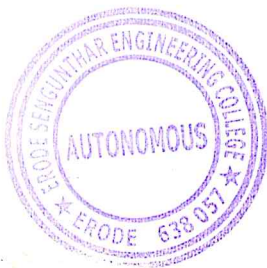


COURSE COORDINATOR



HOD/M.TECH (CSE)

PRINCIPAL




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DEPARTMENT OF M.TECH COMPUTER SCIENCE AND ENGINEERING

INNOVATIVE TEACHING PROCESS

2023-2024 Even Semester

1. Name of subject with course code : 21CS407 MICROCONTROLLER LABORATORY
2. Class / Year/ Branch : II Year / IV Semester / M.Tech Computer Science and Engineering
3. Name of The Course Coordinator : P.Kumudham, AP/M.TECH-CSE
4. Date and Hour : 18.03.2024 and 5th to 7th Hour
5. Topics of the class : Interfacing Traffic Light Controller
6. Title of Innovative teaching learning process : Practice Based Learning
7. Objective : Student can able to understand basic GPIO operations using assembly language.

8. Student name list:

Sl.No	Reg. Number	Name of the Students	Sl.No	Reg. Number	Name of the Students
1	730422553002	Akilan P R	22	730422553024	Komala V
2	730422553003	Anesha M .P	23	730422553025	Lingeshwaran M
3	730422553004	Balachandar T	24	730422553026	Logeshwaran S
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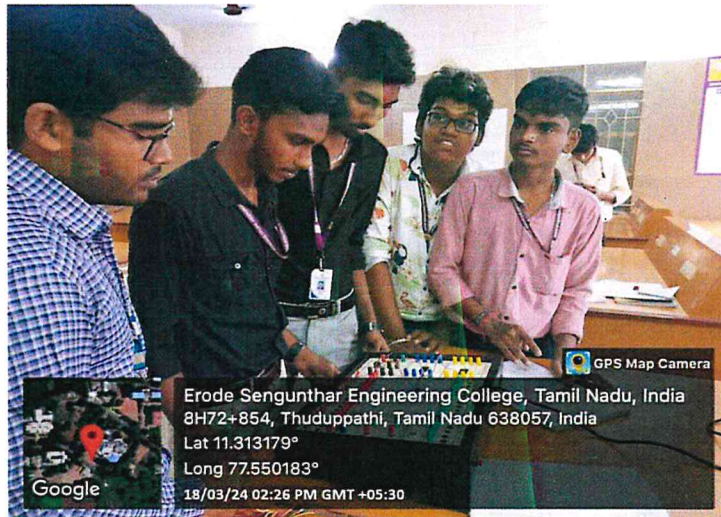
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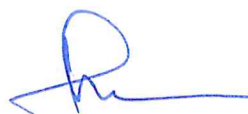
DEPARTMENT OF M.TECH COMPUTER SCIENCE AND ENGINEERING

Innovative Teaching Process

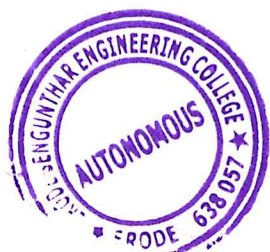
9. Geo-Tagged Photos:




Course Coordinator


HoD


Principal




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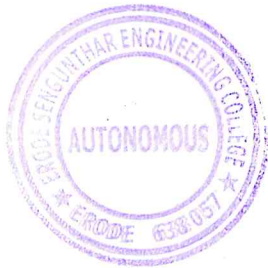
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DEPARTMENT OF M.TECH COMPUTER SCIENCE AND ENGINEERING

Innovative Teaching Process

9. Geo-Tagged Photos:



Kumudha
Course Coordinator

[Signature]
HoD

[Signature]
Principal



[Signature]
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3. Name of The Course Coordinator : P.Kumudham, AP/M.TECH-CSE
4. Date and Hour : 17.05.2024 and 5th to 7th Hour
5. Topics of the class : Handling Interrupts using IDE
6. Title of Innovative teaching learning process : Practice Based Learning
7. Objective : Student can able to learn the process of handling interrupts using IDE tool.

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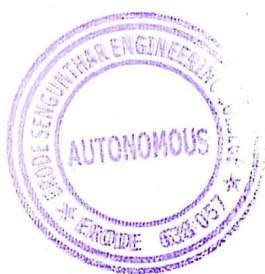
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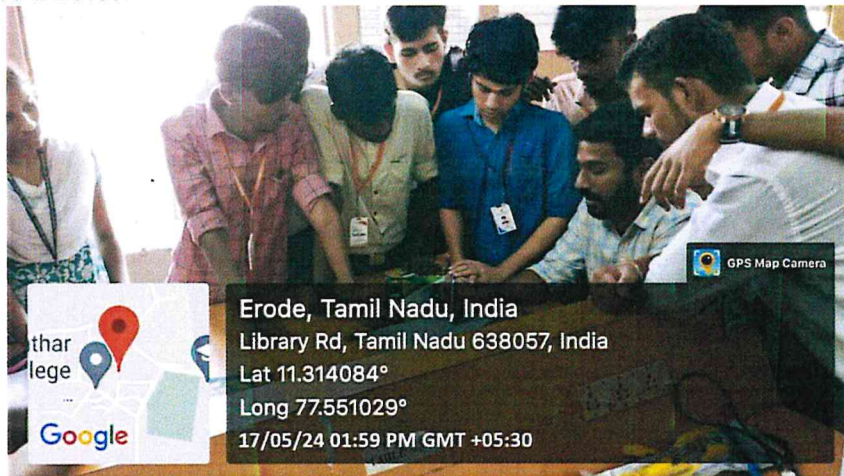
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Innovative Teaching Process

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[Signature]
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PARTICULARS OF EXPERIMENTS CONDUCTED

Semester : IV

Branch / Class : M.Tech Laboratory : MC Lab

Date	Time	Experiment	Sign.	Remarks
BATCH - A.				
26/02/24	5 ³⁰ to 7 ³⁰	Co Po Presentation	XLM	
04/03/24	5 ³⁰ to 7 ³⁰	8051 Microcontroller		
		Data Manipulating	XLM	
		Delay Routines		
11/03/24	5 ³⁰ to 7 ³⁰	String operations	XLM	
		using 8051 Microcontroller kit		
18/03/24	5 ³⁰ to 7 ³⁰	Interfacing Traffic		
		Light controller	XLM	
25/03/24	5 ³⁰ to 7 ³⁰	Interfacing ADC	XLM	
01/04/24		Interfacing DAC	XLM	
		Interfacing Stepper Motor	XLM	
08/04/24	5 ³⁰ to 7 ³⁰	Interfacing of Stepper Motor	XLM	
15/04/24	5 ³⁰ to 7 ³⁰	Memory Data Transfer operations & Input & output using IDE TOOL	XLM	
22/04/24	5 ³⁰ to 7 ³⁰	Timer / Counter Programming using IDE TOOL	XLM	
06/05/24	5 ³⁰ to 7 ³⁰	Serial Port programming using IDE TOOL	XLM	
13/05/24	5 ³⁰ to 7 ³⁰	Handling Interrupt using IDE TOOL	XLM	
20/05/24	5 ³⁰ to 7 ³⁰	Model Farm	XLM	
27/05/24	5 ³⁰ to 7 ³⁰	Temperature Monitor using IDE TOOL	XLM	

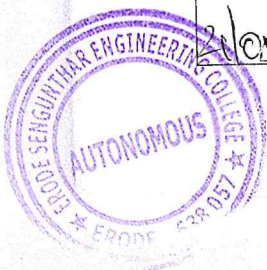


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PARTICULARS OF EXPERIMENTS CONDUCTED

Semester : V Branch / Class : M.Tech Laboratory : M.C Lab.

Date	Time	Experiment	Sign.	Remarks
		BATCH - B.		
01/03/24	8 to 10	Data Manipulating operation & Delay Routines	<u>MS</u>	
08/03/24	8 to 10	String operations. using 8051 Microcontroller	<u>MS</u>	
15/03/24	8 to 10	Traffic light controller using 8051 Microcontroller	<u>MS</u>	
22/03/24	8 to 10	Interfacing of ADC	<u>MS</u>	
29/03/24	8 to 10	Interfacing of DAC	<u>MS</u>	
12/04/24	8 to 10	Interfacing of the systems		
19/04/24	8 to 10	Interfacing of Stepper Motor	<u>MS</u>	
26/04/24	8 to 10	Memory Data Transfer operations & Input / output using IDE TOOL	<u>MS</u>	
03/05/24	8 to 10	Timer / Counter using IDE TOOL	<u>MS</u>	
10/05/24	8 to 10	Serial port Programming using IDE Tool	<u>MS</u>	
17/05/24	8 to 10	Handling Interrupts using IDE TOOL	<u>MS</u>	
24/05/24	8 to 10	Model Exam - Practical	<u>MS</u>	



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DEPARTMENT OF M.TECH COMPUTER SCIENCE AND ENGINEERING

DEPARTMENT OF M.TECH - COMPUTER SCIENCE AND ENGINEERING

Content beyond the Syllabus

21CS407 MICROCONTROLLER LABORATORY

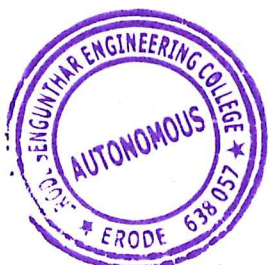
Topic: Interfacing of Stepper Motor using 8051 Microcontroller

AIM:

To write an assembly language program to interface a stepper motor using 8051 microcontroller.

ALGORITHM:

1. **Initialize Ports**
 - o Configure the GPIO pins of Port 2 (or any port) as output to drive the stepper motor through a driver circuit (e.g., ULN2003).
 - o Ensure that the microcontroller can safely drive the motor via the driver.
2. **Define Step Sequence:**
 - o Store the stepper motor's excitation sequence (full-step or half-step) in a memory array or registers.
3. **Set Delay Subroutine:**
 - o Write a delay subroutine to control the speed of the stepper motor by adding a delay between steps.
4. **Write Main Routine:**
 - o Load the step sequence from memory.
 - o Send each step pattern to the port connected to the stepper motor.
 - o Add a delay after sending each step to ensure proper timing.
5. **Control Direction:**
 - o For **Clockwise (CW) Rotation**, process the step sequence in forward order.
 - o For **Counter-Clockwise (CCW) Rotation**, process the step sequence in reverse order.
6. **Control Steps:**
 - o Use a loop counter to rotate the motor for a specific number of steps.
 - o Decrement the loop counter after each step until the desired number of steps is reached.
7. **Stop Motor:**
 - o Send 0000 to the motor port to stop the stepper motor when the operation is complete.
8. **Repeat (Optional):**
 - o Allow the motor to continue rotating based on user input or system conditions.



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PROGRAM:

ORG 0000H ; Start of program

MOV P2, #00H ; Initialize Port 2 as output for stepper motor

MOV R7, #10H ; Set number of steps (16 in this case)

START:

// Full-Step Sequence

MOV A, #0C0H ; Step 1: 1100

ACALL DELAY

MOV P2, A

MOV A, #060H ; Step 2: 0110

ACALL DELAY

MOV P2, A

MOV A, #030H ; Step 3: 0011

ACALL DELAY

MOV P2, A



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MOV A, #090H ; Step 4: 1001

ACALL DELAY

MOV P2, A

DJNZ R7, START ; Decrement steps counter and repeat if not zero

MOV P2, #00H ; Stop motor

SJMP \$; End program (infinite loop)

//Delay Subroutine

DELAY:

MOV R6, #0FFH ; Outer loop

D1: MOV R5, #0FFH ; Inner loop

D2: DJNZ R5, D2 ; Decrement inner loop counter

DJNZ R6, D1 ; Decrement outer loop counter

RET ; Return from subroutine

END



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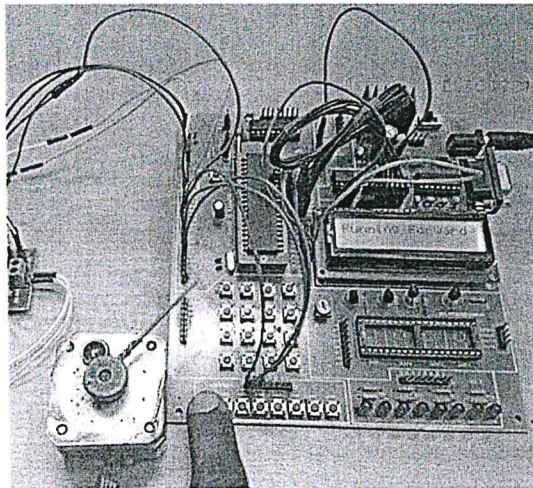
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OUTPUT:



RESULT:

Thus the assembly language for interfacing stepper motor with 8051 microcontroller was executed and verified successfully.



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