EE337 - Microprocessors Lab

Course Outline

Instructor: Prof Sachin Patkar <Patkar@ee.iitb.ac.in >

Jan 7, 2025

Timings and Venue

- Lab slot
  - BTech: **Mondays, 2 to 5 PM**
  - DD: **Tuesdays, 2 to 5 PM**

  [To optimize lab resources, BTech students approx. 10-11 will be moved to the Tuesday batch. Students are encouraged to submit a voluntary request, else random allocation will be done].

- Venue: WEL-4 and DSP Lab, 3rd floor of EE main building

Course Objective

- Understand and develop applications on the 8051 microcontroller
- Complements the Microprocessor theory course (EE309)

Skills Gained

- Develop, simulate and debug programs using the Keil IDE
- Write assembly and embedded C programs for given problem statements
- Interface variety of peripherals like LCD, keypad, speakers, ADC/DAC
- Understand and implement various communication protocols like SPI, UART

Prerequisites

- EE 214 Digital circuits
- EE 224 Digital systems
- EE 309 Microprocessors
  - Taking it this semester is also fine

Mandatory Attendance

- Be present in the lab slot by 2 pm (5 min. buffer time with late entry). **No entry to the lab after 2.05pm**.

- If you cannot attend a lab session **for medical reasons**, inform us and your TA
  - Email patkar@ee.iitb.ac.in, mab@ee.iitb.ac.in with CC to
    - Yerramsetti Chaitanya Kumar chaitanya729@iitb.ac.in (RA)
    - Batta Hemanth Kumar 23m1183@iitb.ac.in (RA) and
    - Your assigned TA

    [Considered, if Pink Slip from IITB Hosp. is produced]

Lab Experiment Schedule

- Each student will be issued a Pt-51 board against ID Card during lab session
- Lab exercises will released on Wednesdays
- Lab slot on the following Monday or Tuesday will be used for evaluation
  - Students can also use the lab slot for getting help from TAs
  - One TA/RA for a group of 6-8 students
- The completed code needs to be uploaded in Moodle
  - For BTech students, upload deadline is 5.15pm on Mondays
  - For DD students, upload deadline is 5.15pm on Tuesdays

Lab Experiment Evaluation

- You will show your work to the TA on your laptop
- TA will ask questions to test your understanding
- You are encouraged to discuss, but prepare your own solution
- **Penalties for any academic dishonesty**

What counts as malpractice?

- Copying code from the web, getting others to solve etc
- Sharing your code with your classmates
  - Multiple instances of this in previous years
  - Both parties (source and receiver) get the same penalty
- Sharing your code on a public Github repo or webpage
  - If you want to showcase your skills, pick something other than assigned lab exercise solutions to share
- Alternative copying methods ….

Website and Moodle

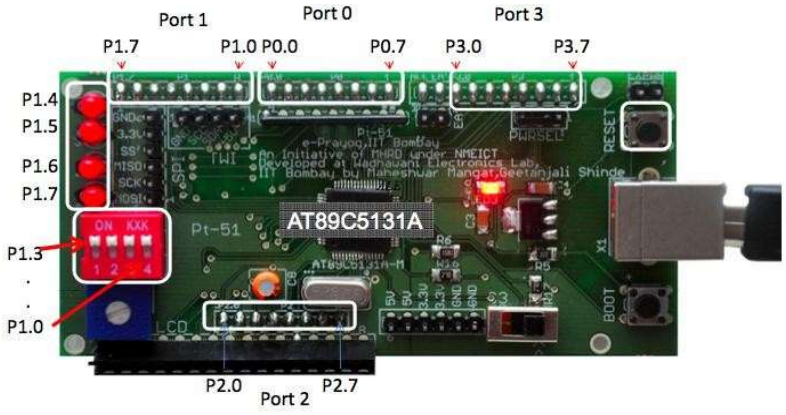
- Course Moodle will be used for announcements, assignments, grades
- Always check your marks in Moodle

  Report your TA/ RA if your marks are missing.

Reference Texts

- The 8051 Microcontroller and Embedded Systems - Using Assembly and C, Second edition
  - Muhammad Ali Mazidi, Janice Gillispie Mazidi, and Rolin D. McKinlay
- The 8051 Microcontroller, Third Edition
  - Kenneth J. Ayala

Lab kit and software



- Every student will receive a lab kit
  - A Pt-51 board, LCD, a keypad, a USB cable
- Install the software (Keil and Flip) on your personal laptops and make sure the kit is working correctly (see the self-test procedure)

Note: The development board Pt-51 has been developed, soldered and tested in WEL. We appreciate the entire WEL Team's contribution in the development of in-house microcontroller boards and other valuable resources for lab courses.

So please respect their efforts. Use the boards carefully and return them!

Download links for software

- ARM Keil-C51 download
  https://www.keil.com/demo/eval/c51.htm#/DOWNLOAD
  (requires registration)

- FLIP download
  https://www.microchip.com/developmenttools/ProductDetails/FLIP

EE-337: Microprocessor Lab Schedule (Spring 2025)

Date	Lab	Resources	Exercises
Pre-requisites 2 Jan		Development Tools	
		Getting_Started_with_Keil_uVision_2024.pdf	
		Keil Video Walkthrough : https://www.youtube.com/watch?v=IQZ8nyKL4xI	
		Introduction_to_microcontrollers.pdf	
		8051_Instruction_set.pdf	
7 Jan	Lab-0		Course Introduction and Keil IDE Familiarity
13 Jan 14 Jan	Lab-1		Assembly - 1
20 Jan 21 Jan	Lab-2		Assembly - 2
27 Jan 28 Jan	Lab-3		Assembly - 3
03 Feb 04 Feb	Lab-4	Embedded C programming for 8051 using Keil.pdf	Assembly - 4
		programming stylesheet.pdf	
		lcd-control-made-easy.pdf	
		lcd_interfacing_with_pt51.pdf	
08 Feb	**LAB MIDSEM EXAM (SATURDAY)**		**Assembly programming based**

10 Feb 11 Feb	Lab-5		Embedded C - 1
17 Feb 18 Feb	Lab-6		Embedded C - 2
22 Feb - 2 Mar	**Theory Midsem Exam**		
03 Mar 04 Mar	Lab-7a		Embedded C - 3 (Timer + Keypad + LCD + Speaker)
10 Mar 11 Mar	Lab-7b		Embedded C - 3 (Timer + Keypad + LCD + Speaker)
17 Mar 18 Mar	Lab-8a	https://ee337.github.io/dks/serial_io.html	Embedded C - 4 (UART)
24 Mar 25 Mar	Lab-8b		Embedded C - 4 (UART)
31 Mar 1 Apr	Lab-9a		Embedded C - 5 (SPI Imple.)
7 Apr 8 Apr	Lab 9b		Embedded C - 5 (SPI Application)
12 Apr	**LAB ENDSEM EXAM (SATURDAY)**		**Embedded C programming based**
14 Apr 15 Apr	**Project Demonstration (SPI Application)**		
21 Apr - 01 May	**Theory Endsem exam**		

Grading Policy (Tentative)

- Lab experiments (30%)
  - Attendance is mandatory for all the sessions.
- Midsem (30%)
  - Will be held on 8th February (Saturday)
- Endsem (40%)
  - Will be held on 12th April (Saturday).

Thank you

Good luck!