

Dear Students,

You must do a mini project as a part of the course to get 15 marks in the internals (remaining 5 marks are for assignment). An important deadline for submitting all the deliverables for the project is **Friday, 11th November 2016**. Below, you will find various guidelines and information for the mini project.

Thanks,
Balaji.

Rules for the project:

1. **Individual or Groups:** Mini project can be done as an individual project or in groups. Each group shall comprise of 2 or 3 members. Groups should be organized among the same batch students(e.g. if you are from F1, other members of the group must be from F1.)
2. **Incomplete Submission:** Deliverables for the project are given below. Lack of expected deliverables and/or lack of expected material in a deliverable leads to deduction of internal marks (i.e from 15 marks).
3. **Plagiarism:** Any form of cheating found towards doing and submission of the mini project leads to 0 out of 15 marks in the internals.

Purpose of the project:

To understand the theoretical concepts of the course Embedded Systems better than learning the contents of the course without a project.

Assessment of the project:

A student gets full 15 marks after submitting the deliverables of the project (with completion) on or before 11th November 2016. Project proposal (and declaration form), intermediate project report, and the final project report together carries 15 marks and each carries 5 marks.

Project Deliverables:

1. [Declaration Form](#)
2. Project Proposal (Project Title, Members (with their Registration numbers),

Batch (F1/F2), and Brief Description)

3. Intermediate Project Report (Progress made on the project, Observations, and Plans to complete the project)
4. Final Project Report (Description of the whole project, Inferences and Conclusions)

Plans for the Mini Project:

I have organized the plans for your project into two groups: (1) Plan A, and (2) Other plans.

- If you follow Plan A, you will benefit from the lectures for the Embedded Systems Course; I will teach step-by-step building up your mini project. For other plans, you can approach me in person and I will be very happy to guide you completing your mini project with other plans.
- Following Plan A requires you to use the same software that you use at the Embedded System Laboratory. In this respect following Plan A has an advantage of using a familiar software.

Plan A

Plan A requires you to use the Keil Software MicroVision and write some small programs using C and/or to understand a larger program called "Measure".

- You could write C programs for the mini project corresponding to the assembly program lab exercises you do as part of the Embedded Systems Lab currently at the SITE school.
- Apart from these programs, I have also provided you with some programming exercises that you can write for your mini project.
 - Write an 8051 Program to toggle bits of Port P1 every 200ns.
 - Write a time delay function for 100ms.
 - Write an 8051 C Program to toggle only bit P1.3 every 200ms.
 - Write an 8051 C program to count up P1 from 0-99 continuously.
 - Write a C program that finds the number of zeros in an 8-bit data item.
 - A Stepper motor uses the following sequence of binary numbers to

move the motor. How would you generate them in 8051 C?

- Write a program to convert the following series of packed BCD numbers to ASCII. Assume that the packed BCD is located in data RAM: 76H, 87H, 98H, 43H
- Write a program to convert the following series of ASCII numbers to packed BCD. Assume that the ASCII data is located in data RAM "8767"
- Write a program to get an 8 bit binary number from P1, convert it to ASCII, and save the result if the input is packed BCD of 00 - 0X99. Assume P1 has 1000 1001 binary as input.
- Write an 8051 C program to send your first and last names to Port P2. Use ROM code space.
- Program Timer 0 (and/or Timer 1) in C to generate a square wave of 3 kHz (and/or wave of 0.5 kHz). Assume that XTAL = 11.0592 MHz.
- Program Timer 1 in C to be an event counter. Use mode 1 and display the binary count on P1 and P2 continuously. Set the initial count to 20,000.
- Program Timer 0 in C to be an event counter. Use mode 2 and display the binary count on P2 continuously. Set the initial count to 20.
- Write an 8051 C program to transfer serially the letter "Z" continuously at a 1,200 baud rate.
- Write an 8051 C program to transfer serially the message "The earth is but one country and mankind its citizens" continuously at a 57, 600 baud rate.

For Plan A, you will find various links below useful.

- Keil MicroVision Software
 - [Keil Software Download](#)
 - [Getting Started with the 8051, Keil Microvision Document](#)
 - [Other products from Keil](#)
- 8051 References
 - *Bible References for 8051:*
 - [80C51 Family Architecture](#)

- [80C51 Family Programmer's Guide and Instruction Set](#)
- [80C51 Family Hardware Description](#)
- [8051 Microcontroller Books \(a good list of references\)](#)
- [8051 Online Tutorial](#)
- C References
 - [C program with 8051 \(Cx51\) User Guide](#)
 - [Reference books for C language and references related to C with 8051](#)
- Using Keil and 8051 references
 - *Blogs*
 - [How to use Keil](#)
 - [Programming the 8051](#)
 - [Getting started with Keil Version](#)

Other Plans

(If you are contemplating about all other plans, I strongly encourage you to come to my cabin and discuss about it. My cabin number is A39, Room Number 213. I am free on Tuesdays and Thursdays.)

- Buy the Kit (or simply do simulation) and do labs as detailed in the EdX course "[Embedded Systems Shape the World](#)"
- Use [FreeRTOS](#) software and do a Mini Project.
- Do Microarchitecture design using the processor simulator [SimpleScalar](#)
- Use [SystemC](#) for Embedded System Design.
- Of course you can come up with your plan to do a Mini Project.