

Design, Implement, and Demonstrate an Embedded system

Learning outcomes expected from the Project

LO5: **Design** of Embedded systems for industrial applications

LO6: **Assemble**, build and demonstrate the final product of embedded system

Individual or Group Project	Group project.
Number of Members in a Group	Maximum 5 members.
Aim	To design, implement, and demonstrate an embedded system
Duration	Five weeks

You are required to implement an embedded system that fits into **one of the following three** categories.

1. Design and implement a solution to an existing problem. Your solution should be a novel solution.
2. Design and implement new feature(s)/Functionality to an existing solution/system. In here, you are expected to implement the whole system along with the new feature or justify the parts you omit to implement.
3. Implement an existing solution to a problem with your own design.
Eg: Implement a GPS tracker, Model a PLC

Important notes on project selection:

- a. If you are choosing category 3, the implementation must use an **Atmega 328P** or **PIC16F87X** microcontroller and the coding should be in **C language** (for Atmega 328P) or **Assembly language** (for PIC).
- b. If you are using any other microcontroller/microprocessor you need to justify the requirement of the particular microcontroller/microprocessor for the particular project (eg. Based on available resources, power consumption etc.).

What is expected from you:

Study the background of a problem and propose a viable solution, to study an existing solution to improve an existing system, or to study an existing device to implement it using the **Atmega 328P** or **PIC16F87X** microcontroller. Follow the following steps.

STEP 1:

Discuss your project idea with the teachers and get the approval before **16th of April 2024**.

Once the idea is finalized, submit a project proposal including the following.

1. Front page: Include the university logo, project title, module name and code, department, faculty and the university, Module name, IDs of group members
2. Introduction: Introduction to the problem or the solution that you are tackling in this project (**a moderate description**), the objective of your work (what you are trying to implement) and the scope (the limitations of your implementation).
3. Specifications: A list of specifications of the product (features which should be in the final product) from which you measure the successful completion of your project

4. Block diagram: A block diagram of your proposed product with a **detailed** description of each block (what the block is supposed to do).
5. Preliminary Work: Preliminary developments if any.
6. References

Important notes on the project proposal:

DO NOT INCLUDE NAMES/MAKES/MODEL NUMBERS OF COMPONENTS ANYWHERE IN YOUR PROPOSAL

Deadline for project proposal submission (soft copy) is on **18th of April 2024**.

STEP 2:

Following steps should be followed developing your solution.

1. Model your solution using **Proteus** or any other equivalent computer software. It is advised to improvise (mimic) any part which is not available in your modeling software.
2. Draw a flow chart for the expected firmware

Above two steps need to be completed and presented along with your progress to your teacher by **26th of April 2024**.

STEP 3:

The final product should have proper appearance placed in a suitable enclosure, properly soldered, and be able to demonstrated to the examiner. It should meet the product specifications proposed at the proposal document. The final report should contain following.

1. Front page: Include the university logo, project title, module name and code, department, faculty and the university, Module name, IDs of group members
2. Introduction: Introduction to the problem or the solution that you are tackling in this project (**a detailed description**), the objective of your work (what you are trying to implement) and the scope (the limitations of your implementation).
3. Specifications: A list of specifications of the product (features which should be in the final product) from which you measure the successful completion of your project
4. Implemented Solution: A block diagram of your final product and description of each block, model solution (simulation), flow chart of the firmware, required equations and calculations and descriptions, Images of the final product.
5. References

Important Notes:

Each stage of the project shall be completed by the deadlines stipulated in Table 1 below unless otherwise specified at the learning management system of the module.

Important notes on the final project report:

Final report should be submitted by the time you conduct the project demonstration.

For any report submission,

Delayed submissions will not be tolerated and 1 mark/day will be deducted for delayed submissions (out of 40 marks).

Mark allocation Out of 40:

Task	Marks	Deadline
Proposal	5 Marks	18 th of April 2024
Progress demonstration - Technical progress	10 Marks	26 th of April 2024
- Modern tool usage	5 Marks	26 th of April 2024
Final report	5 Marks	Date will be informed
Viva	5 Marks	Date will be informed
Demonstration	10 Marks	Date will be informed

Important notes on report writing:

1. **Do not include any figure** in a report which does not have any significance to your project.
2. **Do not include any figure** without describing it in the paragraph just above or below the figure, referring to the figure number
3. **Do not include any table** without describing it in the paragraph just above or below the table, referring to the table number
4. **Do not include random bullets along with lists**, rather enumerate the list (1, 2, 3, ... or a, b, c, ... or i, ii, iii, ...etc.).
5. Any figure, table or information you obtain from an article (or website) should be cited right where you refer to the information and a list of references should be provided as a separate chapter. Citations should be in IEEE referencing format. Read: <https://pitt.libguides.com/citationhelp/ieee>
6. Introduction chapter should contain the background information should have searched regarding the problem, solutions, and shortcomings of existing solutions. Further, the
7. In a block diagram the system should be broken down into major parts (blocks) based on their functionality and their connections are represented using the diagram. Along with the block diagram, a **detailed** description of each block (what the block is supposed to do not how it is implemented) should be listed. Note that a block diagram is **not exactly a flow chart**.