Semester Project

AI & DS 2001
Programming for AI & Intro to DS

Faculty: Ms. Umarah Qaseem, Ms. Mariam bint Imran,

Assigned on: October 11, 2025

Requirement Document

You are required to **design** and **implement** a physical AI/hardware semester project. It must have hardware and software components integrated with each other. The project title/topic is open ended, but it must come inside the physical AI domain. For this, two activities were conducted in class to brainstorm the ideas and group discussion. Your project was announced in the Week 6th – 10th October.

Division of Project:
Project is divided into 2 parts.
Part A: Simulation
Simulation includes complete circuit diagram, complete simulation on any online tool including tinkercad, wokwi, VS Code etc, all software components and complete code.

Part B: Hardware Implementation
Hardware includes the assembling of hardware components, complete implementation of the functionality on hardware, i.e. a project which is completely working and functional providing all promised features and code.

Both parts have separate deadlines, to ensure students' ease and score gaining.

Complexity and Requirements:
Each project must have a basic mobile robot, you have to implement 2 or 3 complex features on it (or even one highly complex feature). If you want to work on some other kind of robot which is stationary, but it involves a certain level of hardware (Arduino, some sensors and motors) that is also allowed. Make sure your

project has a hardware component as well as a software component. For the software part, you will process data from sensors, implement some kind of algorithm and then output will be shown on the hardware in the form of movement or so.

You were required to get your idea approved by your respective class teachers. Each idea must be unique. This means that if an idea is reserved then no other group can work on that idea. Ideas were allocated on first come first serve basis.

Code and Modularity:
The code should follow the programming conventions, and it should be modular. Everything should be well referenced if it is taken from any source. You can use any language for programming with ESP or Arduino (Arduino programming language, micro python,etc)

Presentation:
The overall hardware presentation carries marks.

Efforts:
Efforts count the most!

Plots and Visualization:
If there are any plots, please do put them in your report.

Rules and Guidelines:
1. This is a group assignment.
2. You are responsible for forming your groups.
3. No excuses will be accepted for incomplete contributions.
4. The project will be evaluated as a whole; therefore, the division of work is your responsibility.
5. Each group member is expected to contribute actively. Failure to do so may result in penalties or exclusion from the evaluation.
6. Ensure that all group members are familiar with and agree upon the division of tasks.
7. Group disputes will not be entertained. It is the group's responsibility to resolve any internal issues.

Report:
A word document (converted to pdf later) in **proper** report format. Learn how to present your efforts! It should contain everything in a structured way. Complete

Code should be present at the very end of your report. Although you can put screen shots of a function or two which is unique or if you want to highlight something. Mention the list of features in that start and then list of modules, circuit diagrams, your project's functionality in the report. Add pictures of simulations, physical outputs as well as BTS (behind the scenes) to prove your work. Also mention the work division between the group members in the report. Marks will be deducted if circuit diagram and block diagrams are not present in report as well as presentation (ppt)

Deliverables:

1- **Code file** (Name it as Rollnumber_firstname_ lastname_code)
2- **Report** (Name it as Rollnumber_firstname_lastname_report)
3- Hardware demo in class along with presentation through a **PPT.**
Put both report and code in a zip file and submit on GCR. Name it as (Rollnumber_firstname_lastname_assignment1). Handwritten material (if any) must be scanned and put in report.

Evaluation:

Through report and demo/presentation

Group Members:

For your ease 5 members in each group were allowed. The complexity of your project must be reflected as a semester project of 5 members. No one is allowed to have less members (or solo) unless special permission is taken otherwise, to maintain consistency throughout the class.

Plagiarism:

STRICT POLICY ON CHEATING THROUGH ANY SOURCE WITHOUT REFERENCE and UNDERSTANDING. ZERO MARKS WILL BE ASSIGNED IN ALL ASSIGNMENTS AND QUIZZES.

Reports will be checked through plagiarism detector, and marks will be deducted upon the usage of generative AI for reports.

If you are using a code or functionality from somewhere, please cite it. Furthermore, you should have complete understanding of that.

Announcement Date:

11th October 2025

Deadline:

Simulation: 23 November 2025

Hardware: 30 November 2025