

Final Project Report Guidelines

ECE 381 : Applications of Machine Learning

Dear Students,

Given that you have one full month for the final project, we have updated the requirements to better reflect this timeline and to allow you to create a more comprehensive and robust system.

1. Increased Technical Requirements

- **Docker Integration:** Your project must leverage **at least three** of the available docker environments¹. The original requirement was two²². This means you must create a pipeline where at least three of the following systems interact:
 - ViT (NanoOWL)⁴
 - Stable Diffusion⁵
 - Object Detection (Yolo Models)⁶
 - Regression (For identifying X, Y coordinates) & Classification (For identifying symbols / utensils, etc.)⁸
- **Example of a 3-System Project (Do NOT implement this idea, this is just an Example):**
 - Use **Object Detection** to find all items on a table⁹.
 - Pass the cropped images of those items to a **Classification** model to identify them (e.g., "apple," "knife")¹⁰.
 - Feed the list of identified items ("apple, knife") into an **LLM** to generate a safety warning or a recipe¹¹.
- **Not restricted to the dockers you have worked with and there is also no restriction to implementing them on the Jetsons, you can use your own Laptops. But it should include any 3 of the models mentioned above.**

2. Project Deliverables

1. **Final Report (PDF):** An expanded research paper. See new section requirements below.
2. **Demo Video (Working Pipeline):** A 5-10 minute video where you:
 - o Briefly introduce your project's goal.
 - o Show a live demo of your system working.
 - o Explain the results and what your video is showing.
3. **Final Presentation** for the project. (Dates will be announced).

3. Expanded Final Report Structure

Your final report must now be **8-10 pages** (excluding references)¹³ and must include all previously required sections¹⁴, plus two new ones.

1. **Abstract**¹⁵
2. **Introduction**¹⁶
3. **Dataset and Preprocessing**¹⁷
4. **Methodology and System Architecture**
 - o This section combines the original Methodology requirements¹⁸.
 - o **New Requirement:** You must include a detailed **system architecture diagram** (e.g., a flowchart) showing how your 3+ services interact. Explain the data flow (e.g., "The YOLO model outputs JSON coordinates, which are read by a Python script and sent to the Regression model...").
5. **Experiments and Results**
 - o Must still evaluate and compare at least two models or approaches¹⁹.
 - o Must still use a minimum of three relevant metrics²⁰.
 - o Must include visualizations like training curves, confusion matrices, or visual results²¹.
6. **Discussion**²²
7. **Ethical Considerations and Limitations (New Section)**

- You must now formally discuss the limitations of your project²³.
- Discuss potential biases in your chosen dataset²⁴.
- Discuss the potential for misuse or negative societal impact of your application.

8. Conclusion and Future Work²⁵

9. References

- You must now include **at least eight** scholarly, peer-reviewed sources²⁶.