

## ICT304 Assignment and Project – Developing an AI System

**Assignment Due: by midnight on Friday on 13 February 2026**

Assignment worth 15% of the overall assessment

**Final Project Due: by midnight on Friday on 27 March 2026**

Final Project Worth 30% of the overall assessment

You are required to discuss the progress with your lecturer/tutor every week. Please make sure you have a backup for all your submissions and use version control.

You are required to work in a team of up to 3 (minimum 2). Please take note that the marking scheme is the same regardless of the number of members in the team. **Group declaration form needs to be submitted with your submission. If the form is missing, your project will not be marked.** Please also be aware that, if your group has less than 3 students, the unit coordinator may assign another student to your group.

Your team members have to be from the same tutorial group.

**Email the names and email addresses of your team to your lecturer/tutor as soon as you have formed your team.** It should not be later than two weeks before the assignment due date.

**You may be asked to attend a personal interview to explain your submission. Marks are final ONLY WHEN a personal interview is not needed.**

**Students are strongly warned against plagiarism, collusion and other forms of cheating. You should familiarise yourself with the rules concerning misconduct in the submission of assessable work. The University regards this very seriously, and students found breach would be subject to disciplinary action by the School.**

You can use Python, R, and related libraries to implement the solutions.

You are allowed to use any APIs and resources you can find; however, you need to state clearly and make appropriate reference to the sources. State clearly what are your own works and what are the APIs or codes or tools you used from other sources. You need to understand what you are using!

**You can use AI tools but read the guidelines in your unit information guide before using them. And you must declare or reference the part that you use them. See <https://libguides.murdoch.edu.au/APA/generativeAI> on information of how to make reference to them. Include the prompts you use in the report.**

You are responsible to the materials and programs you are submitting in your assignment and project!

## PROJECT DESCRIPTION

In this project, you are to produce **a fully functioning AI system (not an AI model/technique/sub-system)**. You should imagine that you are working in a company and work on the requirements of the system. The requirement will need to be approved by the lecturer/tutor. The following are some examples of AI systems. Your team can develop your own AI system for this assignment and project. Do not be too ambitious in your specifications, as you may have limited time to produce a fully working demo product. You should discuss with your tutor weekly to make sure that you are on the right track.

1. Intelligent inventory system for automating the warehouse system.
2. Intelligent Home Care System for monitoring a senior person's health and activities in aged care facility or at home.
3. Intelligent disaster alert system for fire or emergency situations.

In this project, the following tools are mandatory. In some cases, you can find one software tool that has more than one of the following functions. **If your team does not report the use of the following tools, the project will not be marked.**

- Project Management
- Version Control
- Collaboration
- Communication

Marks will be awarded for showing the understanding of the problem that the system can solve, the quality of the proposed solution, identification of the sub-systems (including non-AI sub-systems), the steps in building the AI sub-systems to the whole system, how the system can be integrated in the workflow, the clarity of the report, quality of any code written, the use of tools and the evaluation method.

**System Engineering Product Life Cycle** (see Chapter 3 of NASA System Engineering Handbook) should be used when handling your project. Make sure you read and understand the concepts and stages mentioned in this book. You should adopt the methodology and update your lecturer/tutor in every phase/stage of your development. Remember to update the progress every week and as often as possible. This can help you to refine your idea and project better.

In this assignment and project, you are to build (not just describe) the AI system. You must submit a **fully demo version**.

If you are using data-driven AI models to build the AI system, you will need to develop, look for or collect your own ground truth data. If you are using any data that are not publicly available to develop your AI system, you should have sorted any legal arrangement and implication. If you are unsure, always discuss with your tutor.

You will need to provide an investigation of at least two techniques and provide a justification on why the selected AI technique is better to be used for your AI sub-system/s. For example, if you are designing an obstacle avoidance system for a robot vacuum, you can compare the fuzzy system and rule based system and choose one for your final product development. For another example, if you are designing a real time wild boar alert system, you can compare the use of AlexNet and YOLO networks in the AI animal detection sub-system of the system. Justification needs to be provided for your choice.

<b>Assignment Part:</b> Assignment worth 15% of the overall assessment
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In the System Engineering Product Life Cycle, problem formulation, concept development, system and sub-systems design, and prototyping basic sub-systems are the initial steps. This is what you have to submit for your assignment.

In any IT project development, creating prototype/s is an important step before the final product is developed. You should identify the sub-systems or parts of your AI system and develop them for this assignment part. The assignment will require you to submit the system design document and the prototype of at least one AI sub-system. Remember, this is only a prototype of the sub-system/s, not the full system yet.

In the real-world industry process, this part can be using the prototype to get the confirmation of your client that you understand their requirement in the final AI system.

### **Assignment Report and Code – Submission Requirements**

(1) A written formal technical report should cover the following (but not limited to the following):-

- Title of your AI System – this is to provide a good and easily understanding product title that can let your client understand what you are building.
- Provide an overview of the system engineering process you are adopting, and describe the details and the tasks in each phase. Highlight which part of the System Engineering Product Life Cycle covered in this assignment submission.
- Description of the AI system and how the AI system can be innovative. Give as much information about the problem domain you are working on so that others can understand the innovation of your AI system. Discuss what methods are commonly used and how AI techniques can help to improve the system you are building. (**NOTE:** You will need to research the topic and propose what AI system can be developed). Provide an understanding of the data or knowledge required to be used for designing such an AI product/solution.
- Provide an overview of the AI system, the sub-systems, the elements, the parts, the workflow and how the system can be used. Provide a test plan for your system (including the testing of all sub-systems)
- Any information you think can help the client to understand your innovation and uniqueness of your developed AI system. Remember, you need to provide a “product result and not an academic result”.
- Provide a plan and milestone to complete the development of the AI system.
- Provide details of the project management, version control, collaboration, communication tools used.
- References and any additional information need to be cited. For example, if you use a website on the tutorial of how to create a real time object detection system, you need to provide a reference on this. Although you learn from the website, you need to understand every step as an interview may be required to check if you understand the system you are developing. **If you cannot demonstrate that you understand what you are submitting, you could receive a zero for your submission.**

If you are not sure how to cite references, read <https://www.murdoch.edu.au/library/help-support/support-for-students/referencing>

Assignment Due Date	Assignment	15 %
<b>Friday 13 February 2026 before midnight</b>	Upload the report, code, and relevant files to LMS for submission	<b>15%</b>

## ASSIGNMENT ASSESSMENT CRITERIA

- The description of the system engineering concepts used to develop the AI system (10%)
- Providing clear requirement and specifications of the system, the problem domain and the problem formulation (including data and knowledge) required to develop the AI system include the test plans. (35%)
- Critical analysis and detail investigation of the AI techniques. Provide justification on why the selected AI techniques can be used for the AI system (20%)
- Prototype – the code provided for the prototype and initial results (15%)
- Innovation and creativity (10%)
- Report writing and completeness of presentation (including references) (10%)
- If the team does not report any of the software tools, the project will not be marked.
- If the team does not include Group Declaration form, the project will not be marked.
- If the code and the demo is not working, 50% of the total mark will be deducted.

<b>Final Project Part:</b> Final AI system Worth 30% of the overall assessment
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You should have already identified the AI system that you are going to work on from the submission of the assignment. You can only work on the same AI system from your assignment. If you are going to change your proposed AI system, talk to your unit coordinator first to seek approval. However, this is normally undesirable. **If you need to, this should be done at least 4 weeks before the due date of this project.** After which, you will not be allowed to change your proposed AI system. However, you are allowed to change the AI techniques used in your final product with a strong justification for the change. You will also need to justify how the change can enhance the sub-system or element of your AI system. The advice is not to leave it too late as well.

When creating an AI system, you will need to discuss and demonstrate an understanding of the following in the final project:-

- The adoption of the System Engineering concepts especially the System Engineering Product Life Cycle when developing your AI system.
- Why the particular AI techniques are chosen for the AI system.
- Provide a detail description of the steps in creating the AI system.
- Describe and explain any data pre-processing and post-processing steps. Give reasons to justify why they are required for the different AI technique used.
- Why the kind of evaluation method you have chosen is suitable for evaluating your AI system (including the discussion of why such measurement is used)
- Justify your investigation and comparison results to recommend the best solution for your problem domain.
- Provide a deployment, integration and maintenance plan for your AI system to be used in real world situation. Include test plan and test results of the system including the testing of the sub-systems.
- Note that this project does not require you to provide results that are better than those in the literature or website. However, you need to demonstrate that you understand every step and justify them. You will need to discuss why such results could be acceptable for your AI system, and how you can improve it.

## **Final Project Report and Code – Submission Requirements**

A **report** should be organised as a scientific report under the following headings. Note: The following is only a suggestion, you are allowed to include more details to justify and explain your solution.

- Title: A line stating clearly the purpose of the AI System.
- Abstract: One paragraph giving a summary of the AI system, the innovation and uniqueness of the product, how the AI technique could enhance the whole system, the results and conclusions of your work.
- Introduction: Describe and discuss the application and the problem that your product can be used for. You need to demonstrate you understand the problem domain you are working on and why your AI system could help to improve the process or workflow.
- Background: Describe what prior experiments have been done on such a problem. Put the results of your reading to work. Briefly critique these works and say what you learn from each. Explain how you get the motivation or idea of the proposed AI product. Explain how this leads to your choice of the AI technique for your AI system, as detailed in the next section.
- System Engineering Product Life Cycle: Provide details on each stage of the project following the system engineering concepts and the product life cycle.
- The design and details of the whole system, including all sub-systems and why each sub-systems are necessary in the system. This include all the variables, input/output, interaction between the sub-systems, as well a complete test plan for the system (including the testing of the sub-systems).
- AI Technique: Give details of the algorithms, heuristics, you are using. Provide a detail description of any parameters you can use to optimise the AI technique. When necessary, give citations for the sources or research papers for these. Credit any other authors who you have cited, and make sure to be clear about what are your work. Provide the steps in creating the chosen AI techniques. Provide any listings of your code (or models) in the Appendix at the end. **Please take note: You have to submit the code or model, and datasets such that your lecturer can repeat your steps here. If you use any (extra) libraries/frameworks to build your solution, it has to be clearly stated in the User Guide (not here).**
- Evaluation Method. Explain how you will show that you have met the goal of your AI system. This might involve an analysis of the behaviour of your system's operation, architecture, task and environment. Systematically manipulate one of these variables at a time and see how it influences the behaviour of your system. Alternatively, it might be important to measure the performance of your system using some direct score, measurement or index. Describe the data cases or specific environment you used and the steps you took to set up your experiment. Explain the measurements or observations you will use.
- Discussion: Interpret the results of the developed AI system for the reader. How can we understand what has happened? Was the outcome what you expected? What have you learned by doing the experiment? What went well, and what went poorly? What could be done to improve the performance of the method in future? What is your conclusion?

- **Acknowledgements (if needed):** If you are given help or use code taken from some source, you may want to acknowledge these here. If you modify code obtained from the book or Internet, remember to observe the copyrights of the code obtained, and make proper reference to the author. If it's a requirement for you to gain permission from the author of the code, please make sure you keep the copy of approval obtained and submit a copy with your report.
- **References:** You will need to provide appropriate references for the materials you have used. If you are not sure how to cite references, see <http://library.murdoch.edu.au/Students/Referencing/>
- **Appendix:**
  - One or more of these giving extra data, results etc. which is too long to go into the report.
  - **Include all prompts used to query the AI tools to seek help or information for the project – you can include screen shots for this.**
- **User Guide:**
  - The purpose of this is two-fold. One is to describe how to use your AI system. Secondly, describe how a developer can duplicate the steps you use in developing your system.
  - If you are using an online tool (like Collaboratory) to build your AI system, you will need to detail all the steps of how you use it to build your system. You will need to provide **screen-shots** of the important steps. You should provide enough information in each step for your lecturer to re-generate your results to verify your report.
  - If you are programming on your computer, you will need to provide brief but detailed instructions on how to compile, link, run and/or use the program. It should be clear enough for the lecturer to re-generate your results to verify your report. Include the version numbers used.
  - You will need to provide information about the datasets you are using and how you separate them into training, validation and test sets.
  - You will lose mark if the results you produced cannot be re-generated by your lecturer/tutor
  - You may fail your project if your AI system cannot be run on any computer – think about how to inform your users to install on their machine and run it.
- **AI system Demo Video:**
  - You will need to submit a video file that contains the video demo of your AI system. You can generate the video using any video or screen capturing software (e.g. Camtasia or ShareX).
  - You can also use part of the video in your final project presentation.

Due Date	Project	30 %
<b>Friday 27 March, 2026 before midnight</b>	Final report, user guide, code, presentation slides	<b>27%</b>
	Upload submission through LMS	
<b>27 March, 2026 before midnight</b>	Final Project Presentation Video (10 mins)	<b>3%</b>
	Upload video file through LMS	

- If your team does not report any of the following tools, the project will not be marked.
  - Project Management
  - Version Control
  - Collaboration
  - Communication
- If the team does not report any of the software tools, the project will not be marked.
- If the team does not include Group Declaration form, the project will not be marked.
- If the code and the demo is not working, 50% of the total mark will be deducted.

## **Team Submission Requirement**

Please take note that the marking scheme is the same regardless of the number of members in the submission. Group declaration form needs to be submitted with your submission. If the form is missing, your project will not be marked.

**Team Work:** You need to explain how you coordinate your team effort for your project and identify the contribution of each member. Every team member needs to explain clearly in the documentation and oral presentation of what contributions each member has on the project.

The marks for an individual group member are calculated based on the group mark and your contribution to the assignment according to the submitted Group Declaration Sheet in the following way:

$$M = \text{GroupMark} \times \text{TeamSize (i.e. 2)} \times \text{YourWeighting}$$

$$\text{YourMark} = \text{MIN}(M, \text{GroupMark}+10, 100)$$