

## ***BITI: ARTIFICIAL INTELLIGENCE***

### PROJECT TYPE I: ANALYSIS

#### NOTE:

*An analysis-type project in the context of a bachelor's degree final year project typically involves the exploration, examination, and interpretation of data, information, or phenomena to derive meaningful insights, patterns, or conclusions. This type of project often focuses on understanding or comparing existing systems, processes, or datasets, and drawing conclusions based on analytical methods.*

## **CHAPTER 1. INTRODUCTION**

### **1.1 Introduction**

Introduction to your project and your project background as a whole but in brief.

### **1.2 Problem Statement (PS)**

- Description of problems that directly influence the motives of the project. (Example, explanation of problems of “Algorithm X is inefficient in environment Y”)
- Applicable for improving or solving a specific case.

### **1.3 Objectives**

- A minimum of two objectives.
- Must be measurable.

### **1.4 Project Scope**

- Research domain
- Experimental setup (e.g. Tools used)
- Case study used
- Data used
- Constraints and limit of research (if any)

### **1.5 Project Contribution (PC)**

- Describe who/what may benefit from the project and how it will benefit them ? You can infer it back to your objectives.

- Describe what is expected from your project and the significant contribution of your project.

## 1.6 Report Organisation

- Give a summary of each chapter presented in this report. For example:

### **Chapter 1: Introduction**

This chapter discusses about . . . . .

. . . . .

. . . . .

### **Chapter 6: Project Conclusion**

. . . . .

## 1.7 Summary

Give a summary of this chapter and the next activities to be developed.

## CHAPTER 2. LITERATURE REVIEW

*(Notes: In this chapter, you are expected to cite previous work, especially in Section 2.3 which is previous research for a minimum of 20 citations and make sure to list them in your Reference list. Make sure you are using Harvard Styles of referencing)*

### 2.1 Introduction

Preview the literature review of your project. Provide a brief overview of the literature that is being reviewed, along with the topic and research aims to set the context for the reader.

### 2.2 Related Work/Previous Work

- Identify the domain related to your project with explanations from general to specific.
- Explain any issues related to your domain problem for example its platform, architecture, algorithm etc.
- You can provide any evidence or statistics which can help to verify your domain problem.
- Explain several terms that are being used in your project.

### 2.3 Critical review of current problem and justification

- Study of theory/algorithm/method that can contribute towards solving the problem.
- Justification of chosen theory/algorithm/algorithm/method
- Every sub-topic within the domain must have a review.
- Cite the source/s if you refer the approach/es from published materials.
- Conclude for the above fact and finding.

### 2.4 Summary

Summarize the chapter and explain the next activities to be developed.

## **CHAPTER 3. PROJECT METHODOLOGY**

### **3.1 Introduction**

Preview to the project methodology and how it would be carried out.

### **3.2 Operational Framework/ Research Workflow**

- Follow common phases of methodology: Analysis, Design, Implementation, and Evaluation.
- Details of each research phase with regards to the research objectives.
- Describe each stage of the selected methodology and describe the activities that have been done in every stage and relate it with your project. Draw the framework of your project methodology.
- Analysis category: experimental, testbed, simulation, pilot test, survey.
- Data Collection: Describe the data sources you utilized for your project (e.g., datasets, surveys, interviews, etc.). Explain how the data was collected, including any pre-processing steps and considerations for handling noise in the data.
- Describe and justify the tools/techniques used.
- All forms of data collection must be attached by appendix.
- Make data collection by using appropriate software.

### **3.3 Project Activities and Milestones**

- Explain your action plan prior to the end of the project. Apply from what you have learnt from project management.
- List and describe stage by stage of your activities.
- Attach your project timeline for the Gantt Chart for PSM 1 and PSM 2.

### **3.4 Performance Measurement/ Evaluation Metrics**

List and describe the performance measurement. Give justification for the selected measurement.

### **3.5 Summary**

Summarize the chapter and explain the next activities to be developed.

## **CHAPTER 4.        PROPOSED METHOD**

### **4.1    Introduction**

Introductory preview to this chapter. Provide outline of Chapter 4.

### **4.2    Proposed Solution**

- Explain the possible solution (can be in the form of an algorithm/method/approach) and give justification for the proposed solution.

### **4.3    Experiment Design**

- Identify and explain the overall flow
- Identify and explain the testbed/simulation setup
- Comparison of Techniques/Modeling (if applicable)

### **4.4    Summary**

Summarize the chapter and explain the next activities to be developed

## **CHAPTER 5. RESULTS AND DISCUSSION**

### **5.1 Introduction**

Introductory preview to this chapter. Provide outline of Chapter 5.

### **5.2 Results**

- Elaborate about the results based on the methodology.

### **5.3 Analysis and Discussion**

- This section should consist of graphical results using the collected data from the implementation phase.
- A critical analysis of the graphical results should also be represented in this section.
- Use suitable representation (e.g. Tables, Graphs, etc.) to explain the findings.
- Provide discussion with the technical justification of the results. Relate with the proposed technique.

### **5.4 Summary**

Summarize the chapter and explain the next activities to be developed.



## **CHAPTER 6. CONCLUSION**

### **6.1 Introduction**

Introductory preview to this chapter.

### **6.2 Project summarization**

Summarize your project based on the set objectives. Describe how the objective has been achieved by integrating the information that you have reported in the implementation and testing phase. Conclude the significant result that you have gained in this project. State the weaknesses and strengths of your project.

### **6.3 Project Contribution**

- State your project contribution to the university/faculty/company/individual. Your contribution must be aligned with the contribution that you have mentioned in Chapter 1.

### **6.4 Project Limitation**

State your project limitation.

### **6.5 Future Works**

- Present your suggestions on how your system can be further improved.
- Elaborate each of your suggestions in a paragraph.

### **6.6 Summary**

- State whether you think your project meets your set objectives conclusively.
- Concluding phrases to conclude the project.

## **REFERENCES**

- A list of references used in the project report such as journals, articles, books, etc. as directly quoted in the report.
- Minimum of 20 references (majority of the references in analysis-type project must be scholar references). Please use Harvard styles.
- For complete reference, please refer to the Final Year Project Writing Guide.

## **APPENDICES (if applicable)**

- E.g. sample code, sample data, diagrams and etc.

## ARTIFICIAL INTELLIGENCE (BITI)

### PROJECT TYPE II: PRODUCT

*Note:*

*A product-type project, in the context of a bachelor's degree final year project, involves the development of a tangible and functional output that typically addresses a specific problem or need.*

*This type of project focuses on creating a product or solution that can be practically applied, utilized, or implemented. The solution must include Artificial Intelligence-related components.*

*This could include web-based applications, mobile applications, desktop applications, etc.*

## CHAPTER 1. INTRODUCTION

### 1.1 Introduction

Introduction to your project and your project background as a whole but in brief.

### 1.2 Problem statement(s)

- Description of problems that directly influence the motives of the project.
- Applicable for the project of improving or solving a specific case.
- Project that is of new creation, re-creation, or individual initiative.

### 1.3 Objective

- Can be in point form format (use bullets) together with a brief explanation.
- Describe in sequence the objectives to be achieved. E.g. *To propose. . ., To design. . ., To implement. . ., to Evaluate. . ., etc.*

### 1.4 Scope

Describe every scope involved in your project and give reason(s) for the involvement. Examples: (e.g. children's education), specific users (e.g. children between 5 and 8), other specific entities, specific platforms (e.g. network, OS) etc.- Can be in point form format (use bullets) together with a brief explanation.

### 1.5 Project Significance

Describe who/what may benefit from the project and how? You can infer it back to your objectives (if applicable).

## 1.6 Expected Output

Describe what do you expect from your project, the outcome of your research work or findings and the contribution to the knowledge as a whole.

## 1.7 Report Organisation

- Give a summary of each chapter presented in this report. For example:

### **Chapter 1: Introduction**

This chapter discuss about . . . . .

. . . . .

. . . . .

### **Chapter 6: Project Conclusion**

. . . . .

## 1.8 Summary

Give a summary of this chapter and next activities to be developed.

## **CHAPTER 2. LITERATURE REVIEW AND PROJECT METHODOLOGY**

### **2.1 Introduction**

Preview to the literature review and project methodology.

### **2.2 Facts and findings (based on topic)**

#### **2.2.1 Domain**

Identify domain related with your project with explanations.

#### **2.2.2 Existing System**

- Summarize all the reviewed system in a table.
- Identify domain related with your project with explanations.
- Discuss and state your approach and related or past research, references, case study and other finding that relate to your project title. Examples: readings 1 and 3, experiments you get 3 and 4, case study 5 and 6 etc.
- Tagged the source if you refer the approach from published materials.
- Support the approach with statements (from published materials) to justify your fact findings are sound.
- Identify hardware and software used

#### **2.2.3 Technique**

- Summarize all the techniques reviewed in a table.
- State other approaches than what you use that you think also applicable and related and give reason to justify why not.

## **2.3 Project Methodology**

- Describe the selected approach or methodology used in your project with justification (Examples: CRISP-DM, Experimental Paradigm and Methods, and relevant methodology)
- Describe the activities that you may do in every stage and relate with your project. Eg. data collection, data pre-processing, etc.
- Describe the experiment measurements and parameters involved.
- Include statements (from published materials) that support the approach you apply.

## **2.4 Project Requirements**

Describe briefly about the project requirements.

### **2.4.1 Software Requirement**

List software requirements in point form. Examples: MS Visual Basic Professional v.6.x, Apache Tomcat and the related for developing application software, MS Project 2000 for project management etc.

### **2.4.2 Hardware Requirement**

List hardware requirements in point form. Examples: PCs, server, devices and storage.

### **2.4.3 Other Requirements**

State other requirements to be used in your project such as you need special lab for project development, photo copy facility, discussion room and etc.

## **2.5 Project Schedule and Milestones**

- Explain your action plan prior to the end of the project. Apply from what you have learnt from project management.
- List and describe stage by stage of your activities.
- Attach your project timeline or Gantt chart (in 1 page view)

## **2.6 Summary**

Summarize the chapter and explain the next activities to be developed.

## **CHAPTER 3. REQUIREMENT ANALYSIS**

### **3.1 Introduction**

Preview to the analysis phase and how it would be developed.

### **3.2 Problem Analysis**

- Investigate and describe current system scenario/situation. Design the state diagram or data flow diagram or activity diagram from your reference(s), showing how the current system(s) or business(s) runs.
- Use statistics or mathematical formulation and validate the models (if using computational analysis).
- Describe in details the process involved in the methodology to solve the problem.

### **3.3 Requirement analysis**

#### **3.3.1 Data Requirement**

- What kind of input and interface should be in the system?
- What kind of data to store in the database?
- It can be illustrated by using Data Model or Data Dictionary.

#### **3.3.2 Functional Requirement**

- Specify the functions of the system or algorithm.
- Explain on how it works, records, compute, transforms, and transmits within their frames.
- It can be illustrated by using state diagram, DFD, Context diagram or Use case.



### **3.3.3 Non-functional Requirement**

Specify how well the system perform its intended functions. E.g. Quality requirement, Performance-how many computer resources should it use, how accurate should the result be, how much data should it be able to store?

### **3.3.4 Others Requirement**

Describe each of software hardware and requirements that will be used (justification of usage).

## **3.4 Summary**

Summarize the chapter and explain the next activities to be developed.

## CHAPTER 4. DESIGN

*Note: The following sub-sections are guidelines, select and include only those related and necessary sections based on project type in your report.*

### 4.1 Introduction

Introductory preview to this chapter. Examples: this chapter defines the results of the analysis of the preliminary design and the result of the detailed design.

### 4.2 High-Level Design

Describe a high-level view of your system's structure or system's interior. You may refine some of the functions below once you are in PSM II.

#### 4.2.1 System Architecture for expert system/DSS/simulation

- Must have the architecture diagram. Define the architecture view of your system. The architecture view can be present in layer, framework, and tier or patent.
- Include a n appropriate diagram to explain artificial intelligence techniques in system development.

**OR**

#### System Architecture for robotic and automation

- Define the architecture view of hardware. The architecture view can be presented by layer or framework.
- Describe the static view or dynamic view of the application (use diagram such as state or sequence diagram).

#### **4.2.2 User Interface Design for expert system/DSS/simulation**

Refine your user interface design (mock UI) that is defined in Chapter 5 of PSM I.

**OR**

#### **System Architecture for robotic and automation**

Refine on software and hardware defined in Chapter 5 of PSM I.

#### **Navigation Design**

Define and refine the navigation flow and types of navigation controls.

#### **Input Design for expert system/DSS/simulation**

- Define and refine the screens (e.g. types of inputs such as text, numbers, selection box etc.) used to enter information, as well as any forms on which users write or type information.
- Define and refine validation rule for each of input field.

**OR**

#### **Input Design for robotic and automation**

- Define and refine the control panels (e.g. types of inputs such as text, numbers, and selection box etc.) used to enter command to control robot's assembly system.
- Define and refine validation rule for each of input field.

#### **Output Design**

Define and refine the types of outputs including detail reports, summary reports, turnaround documents and graphs. Classify your output in term of periodically or ad-hoc basis. For example, daily, monthly, yearly etc.

#### **4.2.3 Database Design**

##### **Conceptual and Logical Database Design**

- Introduce briefly to the logical data model (LDM) or entity relation- ship diagram (ERD) and what they have to do with the database design.

- Define, refine and construct the entity relationship (ER) diagrams in details with explanation in text on what basis (business rules) applied for every entity relationship that have been defined in the diagram.
- Data dictionary and normalization.

**OR**

#### **Non-database Design**

- Logical and conceptual design.
- Define, refine and provide explanation in text on what basis (business rules) applied for every element in the diagram.

### **4.3 AI Component Design**

- Describe about dataset.
- Describe the proposed AI techniques or pseudo-code or algorithm (e.g. Genetic Algorithm, Artificial Neural Networks, Intelligent Agents, etc).
- Specification and diagrams may be further elaborated. Emphasis should be on the logic of the design and the approach to satisfy the requirements.
- Student should be able to answer on how will the system function.

### **4.4 Software or Hardware Design (if applicable)**

- For those use CRISP-DM: Describe in detail of every stages.
- For those develop hardware: Describe in detail of every robot assembly system. The program specification includes information such as pseudo-code, ladder diagram of robot manipulators.

### **4.5 Summary**

Summarize the chapter and explain the next activities to be developed

## CHAPTER 5. RESULTS AND DISCUSSION

### 5.1 Introduction

- Introductory preview to this chapter.
- Briefly describe the activity involved in the testing phase and what is the testing strategy to be adopted in your project.

### 5.2 Evaluation of AI Techniques used in the project.

Depending on what are the techniques used :

- For Evolutionary Algorithms project:
  - Quality of solution and scalability of algorithms
- For Machine Learning Algorithms project:
  - Prediction/Classification performance – error rate and robustness
- For the Discrete Simulation project
  - Evaluation of Behavioural testing and accuracy
- For the Geospatial project
  - confusion matrix to compute the overall accuracy, producer accuracy, user accuracy, precision, recall and F1-score.
- For NLP systems project (depending on what technique or application used)

Techniques:

- Machine Learning / Deep Learning – accuracy, precision, recall, F1 score, AUC, or may refer to Machine Learning Algorithms.
- NLP models may be also evaluated using behavioural testing.

Applications:

- Parsers – accuracy, coverage, n-best accuracy, cross-brackets.

- Text Summarization – BLEU/ Rouge / METEOR score
- Chatbot – various tests may be used such as the natural flow of dialogue, testing the chatbot’s understanding, testing off-topic handling, etc.
- Development of language model or LLM – Perplexity test, Extrinsic evaluation, Intrinsic evaluation

### 5.3 Testing of Functional Requirement

- Explain the testing of all the functional requirements of the product.
  - Test case identification, tester identification, test case results (Success/Fail), and detailed documentation on the failed test case.

**OR**

- For the Robotics project

Testing of Functional Requirements:

- behavioural testing, accuracy;
- confusion matrix, accuracy, precision, recall, F1-score, AUC, or may refer to standard algorithm's metrics;
- classification performances - error rate, robustness;
- others.

Testing of Non-Functional Requirements:

- usability, practicability;
- commercial values;
- design impacts;
- others.

### 5.4 Summary

Summarize the chapter and explain the next activities to be developed.

## **CHAPTER 6. CONCLUSION**

### **6.1 Observation on Weaknesses and Strengths**

- State the weaknesses and strengths of your project.
- You also may state other's responses regarding project topics.

### **6.2 Propositions for Improvement**

- Present your suggestions on how your system can be improved better.
- Elaborate each of your suggestions in a paragraph.

### **6.3 Project Contribution**

- State your project contribution to the university/faculty/company/individual.
- State where to find the user manual - e.g. Appendix XX

### **6.4 Summary**

- State whether you think your project meets your set objectives conclusively.
- Concluding phrases to conclude the project.

## **REFERENCES**

- A list of references used in the project report such as journals, articles, books and etc. as directly quoted in the report.
- Minimum of 20 references. Please use Harvard styles.
- For complete reference, please refer to Final Year Project Writing Guide.

## **APPENDICES**

- E.g. user guide, user manual, diagrams etc.