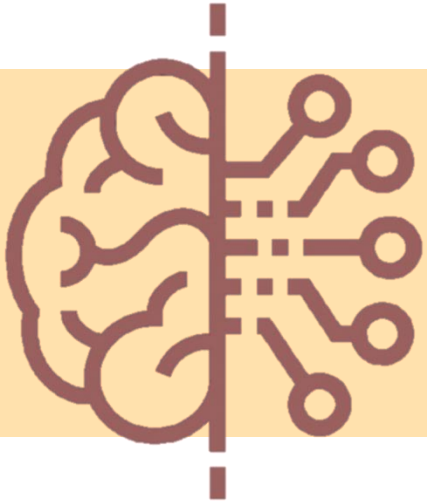
# AI Project Briefing 2023

*(4-5 members per group)*



## Artificial Intelligence

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# Outline

1. The Problem Background
2. The theme – UTM Campus Assistance Chatbot
3. Development Approach - Design Thinking Oriented
4. Mapping Task Assessment
5. Project Description and Timeline
   i. A1: Design Thinking oriented proposal (Due: Week 5)
   ii. A2: Features and Design (Due: Week 9)
   iii. A3: Intelligent Agent (Due: Week 11)
   iv. Prototype (Due: Week 15)

# The Problem Background

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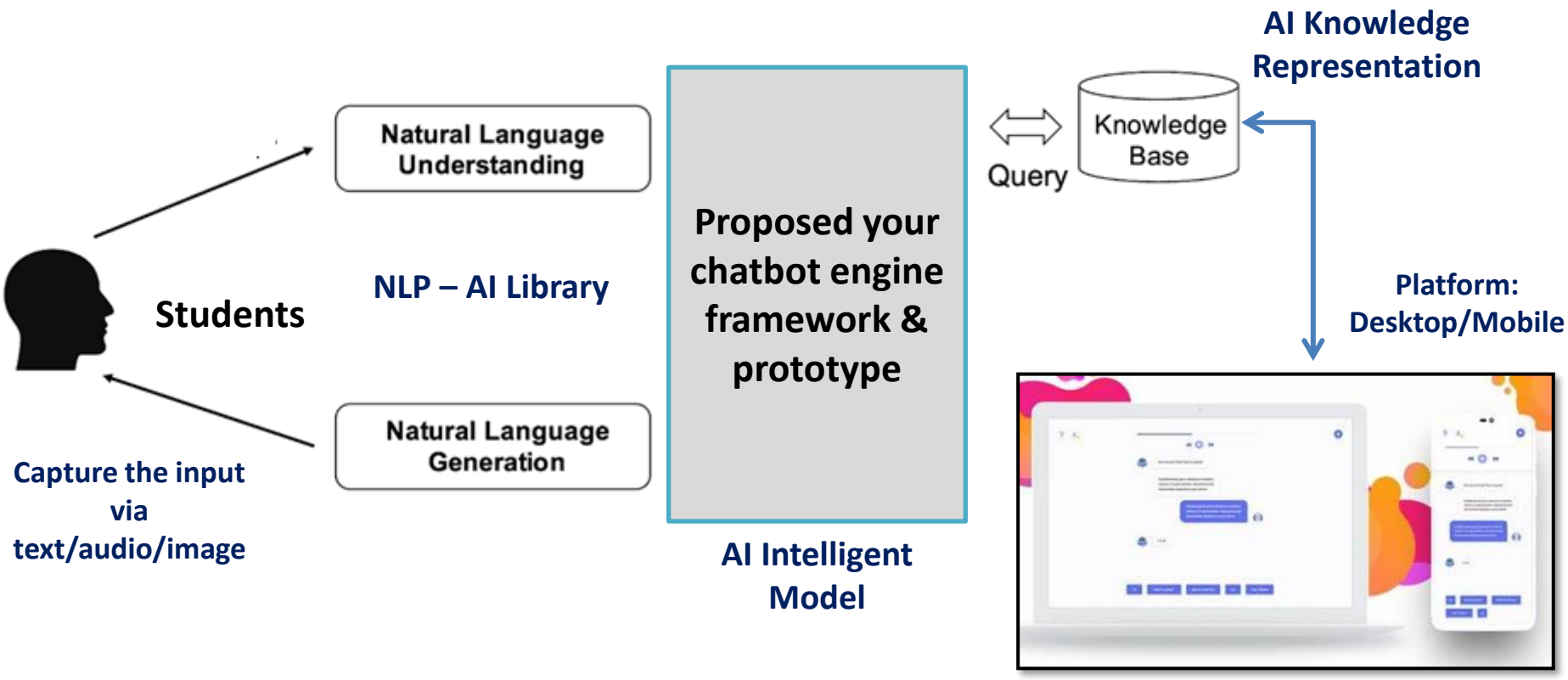
Campus life is challenging. Students must always be aware of their course registration, course schedule, events, and many more. It is frustrating when the information is insufficient and hard to reach.

Thus UTM Campus Assistant Chatbot is believed can assist students in:

- Managing the course information
- Registration and enrollment
- Campus events and activities
- Student services
- Hostel management
- Student International Affairs
- Etc

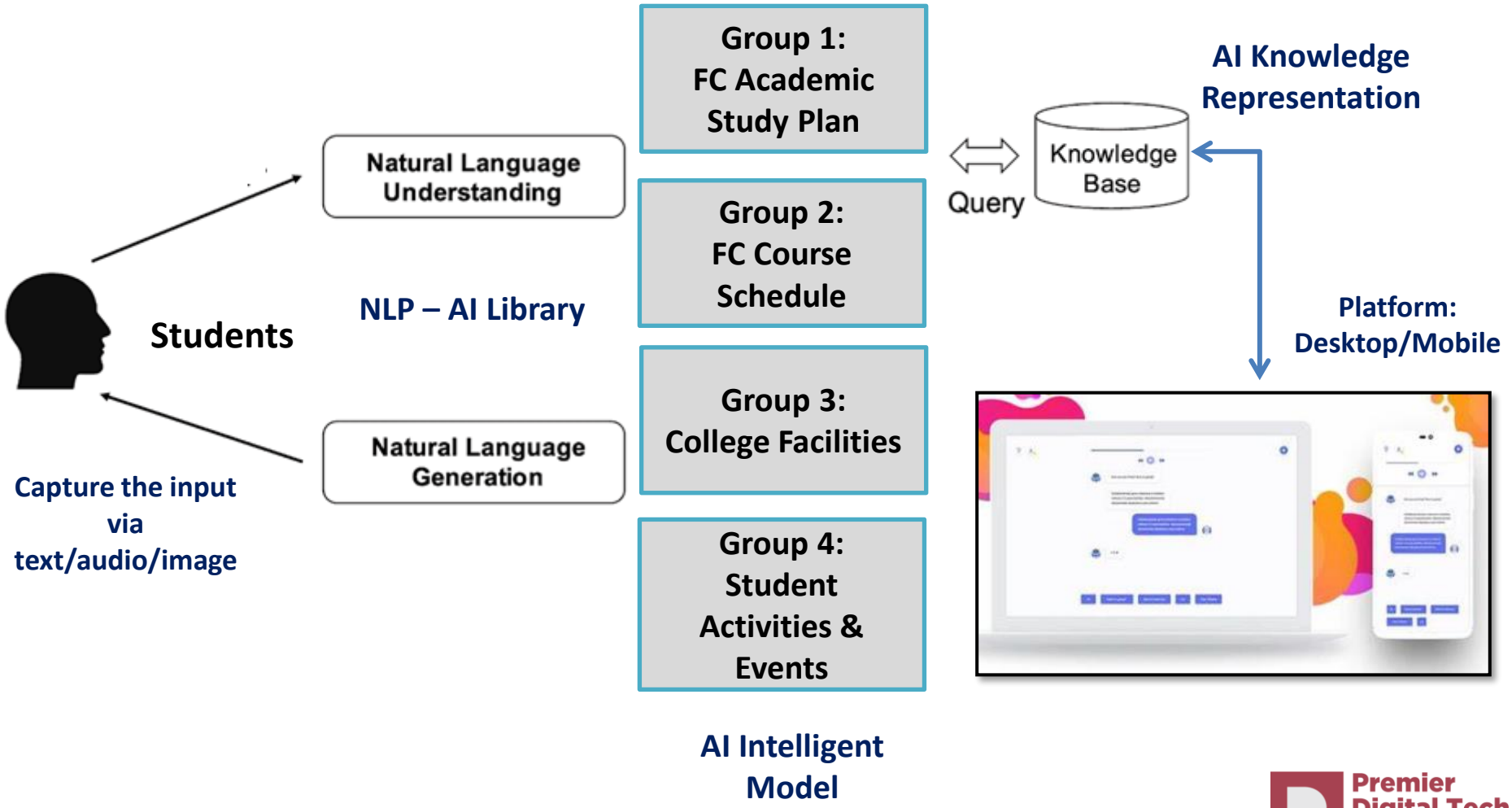
# Theme: UTM CAMPUS ASSISTANT CHATBOT





# Theme: UTM CAMPUS ASSISTANT CHATBOT



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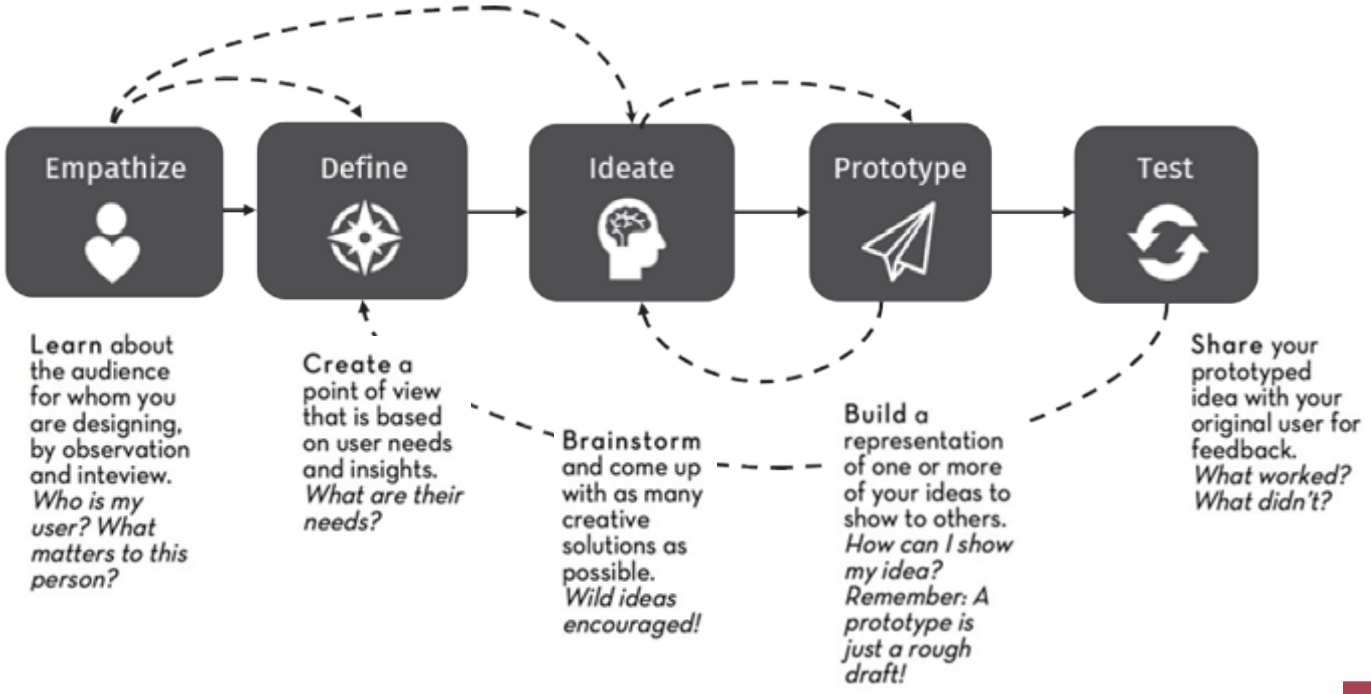
# Development Approach – Design Thinking Oriented



Design thinking does not have its origins in design; it's a problem-solving approach that's been around for decades and has uses across lots of industries. It's most useful when problems or optimal solutions are fuzzy. It's human-centered, which means it starts by focusing on people rather than business goals. Product developers often use a design thinking approach to design products because the products ideally solve some sort of problem or need that buyers or users have.



# Mapping Task Assessment

| No. | Assessment | Task | PS | Survey |
|---|---|---|---|---|
| 1 | A1: Proposal<br>1 week | Using **Empathize** and **Define** a process to prepare a proposal that defines:<br>a) The overview of the problem background<br>b) The stakeholders and the Empathy Map<br>c) The proposed system architecture | Visualize the problem, describe the problem in the empathy map, describe the proposed solution architecture | • Problem and pain of the existing application and the needs of the AI solution are clearly described.<br>• The stakeholders of the current application are clearly described. The empathy map is completely presented<br>• The proposed system architecture diagram and table are completely presented. |
| 2 | A2: Features and design<br>2 weeks | Using **Define** and **Ideate** process to prepare UI Storyboard that defines:<br>a) User Interface Flow Diagram<br>b) Knowledge Representation in KB<br>c) New knowledge using resolution refutation proving tree | Plan the solution by having the survey to get input. Demonstrate the solution plan using UI navigation flow and knowledge representation. | • Survey report - The report comprises the user's feedback and the desired features which are clearly described.<br>• User Interface - The user interface is appropriately and completely presented.<br>• **UI Navigation Flow -** The UI navigation flow are completely presented.<br>• Knowledge base - The knowledge is clearly represented using natural language and FOL with correct semantic. |
| 3 | A3: Intelligent Agent Design<br>2 weeks | Using **Define** and **Ideate** process to design the PEAS model representation that supports AI solution to achieve the goal | Demonstrate the solution plan of the AI model | • **Diagram of PEAS model -** The performance measures, environment, actuators/effectors and sensors are clearly described in a diagram. |
| 4 | Project: Prototype<br>3 weeks | Using **Prototype** and **Test** process to develop:<br>a) Prototype that comprise the interactive screens<br>b) Administrator manual that supplement the documentation of the prototype | execute the plan, check and evaluate | |

# Mapping Task Assessment

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| No. | Assessment | Task | Total (%) |
|---|---|---|---|
| 1 | A1: Proposal | Using **Emphatize** and **Define** process to prepare proposal that defines:<br>a) The overview of problem background<br>b) The stakeholders and the Empathy Map<br>c) The proposed system architecture | 5.0 |
| 2 | A2: Features and design | Using **Define** and **Ideate** process to prepare UI Storyboard that defines:<br>a) User Interface Flow Diagram<br>b) Knowledge Representation in KB<br>c) New knowledge using resolution refutation proving tree | 5.0 |
| 3 | A3: Intelligent Agent Design | Using **Define** and **Ideate** process to design the PEAS model representation that supports AI solution to achieve the goal | 5.0 |
| 4 | Project: Prototype | Using **Prototype** and **Test** process to develop:<br>a) Prototype that comprise the interactive screens<br>b) Administrator manual that supplement the documentation of the prototype | 10.0 |

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# A1: Design Thinking oriented Proposal (5%)

**Submission due – Week 5**

# CLO2: Design Thinking oriented Proposal – 5%



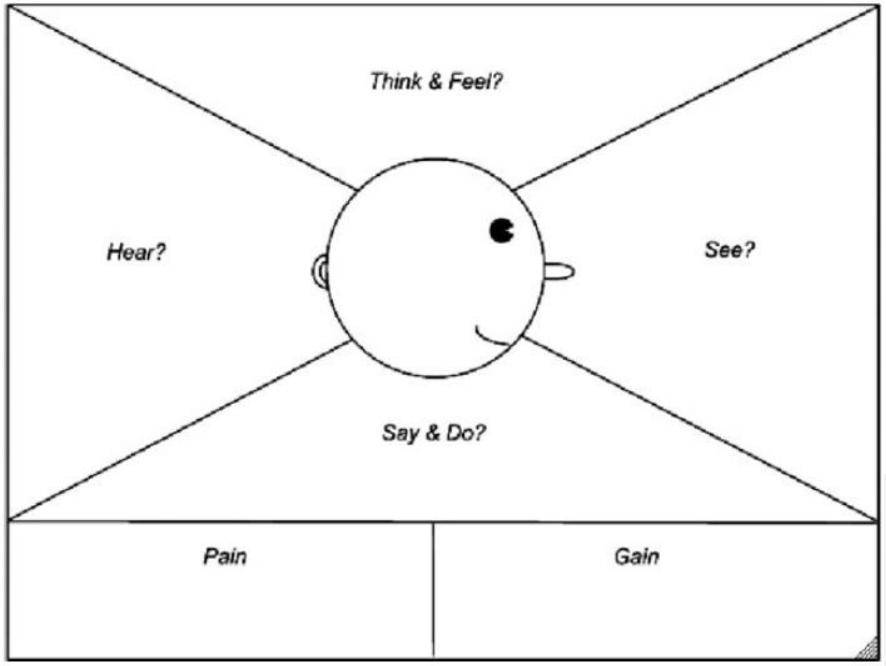
- The project aims to provide an innovative solution that improves current established system, or a new unprecedented solution based on real-world problem (according to the given theme) by implementing AI.
- Use Design Thinking (DT) approach to discover AI solutions to a real-world problem solver.
- The proposal should comprise at least as follows:

| Chapter | Description |
|---|---|
| The overview of problem background | State the chosen application. State the significant of the problems and elaborate why need a solution in AI. |
| The stakeholders and the Empathy Map | State the stakeholders/users of the existing application/domain. Present the Empathy map from the perspective of user-student. |
| The proposed system architecture | Proposed the appropriate diagram of system architecture design with table that explains its components. |

# Example of Client Empathy Map



An **empathy map** is a visual representation of how a stakeholder feels and behaves. Traditionally, empathy maps have used a simple design in which a square is divided into four quadrants with a fictional 'user' in the middle. Based on the given scope of project, write your perception according to the following empathy map.

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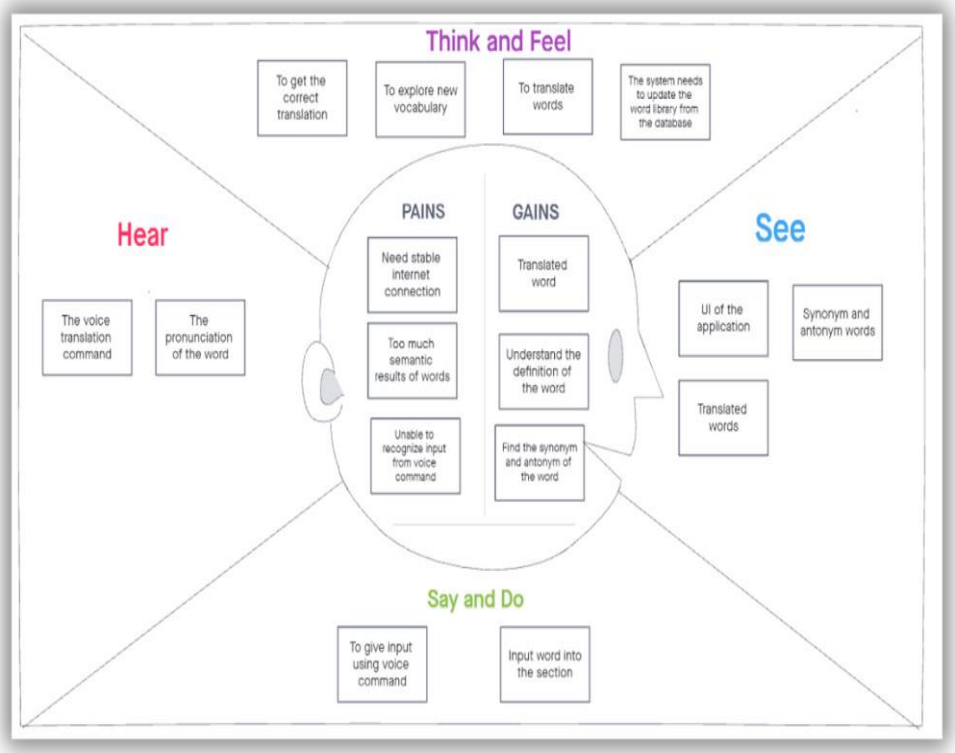


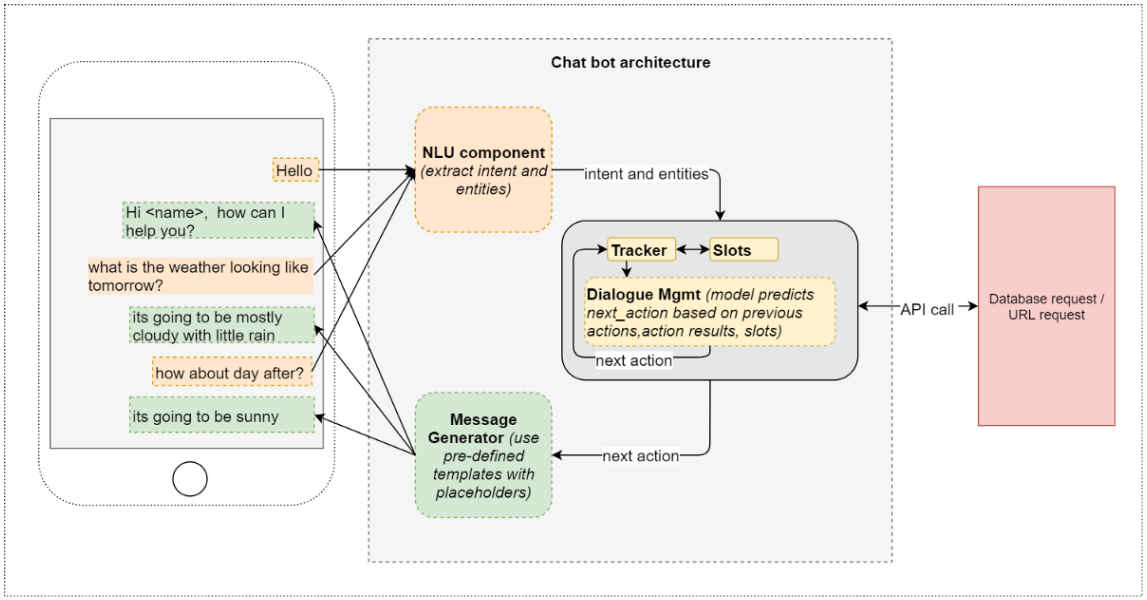

Follow here for more example:
https://conceptboard.com/blog/create-a-customer-empathy-map-in-6-easy-steps/

# Example of Chatbot Architecture



The architecture design of your chatbot solution **can be a web-based or mobile-based solution**. The key components must be shown in this architecture design are:

i. UI component
ii. Dialog management (may involve intent classification, entity identification, response generation.
iii. Repository that store the inquiry-answer knowledge (Database/Knowledge-base)



# Rubric: Design Thinking oriented Proposal (5%)



| | | | | | |
|---|---|---|---|---|---|
| **The overview of problem background** | Problem and pain of the existing application and the needs of the AI solution are clearly described. | Problem and pain of the existing application and the needs of the AI solution are somehow clearly described. | Problem and pain of the existing application and the needs of the AI solution are limited described. | Problem and pain of the existing application and the needs of the AI solution are unclear described. | |
| **Score** | **20-15** | **14-10** | **9-5** | **4-0** | **?** |
| **The stakeholders and the Empathy Map** | The stakeholders of the current application are clearly described. The empathy map is completely presented. | The stakeholders of the current application are somehow clearly described. The empathy map is somehow completely presented. | The stakeholders of the current application are limited described. The empathy map is limited presented. | The stakeholders of the current application are unclear described. The empathy map is unclear presented. | |
| **Score** | **20-15** | **14-10** | **9-5** | **4-0** | **?** |
| **The proposed system architecture** | The proposed system architecture diagram and table are completely presented. | The proposed system architecture diagram and table are somehow completely presented. | The proposed system architecture diagram and table are limited presented. | The proposed system architecture diagram and table are unclear presented. | |
| **Score** | **20-15** | **14-10** | **9-5** | **4-0** | **?** |

# A2: Features and Design (5%)

**Submission due – Week 9**

# CLO2: Features and Design – 5%

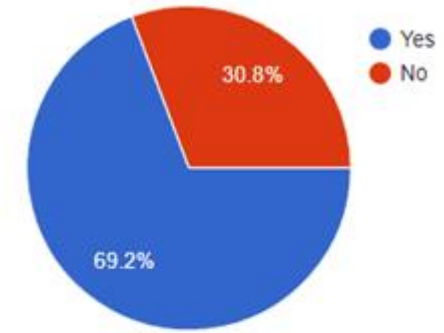


- In the phase of **Define in Design Thinking approach**, we usually obtain the perspective from those who have biggest stake in resolving the problem. We refine the problem based on insight from these varying perspective. Next, we transform those problems into UI solutions storyboards.
- Thus, you are required to prepare **User Interface Storyboard document** that comprise the following items:
  - User interface flow diagram of the Intelligent Chatbot
  - Define at least 10 possible knowledge representations in predicate logic that can be deposited in the knowledge base (KB).
  - Based on the knowledge premises in the KB, give 1 example of scenario that showing the use of resolution refutation in proving (proving tree) the new knowledge to be added in the KB.

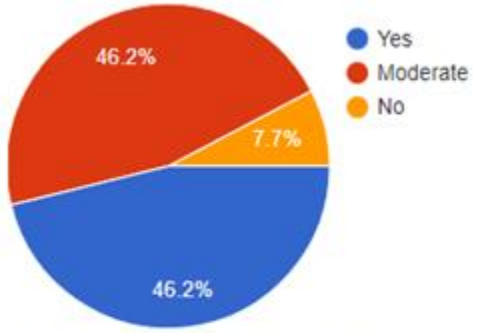
# Example of User Interface Storyboards



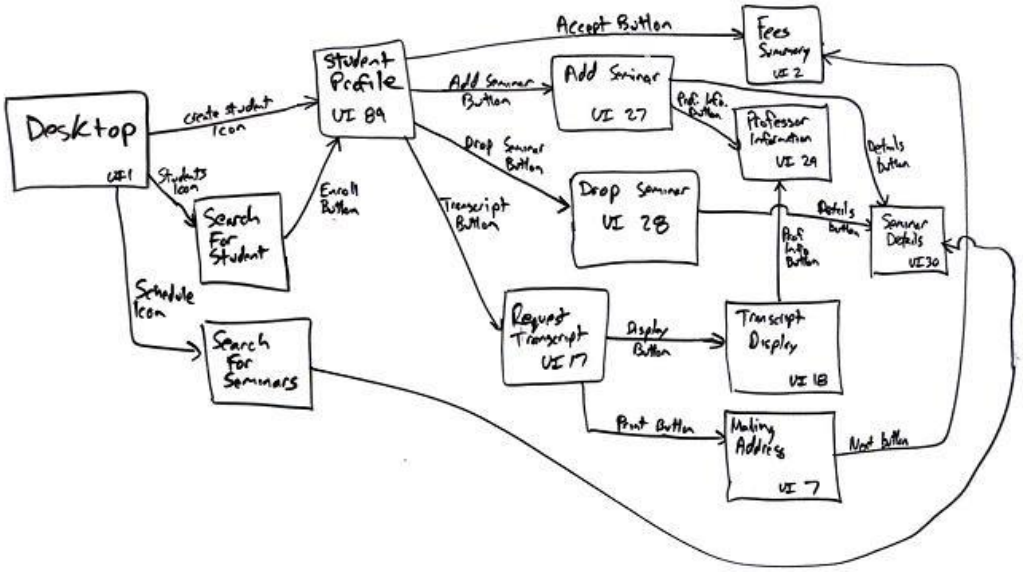
- To refine the problem, you must get insight from various perspective of student-user. Thus, you are required to **post a survey** to get a feedback of what frequent questions being asked. **Report from survey** must attached to this document. Next, you must interview 1 stakeholder that eligible to answer all questions.
- The outcome of the survey and interview can help you to design the user interface storyboards and KB.
- **User interface storyboards** or also called as User Interface Flows are system models that shows how different pages of a user interface are connected and how a user can step through various pages of the system. User Interface Flows are typically comprised of **screens and navigation paths between various screens.**




(C) Do you know DBP has a translation service? The service can be accessed from: https://prpm.dbp.gov.my/.




(G) Do you think this DBP translation service is easy to use?



# Rubric: Features and Design (5%) – UI Storyboards

| | | | | | |
|---|---|---|---|---|---|
| **Survey Report** | The report comprises the user's feedback and the desired features which are clearly described. | The report comprises the user's feedback and the desired features which are somehow clearly described. | The report comprises the user's feedback and the desired features which are limited described. | The report comprises the user's feedback and the desired features which are unclear described. | |
| **Score** | **20-15** | **14-10** | **9-5** | **4-0** | **?** |
| **User Interface** | The user interface is appropriately and completely presented. | The user interface is somehow appropriately and completely presented. | The user interface is limited presented. | The user interface is unclear presented. | |
| **Score** | **20-15** | **14-10** | **9-5** | **4-0** | **?** |
| **UI Navigation Flow** | The UI navigation flow are completely presented. | The UI navigation flow are somehow completely presented. | The UI navigation flow are limited presented. | The UI navigation flow are unclear presented. | |
| **Score** | **20-15** | **14-10** | **9-5** | **4-0** | **?** |

# Rubric: Features and Design (5%) – Knowledge Base

You are developing the Knowledge base (KB) of UTM Campus Assistance Chabot. Perhaps, the possible entities in the KB are Course, and CourseTimeTable. Based on these entities, define at least 10 possible knowledge representations in predicate logic that can be deposited in the knowledge base.

| | | | | | |
|---|---|---|---|---|---|
| **FOL semantically correct** | The knowledge is clearly represented using natural language and FOL with correct semantic. | The knowledge is somehow clear represented using natural language and FOL with some correct semantic. | The knowledge is somehow clear represented using natural language and FOL with limited correct semantic. | The knowledge is unclear represented using natural language and FOL with correct semantic. | |
| **Score** | **10-9** | **8-6** | **5-4** | **3-0** | **?** |
| **FOL syntactically correct** | The knowledge is clearly represented using a correct syntax of FOL. | The knowledge is somehow clear represented using some correct syntax of FOL. | The knowledge is somehow clear represented using limited correct syntax of FOL. | The knowledge is unclear represented using a correct syntax of FOL. | |
| **Score** | **10-9** | **8-6** | **5-4** | **3-0** | **?** |

# Example of Knowledge Representation (KR)



- This chapter should explain how the implementation of KR can support the proposed AI solution to *achieve the goal*
- The list of KR should be tabulated as follows: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Assume:
p = T(x) = Text detector
q = A(x) = Audio detector
r = S(x) = Speech recognition
s = V(x) = Word verification
g = W(x) = Word translation

| No. | English Sentence | FOL |
|---|---|---|
| 1. | Text is detected | T(x) |
| 2. | Audio is detected | A(x) |
| 3. | Speech is recognised | S(x) |
| 4. | Word is verified | V(x) |
| 5. | Word is translated | W(x) |
| 6. | If text is verified,then word is translated | $V(x) \rightarrow W(x)$ |
| 7. | If text is not verified, then not word #is translated | $\neg V(x) \rightarrow \neg W(x)$ |
| 8. | If text is detected, then word is verified | $T(x) \rightarrow V(x)$ |

# Rubric: Features and Design (5%) – State Space Graph



Based on the knowledge **premises in the KB**, give 1 example of scenario that showing the use of **resolution refutation** in proving (proving tree) the new knowledge to be added in the KB. The goal to be proved must be indicated. Next, you can use relevant knowledge premises in KB in order to prove the goal. Present the proving tree until you achieve NILL.

| | | | | | |
|---|---|---|---|---|---|
| **CNF Conversion** | The knowledge in FOL is converted into clause form with a correct syntax. | The knowledge in FOL is converted into clause form with some correct syntax. | The knowledge in FOL is converted into clause form with limited correct syntax. | The knowledge in FOL is converted into clause form with incorrect syntax. | |
| **Score** | **10-9** | **8-6** | **5-4** | **3-0** | **?** |
| **Proving tree** | The goal is clearly indicated. The proving tree is completely growing to reach NIL. | The goal is somehow clear indicated. The proving tree is somehow complete growing to reach NIL. | The goal is limited indicated. The proving tree is limited growing to reach NIL. | The goal is unclear indicated. The proving tree is unclear growing to reach NIL. | |
| **Score** | **10-9** | **8-6** | **5-4** | **3-0** | **?** |

# Example of Proving Tree – State space graph

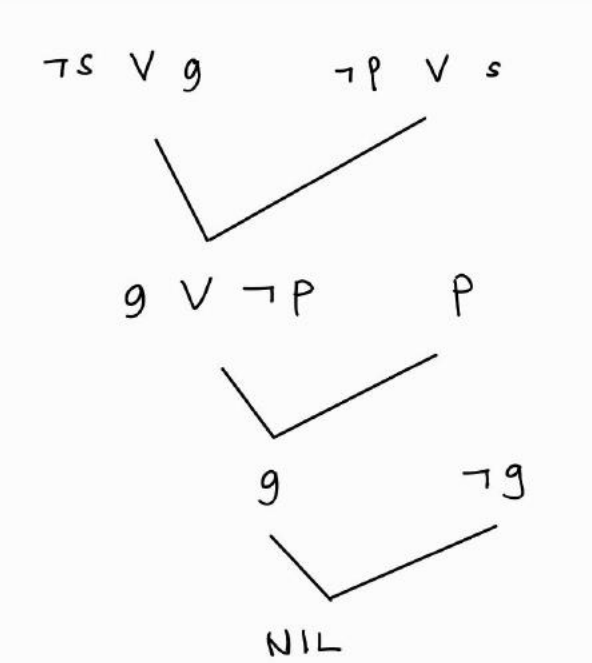
ENGLISH-MALAY DICTIONARY CHATBOT

**Table 2: Convert FOL to CNF**

| No. | FOL | CNF |
|---|---|---|
| 1. | T(x) | T(x) |
| 2. | A(x) | A(x) |
| 3. | S(x) | S(x) |
| 4. | V(x) | V(x) |
| 5. | W(x) | ¬W(x) |

Since NIL is achieved, we can conclude that "Word is translated" is true.

16



# A3: Intelligent Agent (5%)

**Submission due – Week 11**

# A3: Intelligent Agent – 5%



- In the phase of **Ideate in Design Thinking approach**, we will create a design **blueprint of AI solution**.
- *Formulate* the proposed AI solution using PEAS model representation in a report
- Define in detail each property of PEAS model
  - P: Performance measure
  - E: Environment
  - A: Actuators/Effectors
  - S: Sensors
  - Provide PEAS model diagram of your AI solution
  - Provide a table to describe all the properties of the PEAS model
  - You may support/relate the proposed UI in A2 to elaborate each property of the PEAS model

# Rubric: Intelligent Agent (5%)

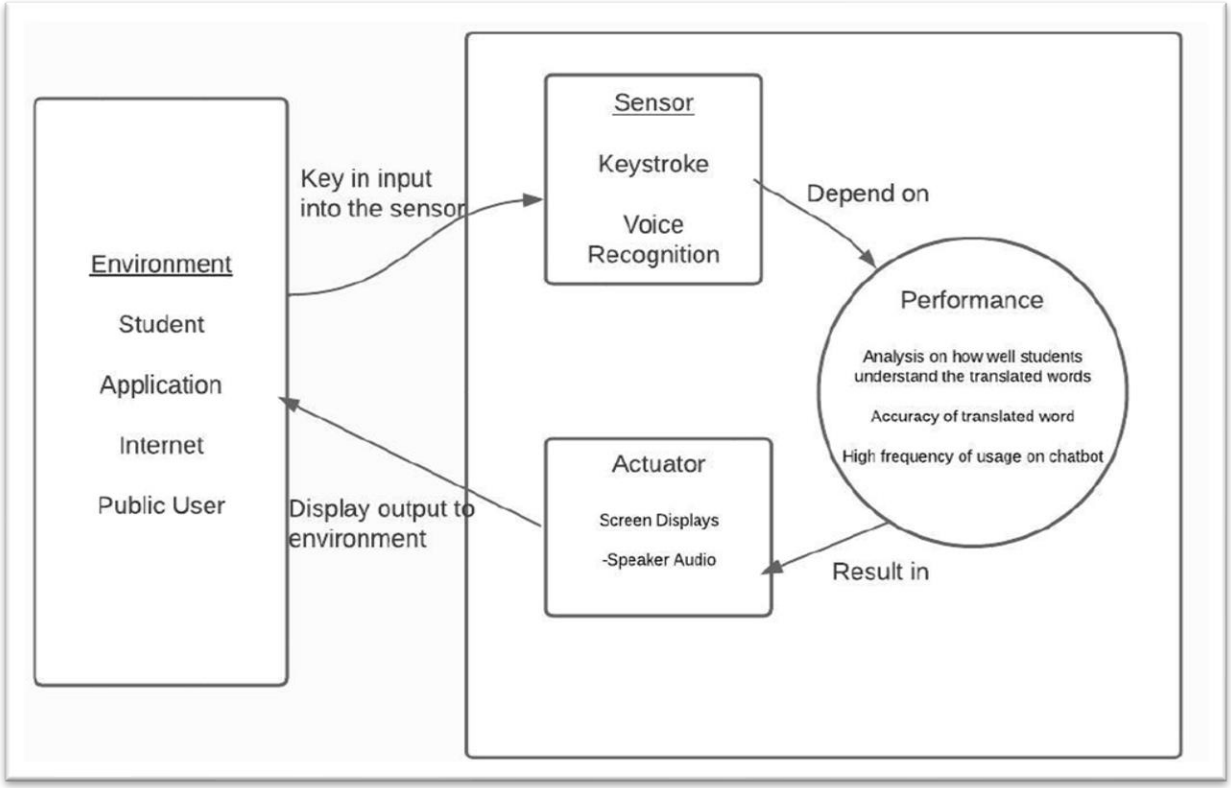


| | | | | | |
|---|---|---|---|---|---|
| **Diagram of PEAS model** | The performance measures, environment, actuators/effectors and sensors are clearly described in a diagram. | The performance measures, environment, actuators/effectors and sensors are somehow clearly described in a diagram. | The performance measures, environment, actuators/effectors and sensors are limited described in a diagram. | The performance measures, environment, actuators/effectors and sensors are unclear described in a diagram. | |
| **Score** | **10-9** | **8-6** | **5-4** | **3-0** | **?** |
| **Correctness of PEAS model in AI solution** | Represent precisely the solution using PEAS model with thorough explanation. | Represent somehow precisely the solution using PEAS model with decent explanation | Represent somehow precisely the solution using PEAS model with explanation but there are 1-2 errors. | Represent so minimal the solution using PEAS model with no explanation OR there are several errors. | |
| **Score** | **10-9** | **8-6** | **5-4** | **3-0** | **?** |

# Example of Intelligent Agent



## ENGLISH-MALAY DICTIONARY CHATBOT




Along with detailed explanation on the above diagram and how each property will be represented in the POC

# Project: Prototype (10%)

**Submission due: Week 15**

# CLO2: Prototype Development – 10%



- Develop a prototype as proof of concept of the proposed AI solution
- You may use any prototyping tools/software and it should include interactive interface. The main idea is for you to express your solution on how AI can be implemented in real-world problems.
- The **prototype** should comprise at least as the following **screens**:
  - Able to receive input from user
  - Able to display an appropriate and desired output for user
- You must also prepare the **Administrator Manual** to supplement the prototype that comprise the following items:
  - The component (library/function) and the configuration note
  - Guideline to use

# Example – Prototype



## ENGLISH-MALAY DICTIONARY CHATBOT


Must be an *interactive design* to demonstrate the concept of the proposed AI solution

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# Rubric: Prototype (10%)



| | | | | | |
|---|---|---|---|---|---|
| **Originality, Interactive Screen** | POC shows large amount of original thought. Ideas are creative and inventive. | POC shows some original thought. Work shows new ideas and insights. | Uses other people's idea (giving them credit) but there is little evidence of original thinking. | Uses other people's ideas but does not give them credit. | |
| **Score** | **10-9** | **8-6** | **5-4** | **3-0** | **?** |
| **Problem Solving** | Problem is clearly addressed and well explained. | Problem is clearly addressed with adequate explanation. | Problem is somehow clear solved with limited explanation. | Problem is unclear solved. | |
| **Score** | **10-9** | **8-6** | **5-4** | **3-0** | **?** |
| **Admin Manual** | Admin manual is well-presented, design is well-described and clear with supported process. | Admin manual is presented, design is described and relatively clear with decent process | Admin manual is weakly presented, design described with unclear explanation with minimal process | Admin manual is poor, design is unclear with no process | |
| **Score** | **10-9** | **8-6** | **5-4** | **3-0** | **?** |

# Reference


- https://towardsdatascience.com/how-do-conversational-agents-answer-questions-d504d37ef1cc
- https://towardsdatascience.com/part-of-speech-tagging-for-beginners-3a0754b2ebba#:~:text=Part%2Dof%2Dspeech%20(POS,the%20word%20and%20its%20context.
- https://www.nltk.org/book/ch05.html
- https://www.altexsoft.com/blog/conversational-ai/