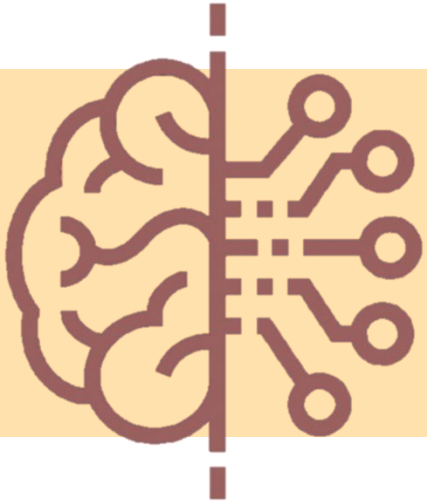
Project Task

(4-5 members per group)



Artificial Intelligence

School of Computing
Universiti Teknologi Malaysia

Outline

1. Mark Distribution
2. The theme
3. Mapping Task Assessment
4. Design Thinking
5. Project Timeline & Grading
   i. Progress 1 - Design Thinking oriented proposal (Due: Week 6 – 27 Nov)
   ii. Progress 2 – Assignment 1 (Due: Week 9 – 13 Dec)
   iii. Progress 3 – Assignment 2 (Due: Week 11 – 27 Dec)
   iv. Progress 4 – Assignment 3 (Due: Week 13 – 10 Jan)
   v. Progress 5 - Proof of Concept (Due: Week 15 - 30 Jan 2021)

Mark Distribution: Assignment & Project

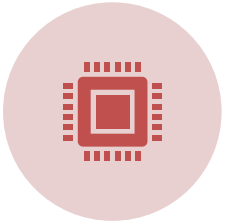
No.	Assessment	Total (%)	PLO3		PLO8	Total (%)
			CLO2	CLO3	CLO4	
1	Assignment 1	5.0	5			5.0
2	Assignment 2	5.0		4	1	5.0
3	Assignment 3	5.0		4	1	5.0
4	Project Teamwork	5.0			5	5.0
5	Project	15.0		15		15.0
Overall Total (%)		35.0	5.0	23.0	7.0	35.0
			28.0		7.0	

The Theme

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 theme) by implementing artificial intelligence (AI). The assignment and project task will reflect the three major components in AI:

- Knowledge representation
- State space search
- Intelligent AI

You will develop a prototype as a proof of concept implementation of an intelligent application (can be in mobile application / web application). Design thinking will be used as a design methodology for you to develop this prototype.



THEME: OPEN

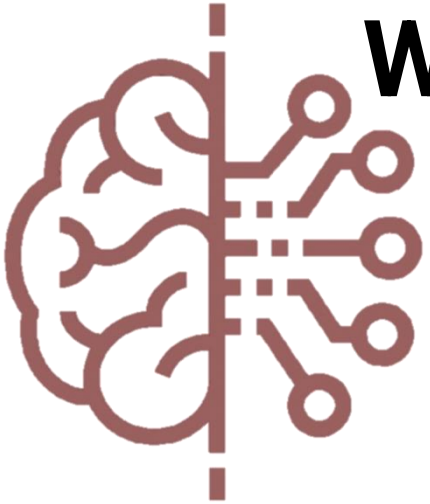
GROUP STRUCTURE: 4-5 MEMBERS

ASSESSMENT SKILL: PROBLEM SOLVING & TEAMWORKING

Premier Digital Tech University™

Mapping Task Assessment

No.	Assessment	Task	Problem Solving	Teamwork	Total (%)
1	Project: Proposal	Proposal that defines: a) AI solution b) The goal of AI solution c) Describe the process of **Emphatize** in DT d) Describe the process of **Define** in DT	5		5.0
2	Assignment 1	Describe **Ideate** process in DT by proposing: a) Relevant knowledge representation that supports AI solution to achieve the goal	5		5.0
3	Assignment 2	Describe **Ideate** process in DT by formulating: a) Using state space search that supports the previous defined knowledge representation to achieve the goal	4	1 (Peer assessment)	5.0
4	Assignment 3	Describe **Ideate** process in DT by formulating: a) Using PEAS model representation that supports AI solution to achieve the goal	4	1 (Self reflection)	5.0
5	Project: Prototype	Describe **Prototype** process in DT by developing: a) Proof of concept of AI solution	10	5 (Peer assessment	15.0

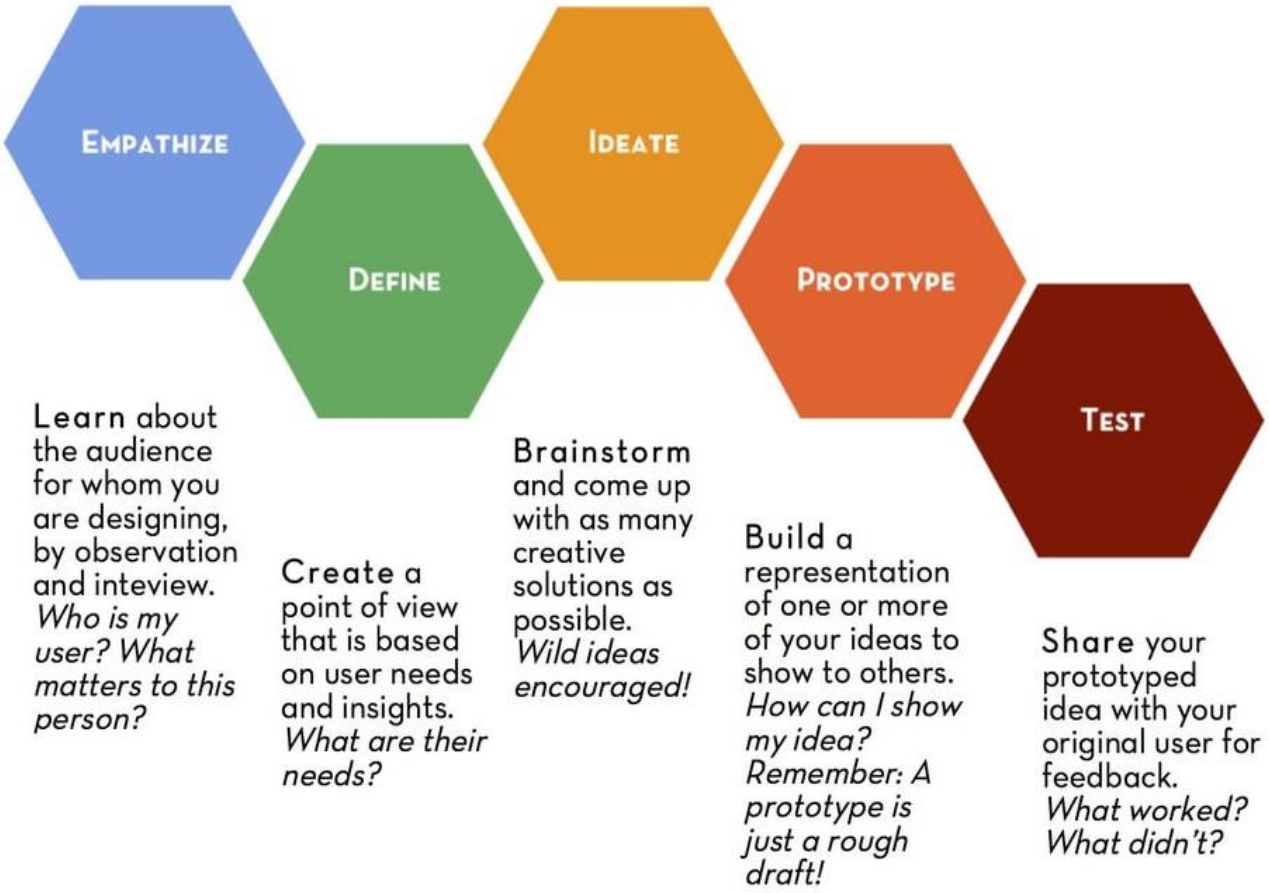


What is Design Thinking?

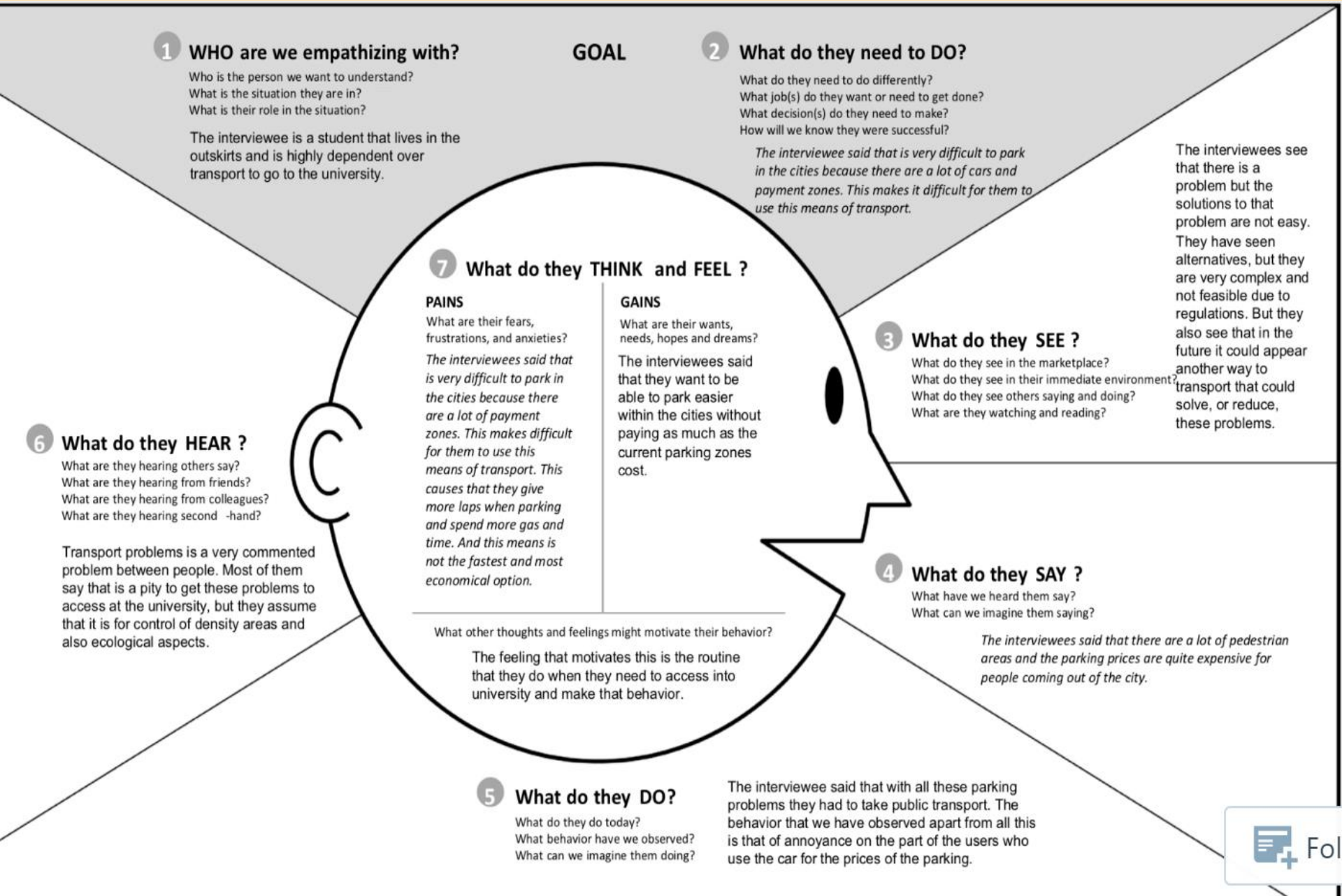
- Definition & Process
- Use Design Thinking to brainstorm ideas to solve real world problems

Design Thinking Process

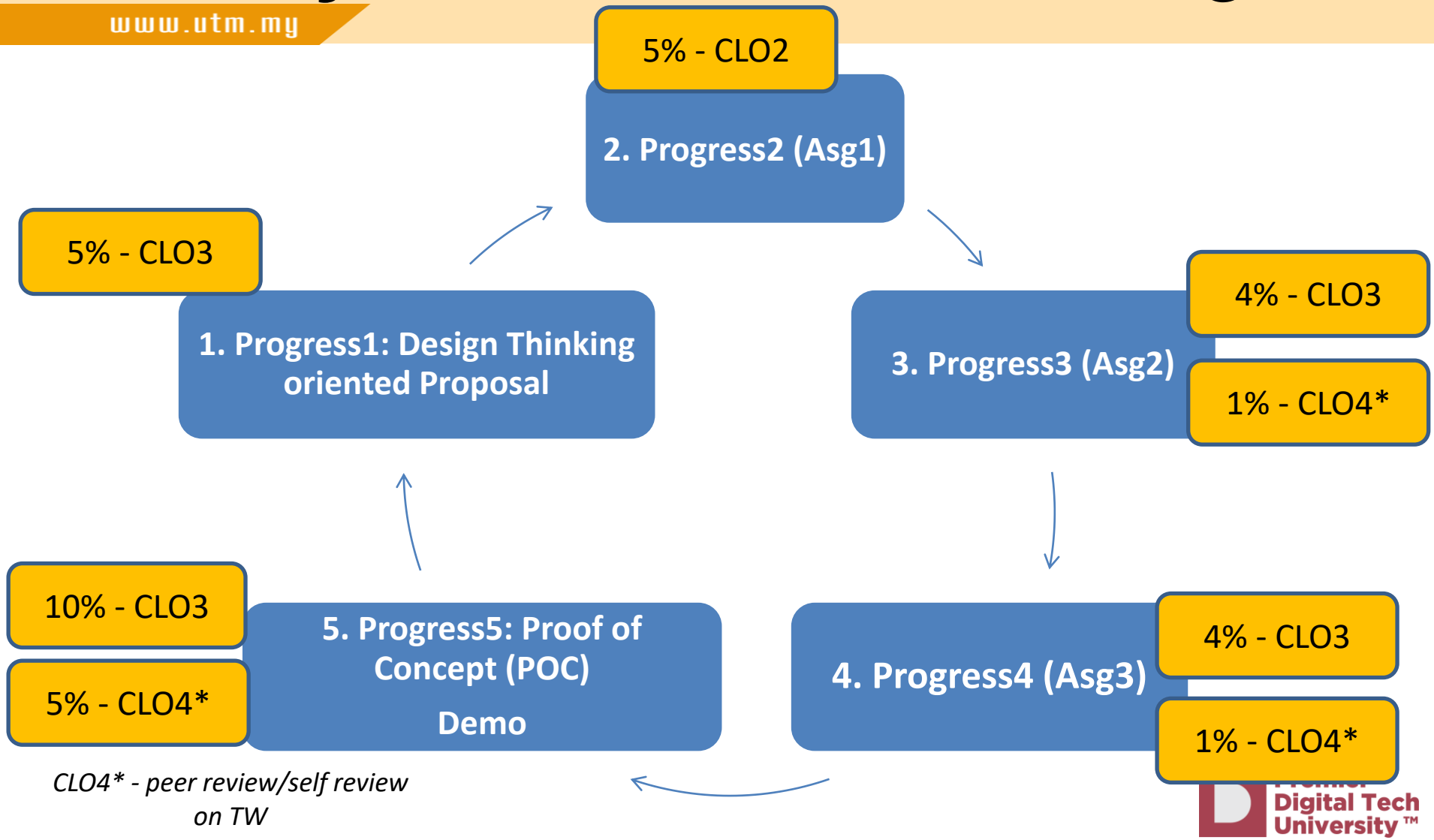
- 1. Empathize with the users and discover their pain
- 2. Define user needs and requirements
- 3. Ideate solutions using AI
- 4. Prototype your ideas into POC



Examples of question in Empathy for DT process



Project Timeline & Grading



CLO4 - peer review/self review on TW*

Progress 1: Design Thinking oriented Proposal

5% CLO3

CLO3: 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 theme either healthcare, agriculture, smart city and smart education) by implementing AI.
- Use Design Thinking (DT) to discover AI solutions to a real-world problem
- *Answer how the AI solution can achieve the aim/objective of the proposed product/system/software/apps*
- *Formulate* your solution and describe it in parts following the Design Thinking Process diagram
- The proposal should comprise at least as follows:
  - AI solution
  - The goal of AI solution
  - Describe the process of **Emphatize** in DT
  - Describe the process of **Define** in DT

Rubric: Design Thinking oriented Proposal (5%)

Category	4	3	2	1	Score?
Elaboration of emphatize	Problem and pain, user/stakeholder and the goal are clearly described.	Problem and pain, user/stakeholder and the goal are somehow clearly described.	Problem and pain, user/stakeholder and the goal are limited described.	Problem and pain, user/stakeholder and the goal are unclear described.	
Elaboration of Design	Covers user/stakeholder needs in-depth with details and examples.	Includes essential user/stakeholder needs.	Includes essential user/stakeholder needs but there are 1-2 factual errors.	User/stakeholder needs is minimal OR there are several factual errors.	
AI solution & goal	AI solution shows large amount of original thought. Ideas are creative and inventive.	AI solution shows some original thought. Work shows new ideas and insights.	AI solution uses other people's idea (giving them credit) but there is little evidence of original thinking.	AI solution uses other people's ideas but does not give them credit.	

Progress 2 – Knowledge Representation

Assignment 1
5% CLO2

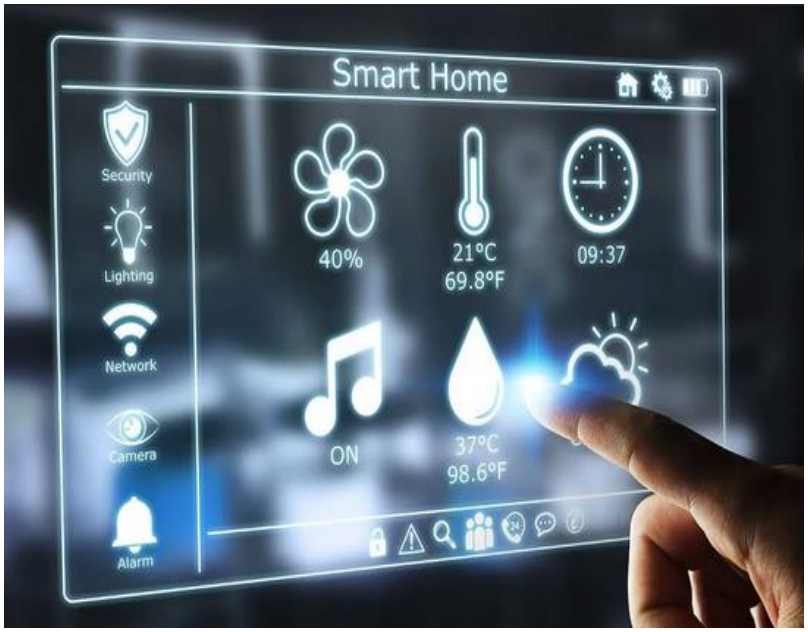
CLO2: Knowledge Representation – 5%

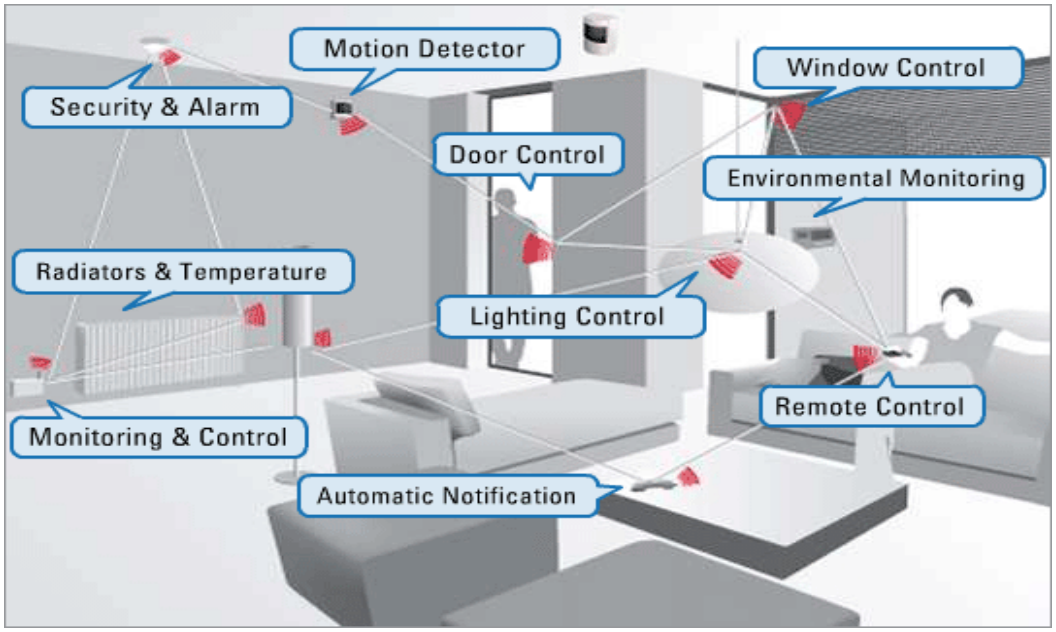
- Propose the knowledge representation(KR) for your AI solution in a report
- Define at least **FIVE** KR using logical representation
  - A detailed write up on the KR
    - Explain how the KR supports the proposed AI solution to *achieve the goal*
  - Use FOL to describe the KR
  - Use appropriate connectives
- *Answer what KR is involved in order to achieve the aim/goal of the proposed product/system/software/apps*

Rubric: Knowledge Representation (5%)

Category	4	3	2	1	Score?
Correctness of semantics	AI solution is clearly represented using natural language and FOL with correct semantic.	AI solution is somehow clear represented using natural language and FOL with some correct semantic.	AI solution is somehow clear represented using natural language and FOL with limited correct semantic.	AI solution is unclear represented using natural language and FOL with correct semantic.	
Correctness of syntax	AI solution is clearly represented using a correct syntax of FOL.	AI solution is somehow clear represented using some correct syntax of FOL.	AI solution is somehow clear represented using limited correct syntax of FOL.	AI solution is unclear represented using a correct syntax of FOL.	

Example: SmartHome - Knowledge Representation





- IF motion_detector = active AND door_control = on AND window_control = on THEN security_alarm = SET
- IF lighting_control = off AND radiator = off OR temp=not_active THEN auto_notify = SET_FIRST_WARN

Progress 3 – State Space Search

Assignment 2
4% CLO3, 1% TW

CLO3: State Space Search – 4%

- Based on the previous KR, *formulate* the problem using state space search in a report
- Define the state space by specifying the states and actions
  - A detailed write up on the state space search
    - Explain each state and each actions
  - Represent the state space as graph (directed/undirected graph)
  - Formulate problem by specifying four things:
    - Initial state, Actions, Goal, Path cost
  - Solution: sequence of actions leading from initial state to goal state
- *Answer how the problem is formulated to support the proposed KR*

Rubric: State Space Search (4%)

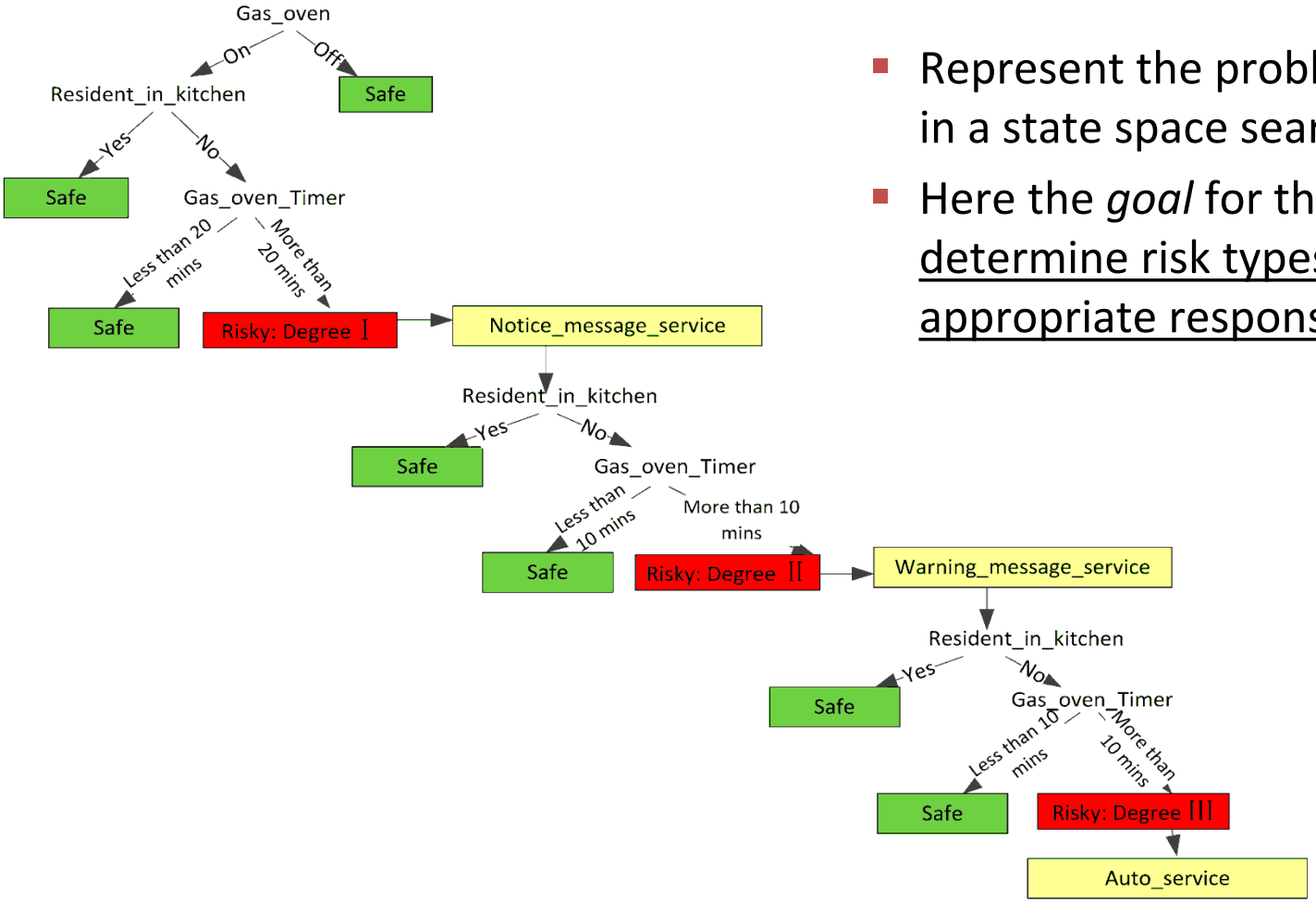
Category	4	3	2	1	Score?
Definition of state space graph	The goal, states, actions and path costs are clearly described.	The goal, states, actions and path costs are somehow clearly described.	The goal, states, actions and path costs are limited described.	The goal, states, actions and path costs are unclear described.	
Correctness of state space graph	Represent precisely the problem using state space graph.	Represent somehow precisely the problem using state space graph.	Represent somehow precisely the problem using state space graph but there are 1-2 errors.	Represent so minimal the problem using state space graph OR there are several errors.	

Rubric: Peer Review on TW (1%)

- 1% Peer review on Team Working (TW)
- Rate each of your group member on Active Participation in the scale of 1 to 4

Category	4	3	2	1
Active participation	Routinely provides useful ideas when participating in the group.	Usually provides useful ideas when participating in the group.	Sometimes provides useful ideas when participating in the group.	Rarely provides useful ideas when participating in the group.

Example: SmartHome – State Space Search



- Represent the problem formulation in a state space search
- Here the *goal* for the system is to determine risk types and give appropriate response for such risks

Premier Digital Tech University™

Progress 4 – Intelligent Agent

Assignment 3
4% CLO3, 1% TW

CLO3: Intelligent Agent – 4%

- *Formulate* the proposed AI solution using PEAS model representation in a report
- Define in details each property of PEAS model
  - P: Performance measure
  - E: Environment
  - A: Actuators/Effectors
  - S: Sensors
  - Provide diagram(s) to represent the relations between each property and how it supports the goal/aim of your AI solution
  - A write up on how each property will be represented in the Proof of Concept (POC)
- *Answer how agent in AI behaves and achieve the goal in the proposed product/system/software/apps*

Rubric: Intelligent Agent (4%)

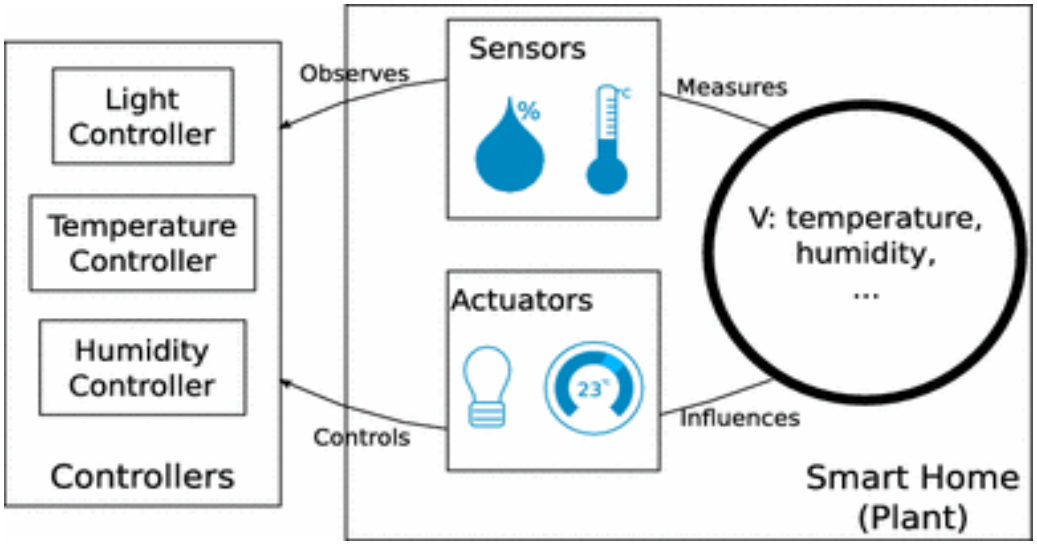
Category	4	3	2	1	Score?
Definition of PEAS model	The performance measures, environment, actuators/effectors and sensors are clearly described.	The performance measures, environment, actuators/effectors and sensors are somehow clearly described.	The performance measures, environment, actuators/effectors and sensors are limited described.	The performance measures, environment, actuators/effectors and sensors are unclear described.	
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.	

Rubric: Self reflection on TW (1%)

- 1% Self reflection on Team Working (TW)
- Prepare write up on Team Working Value in the scale of 1 to 3

Category	3	2	1
Team Working Value	Clearly express his/her role in making the team to successfully work to complete the task	Implies but does not clearly express his/her role in making the team to successfully work to complete the task	Does not clearly express his/her role in making the team to successfully work to complete the task

Example: SmartHome – Intelligent Agent



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

Progress 5 : Proof of Concept - POC

10% CLO3

5% TW

CLO3: Proof of Concept – 10%

- Develop a prototype as POC 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.
- Explain in details how your AI solution is designed (the representation of previous KR, state space search and PEAS model)
- *To answer how the proposed AI solution can verify the concept in solving problems*

Rubric: Proof of Concept (10%)

Category	4	3	2	1	Score?
Originality	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.	
Problem Formulation	Problem is clearly formulated and well explained with examples.	Problem is clearly formulated with adequate explanation.	Problem is somehow clear with limited explanation.	Problem is unclear.	
Design Concepts	Concepts of design are well-presented, design is well-described and clear with supported process	Concepts of design are presented, design is described and relatively clear with decent process	Concepts of design are weakly presented, design described with unclear explanation with minimal process	Concepts of design are poor, design is unclear with no process	

Rubric: Peer Review on TW (5%)

- 5% Peer review on Team Working (TW)
- Rate each of your group member on Team Working Value in the scale of 1 to 4

Category	4	3	2	1
Contributions	Routinely provides useful ideas when participating in the group.	Usually provides useful ideas when participating in the group.	Sometimes provides useful ideas when participating in the group.	Rarely provides useful ideas when participating in the group.
Problem-solving	Actively looks for and suggests solutions to problems.	Refines solutions suggested by others.	Does not suggest or refine solutions but is willing to try out solutions suggested by others.	Does not try to solve problems or help others solve problems. Let others do the work.
Attitude	Is never publicly critical of the project or the work of others. Always has a positive attitude about the task(s).	Is rarely publicly critical of the project or the work of others. Often has a positive attitude about the task(s).	Is occasionally publicly critical of the project or the work of other members of the group. Usually has a positive attitude about the task(s).	Is often publicly critical of the project or the work of other members of the group. Is often negative about the task(s).
Focus on the task	Consistently stays focused on the task and what needs to be done. Very self-directed.	Focuses on the task and what needs to be done most of the time. Other group members can count on this person.	Focuses on the task and what needs to be done some of the time. Other group members must sometimes nag, prod, and remind to keep this person on task.	Rarely focuses on the task and what needs to be done. Lets others do the work.
Working with Others	Almost always listens to, shares with, and supports the efforts of others. Tries to keep people working well together.	Usually listens to, shares, with, and supports the efforts of others. Does not cause "waves" in the group.	Often listens to, shares with, and supports the efforts of others, but sometimes is not a good team member.	Rarely listens to, shares with, and supports the efforts of others. Often is not a good team player.

Example: SmartHome – Proof of Concept

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