School of Computer Science – Group Coursework Sheet

Session	2024/2025	**Semester**	Spring
Module Name	Designing Intelligent Agent	**Code**	COMP3071
Module Convenor	El Ioini Nabil, Simon Lau Boung Yew		

Coursework Name	Group Coursework (to be done in **pairs** only) **Weight**: 100%
Coursework Overview	The coursework for this module requires each group to **develop an intelligent agent** that performs a well-defined task in a dynamic environment. The module revolves around several main components: • **Design and implement** an agent capable of solving a given task. • **Define the agent's environment** and how it interacts with it. • **Evaluate the agent's performance** using appropriate metrics and experimental methodologies. • **Write a report** documenting the development, evaluation, and findings. • **Deliver a presentation** to explain, defend, and justify the design and evaluation choices.
Project Selection & Scope	The coursework encourages each group to work on cutting-edge applications while fostering **competition** and innovation. Rather than focusing solely on standard lab level ideas, the goal is to **push you to tackle real-world challenges and develop state-of-the-art solutions**. To this end, we have selected a set of predefined project ideas, each requiring **adaptive decision-making** and dynamic agent behaviour, while providing ample room for creativity, experimentation, and novel enhancements. ## 1. Adaptive Traffic Light Control Agent **Task:** Develop an AI agent that dynamically controls traffic lights to optimise traffic flow and reduce congestion. The agent should adapt to real-time traffic conditions and function effectively in different environments (e.g., urban vs. suburban, rush hour vs. low traffic, emergency vehicles). Traditional traffic lights operate on fixed schedules, often leading to unnecessary delays or congestion. An adaptive system can improve traffic flow, reduce emissions, and decrease waiting times. ## 2. AI-based Customer Support Chatbot **Task:** Develop an intelligent chatbot that assists users by answering their technical support questions. The agent should adapt its responses based on user sentiment, language style, and previous interactions. Many customer support bots fail to understand user frustration or adapt to different customer needs, leading to poor user experiences.

	3. Autonomous Warehouse Robot **Task:** Develop an AI agent that navigates a warehouse to pick and deliver items efficiently while avoiding obstacles and dynamically adjusting routes based on real-time warehouse conditions. Many warehouses rely on fixed-path robots that cannot adapt to changing layouts, leading to inefficiencies when obstacles appear or demand fluctuates. **4. Financial Trading Bot** **Task:** Develop a trading bot that analyses stock or cryptocurrency market data (could include other data such as news, tweets…), then predicts price movements, and executes trades dynamically. Traditional trading strategies often fail to adapt to sudden market changes, leading to significant losses. **5. Intelligent Web Crawling Agent** **Task:** Develop an AI-powered web crawler that autonomously navigates online sources to extract relevant and structured information. The agent should dynamically adapt its crawling strategy and environment based on content relevance, link structures, the constraints imposed by the web applications and other factors. Based on these ideas, each group is encouraged to define more concrete scenarios, tailoring their approach to specific challenges. The provided project descriptions serve as a baseline, ensuring all teams start with a solid foundation while allowing for innovative extensions and adaptations to real-world problems.
Implementation Rules	- Where feasible, students are encouraged to implement their ML model from scratch. If a pre-trained model is used, fine-tuning and detailed justification are required. - If you choose to use a pre-trained model, you need to fine-tune it for your specific use case and provide a detailed explanation of the modifications made and their impact. - Generative AI models (e.g., GPT) cannot be used directly for core decision-making, but they may be referenced for benchmarking and comparative analysis, provided you justify their relevance and discuss the insights gained.
Initial Idea Submission	Before proceeding with full implementation, each group needs to submit a write up of the initial idea (approximately **300 words**) outlining: • The selected project from the predefined list. • The specific approach they intend to take. • Any unique enhancements or modifications they plan to introduce (how your approach might address the weakness of the existing solutions). • Initial thoughts on the evaluation criteria they will use.

Format and deadline	▪ The proposal should be submitted in .pdf format. ▪ The initial idea **must be submitted via Moodle by 17:00 (5pm) on 24 February 2024** for approval. Feedback will be provided by **4 March 2024**, allowing teams to refine their approach before full implementation begins.