1. **PEAS**

* 1. Let each member of the group Identify an AI system and characterize it based on the PEAS formulation. For each system, have a single-paragraph description. Then compare them based on their PEAS specification.  (Read Part I, Chapter 1, and Chapter 2)

**AI System: Siri (Apple)**

Siri is Apple's virtual assistant, integrated into iPhones, iPads, Macs, and other Apple devices. It allows users to perform tasks, get information, and control device functions using natural language voice commands. Siri uses advanced natural language processing and machine learning algorithms to understand and respond to user queries, providing personalized assistance and recommendations.

* Performance Measure: The performance of Siri is measured by its ability to understand and respond to user voice commands, provide information, execute tasks, and interact with various apps and services on Apple devices.
* Environment: Siri operates in digital environments, primarily on Apple devices such as iPhones, iPads, and Mac computers, interacting with users through voice commands and text inputs.
* Actuators: The actuators for Siri include speech synthesis for generating responses, integration with apps and services to perform tasks, and interfaces for controlling device functions.
* Sensors: Siri utilizes microphones for capturing voice inputs and accessing various data sources such as apps, the internet, and device sensors for information retrieval and context understanding.

**AI System: DeepMind AlphaGo**

DeepMind AlphaGo is an AI program developed by Google's DeepMind division that became famous for defeating human Go world champions. AlphaGo uses deep reinforcement learning and neural networks to analyze and play the ancient board game of Go at a superhuman level. Its groundbreaking achievements demonstrated the power of AI in mastering complex strategy games.

* Performance Measure: The performance of DeepMind AlphaGo is measured by its ability to play the board game Go at a superhuman level, defeating top human players and achieving optimal game strategies.
* Environment: DeepMind AlphaGo operates in the digital environment of the Go game board, interacting with a virtual representation of the game state and making strategic moves.
* Actuators: The actuators for DeepMind AlphaGo involve selecting and executing moves on the Go board based on its analysis of the game state and potential outcomes.
* Sensors: DeepMind AlphaGo uses machine learning algorithms to analyze the current game state, historical game data, and potential future moves to determine the best course of action.

**AI System: Boston Dynamics' Spot**

Spot is a versatile quadruped robot developed by Boston Dynamics, now owned by Hyundai Motor Group. Spot is designed for various applications, including inspection, surveillance, research, and entertainment. Equipped with advanced sensors, cameras, and robotic limbs, Spot can navigate challenging terrain, perform tasks autonomously, and interact with its environment in diverse settings.

* Performance Measure: The performance of Boston Dynamics' Spot is measured by its ability to navigate various terrains, perform tasks autonomously, and interact with its environment using its robotic limbs and sensors.
* Environment: Spot operates in both indoor and outdoor environments, traversing rough terrain, climbing stairs, and executing tasks such as inspection, surveillance, and delivery.
* Actuators: The actuators for Spot include motorized limbs for locomotion and manipulation, sensors for detecting obstacles and terrain features, and control algorithms to execute tasks autonomously.
* Sensors: Spot is equipped with a suite of sensors including cameras, lidar, and inertial sensors to perceive its surroundings, navigate obstacles, and interact with objects.

**AI System: OpenAI GPT (Generative Pre-trained Transformer)**

OpenAI GPT (Generative Pre-trained Transformer) is a state-of-the-art natural language processing model developed by OpenAI. GPT is capable of generating human-like text based on given prompts, engaging in conversation, and performing various language-related tasks such as translation, summarization, and question-answering. GPT's remarkable language generation abilities have applications in content creation, chatbots, and text-based AI assistants.

* Performance Measure: The performance of OpenAI GPT is measured by its ability to generate human-like text based on given prompts, engage in natural language understanding and generation tasks, and perform various language-related tasks such as translation, summarization, and question-answering.
* Environment: OpenAI GPT operates in digital environments, interacting with text-based inputs and outputs across a wide range of applications including natural language processing, conversational agents, and content generation.
* Actuators: The actuators for OpenAI GPT involve generating text outputs based on its understanding of input prompts, using pre-trained language models and neural network architectures.
* Sensors OpenAI GPT utilizes text inputs as its primary source of information, using machine learning techniques to analyze and generate text based on the context provided.

**comparison of the four mentioned AI systems based on their PEAS specifications**

**Performance Measure:** Each system has a unique performance measure tailored to its specific task. Siri aims for efficient voice-based interactions and task execution, AlphaGo strives for optimal gameplay and winning strategies, Spot focuses on efficient and effective navigation and task execution, while OpenAI GPT aims for coherent and contextually relevant text generation.

**Environment:** The environments in which these systems operate vary significantly. Siri interacts with users on Apple devices, AlphaGo operates in the digital environment of the Go game, Spot navigates physical environments, and GPT operates in digital text-based environments.

**Actuators:** Actuators for each system are designed to perform actions relevant to their tasks. Siri employs speech synthesis and device control, AlphaGo selects and executes moves on the Go board, Spot utilizes robotic limbs for locomotion and manipulation, and GPT generates text outputs based on input prompts.

**Sensors:** Each system relies on sensors to gather information necessary for its operation. Siri uses microphones for voice inputs and accesses data sources for information retrieval, AlphaGo analyzes the game state and potential moves, Spot perceives its environment using cameras and sensors, and GPT uses text inputs for language understanding and generation.

* 1. Come up with project ideas. Each student should come up with an idea. Have a paragraph that describes an idea. Don’t worry about the difficulty or whether you will be covering the topic. Based on the ideas, I will be brainstorming with you and you will implement one of them with feasible specifications.

**Project Idea: Wordle Solver**

A Wordle solver leveraging search algorithms to find the solution word faster. We'll explore informed search techniques like A\* search, prioritizing words that align best with the received clues (correct/incorrect letter positions). The project will utilize Python libraries and focus on core AI concepts while maintaining efficient code. This solver demonstrates the power of AI in problem-solving and can be extended to incorporate machine learning for more sophisticated approaches (time permitting).

**Project Idea: Pathfinding Algorithm Visualizer**

Build a pathfinding algorithm visualizer application that allows users to see different search algorithms in action. The application will visualize algorithms such as DFS, BFS, A\*, Dijkstra's algorithm, and others on grid-based maps with obstacles. Users can interactively create maps, set start and goal points, and observe how each algorithm finds the shortest path.

**Project Idea: Maze Solver with Uninformed Search**

Develop a maze solver application using uninformed search algorithms such as depth-first search (DFS) or breadth-first search (BFS). The application will take a maze as input and find the shortest path from the start to the goal using the chosen uninformed search algorithm. We'll focus on visualizing the search process and optimizing the algorithm for efficiency.

**Project Idea: Tic-Tac-Toe AI using MiniMax & Alpha-Beta Pruning**

Develop an AI player for the game of Tic-Tac-Toe using the MiniMax algorithm with alpha-beta pruning. The AI player will evaluate possible game states to make optimal moves and ensure victory or draw against human opponents. We'll focus on implementing the MiniMax algorithm efficiently and integrating alpha-beta pruning to reduce the search space and improve performance.

**Question 3 Report**

