ADDIS ABABA INSTITUTE OF TECHNOLOGY

SCHOOL OF INFORMATION TECHNOLOGY AND ENGINEERING

DEPARTMENT OF SOFTWARE ENGINEERING

INTRODUCTION TO ARTIFICIAL INTELLIGENCE

Assignment 1 Deliverable

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Choosing AI systems and analysing them based on PEAS specification

For this assignment we have chosen the following five(5) AI systems to analyse them based on the PEAS specification:

1. **Amazon Alexa**
2. **Tesla Autopilot**
3. I**BM Watson**
4. **Google Assistant**
5. **Roomba Robot Vacuum**

First we will discuss each system based on the PEAS specification and then after doing that we will compare each system based on their characteristics under each specification of PEAS(**Performance measure, Environment, Actuators, Sensors**)

PEAS specification

1. Amazon Alexa:

Performance measure: Alexa's performance is measured by its ability to accurately understand and respond to user voice commands, provide relevant information, and execute requested tasks efficiently.

Environment: Alexa operates in a variety of environments, such as homes, offices, and public spaces, where it can access internet-connected devices and services.

Actuators: Alexa interacts with the environment through various actuators, including speakers to provide voice output, smart home devices to control lights or appliances, and APIs to access external services.

Sensors: Alexa uses an array of sensors, primarily microphones, to capture and process user voice commands and environmental sounds.

2. Tesla Autopilot:

Performance measure: The performance of Tesla Autopilot is evaluated based on its ability to navigate and drive autonomously, ensuring passenger safety, efficient route planning, and adherence to traffic regulations.

Environment: Tesla Autopilot operates in real-world road environments, including highways, city streets, and rural areas, with varying traffic conditions, weather, and road infrastructure.

Actuators: Autopilot controls the vehicle's acceleration, braking, and steering systems, enabling it to execute autonomous driving maneuvers.

Sensors: Tesla vehicles equipped with Autopilot utilize a suite of sensors, including cameras, radar, ultrasonic sensors, and a powerful onboard computer, to perceive the surrounding environment and make informed driving decisions.

3. I**BM Watson**:

Performance measure: Watson's performance is evaluated based on its ability to understand and analyze complex data, provide accurate insights, and assist in decision-making across various domains, such as healthcare, finance, and customer service.

Environment: Watson operates in digital environments, processing large volumes of structured and unstructured data from diverse sources, including text documents, databases, and real-time streams.

Actuators: Watson's actuators include natural language generation capabilities to provide human-like responses, APIs for integration with external systems, and visualization tools to present insights.

Sensors: Watson relies on sensors that capture textual or numerical data from a wide range of sources, including websites, social media, and enterprise databases.

4. **Google Assistant:**

Performance measure: Google Assistant aims to provide accurate and helpful responses to user queries, perform tasks efficiently, and improve user satisfaction through personalized interactions.

Environment: Google Assistant operates on various devices, including smartphones, smart speakers, and smart displays, accessing internet-connected services, applications, and devices.

Actuators: Google Assistant uses actuators such as voice output, notifications, and device control to interact with the environment and fulfill user requests.

Sensors: Google Assistant leverages microphones and other sensors to capture user voice commands, as well as environmental information like location, time, and device states.

5. **Roomba Robot Vacuum**:

Performance measure: Roomba's performance is measured by its ability to autonomously navigate a home environment, effectively clean different surfaces, and optimize cleaning time and battery usage.

Environment: Roomba operates in indoor environments, such as homes or offices, where it encounters various floor surfaces, furniture, and obstacles.

Actuators: Roomba's actuators include motorized wheels for movement, a vacuum suction system, brushes, and sensors to detect and avoid obstacles.

Sensors: Roomba utilizes sensors like proximity sensors, cliff sensors, and dirt detection sensors to perceive its environment, avoid obstacles, and identify areas that require cleaning.

Comparison based on the PEAS specification

1. **Performance measure:**

- Tesla Autopilot > Roomba Robot Vacuum > Amazon Alexa > Google Assistant > IBM Watson

(Tesla Autopilot is primarily focused on safety-critical performance, while Watson's performance is centered around data analysis and decision-making. Roomba's performance is measured in terms of effective cleaning, and Alexa and Google Assistant prioritize accuracy and relevance of responses.)

2. **Environment**:

- Tesla Autopilot > Roomba Robot Vacuum > Amazon Alexa = Google Assistant > IBM Watson

(Tesla Autopilot operates in real-world road environments, Roomba operates in indoor environments, and Alexa and Google Assistant operate in various digital and physical spaces. Watson operates primarily in digital environments.)

3. **Actuators**:

- Amazon Alexa = Google Assistant > Tesla Autopilot > Roomba Robot Vacuum > IBM Watson

(Alexa and Google Assistant utilize voice output and device control, while Autopilot controls vehicle systems. Roomba uses a robotic mechanism for movement and cleaning, and Watson primarily relies on generating insights and integrating with external systems.)

4. **Sensors**:
- Tesla Autopilot > Roomba Robot Vacuum > Amazon Alexa = Google Assistant = IBM Watson

(Autopilot employs a wide range of sensors, including cameras, radar, and ultrasonic sensors, for perceiving the surrounding environment. Roomba uses various sensors for obstacle detection and environment perception. Alexa, Google Assistant, and Watson rely on microphones and other sensors for capturing user inputs and environmental information.)

Project ideas of our own

The five project ideas we thought would be interesting to work on are the following:

1. AI-driven Movie Script Generator: Develop an AI model that generates movie scripts based on input prompts or genres. Train the model on a large dataset of existing movie scripts and implement a script generation system that outputs original and creative movie dialogues.

2. AI-powered News Summarizer: Build an AI system that can summarize news articles or blog posts. Utilize natural language processing techniques like extractive summarization to identify key sentences and generate concise summaries of the text.

3. AI-based Weather Forecasting: Create a simple AI model that predicts weather conditions based on historical weather data. Use regression algorithms to analyze variables like temperature, humidity, and wind speed to make accurate weather predictions for a specific location.

4. AI-based Object Detection: the idea is based on idea to develope a system that can recognize objects from real time videos or images. It can be trained to specialize on a small number of objects and made able to recognize them well.

5. AI-based Voice Assistant for Smart Homes: Build a voice assistant using AI technologies that can control smart home devices like lights, thermostats, or speakers. Utilize voice recognition and natural language processing to enable voice commands and automate various home functions