Mahavir Education Trust's

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UG Program in Information Technology

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EXPERIMENT 1

Aim: Design of Intelligent Systems using PEAS

Lab Outcome no: 7.ITL.703.1

Lab Outcome: Design Building Blocks of an Intelligent Agent using PEAS Representation

Theory:

An intelligent system is a machine with an embedded, Internet-connected computer that has the capacity to gather and analyze data and communicate with other systems. Other criteria for intelligent systems include the capacity to learn from experience, security, connectivity, the ability to adapt according to current data and the capacity for remote monitoring and management.

In IT, a system is defined as a collection of connected elements or components that are organized for a common purpose. As such, although they are typically spoken of in terms of devices, intelligent systems include not just intelligent devices but also interconnected collections of such devices, including networks and other types of larger systems. Similarly, intelligent systems can also include sophisticated AI-based software systems, such as chatbots, expert systems and other types of software.

Essentially, an intelligent device is anything that contains a functional, although not usually general-purpose, computer with Internet connectivity. An embedded system may be powerful and capable of complex processing and data analysis, but it is usually specialized for tasks relevant to the host machine.

Intelligent systems exist all around us in point-of-sale (POS) terminals, digital televisions, traffic lights, smart meters, automobiles, digital signage and airplane controls, among a great number of other possibilities. Built-in intelligence is an integral component of the developing internet of things (IoT), in which almost everything imaginable can be provided with unique identifiers and the ability to automatically transfer data over a network without requiring human-to-human or human-to-computer interaction.

There are certain types of AI agents. But apart from these types, there are many agents which are being designed and created today and they differ from each other in some aspects and have some aspects in common too. So, to group similar types of agents together, a system was developed which is known as **PEAS system**.

PEAS stands for Performance, Environment, Actuators, and Sensors. Based on these properties of an agent, they can be grouped together or can be differentiated from each other. Each agent has these following properties defines for it.

Performance:

The output which we get from the agent. All the necessary results that an agent gives after processing comes under its performance.

Environment:

All the surrounding things and conditions of an agent fall in this section. It basically consists of all the things under which the agents work.

Actuators:

The devices, hardware or software through which the agent performs any actions or processes any information to produce a result are the actuators of the agent.

Sensors:

The devices through which the agent observes and perceives its environment are the sensors of the agent.

PEAS REPRESENTATION FOR SOME INTELLIGENT SYSTEM:

1. **Music Composer**

Performance Measures:	number of measures composed per unit time, number of instruments considered, ease of play by a human, range of frequencies within human audible zone, melodic, harmonic and rhythmic criteria.
Environment	Software
Actuators	None required, this can be a pure softbot
Sensors	Code that reads in Basic Parameters

2. **Aircraft Auto lander**

Performance Measures:	Lack of damage to plane, other aircraft or ground structures, lack of injuries to passengers or ground crew or other innocent observers, cargo remains intact, fuel economy, lands at correct airport on correct runway, doesn't take too long
Environment:	Lower atmosphere and surface of planet Earth.

Actuators:	Throttle, landing gear, rudders, ailerons, flaps
Sensors:	Cameras, Altimeter, Speedometer, other meters

3. **Essay Evaluator**

Performance Measures:	awards scores for quality, penalizes crap, detection of plagiarism, impartiality, usefulness of explanation of grading
Environment	Software
Actuators	None
Sensors	File reading software, (perhaps even OCR)

4. **Robotic Sentry Gun for the Keck Lab**

Performance Measures:	Percentage of correct targets hit, lack of hitting friends, minimal energy consumption
Environment	The Keck Lab
Actuators	Gun, trigger, motors, camera
Sensors	Camera, sonar, bump sensors

5. **Internet shopping agent**

Performance Measures:	Price, quality, appropriateness, efficiency
Environment	Current and future Web sites, vendors, shippers
Actuators	None

Sensors	Web pages (text, graphics, scripts. . .)

Conclusion: Thus, PEAS Representation of 5 Intelligent systems for designed highlighting the various Performance Measures, Environment suitable for the system, Actuators required and Sensors which it will use to collect data for maximum learning.