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ROBOTICS

Robots are the artificial agents acting in real world environment.
Robotics is a branch of AI, which is composed of Electrical Engineering, ME and CSE for designing, construction and application of robot.

Robots are aimed at manipulating the objects by perceiving, picking, moving, modifying the physical properties of objects, destroying it or to have an effect thereby freeing manpower from doing repetative functions.

Difference between AI and Robots

	AI	Robots
1.	They usually operate in computer-stimulated worlds.	They operate in real physical world.
2.	The input to an AI program is in symbols and rules.	Inputs to robots is analog signal in the form of speech waveform or images.
3.	They need general purpose computer to operate on.	They need special hardware with sensors and effectors.

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Perception:-

→ Robots can also process visual and auditory information and they can also be equipped with more exotic sensors, such as laser rangefingers, speedometers and radars.

Vision:-

→ Accurate machine vision opens up a new realm of computer applications. These applications include mobile robot navigation, complex manufacturing tasks, analysis of satellite images and medical image processing.

A video camera provides a computer with an image represented as a two-dimensional grid of intensity levels. Each grid element or pixel may store a single bit of information.

Speech Recognition: Natural language understanding systems usually accept typed input, but for a number of applications this is not acceptable. Some major issues in speech systems: 1. Speaker Dependence versus Speaker Independent
2. Continuous vs Isolated
3. Real Time Vs offline processing
4. Large Vs Small Vocabulary
5. Broad Vs Narrow grammer

Action: In this section, we investige the nature of mobility in terms of how

Robots navigate through the world and manipulate objects.

→ Navigation : Moving around the world means planning routes, reaching desired destinations without bumping into things etc.

The STRIPS system, for gave high-level instructions to a robot moving through a set of rooms, carrying objects from one to another.

→ Manipulation : Robot manipulators are able to perform simple repetitive task, such as bolting and fitting automobile parts, but these robots are highly task-specific.

A manipulator is composed of a series of links and joints, usually terminating in an end-effector, which can take the form of a two-pronged gripper, a humanlike hand, or any of a variety of tools.

One general manipulation problem is called pick and place, in which a robot must grasp an object and move it to a specific location.

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Robot Architecture :

When we put it all together - perception, cognition and action. There are many decisions involved in designing an architecture that integrates all those capabilities, among them:

→ What range of tasks is supported by the architecture?
→ What type of environment is supported?
→ How are complex behaviours turned into sequences of low-level actions?
→ Is control centralized or distributed?
→ How are numeric and symbolic representation merged?
→ How does the architecture represent the state of the world?
→ How quickly can the architecture react to changes in the environment?
→ How does the architecture decide when to plan and when to act?

Some robot architecture :

→ CODGER is an architecture for controlling vehicles in outdoor road-following tasks.
→ TCA is an architecture that combines the idea of reactive systems with traditional AI planning. TCA achieves high-speed response by parallelizing planning and execution whenever possible. TCP plan one step, initiate it and then begins to plan the next step.