INTRODUCTION TO ROBOTICS

What is a Robot?

The term comes from a Czech word, *robota*, meaning "forced labor." The word *robot* first appeared in a 1920 play by Czech writer Karel Capek, R.U.R.: Rossum's Universal Robots. In the play, the robots eventually overthrow their human creators.

With so many different kinds of robots, how do you define what one is? It's a physical thing—engineers agree on that, at least. But ask three different roboticists to define a robot and you'll get three different answers.

If a machine is truly autonomous, there's a good chance it's a robot—but there are different degrees of autonomous intelligence. It's easy enough to program a machine to respond to a single environmental input with a single output. But as machine learning algorithms improve, robots will respond to their environments in ways that humans didn't explicitly teach them to. And that's the kind of intelligence that will get robots driving us around, helping the elderly, and keeping us company.

Robots are sometimes grouped according to the time frame in which they were first widely used:
First-generation robots date from the 1970s and consist of stationary, nonprogrammable, electromechanical devices without sensors.
Second-generation robots were developed in the 1980s and can contain sensors and programmable controllers.
Third-generation robots were developed between approximately 1990 and the present. These machines can be stationary or mobile, autonomous or insect type, with sophisticated programming, speech recognition and/or synthesis, and other advanced features.
Fourth-generation robots are in the research-and-development phase, and include features such as artificial intelligence, self-replication, self-assembly, and nanoscale size (physical dimensions on the order of nanometers, or units of 10^{-9} meter).

Robotics is a branch of technology which deals with robots. Robots are programmable machines which are usually able to carry out a series of actions autonomously, or semi-autonomously.
In my opinion, there are three important factors which constitute a robot:

1. Robots interact with the physical world via sensors and actuators.

2. Robots are programmable.
3. Robots are usually autonomous or semi-autonomous.

Artificially intelligent robots are the bridge between robotics and AI. These are robots which are controlled by AI programs.

Many robots are not artificially intelligent. Up until quite recently, all industrial robots could only be programmed to carry out a repetitive series of movements. As we have discussed, repetitive movements do not require artificial intelligence.

Non-intelligent robots are quite limited in their functionality. AI algorithms are often necessary to allow the robot to perform more complex tasks.

The key aspect that differentiates AI from more conventional programming is the word "intelligence." Non-AI programs simply carry out a defined sequence of instructions. AI programs mimic some level of human intelligence.

As you can see, robotics and artificial intelligence are really two separate things. Robotics involves building robots whereas AI involves programming intelligence.

Types

1. **Industrial robots** – These robots bring into play in an industrialized manufacturing atmosphere. Typically these are articulated arms particularly created for applications like- material handling, painting, welding and others. If we evaluate merely by application then this sort of robots can also consist of some automatically guided automobiles and other robots.
2. **Domestic or household robots** – Robots which are used at home. This sort of robots consists of numerous different gears for example- robotic pool cleaners, robotic sweepers, robotic vacuum cleaners, robotic sewer cleaners and other robots that can perform different household tasks. Also, a number of scrutiny and tele-presence robots can also be considered as domestic robots if brought into play in that sort of environment.
3. **Medical robots** – Robots employed in medicine and medicinal institutes, first & foremost as surgical treatment robots. Also, a number of robotic directed automobiles and perhaps lifting supporters.
4. **Service robots** – Robots that cannot be classed into any other types by practice. These could be various data collecting robots, robots prepared to exhibit technologies, robots employed for research, etc.

5. **Military robots** – Robots brought into play in military & armed forces. This sort of robots consist of bomb discarding robots, various shipping robots, exploration drones. Often robots at the start produced for military and armed forces purposes can be employed in law enforcement, exploration and salvage and other associated fields.

6. **Entertainment robots** – These types of robots are employed for entertainment. This is an extremely wide-ranging category. It begins with model robots such as robosapien or the running photo frames and concludes with real heavy weights like articulated robot arms employed as movement simulators.

7. **Space robots** – These were brought into play in space Shuttles, the International Space Station, together with Mars explorers and other robots employed in space exploration & other activities.

8. **Hobby and competition robots** – Robots that is created by students. Sumo-bots, Line followers, robots prepared merely for learning, fun and robots prepared for contests.

Need and applications:

The type of robots that you will encounter most frequently are robots that do work that is too dangerous, boring, onerous, or just plain nasty. Most of the robots in the world are of this type. They can be found in auto, medical, manufacturing and space industries. In fact, there are over a million of these types of robots working for us today.

1. **Outer Space** – Robotic arms that are under the control of a human being are employed to unload the docking cove of outer-space shuttles to launch satellites or to build a space station.

2. **The Intelligent Home** – Robotic systems can nowadays scrutinize home safety, ecological circumstances and energy consumption. Door & windows can be unlocked mechanically and electrical device such as lights and A/C can be pre-programmed to turn on. This helps residents to enjoy appliances irrespective of their mobility.

3. **Exploration** – Robots can enter the environments that are injurious to human beings. An illustration is observing the atmosphere within a volcano or investigating our deep marine life. NASA has utilized robotic probe for environmental study, ever since the early 60's.

4. **Military Robots** – Flying robot drones are brought into play for close watch in present time's modern armed force. In the future robotic airplane and automobiles could be employed to transmit petroleum, bullets, bombs, etc or clear minefields.
5. **Farms** – Programmed robots are used by harvesters to cut and collect crops. Robotic milk farms are existing permitting workers to nourish and milk their cattle distantly.
6. **The Car Industry** – Robotic arms are used, these arms are able to execute numerous tasks in the car manufacturing & assembling procedure. They carry out jobs such as sorting, cutting, welding, lifting, painting and bending. Similar functions but on a minor scale are now being intended for the food industry to execute tasks like- the trimming, cutting and processing of different types of meats like- chicken, beef, fish, lamb, etc.
7. **Hospitals** – The development of a robotic suit is under construction that will allow nurses to raise patients without injuring their backbones. Scientists in Japan have crafted a power facilitated suit which will provide nurses the additional power that they need to lift patients.
8. **Disaster Areas** – Observation robots built-in with superior sensing and imaging gears. This robot can work in dangerous environments like urban site spoiled by earthquakes by inspecting floors, walls, and roofs for structural reality.
9. **Entertainment** – Interactive robots that shows behaviors and education capability. One such robot is owned by SONY which moves around freely, responds to all your commands, carries your luggage and even responds to your oral instructions.

Future Scope

AI