

# Introduction to **ROBOTICS**

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## **Introduction to Mechanical Engineering**

Mechanical engineering is a branch of engineering which deals with the designing, manufacturing and the maintenance of mechanical systems. Mechanical engineering generally focuses on the creation and evaluation of physical things, but covers a broad range of technical areas. This is one of the oldest, broadest and largest engineering disciplines. Mechanical engineering involves almost in every aspect of our lives.

Mechanical engineers are the ones who design the mechanical tools by using the broad ideas of Mechanics. They apply the principles of physics and material sciences for analyzing and designing the mechanical tools. The mechanical equipments which we use in our daily life are all designed and manufactured by mechanical engineers. Most mechanical engineers start their learning with basic physics and calculus courses. Later courses can include static and dynamic systems, strength of materials, fluids, thermodynamics and heat transfer. A mechanical engineering curriculum is usually rounded out with advanced classes that match the student's desired specialty.

### **Branches of Mechanical Engineering:**

- Design Engineering.
- Manufacturing/automation/electro-mechanical.
- Aeronautical.
- Testing and evolution.
- Robotics.
- Thermodynamics.
- Fluid dynamics etc...

## **Introduction to Robotics**

Robotics is a branch of Mechanical engineering. According to the Robotics institute of America, ROBOTICS “is a technology which deals with the design, manufacture and the structural disposition of the 'Robots'”. Robotics is a multi-disciplinary subject which involves Mechanics, Electronics, and also computer science, which is collectively called **Mechatronics**. Now a days robotics is a highly emerging field.

## **Robot:**

“Robot is a machine that can move and do some of the work of a Human being by its own, and is usually controlled by a computer”. Robots are Autonomous devices, which means they can make their own decisions. **Merriam-Webster dictionary** describes a robot as a "machine that looks like a human being and performs various complex acts (as walking or talking) of a human being”.

### **Brief introduction to Robot anatomy**

As like as the humans have various type of sensory organs to sense the environment changes and other organs to organize different types of functions, robots also having such type of mechanical organs. Some of them are

<b><u>Type of task</u></b>	<b><u>Man</u></b>	<b><u>Robots</u></b>
<b>Vision</b>	Eyes	Camera's
<b>Vocalization(speech)</b>	Larynx(Voice box)	Micro phones
<b>Sensing the touch</b>	Skin	Touch sensors
<b>Smell</b>	Nose	?
<b>Taste</b>	Tounge	?
<b>Intelligence</b>	Brain	Micro-controllers and Processors
<b>Locomotion</b>	Limbs(Hands & Legs)	Actuators(Stepper motors,Servo's and Air muscles etc...)

\*The sensors for **smell** and **taste** are not yet invented

Table 1.1

### **Applications of Robotics:**

Now a days Robotics became one of the emerging fields which we have today. It has so many applications in our daily life. Most of applications we have today are found in the Industrial manufacture and assembly of Automobiles. Robots are extensively deployed in many production processes which are considered to be tedious, repetitive and Hazardous to humans to work in. And also extensively used to explore locations and situations considered to be risky for human involvement. Robotics have enormous applications in the following fields.

#### **1) Industrial Applications**

Over the last three decades automobile factories have become dominated by robots. A typical factory contains hundreds of industrial robots working on fully automated production lines, with one robot for every ten

human workers.

In Electronic industries circuit boards (PCBs) are almost exclusively manufactured by pick-and-place robots, typically with SCARA manipulators, which remove tiny electronic components from strips or trays, and place them on to PCBs with great accuracy. And the robots are also used in mechanical workshops which includes some risky works like painting, servicing etc

## **2)Space Experiments:**

Robotics play a main role in space experiments and applications. Almost all the space probes ever launched was a Robot. Unmanned spaceships that explored the Martian landscape and went beyond Jupiter are excellent Robotic examples.

Ex: The mobile robot **Sojourner** was used during the Pathfinder mission to explore the martian surface. It was a tele-operated robot. And also This includes the Voyager probes and the Galileo probes, as well as other probes which are sent to the outer space.

## **2)Defence & Military:**

There are also so many Robotic military aircrafts that perform surveillance on enemy territory, which are called Intelligent Automated Guided Vehicles's (AGV).

Ex: The best Example for this type of Robots is Unmanned flying vehicle which is often called as "Drone", Which is being used by the Armies of various countries.

## **3)Hospitals:**

There are some special rolling robots that distribute and deliver prescribed medicine to patients with programmed location of floors and rooms. They can even be programmed to interface with intelligent hospital elevators to reach any floor and return to the destination.

## **6)In Homes:**

Now a days many robots are being used not only in industrial appliances but also in houses. Many robots are used for cleaning the offices and houses. The best example for such type of robots is "Roomba", Which is a robot designed for Vacuum cleaning purpose in houses and offices. And some robots are also used for entertainment purpose by senior citizens.

## **7)For Doing Hazardous tasks:**

In the hazardous and tight spaces of a building's duct work, many hours can be spent cleaning relatively small areas if a manual brush is used. Robots have been used by many duct cleaners primarily in the industrial and

institutional cleaning markets, as they allow the job to be done faster, without exposing workers to the harmful enzymes released by dust mites

And Robots are also used for cleaning high-security institutions such as embassies and prisons, duct cleaning robots are vital, as they allow the job to be completed without compromising the security of the institution.

### **Conclusion**

From this we can conclude that Robotics is field which comes under Mechanical Engineering and it deals with the artificial intelligent autonomous devices often called Robots. And it has enormous applications in many fields like space, military, and in home appliances. In future there will be no Industries if there are no Robots.

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