

BTME 3072
Robotics and Automation
Lecture 1

2nd Year

III Semester

Galgotias University

2020-21

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Unit I: Introduction to Robotics

- Definition of a Robot –
- **Basic Concepts –Robot configurations** –
- Types of Robot drives –
- Basic robot motions –
- Point to point control –
- Continuous path control.

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Objectives of the lecture

- Understanding of the concept of the robotics
- Understanding the types of robots

The logo of Galgotias University is a circular emblem with a stylized 'G' in the center. The 'G' is composed of three curved segments in shades of yellow, blue, and red. The background of the emblem is a light, multi-colored swirl.

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Robotics

- Word robot was coined by a Czech novelist Karel Capek in a 1920 play titled Rassum's Universal Robots (RUR)
- Robot in Czech is a word for worker or servant

Definition

- Any machine made by by one our members: Robot Institute of America
- A robot is a reprogrammable, multifunctional manipulator designed to move material, parts, tools or specialized devices through variable programmed motions for the performance of a variety of tasks: Robot Institute of America, 1979

Robot applications

- Welding Considered as a dangerous task for a human because of toxic gases emissions.
- The welding job is quite difficult for a person who is required to weld two pipes from different sides and angles and to sit in a difficult position for a long time



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Painting :

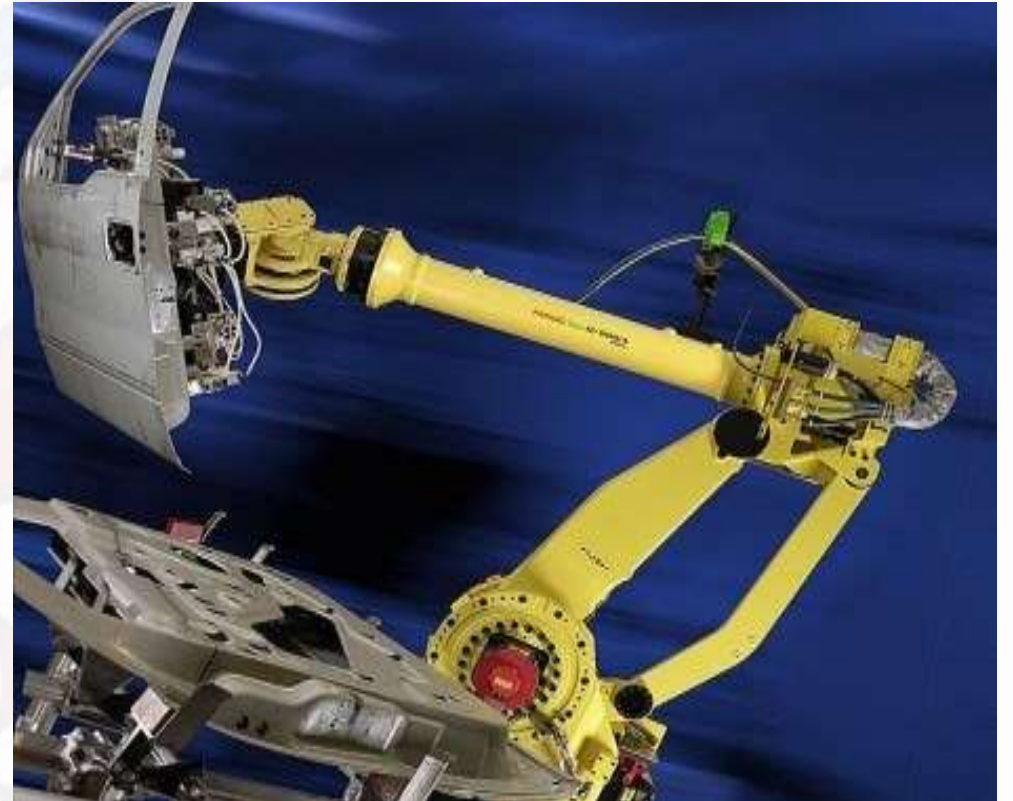
- Painting has similar problems to welding due to the use of toxic chemical products
- picture of a factory robot painting a car as it moves slowly along a conveyer.



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Assembly operation:

- When we assemble a chip we need to be very precise because of very fine wires which require very precise and accurate tasks which a human cannot handle but, on the other hand, is easy for a robot.



Applications of robots

- Consistent quality at high standards can be achieved by a robot. A robot can easily be re-programmed many times to reach the highest possible quality which a human cannot often achieve.
- Safety is especially important when a robot handles chemicals, bio chemicals, toxic and nuclear products.
- They can be handled very safely and smoothly, saving humans from carrying out high risk, stress inducing work.

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Contd..

- Inspection and maintenance tasks in dangerous areas: for example handling explosives, exploring the deep sea, space and other planets. One example is the shipwrecked Titanic.
- A robot was used to discover the ships content as it lay so deep under the ocean it was beyond human reach.
- Space missions: to gather samples from other planets and to analyze them from remote distances.

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Types of robot

- Industrial robots. painting and welding robots
 - Robot painting is equal, uniform with high quality and precision.
 - It can reach very difficult places due to their high degree of flexibility which can be difficult for humans, but can be achieved easily by robots.
 - A human needs to carry heavy painting gun and wear a mask for protection against toxic chemicals.
 - A robot's repetition rate is high as it does not suffer from fatigue.
 - Safety levels which can be achieved by using a robot are high by saving humans from the smell chemical toxics.

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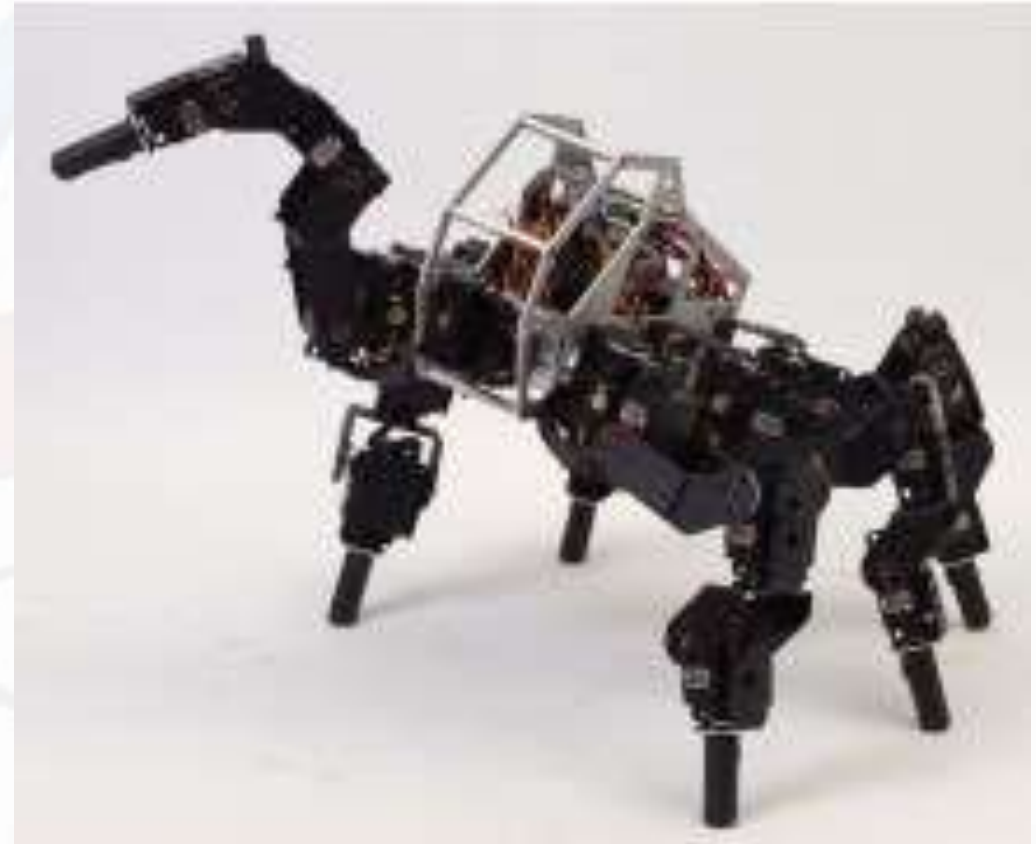
Medical robot to make surgery

- Advantages of a medical robot:
 - Patient gets fast recovery. The operation is more precise with fewer mistakes.
 - Robot can open small incisions in the body and carry out major operations with
 - minimal damage to the patient.
 - Therefore recovery time is decreased.
 - The equipment is more hygienic and safe.



Mobile robot

- Mobile robot with legs or wheel for chemical power plant, under sea or remote areas and bombs fields.
- The advantage in leg robot are
 - It can avoid step over obstacles which can be dangerous like bomb or
 - even to protect objects from being destroyed due to robot moving over them.



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- Robotics aircrafts and boats without pilot which are guided from a station on the ground, which are used by army or rescue mission.



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Other applications and types

- Toys



- Robot for cleaning at home and industry



Questions

- Discuss the applications of the robots in various fields
- What are the types of the robots based on the its applications?

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Text books

- Introduction to robotics mechanics and control by John J Craig
- Fundamentals of Robotic Mechanical Systems by Jorge Angeles
- Robot Operating System for Absolute Beginners: Robotics Programming Made Easy by Lentin Joseph
- Reference book
 - Robotic process automation
 - Robotic Process Automation For Dummies[®], NICE Special Edition

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School of Mechanical Engineering

Course Code : BTME 3072

Course Name: Robotics nad Automation

Thank You !