CSE 437: Lecture 1
Classroom Code: tceqr6n3

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SL. No	Topics / Content	Course Learning Outcome (CLO)
1	Peripheral Basic	CLO1, CLO2, CLO4
2	Data Input/Output Systems Basics	CLO1, CLO3, CLO4
3	Interfacing Principles: ADC, Actuators, Motors, Sensors, Types of Processors	CLO1, CLO3, CLO4

Topics	Specific Outcome(s)	Time Frame	Suggested Activities	Teaching Strategy(s)	Alignment with CLO
Course outline Guidelines, Introduction to Peripheral & Interfacing, Introduction to Transducers	CLO1, CLO2	Week 1		Live Lecture, Multimedia	Slide, Book, Class Lecture
Description of Different Types of Transducers, Introduction to Optocouplers	CLO 2, CLO 3	Week 2		Live Lecture, Multimedia	Slide, Book, Class Lecture
Introduction to Relays	CLO 2, CLO 3	Week 3		Live Lecture, Multimedia	Slide, Book, Class Lecture
Solid State Relays, Temperature Control Systems, CT 1	CLO 5	Week 4		Live Lecture, Multimedia	Slide, Book, Class Lecture
Introduction to Sensors	CLO 1	Week 5		Live Lecture, Multimedia	Slide, Book, Class Lecture
Detailed Description of Ultrasonic Sensor	CLO 3, CLO 4	Week 6		Live Lecture, Multimedia	Slide, Book, Class Lecture
CT 2, Review on the Mid semester syllabus		Week 7			
MID-TERM EXAMINATION					
Half Adder/ Subtractor Programming	CLO 3	Week 8		Live/Recorded video Lecture, Problem Solving	Class lecture, Youtube videos
Full Adder/ Subtractor Programming	CLO 3	Week 9		Live/Recorded video Lecture, Problem Solving	Class lecture, Youtube videos
Function Implementation in Arduino	CLO 4	Week 10		Live/Recorded video Lecture, Problem Solving, Group Discussion	Class lecture and Slide (If provided)
CT 3, Primary memory	CLO 2	Week 11		Live/Recorded video Lecture, multimedia	Slide
Secondary Memory	CLO 2	Week 12		Live/Recorded video Lecture, multimedia	Slide
Servo motor with Arduino, Edge Computing	CLO 5	Week 13		Live/Recorded video Lecture, Case study	Arduino.cc and google scholar
CT 4, Review on the full syllabus	--	Week 14			
FINAL EXAMINATION					

Evaluation Policy

Grades will be calculated as per the university grading structure and individual student will be evaluated based on the following criteria with respective weights.

1. Class Tests 30%
2. Term Examination 50%
3. Mid-Term Examination 20%

Class Test:

1. Assignment + Presentation / Weekly Assignment
2. Test 2

History of Robotics

- Origin – Traced in Czech word ‘robota’
- Means - ‘Forced’ / ‘Compusory labour’
- The word ‘robot’ first appeared in **1921** in the play RUR (“Rossum's Universal Robots”) – written by Czech Writer **Karel Capek (1890-1938)**
- Issac Asimov (**1940**) – Science fiction stories – envisioned the robot as a helper of mankind
- Postulated 3 basic rules for robots

History of Robotics

- Inspired by Asimov's Books on Robots – Joseph F. Engelberger tried to design a robot in 1950.
- He along with George C. Devol started UNIMATION Robotics Company in USA – 1958
- The first Unimate robot – installed in 1961 in General Motors Automobile Factory – New Jersey.

Introduction to Robotics

- Japanese Industrial Robot Association (JIRA) :
- “A device with degrees of freedom that can be controlled.”
- Class 1 : Manual handling device
- Class 2 : Fixed sequence robot
- Class 3 : Variable sequence robot
- Class 4 : Playback robot
- Class 5 : Numerical control robot
- Class 6 : Intelligent robot

Introduction to Robotics

- Intelligent Environments are aimed at improving the inhabitants' experience and task performance
- Automate functions in the home
- Provide services to the inhabitants
- Decisions coming from the decision maker(s) in the environment have to be executed.

Introduction to Robotics

- Decisions require actions to be performed on devices
- Decisions are frequently not elementary device interactions but rather relatively complex commands
- Decisions define set points or results that have to be achieved
- Decisions can require entire tasks to be performed

Definition of Robot

What is a robot?

➢ An electromechanical device that is:

- Reprogrammable
- Multifunctional
- Sensible for environment

- **Robot**, any automatically operated machine that replaces human effort, though it may not resemble human beings in appearance or perform functions in a humanlike manner.

Definition of Robot

According to Robot Institute of America (RIA):

- It is a reprogrammable multi-functional manipulator designed to move materials, parts, tools or specialized devices through variable programmed motions for the performance of a variety of tasks.

- There exist several other too given by other societies, e.g., The Japan Industrial Robot Association (JIAR),British Association (BRA), and All others.

- Reprogrammable, multifunctional manipulator designed to move material through variable programmed motions for the performance of a variety of tasks. (ISO)

Introduction to Robotics

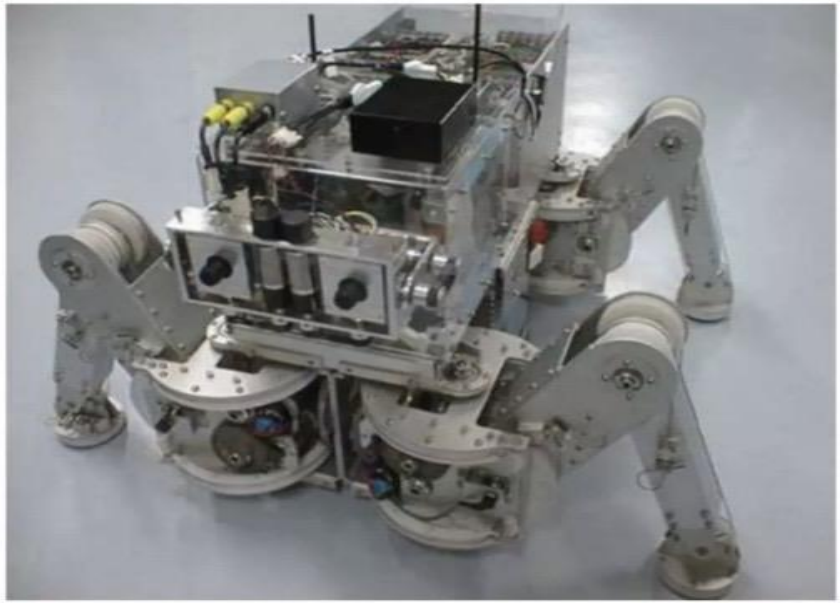
- All definitions have two points in common. They are ‘reprogramability’ and ‘multifunctionality’ of robots.

Type I : Manipulator

Introduction to Robotics

II Type

Legged Robot



Wheeled Robot

Introduction to Robotics

III Type

Autonomous Underwater Vehicle

Unmanned Aerial Vehicle

Robotics Applications

- Jobs that are dangerous for humans

Decontaminating Robot

- Cleaning the main circulating pump housing in the nuclear power plant

Robotics Applications

- Repetitive jobs that are boring, stressful, or labor-intensive for humans

Welding Robot

Robotics Applications

- Manual tasks that human don't want to do

The SCRUBMATE Robot

Laws of Robotics

- Asimov proposed three “Laws of Robotics” and later added the “zeroth law”:

- **Law 0:**

A robot may not injure humanity or through inaction, allow humanity to come to harm

- **Law 1:**

A robot may not injure a human being or through inaction, allow a human being to come to harm, unless this would violate a higher order law

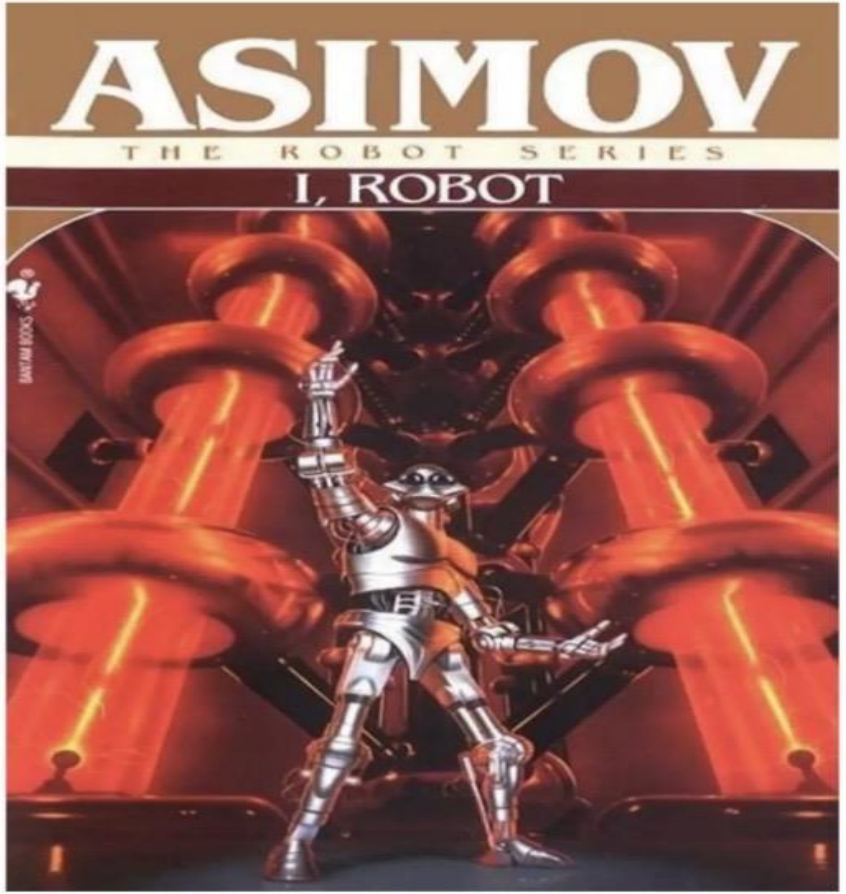
Laws of Robotics

- **Law 2:**

A robot must obey orders given to it by human beings, except where such orders would conflict with a higher order law

- **Law 3:**

A robot must protect its own existence as long as such protection does not conflict with a higher order law



Thank You