

PRESENTATION

# HUMANOID

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HUMANOID ROBOT

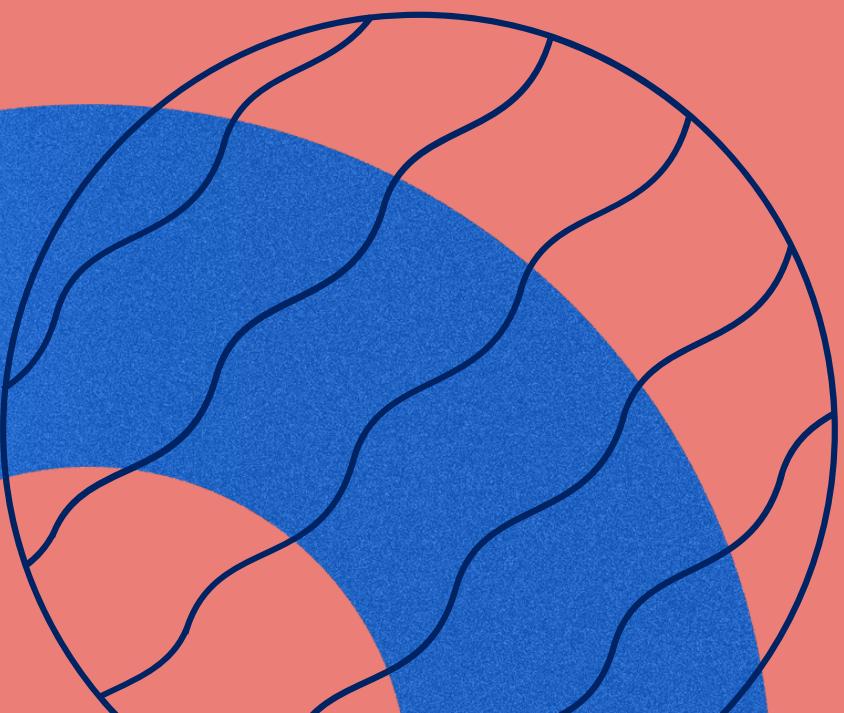


# Introduction

Humanoid robots are machines that resemble the human body in shape and are designed to interact with human tools and environments. They are becoming increasingly popular as research tools, with groups worldwide working on issues such as bipedal motion, control, and human-robot interaction. Humanoid robots have a wide range of applications in fields such as healthcare, sport, space exploration, construction, industry, and education. They can be used to replace humans in dangerous jobs, such as construction and equipment operation, and to perform tasks that are too difficult or dangerous for humans. Although humanoid robots are not yet fully developed, they have the potential to revolutionize many aspects of our lives.

# HISTORY

Year	Inventor	Robot	Description
1495	Leonardo da Vinci	Mechanical knight	A mechanical knight in armour who could sit up, wave their arms and move their head and jaw.
1738	Jacques de Vaucanson	The Flute Player	A wooden, human-sized robot capable of playing various melodies with the flute.
1973	Honda	Honda E01	The first humanoid robot developed by Honda.
2000	Honda	ASIMO	The world's most advanced humanoid robot.
2016	Sharp	Robophone	A humanoid robot that could answer calls and send text messages.



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## Research

Humanoid robots are used as research tools in fields such as bipedal motion, control, and human-robot interaction

## Entertainment

Humanoid robots are used for entertainment purposes, such as performing tasks and singing and dancing like humans

# APPLICATION

## Healthcare

Humanoid robots are used to take care of older people and ensure their safety

## Communication

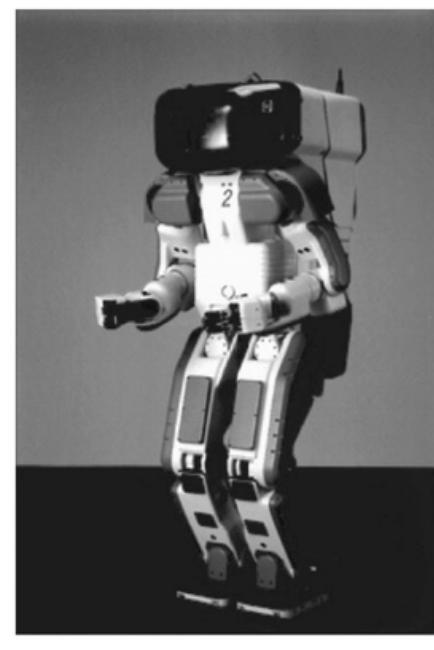
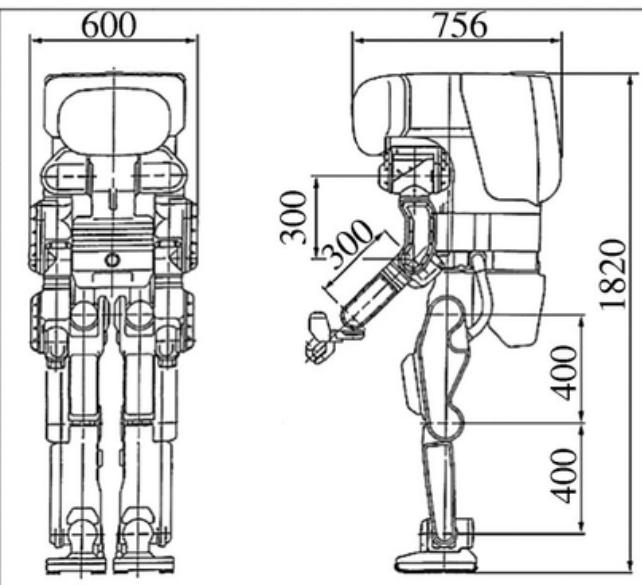
Humanoid robots are used as robotic avatars and ambassadors to communicate with people in different parts of the world

## Disaster response

Humanoid robots are used in disaster response to clear debris and perform other tasks that are too dangerous for humans

## BODY DESIGN

height: 182 cm  
weight: 210 kg  
dimensions:



Body Design of robot contains the links that can provide movement for robot to move with ease. Each links contains different amount of Degree Of Freedome (DOF) and 1 dos is a movement of left and right

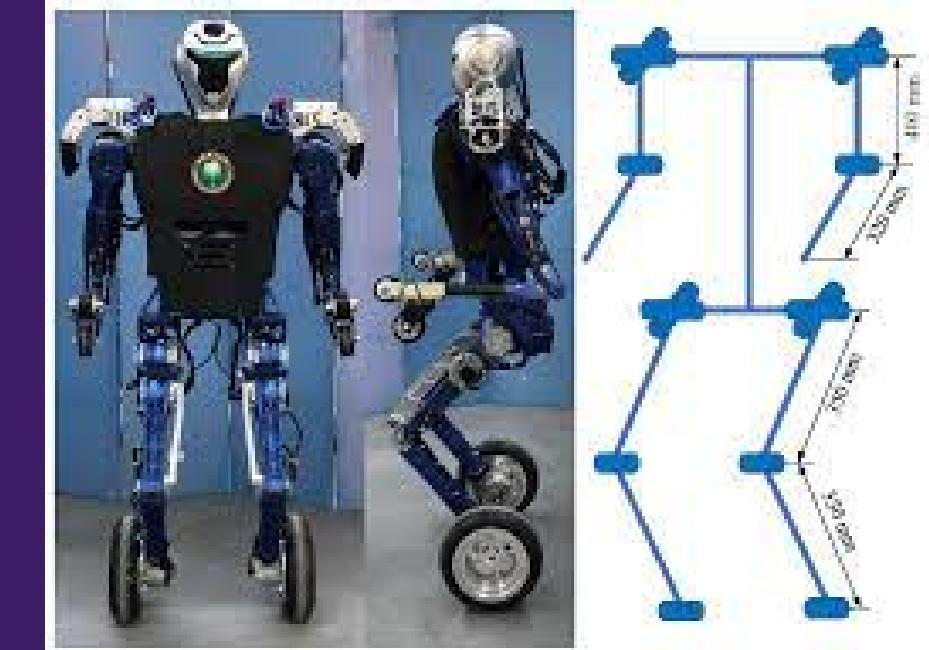
Parts	Joints	MOVEMENT	DOFs
HEAD	NECK	UP,DOWN,LEFT,RIGHT, ROTATION	3
ARMS	SHOLDER	FORWARD, BACKWARD, UP ,DOWN, ROTATION	3
	ELBOW	FORWARD & BACKWARD	1
	WRIST	UP, DOWN, LEFT, RIGHT	14
HANDS	FINGERS	GRABING OBJECT	26
HIP		ROTATION	2
LEGS	ANKLE	FORWARD, BACKWARD, UP ,DOWN, ROTATION	3
	KNEE	FORWARD & BACKWARD	1
	CROTCH	FORWARD, BACKWARD, UP ,DOWN, ROTATION	12



**LEGGED: MOST COMMON TYPE OF LOCOMOTION USED BY HUMANOID ROBOTS. WALKING ROBOTS SIMULATE HUMAN OR ANIMAL GAIT, AS A REPLACEMENT FOR WHEELED MOTION. LEGGED MOTION MAKES IT POSSIBLE TO NEGOTIATE UNEVEN SURFACES, STEPS, AND OTHER AREAS THAT WOULD BE DIFFICULT FOR A WHEELED ROBOT TO REACH**

Components	Application
Electric motor	Leg movement
Hydraulic	Power joint movement
Pneumatic	Leg extension
Servo Motor	Adjusting leg position
Linear	Linear leg motion
Force Sensor	Detecting leg force

# Locomotion



**ROLLING: A TYPE OF LOCOMOTION THAT INVOLVES THE ROBOT ROLLING ON ITS WHEELS OR TRACKS. THIS TYPE OF LOCOMOTION IS OFTEN USED FOR ROBOTS THAT NEED TO MOVE QUICKLY OR OVER ROUGH TERRAIN. ROLLING IS A SIMPLER TASK THAN WALKING, AS THE ROBOT DOES NOT NEED TO WORRY ABOUT BALANCING OR MAINTAINING ITS POSTURE.**

# NAVIGATION SYSTEM

**NAVIGATION SYSTEM ARE A SYSTEM USED BY ROBOTS TO PERCEIVED THIER ENVIROEMENT AND NAVIGATE THROUGH THAT SURROUNDINGS**

## SENSING & PERCEPTION

**USING SENSOR SUCH AS DEPTH SENSOR, CAMERAS , LIDAR ETC AS DUPLICATION OF THE EYES OF THE ROBOT. THESE SENSOR LOCATES THE OBSTACLES TO AVOID, LANDMARK TO FOLLOW AND POSITION ARIENTATION OF THE ROBOT**

## MAPPING & LOCALIZATION

**CREATING MAP OF THE ROBOT ENVIROEMENT AND ESTIMATING ITS POSITION. THE COMMON USED ALGORITHM IS THE SIMULTANIOUS LOCALIZATION AND MAPPING (SLAM)**

## OUTDOOR NAVIGATION

**GLOBAL POSITIONING SYSTEM IS COMMONLY USED IN THIS SATELLITE BASED NAVIGATION AND USEFUL FOR SEARCH AND RESCUE MISSION**

## DATA COLLECTION

**DATA COLLECTED BY COMBINATION OF SENSOR OF THE ENVIRONMENT TO GATHER DETAILS INFORMATION, OBJECT RECOGNITION AND RESPONDS TO STIMULI**

Sensor	Application
Camera	<b>used to collect visual data, such as the shape, color, and texture of objects in the robot's environment.</b>
Microphone	<b>used to collect audio data, such as the sounds of people talking or objects moving</b>
Lidar	<b>used to collect 3D data about the robot's environment, this data can be used to create a map of the environment, track the robot's position within the environment, and identify objects in the environment.</b>
Touch	<b>used to detect when the robot is touching an object, this data can be used to avoid obstacles, manipulate objects, and interact with humans</b>

## COMMUNICATION

### FORM OF INTERACTION BETWEEN THE ROBOT AND HUMAN (OPERATORS) IN FORM OF SPEECH, TOUCH BODY LANGUAGE OR FACIAL EXPRESSION

Communication Method	Description
Wireless	wireless protocols such as Wi-Fi and Bluetooth to communicate
Human - Robot interaction	Data collecting during the the interaction with human by reading thier facial expression or body language
Sensor data	data received from sensors to interact with the robot enviroments
Zigbee	used to detect when the robot is touching an object, this data can be used to avoid obstacles, manipulate objects, and interact with humans

## POWER MANAGEMENT

**POWER SOURCE ARE IMPORTENT FOR ANY ROBOTICS BASED INVENTION. HUMANOID ROBOT REQUIRES EFFECTIVE POWER MANAGMENT FOR A PROLONGED OPERATION. POWER MANAGMENT INCLUDE POWER SOURCE AND CHARGIN STATION**

Power Source	Description
Battery	<b>Using rechargeable battery such as Li-Po or Lithium ion battery so that it can be reused many time. Eg: ASIMO robot is powered by Lithium ion battery</b>
Power Cord	<b>Suitable for tethered cable connected to supply power for long operation time</b>
Solar cell	<b>Convert solar energy to electrical DC voltage by using solar panels</b>
Fuel cell	<b>Converst chemical energy from combustion of fuel or hydrogen to electrical energy</b>