

ENGR 3421: Robotics I

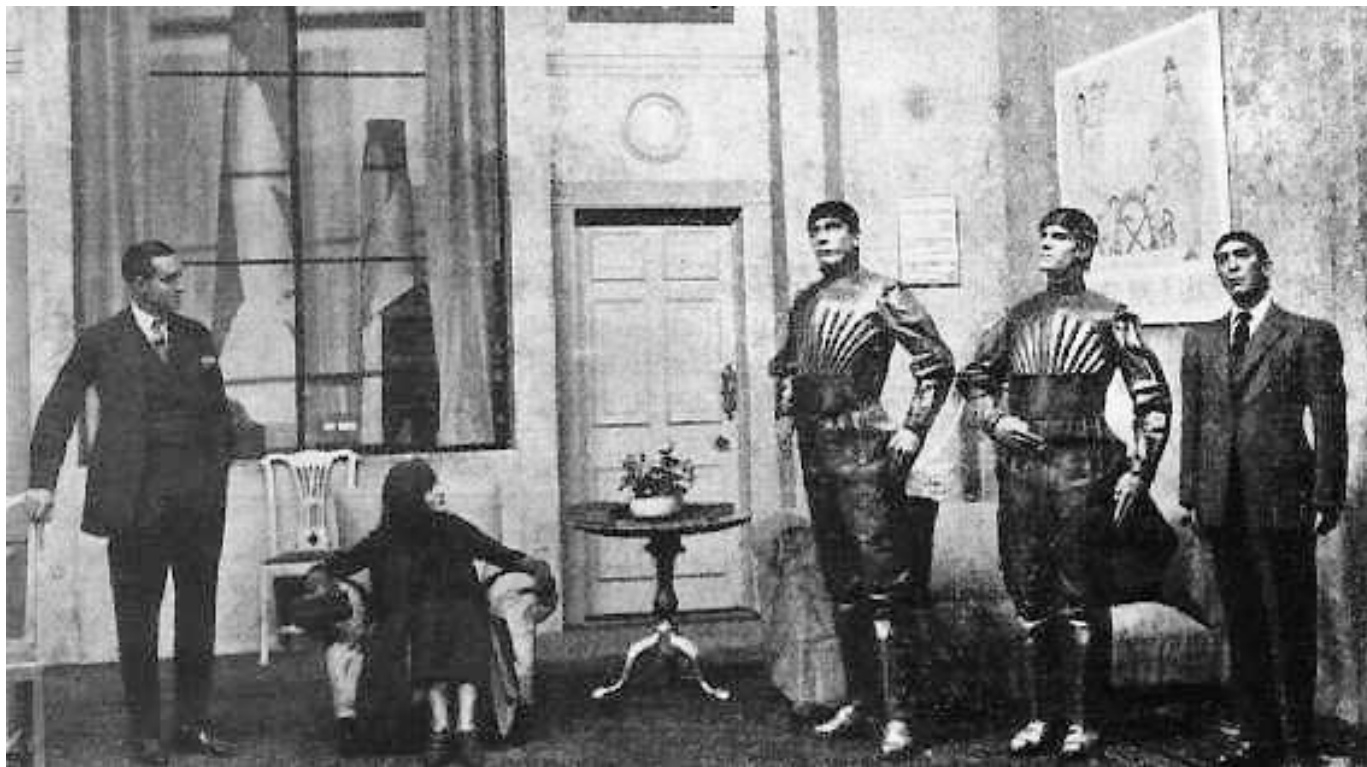
Introduction

08/26/2025



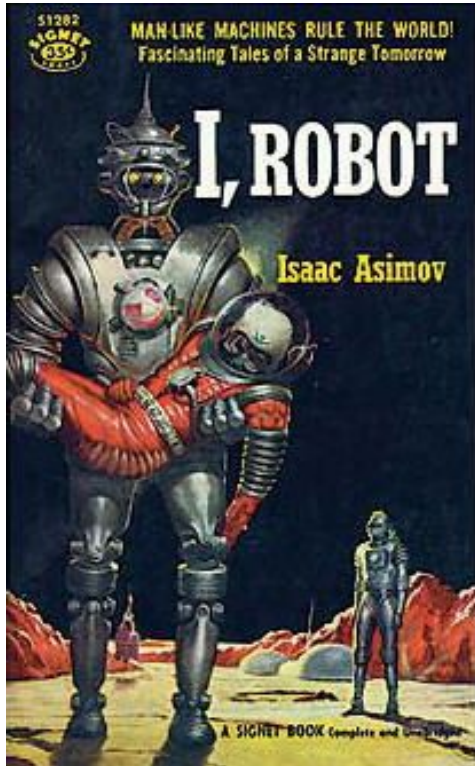
A Brief History to Robotics

The Origin of the Word "Robot"



Rossum's Universal Robots (R.U.R.) is a 1920 science fiction play by the Czech writer Karel Čapek.

Three Laws of Robotics



1. A robot may not injure a human being or, through inaction, allow a human being to come to harm.
2. A robot must obey the orders given it by human beings except where such orders would conflict with the First Law.
3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.

Dreams of the Artificial Life



Talos from Greek mythology



Golem from Jewish folklore

Amazing Clockworks of Automata



Model of Leonardo's robot with inner workings, on display in Berlin



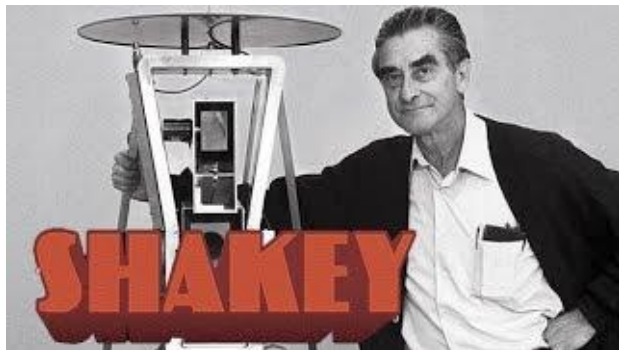
Automaton of a Friar. Mid-16th century (Smithsonian National Museum of American History, Washington, D.C.)

The First Industrial Robot



- Created in 1961 by Unimation, accompany founded by George Devol and Joseph Engelberger.
- General Motors introduced the Unimate robot to its assembly line of General Motors' Ternstedt plant, in Trenton, N.J.
- It took over the repetitive, dirty, dreary, and dangerous jobs.

Robots in Late 20th Century



Shakey(1966s), the mobile robot perceives and reasons its surroundings



ALVINN (1989), the autonomous land vehicle in neural network



Sojourner (1997), the Mars Rover

Robots in 21st Century



A mobile robotic chemist



Nvidia Self-Driving



Perseverance (2021), the Mars Rover

Other Types of Robots



Autonomous Drone Racing



Atlas by Boston Dynamics



Unitree A2

Mobile Robot (Our Focus)

A.k.a. automated guided vehicle, Autonomous ground vehicle (AGV), unmanned ground vehicle (UGV).

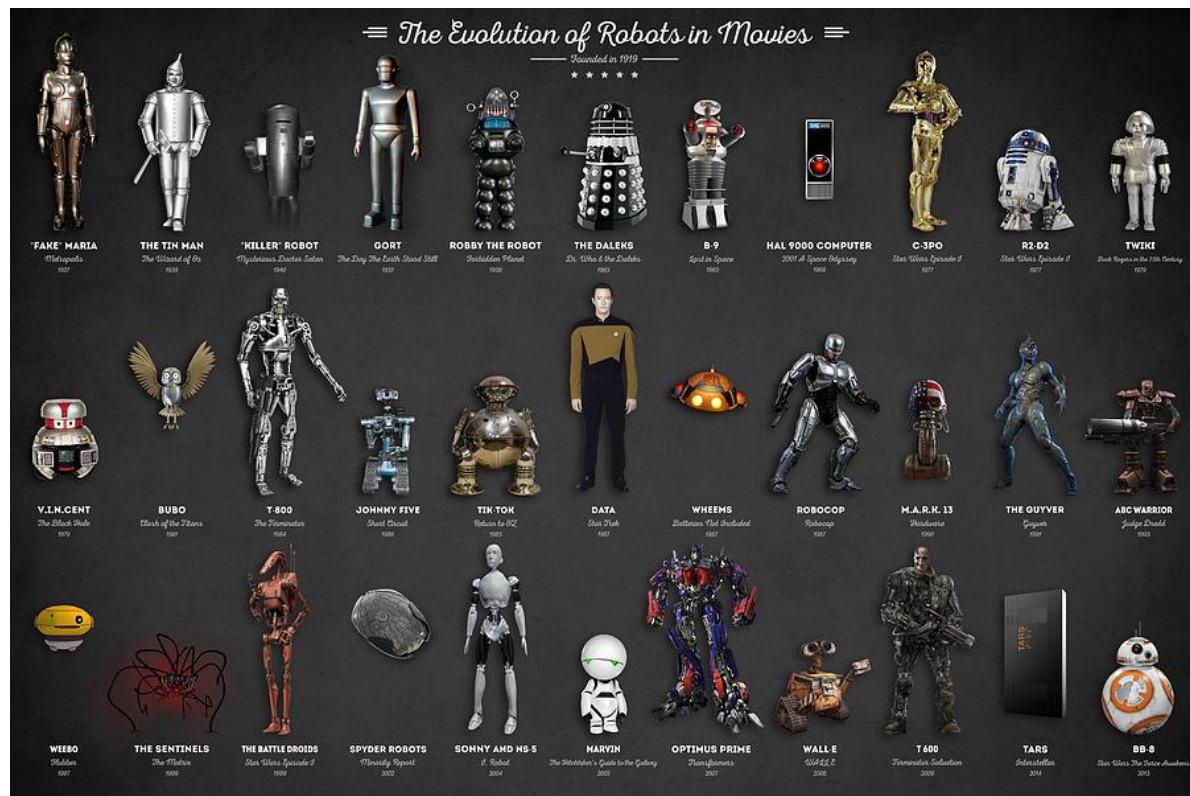
- Self-driving car
- Delivery robot
- Warehouse robot
- Housekeeping robot

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What Is A Robot?

In Popular Culture



In Industries

Robots may be constructed to evoke human form, but most robots are task-performing machines, designed with an emphasis on stark functionality, rather than expressive aesthetics.

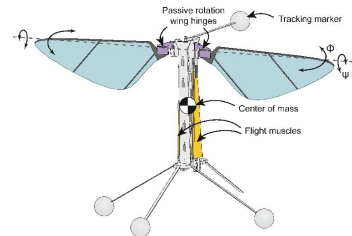
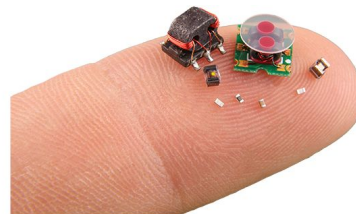
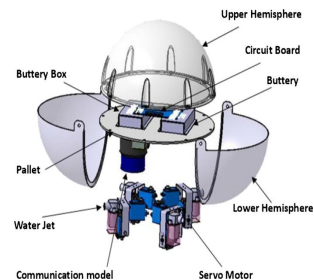
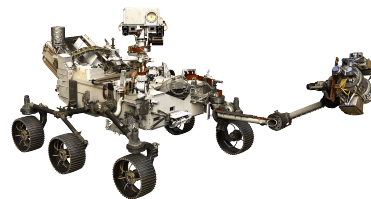
- Factory robot
- Housekeeping robot
- Warehouse robot
- Agricultural robot
- Survey robot
- Entertainment robot



In Scientific Research

A robot is a machine—especially one programmable by a computer—capable of carrying out a complex series of actions automatically.

- Humanoid
- Quadrupedal robot
- Spherical robot
- Winged robot
- Quadrotor
- Underwater robot
- Soft robot
- Extra-terrestrial robot
- ...

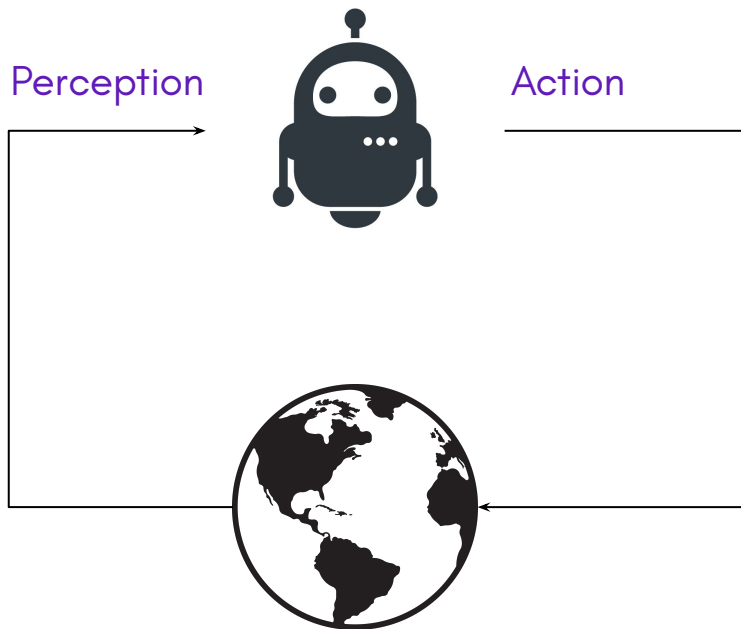


Dictionary Definition

A robot is a machine, especially one programmable by a computer, capable of carrying out a complex series of actions **automatically**.

Roomba Creator's Definition

A robot is an **autonomous** machine capable of sensing its environment, carrying out computations to make decisions, and performing actions in the real world.



How to Success (4Cs)

- Be curious
- Be cautious
- Be committed
- Be communicative



You wanna have fun? Build it, break it, fix it

Safety First

Wear Protections