

Welcome

ENGR 3421: Robotics I

Introduction

08/22/2024



Outline

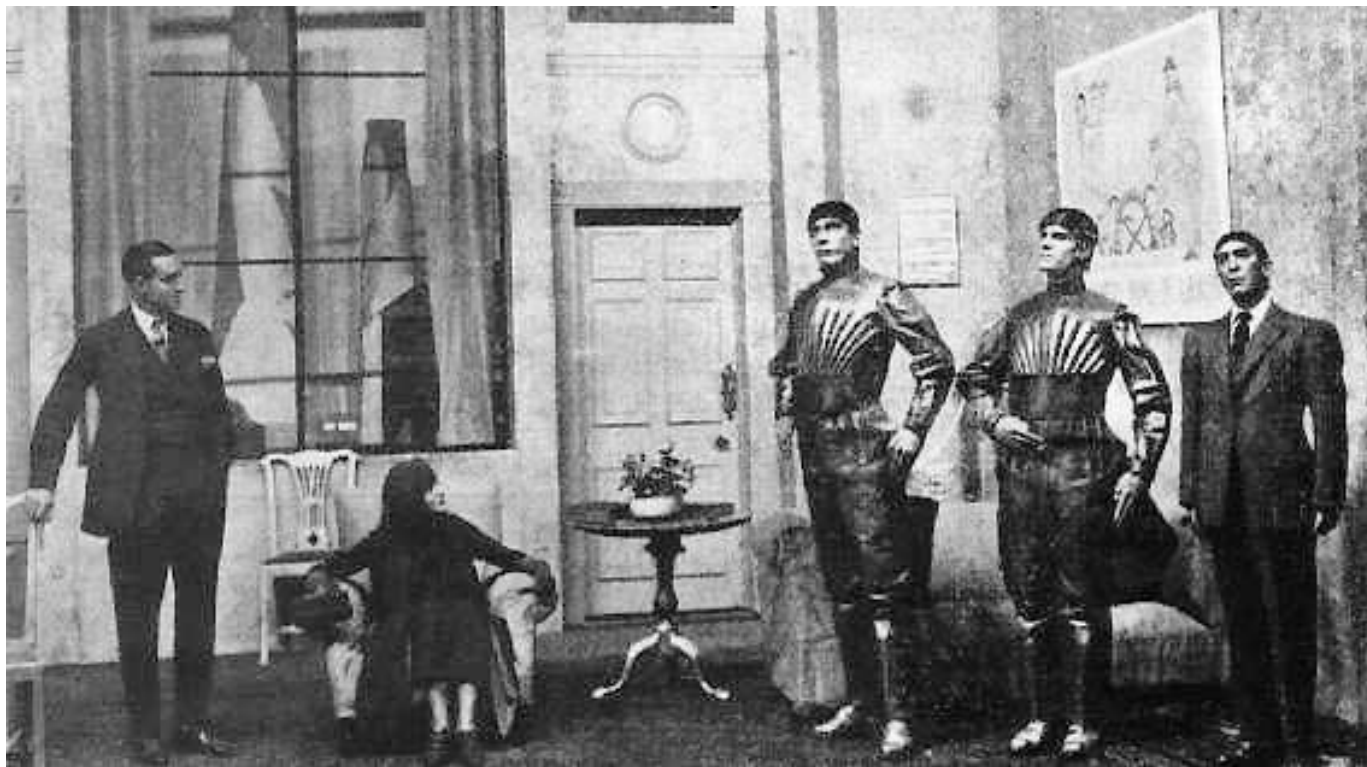
- Course related information
- A Brief Introduction to Robotics

Course Information

- Course Materials: <https://linzhanguca.github.io/robotics1-2024>
- Hours: 10:50 AM – 1:30 PM, Tuesdays & Thursdays
- Location: LSCA 105
- Office Hour: 10:00 AM – 12:00 PM, Wednesdays @ LSCA 105
 - Look for me in LSC 110 / LSC 013 if not in the classroom
- Wifi: BotSpot (physicsrules)

A Brief Introduction 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.

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.

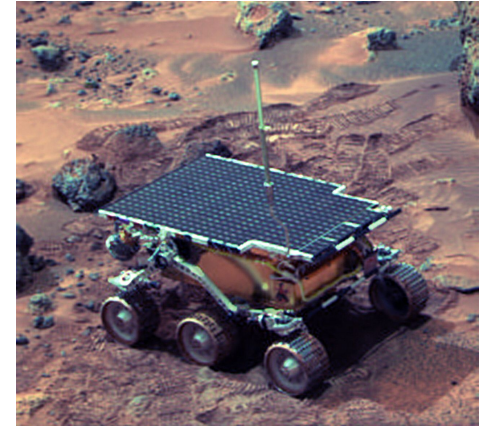
Robots in Late 20th Century



Shaky(1966s), the mobile robot



ALVINN (1989), the self-driving vehicle



Sojourner (1997), the Mars rover

Robots in Late 20th Century



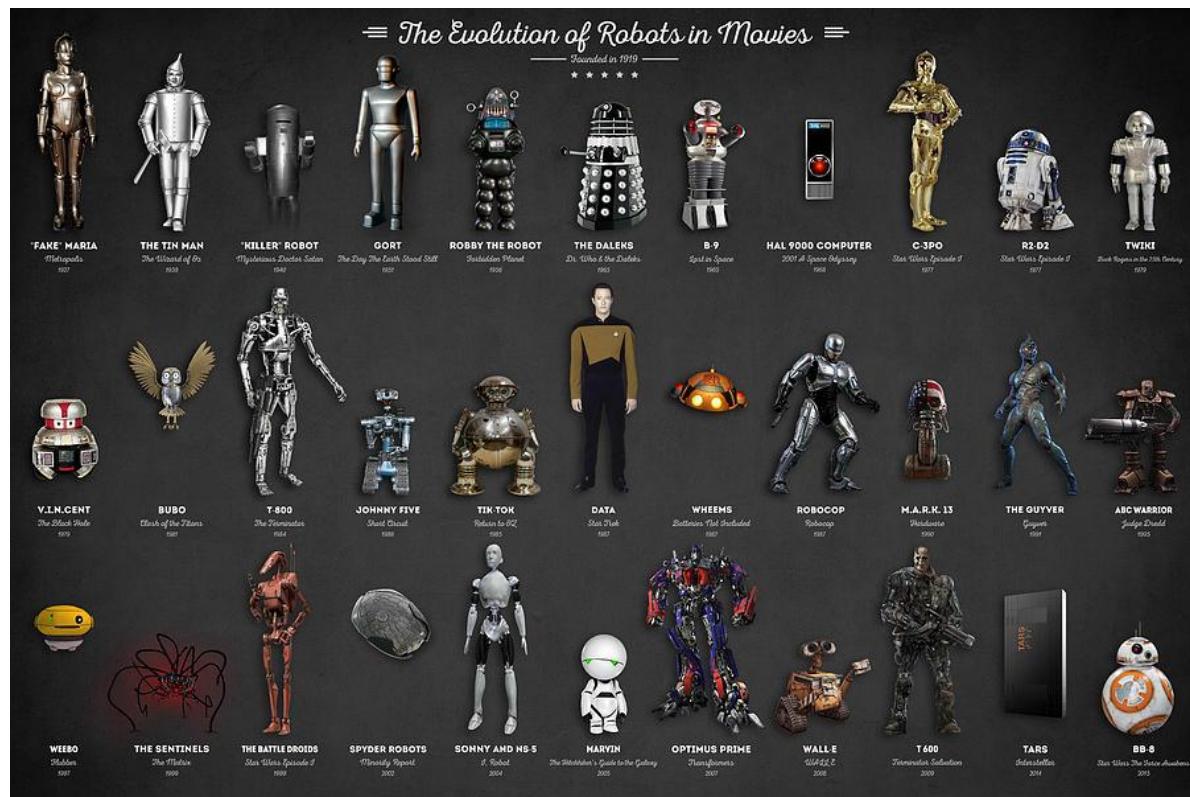
Sophia by Hanson Robotics



Spot by Boston Dynamics

What Is A Robot?

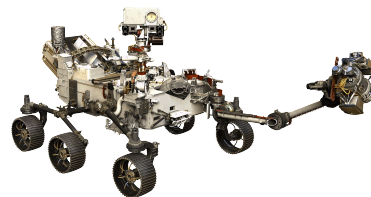
In Popular Culture



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.

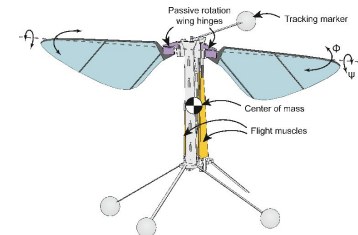
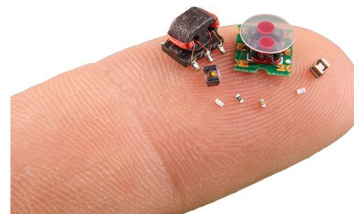
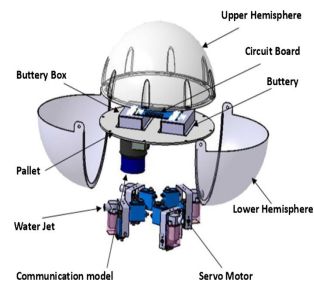
- Factory robot
- Housekeeping robot
- Warehouse robot
- Agricultural robot
- Survey robot
- Entertainment robot



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
- ...

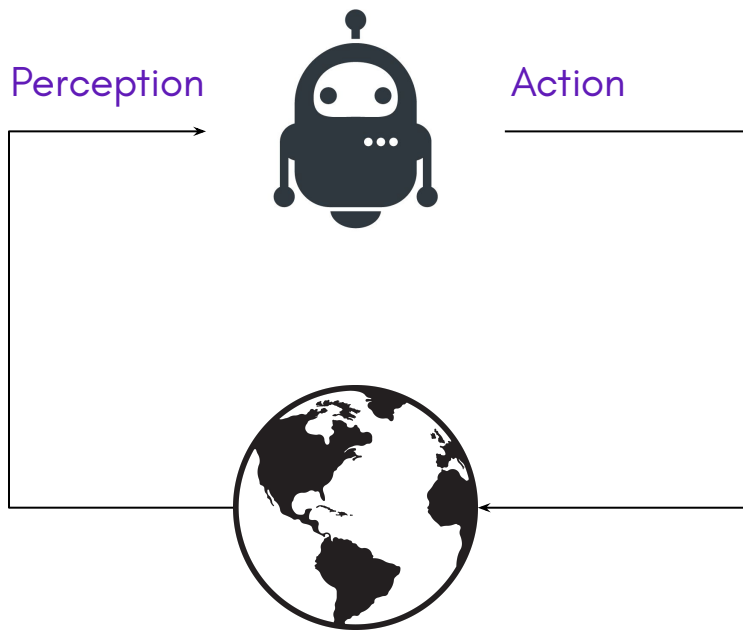


Dictionary Definition

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.



Key Components

- **Mechanical Structure:** This includes the robot's physical body, joints, and actuators (devices that convert energy into mechanical motion).
- **Sensors:** These devices gather information about the robot's environment, such as vision, touch, and proximity sensors.
- **Actuators:** These devices carry out physical actions, like moving limbs or manipulating objects.
- **Control System:** This is the "brain" of the robot, responsible for processing sensor data, making decisions, and controlling the actuators.

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

...



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