

We 1come

# ENGR 3421: Robotics I

## Introduction

08/22/2024



# Outline

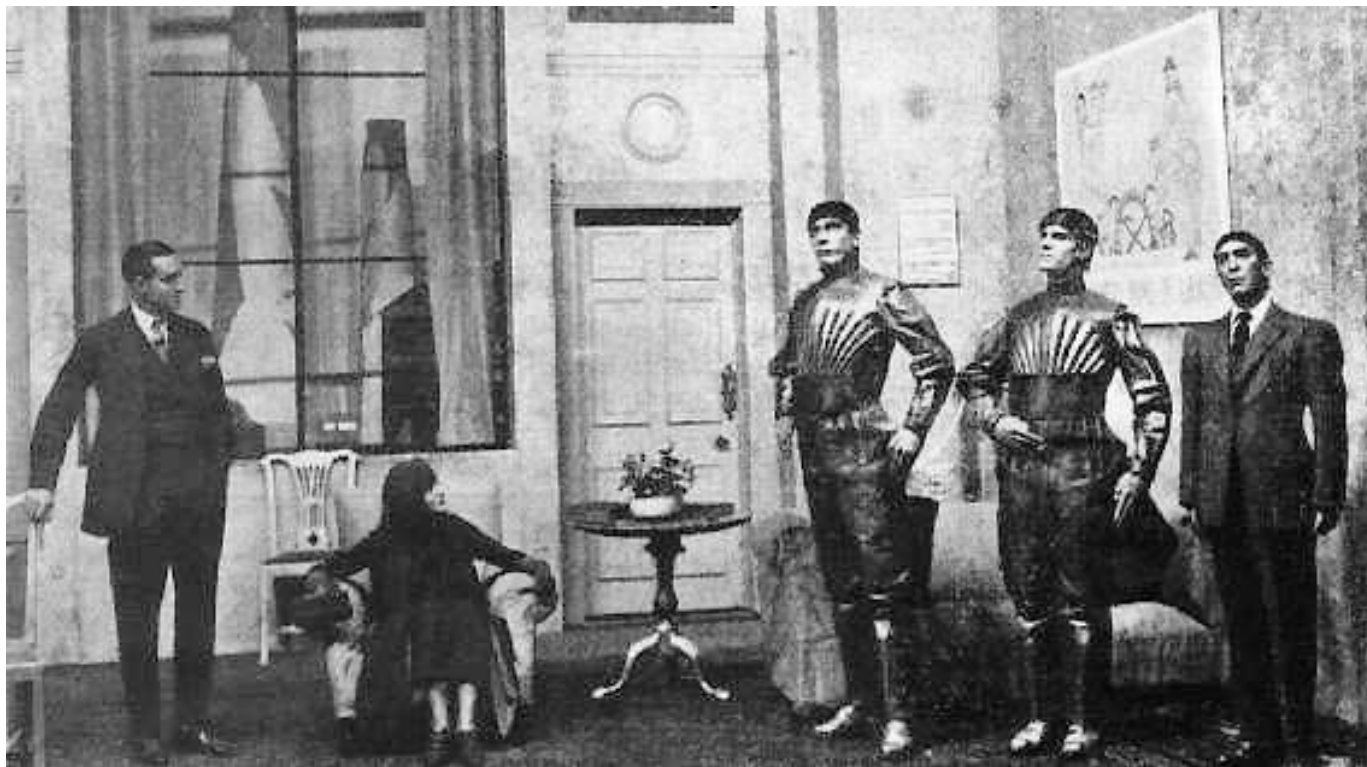
- Course related information
- A Brief Introduction to Robotics

# 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.

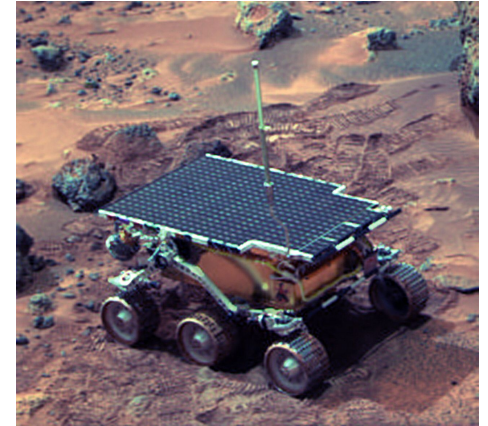
# Robots in Late 20th Century



Shaky(1966s), the mobile robot



ALVINN (1989), the self-driving vehicle



Sojourner (1997), the Mars rover

# Robots in 21st Century



Roomba by iRobot



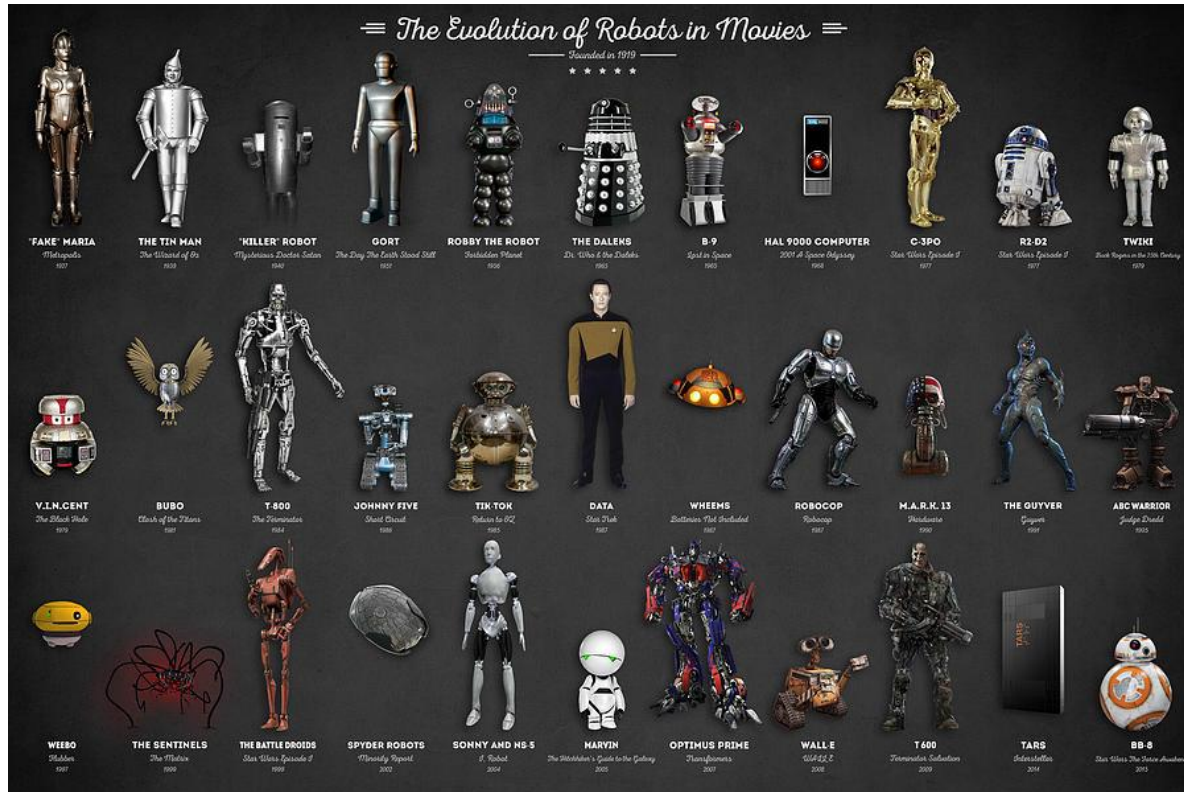
Atlas by Boston Dynamics



Sophia by Hanson Robotics

**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.

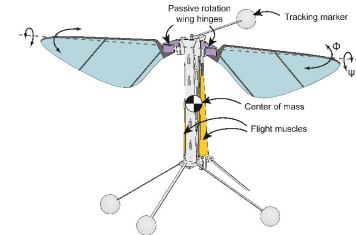
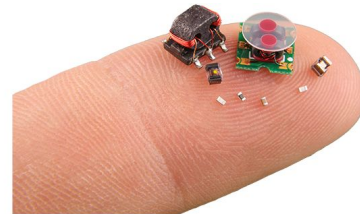
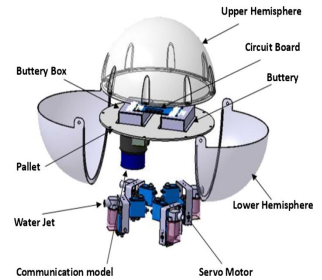
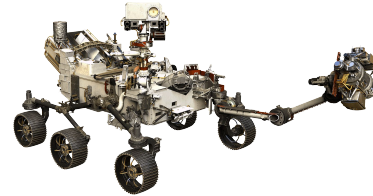
- Factory robot
- Housekeeping robot
- Warehouse robot
- Agricultural robot
- Survey robot
- Entertainment robot



# 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
- ...



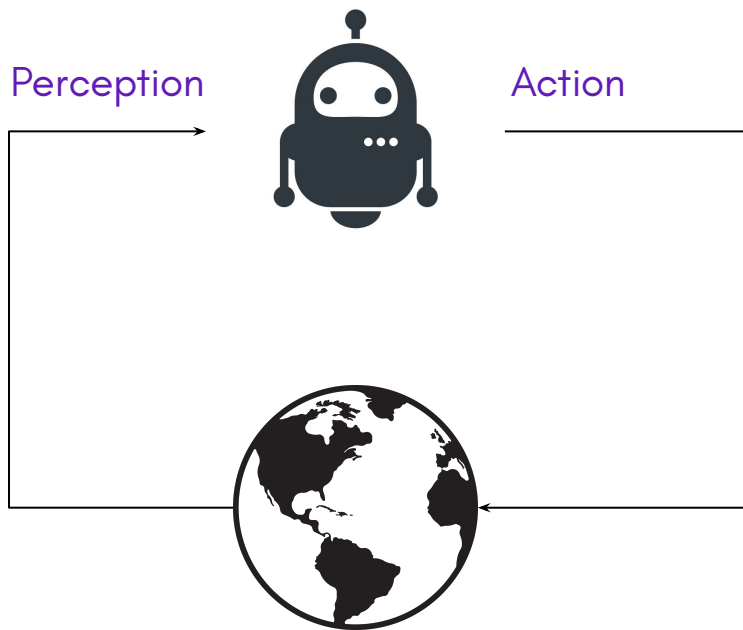
# Dictionary Definition

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**