

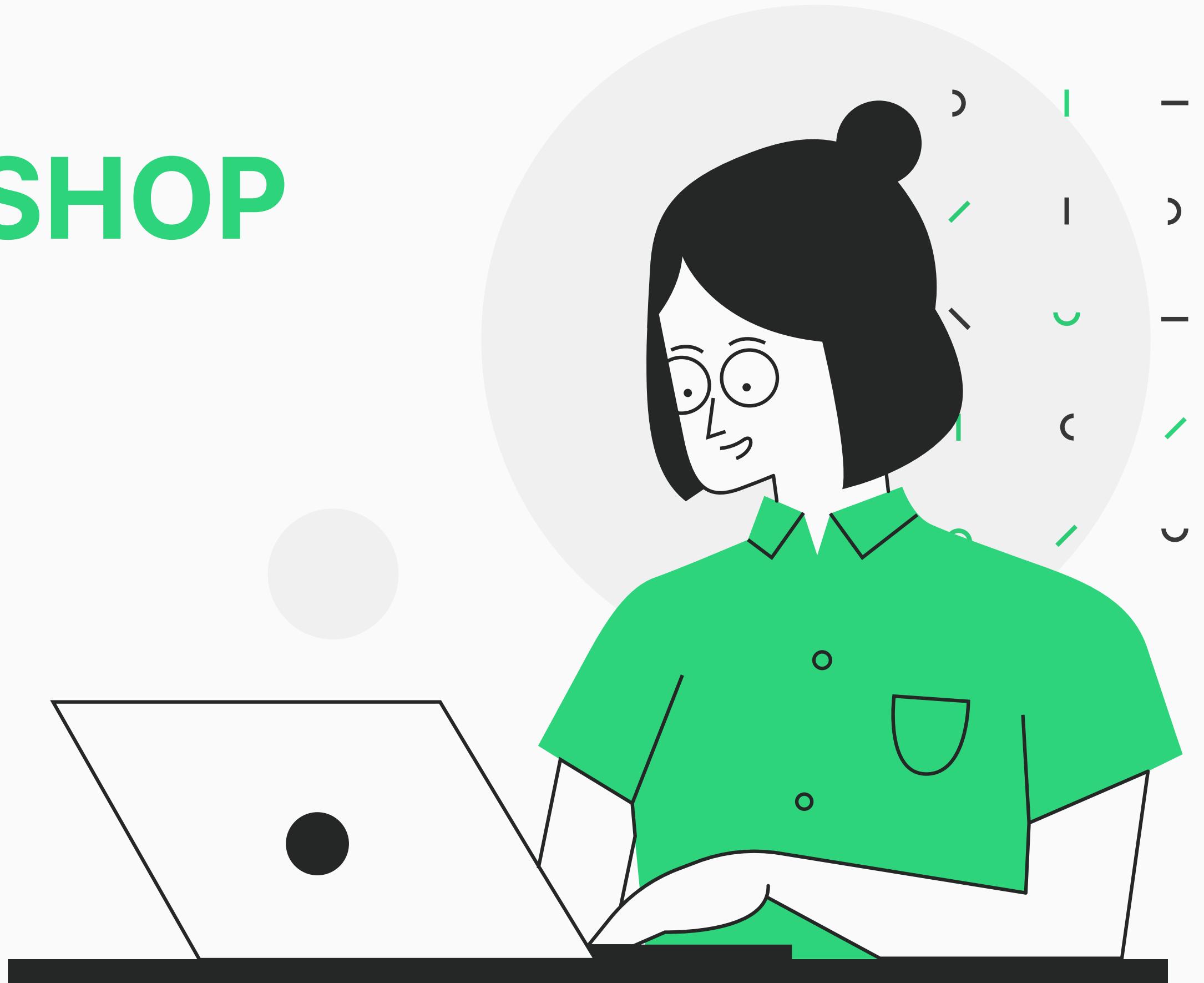
ROS WORKSHOP

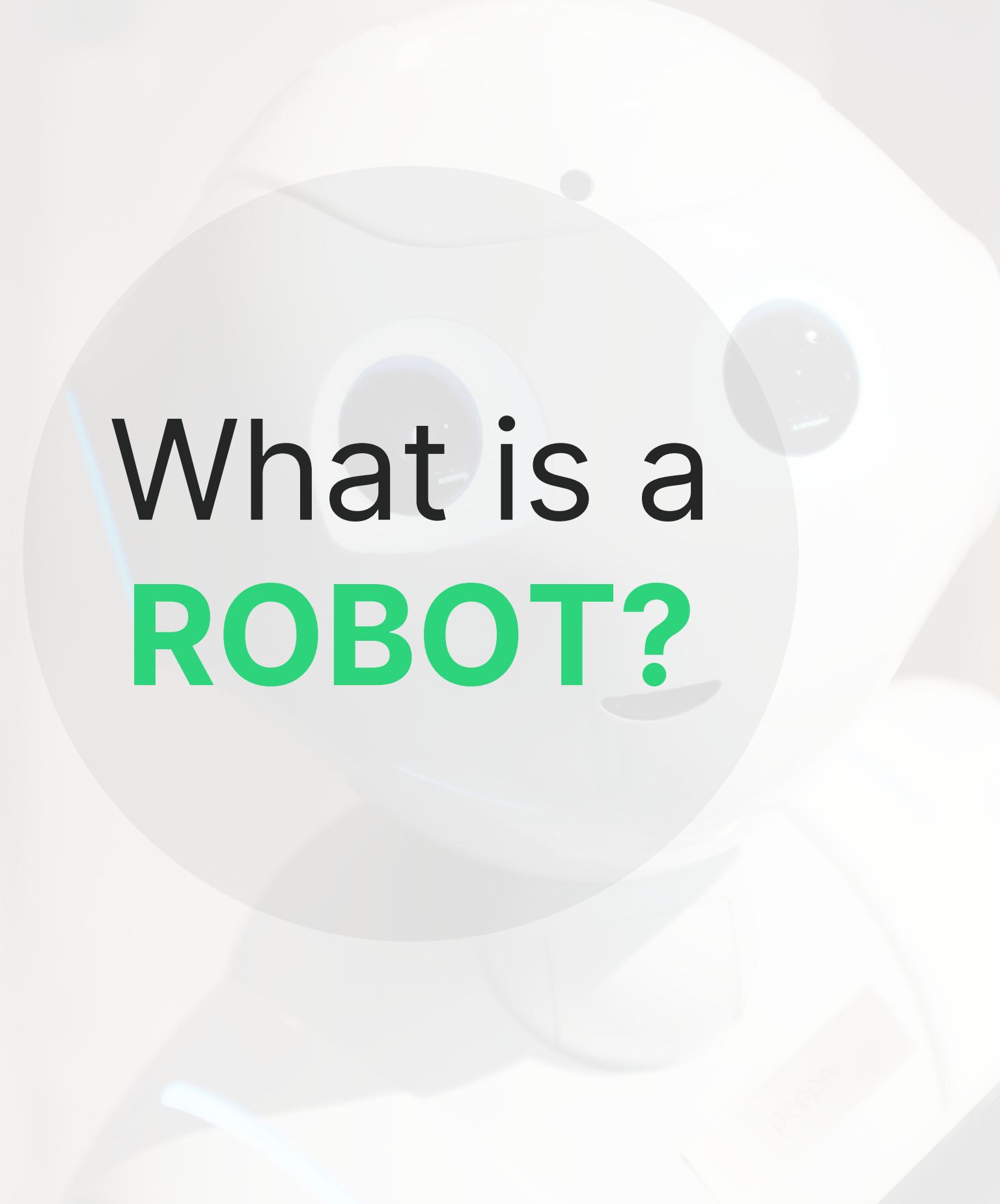
FOR VRC

FOR TECHNOVANZA - VJTI, MUMBAI

RIGBETEL LABS

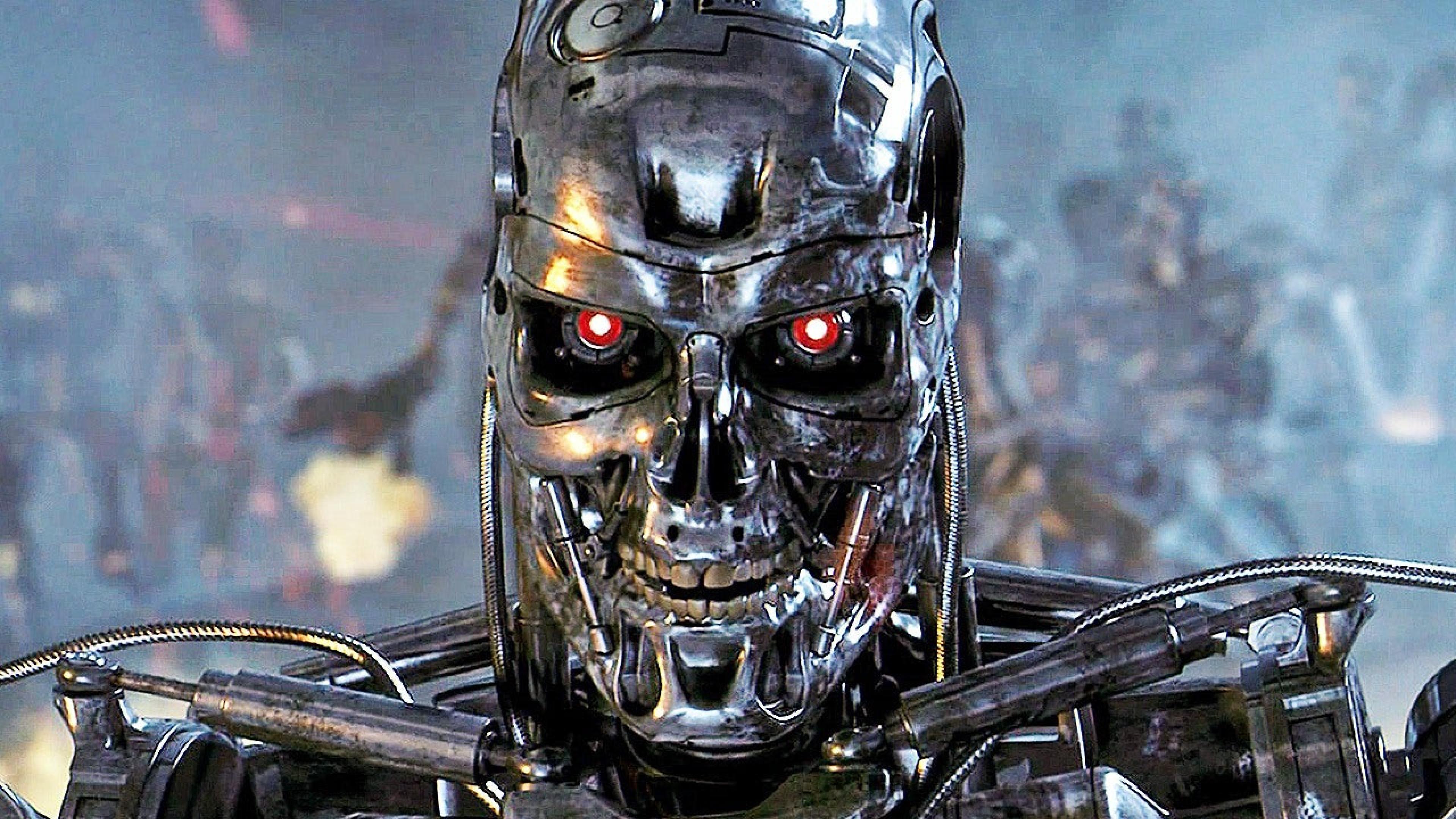
01

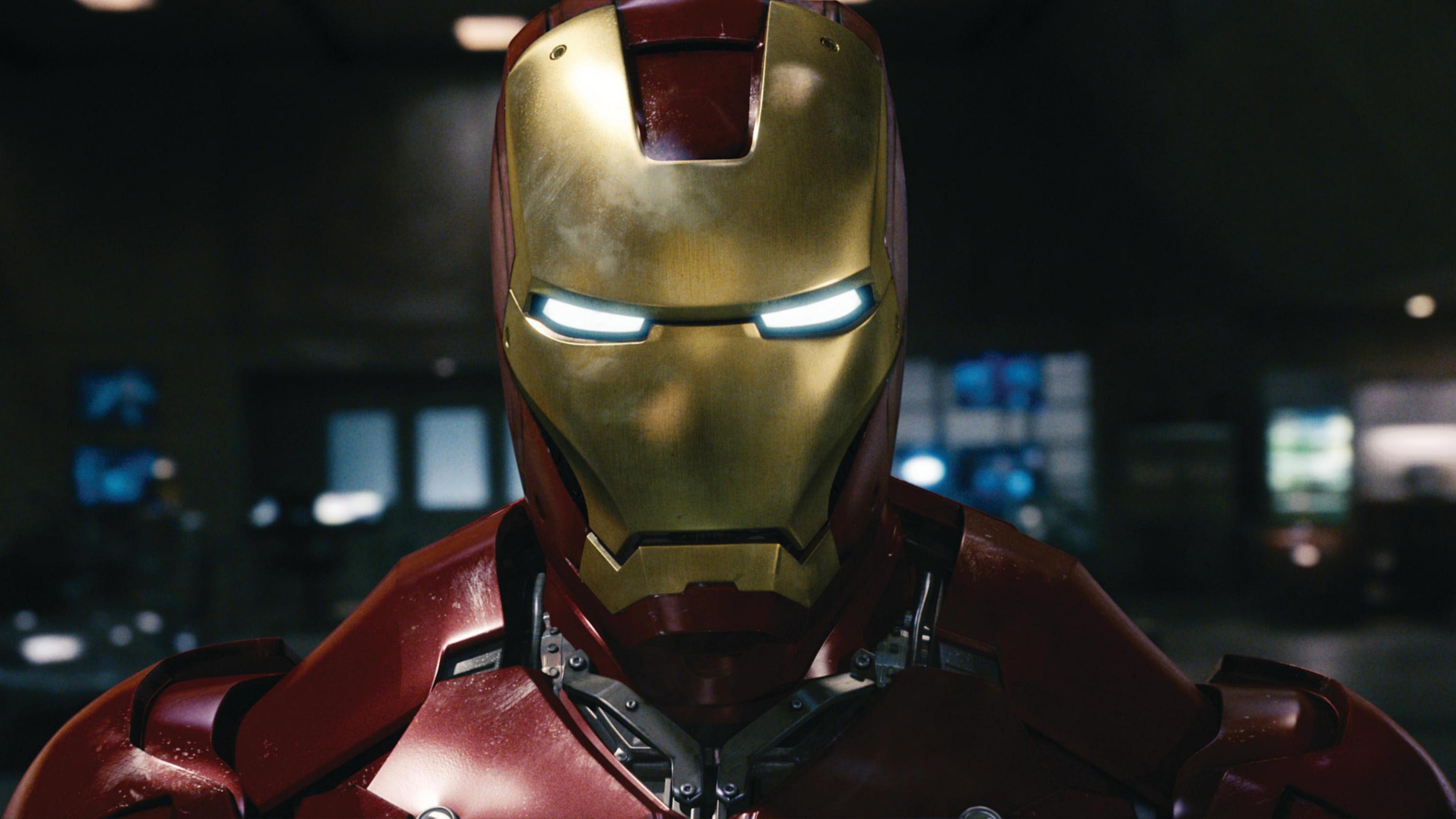




What is a
ROBOT?





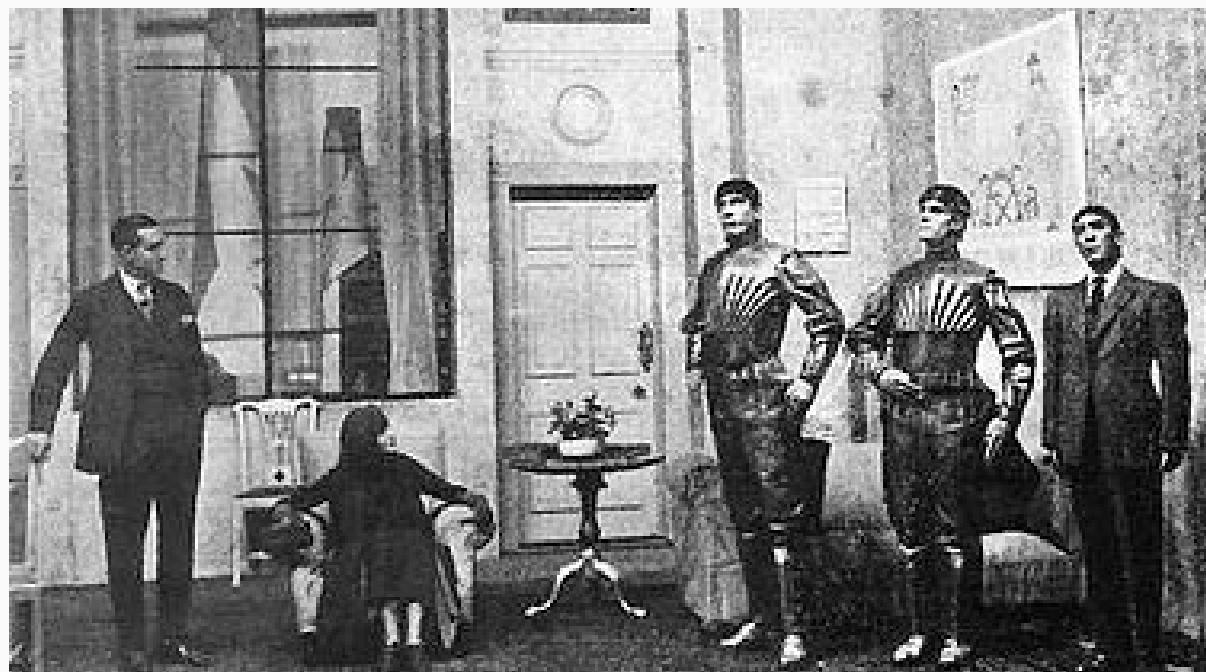


Robotics

Robot VS Machines

ROBOT INSTITUTE OF AMERICA

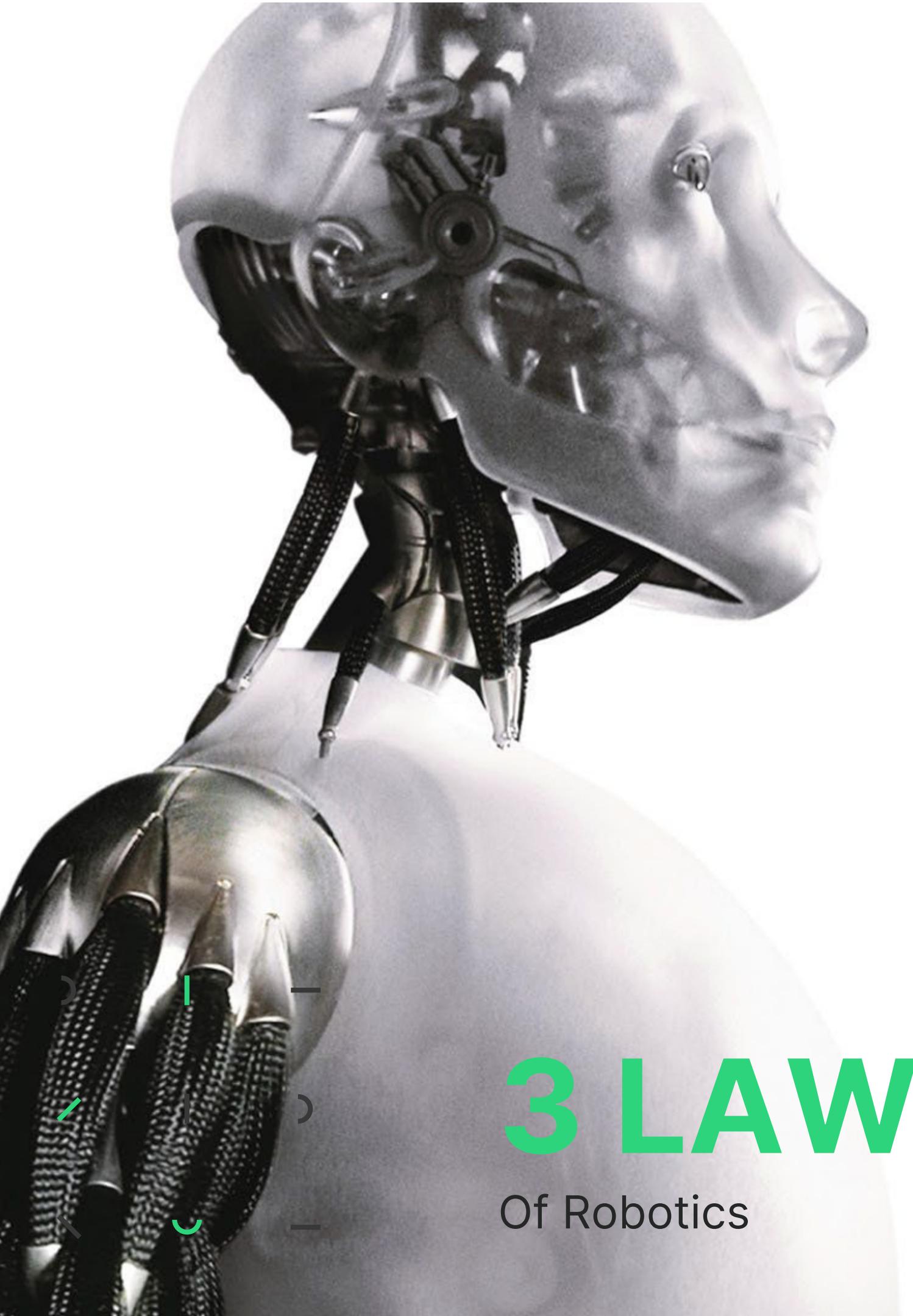
"A robot is a reprogrammable, multifunctional manipulator designed to move material, parts, tools, or specialized devices through variable programmed motions for the performance of a variety of tasks."



HISTORY

Modern term robot derives from the Czech word *robota* ("forced labour"), used in Karel Čapek's play *R.U.R.* (1920). The play's robots were manufactured humans, heartlessly exploited by factory owners until they revolted and ultimately destroyed humanity.

03



3 LAWS

Of Robotics

A ROBOT MAY NOT
INJURE A HUMAN
BEING, OR,
THROUGH
INACTION, ALLOW
A HUMAN BEING TO
COME TO HARM

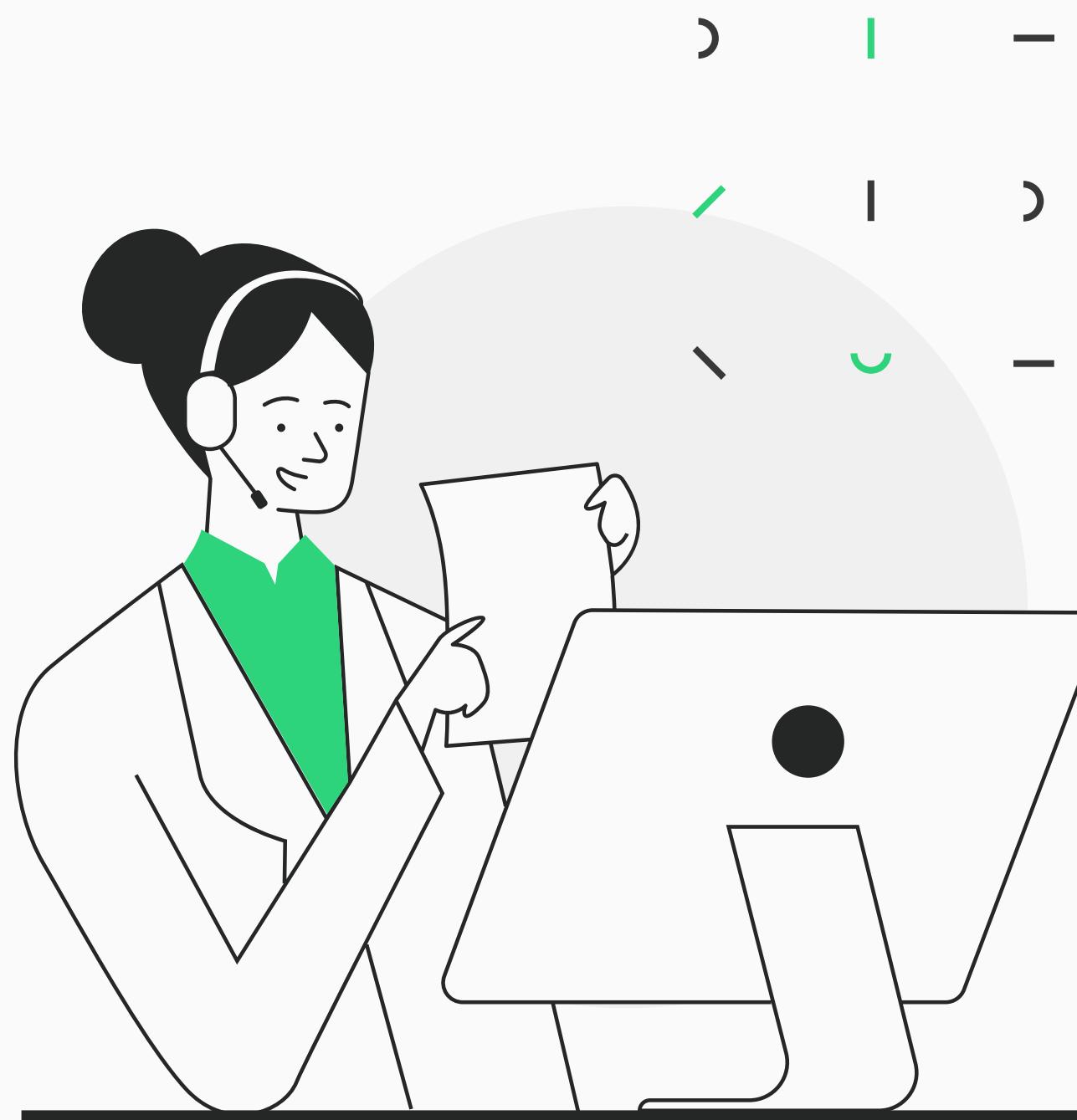
A ROBOT MUST
PROTECT ITS OWN
EXISTENCE AS LONG AS
SUCH PROTECTION
DOES NOT CONFLICT
WITH THE FIRST OR
SECOND LAW.

A ROBOT MUST OBEY
THE ORDERS GIVEN
IT BY HUMAN BEINGS
EXCEPT WHERE
SUCH ORDERS
WOULD CONFLICT
WITH THE FIRST
LAW.

04

Automation VS Robotics?

05



AUTOMATION:

- Machinery designed to carry out a specific task
- Bottle Filling Machine
 - Dishwasher
 - Paint sprayer

ROBOTS:

- Machinery designed to carry out a variety of tasks
- Pick and Place Robot Arms
 - Mobile Robots
 - Computer Numerical Control Machines

Measures of Performance

06

WORKING VOLUME

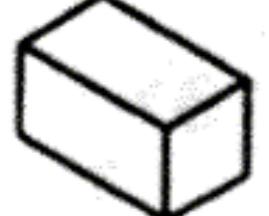
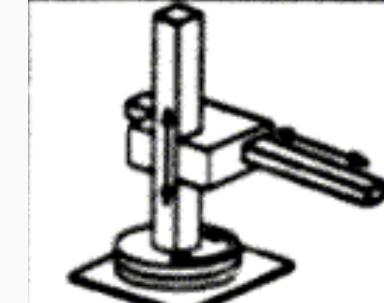
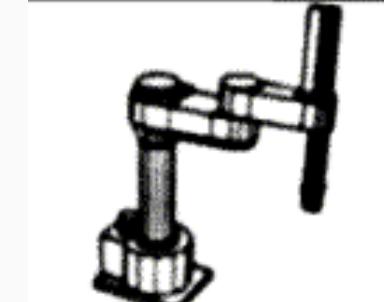
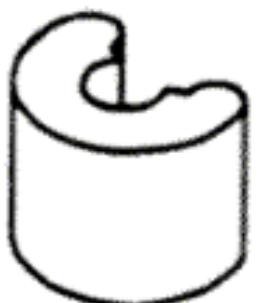
- The space within which the robot operates.
- larger volume costs more but can increase the capabilities of a robot

SPEED AND ACCELERATION

- Faster speed often reduces resolution or increases cost
- Varies depending upon the position of load.
- Speed can be limited by the task the robot performs (Welding, Cutting, etc.)

RESOLUTION

- The smallest step the robot can take.
- Often a speed tradeoff.

| Principle | Kinematic Structure | Workspace |
|--|---|---|
|  Cartesian Robot |  |  |
|  Cylindrical Robot |  |  |
|  Spherical Robot |  |  |
|  SCARA Robot |  |  |
|  Articulated Robot |  |  |

Measures of Performance



ACCURACY

- The difference between the actual position of the robot and the programmed position

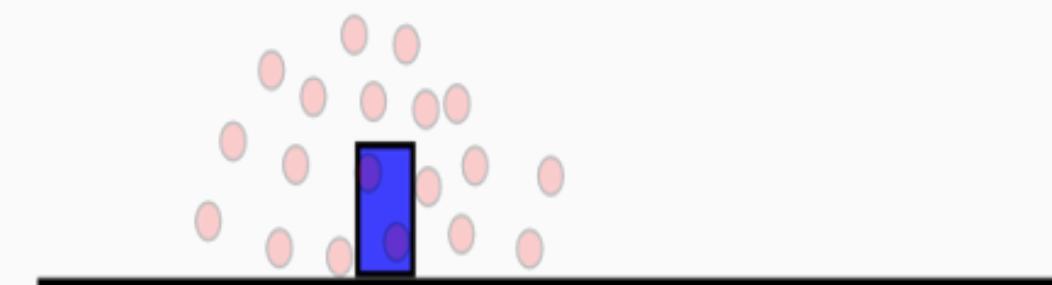
Low accuracy, high repeatability:



REPEATABILITY

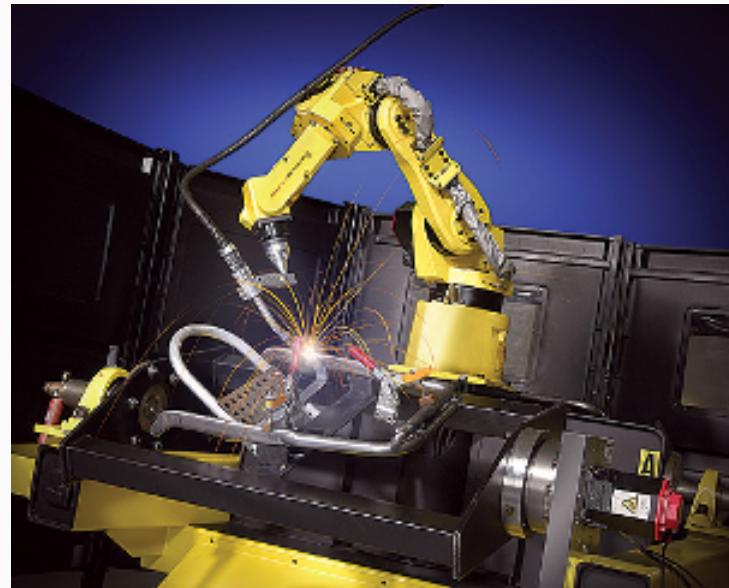
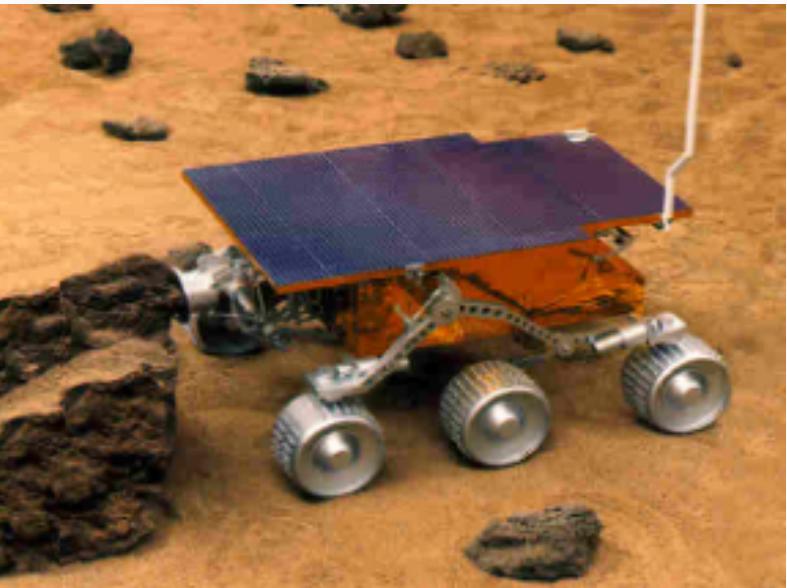
- Will the robot always return to the same point under the same control conditions?

High accuracy, low repeatability:



Robotic Task

- Dangerous:
 - Space Exploration
 - Chemical spill cleanup
 - Disarming bomb
- Boring & Repetitive:
 - Welding Car Frames
 - Pick & Place
- High precision or High Speed:
 - Electronics Testing
 - Surgery
 - Precision Machining



07

Current state of **Mobile Robotics**



08

Overview

Great Expectations...

TASKS FOR OUR MOBILE ROBOT



LOCOMOTION

Unspervised Moving



PERCEPTION

Avoiding Obstacles



NAVIGATION

Localization,
Mapping and
Path Planning

09

HOW SHOULD WE ACHIEVE IT?



DESIGNING

Making Detailed CAD
model of the robot



DESCRIBING PARAMETERS

Using Universal
Robot Description
Format



TELEOPERATION

Control Robot using
command velocity



IMPLEMENTING SLAM

Make Robot capable
of generating a Map
of surrounding

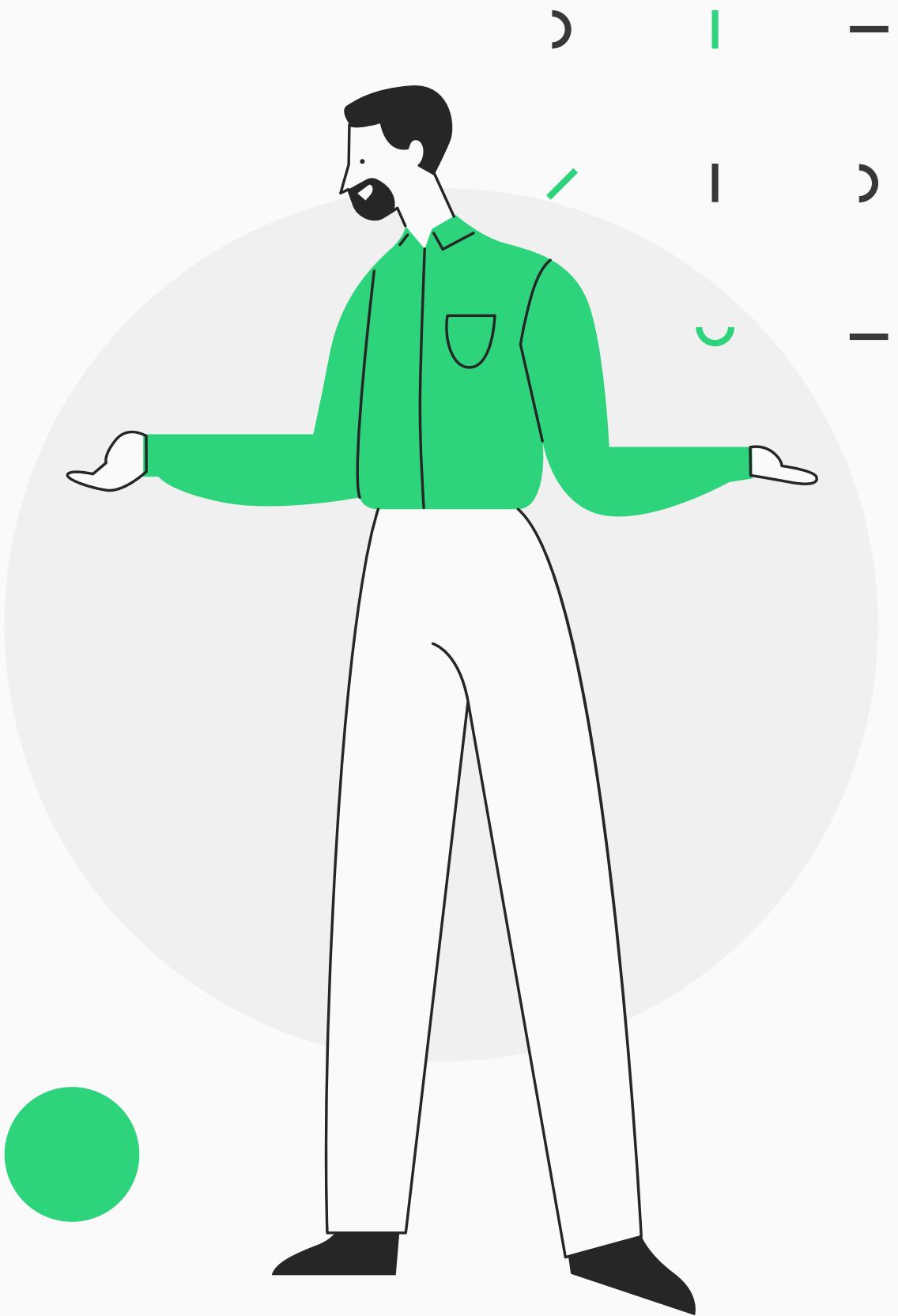


IMPLEMENTING NAVIGATION

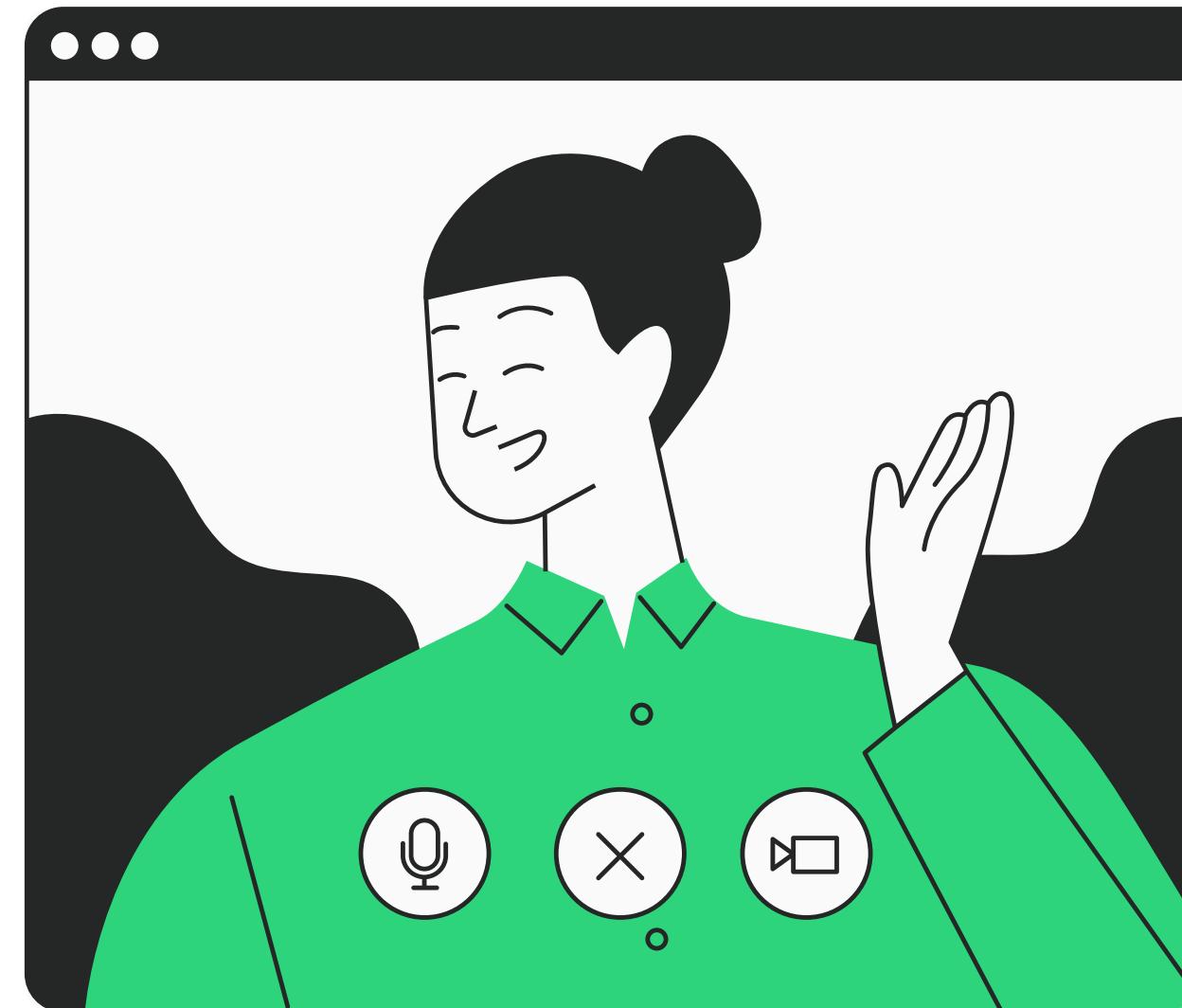
Autonomous
navigation of robot in
known surrounding

10

ANY
QUESTIONS?



Contact Me



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