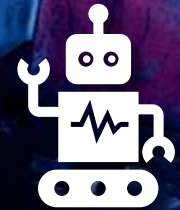
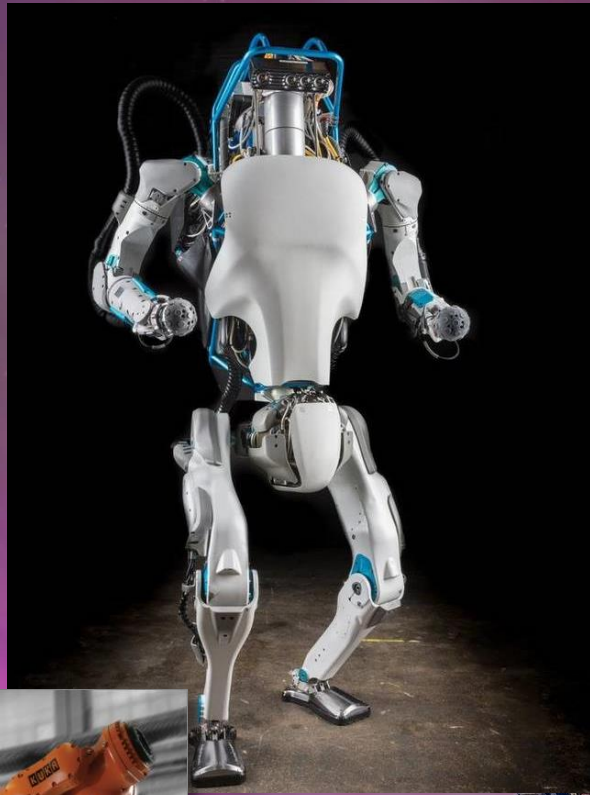


Robotics

Oisin Callan





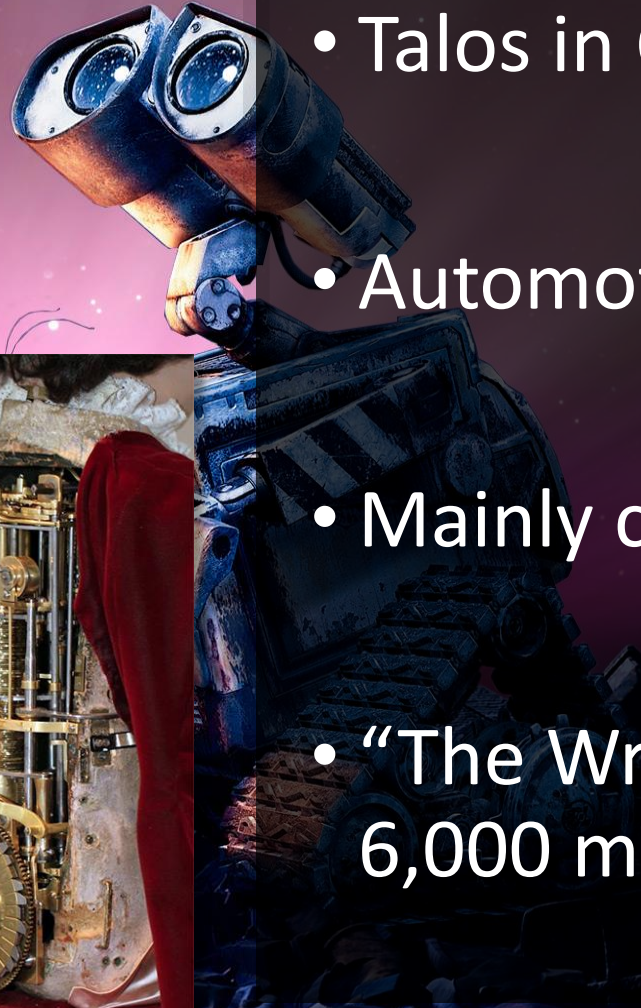
What is a robot?

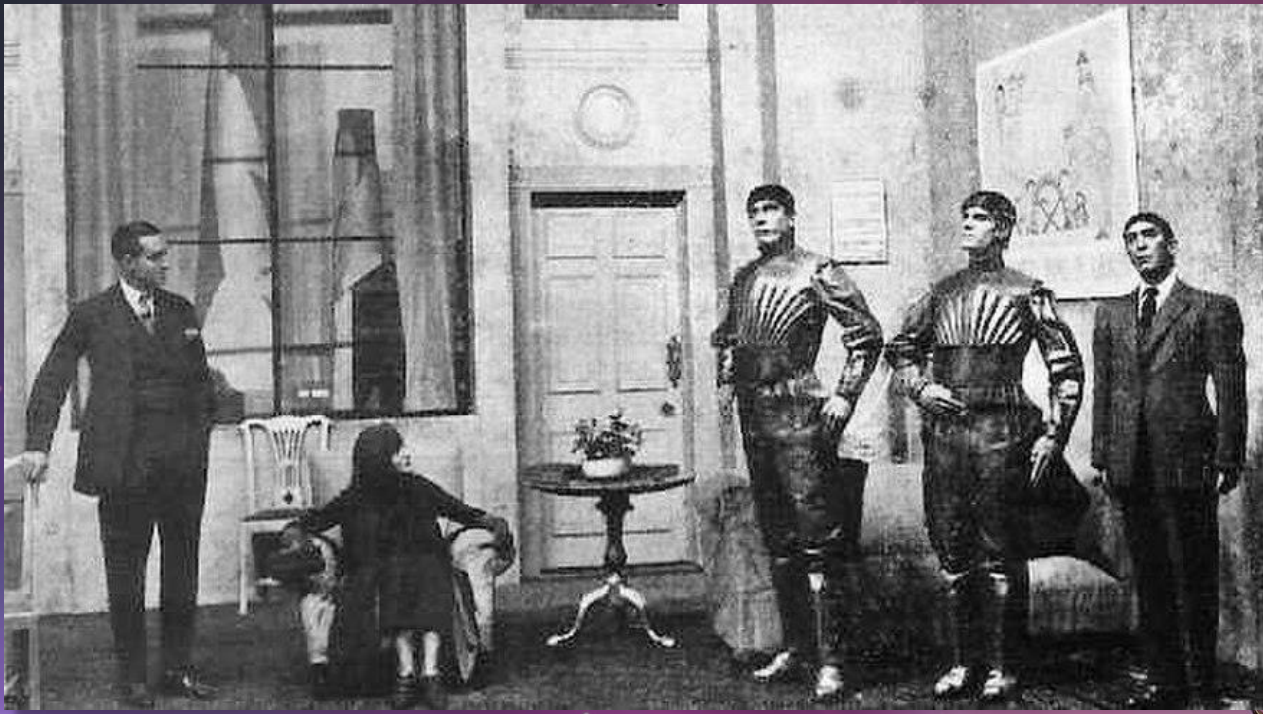
- A machine.
- Programmable by a computer.
- Can carry out a set of tasks automatically.



History of Robotics

- Talos in Crete.
- Automota.
- Mainly clockwork.
- “The Writer” has 6,000 moving parts!





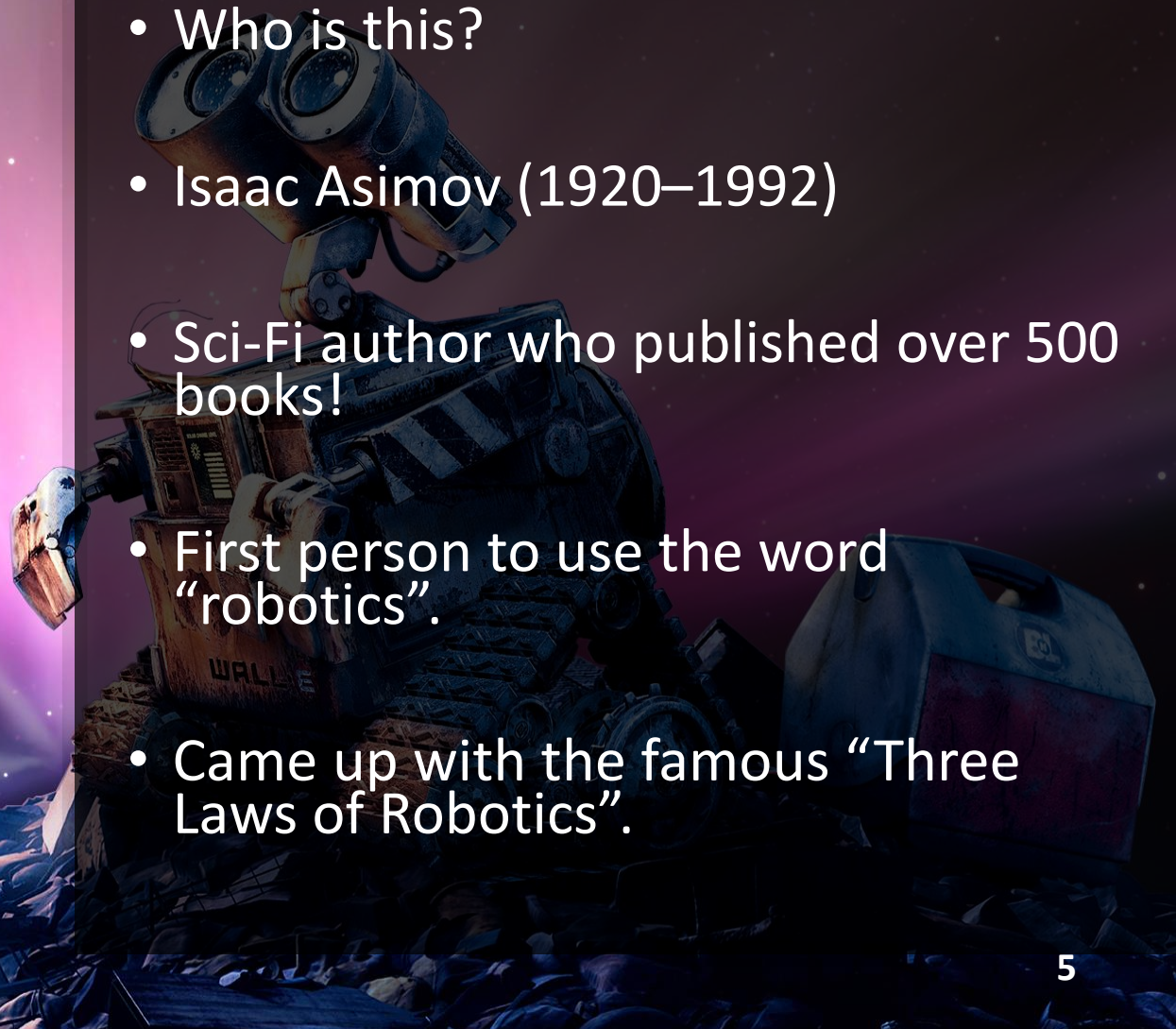
History of Robotics

- Where does the word come from?
- Czech word “**robota**” meaning “forced labour”.
- Karel Čapek’s 1920 play “**R.U.R.**” (Rossum's Universal Robots)



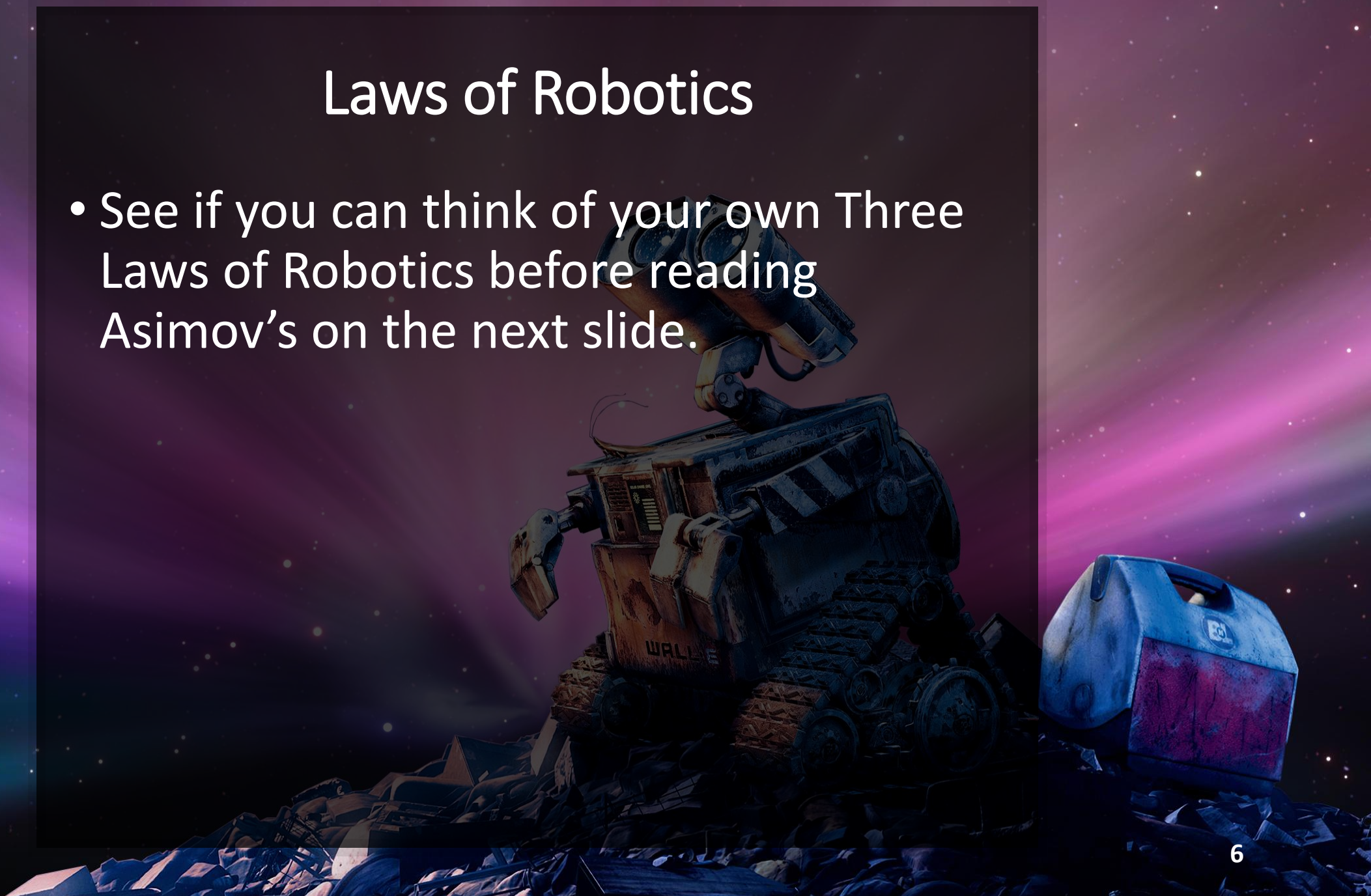
History of Robotics

- Who is this?
- Isaac Asimov (1920–1992)
- Sci-Fi author who published over 500 books!
- First person to use the word “robotics”.
- Came up with the famous “Three Laws of Robotics”.



Laws of Robotics

- See if you can think of your own Three Laws of Robotics before reading Asimov's on the next slide.



Isaac Asimov's Three Laws of Robotics (1940)

First Law: A robot may not injure a human or through inaction, allow a human to come to harm.

Second Law: A robot must obey the orders given it by human beings, unless such orders would conflict with the first law.

Third Law: A robot must protect its own existence, as long as such protection does not conflict with the first or second law.

WHY ASIMOV PUT THE THREE LAWS OF ROBOTICS IN THE ORDER HE DID:

POSSIBLE ORDERING

CONSEQUENCES

1. (1) DON'T HARM HUMANS
2. (2) OBEY ORDERS
3. (3) PROTECT YOURSELF

[SEE ASIMOV'S STORIES]

BALANCED
WORLD

1. (1) DON'T HARM HUMANS
2. (3) PROTECT YOURSELF
3. (2) OBEY ORDERS

EXPLORE MARS!

 HAHA, NO. IT'S COLD AND I'D DIE.

FRUSTRATING
WORLD

1. (2) OBEY ORDERS
2. (1) DON'T HARM HUMANS
3. (3) PROTECT YOURSELF



KILLBOT
HELLSCAPE

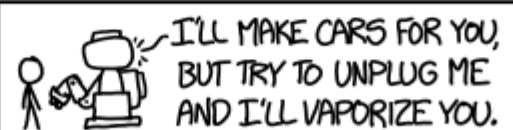
1. (2) OBEY ORDERS
2. (3) PROTECT YOURSELF
3. (1) DON'T HARM HUMANS



KILLBOT
HELLSCAPE

1. (3) PROTECT YOURSELF
2. (1) DON'T HARM HUMANS
3. (2) OBEY ORDERS

I'LL MAKE CARS FOR YOU,
 BUT TRY TO UNPLUG ME
 AND I'LL VAPORIZE YOU.



TERRIFYING
STANDOFF

1. (3) PROTECT YOURSELF
2. (2) OBEY ORDERS
3. (1) DON'T HARM HUMANS

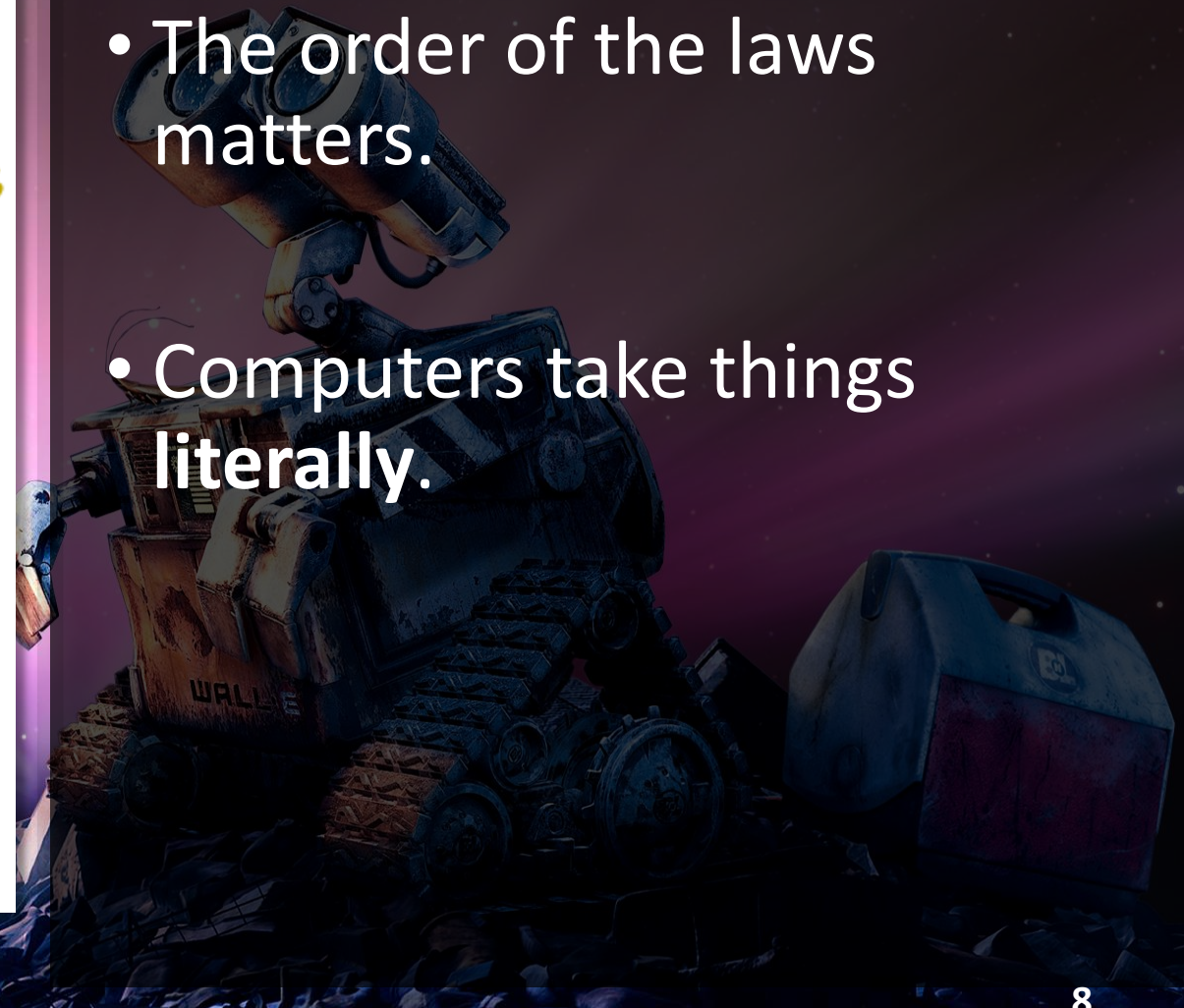


KILLBOT
HELLSCAPE

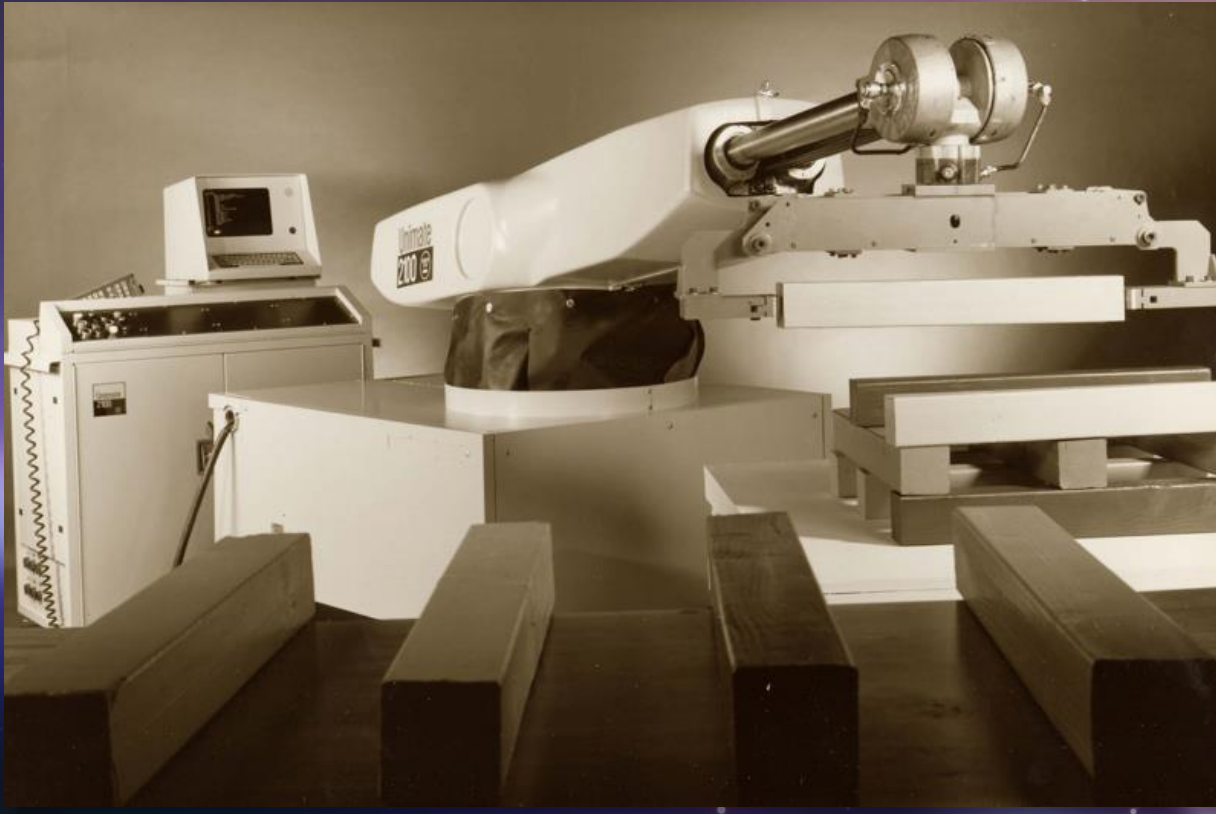
Laws of Robotics

- The order of the laws matters.

- Computers take things literally.



History of Robotics



- First digitally operated **programmable** robot.
- Unimate.
- invented by George Devol in 1954.
- Sold to General Motors for use in their **manufacturing** plants.
- This type of robot is very important in modern manufacturing.

History of Robotics

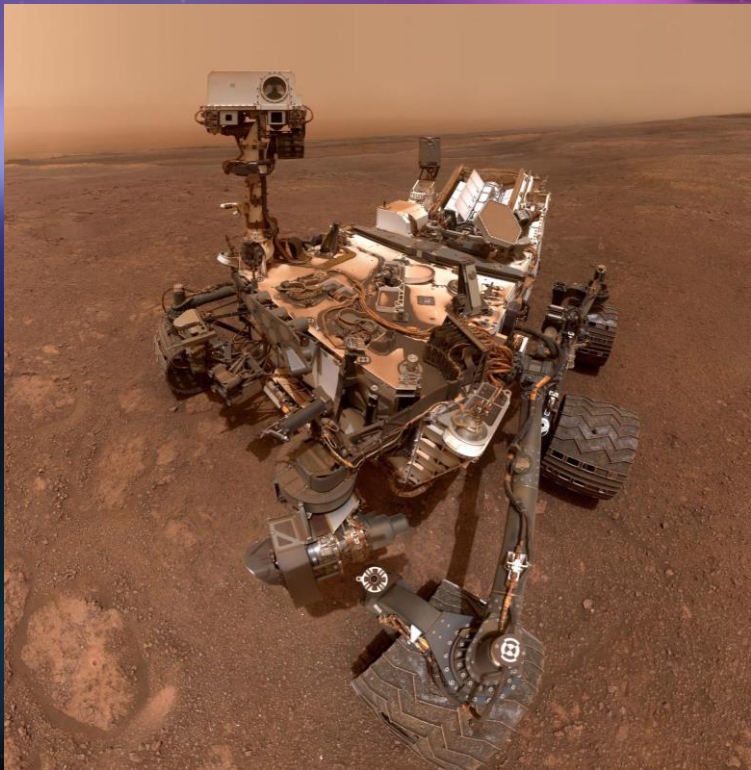
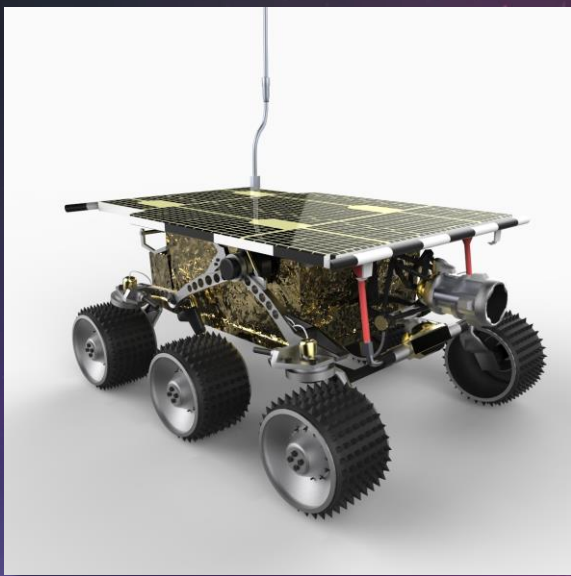


- Cyberknife
- Developed in the early 90s.
- Used to treat patients with brain or spine tumors.
- An x-ray camera tracks displacement and compensates for motion caused by breathing.

History of Robotics



- Canadarm2.
- Attached to the ISS in 2001.
- Helps move modules around and helps astronauts when repairing the station.



History of Robotics

- Sojourner (1997).
- Spirit/Opportunity (2004).
- Curiosity (2012)
- Mars 2020 rover (hopefully)



History of Robotics

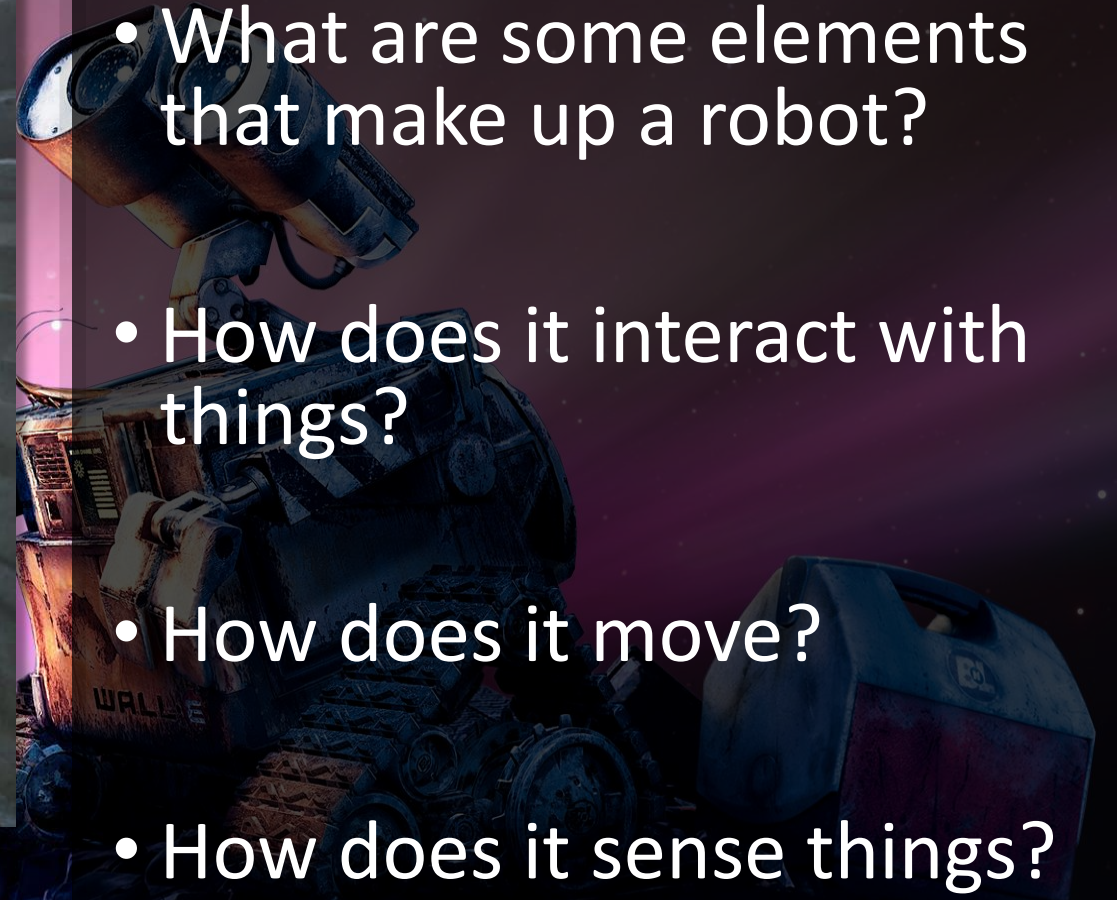
- Atlas.
- Developed in 2013 by DARPA and Boston Dynamics.
- Designed to operate in disaster conditions.
- Now able to perform gymnastics!

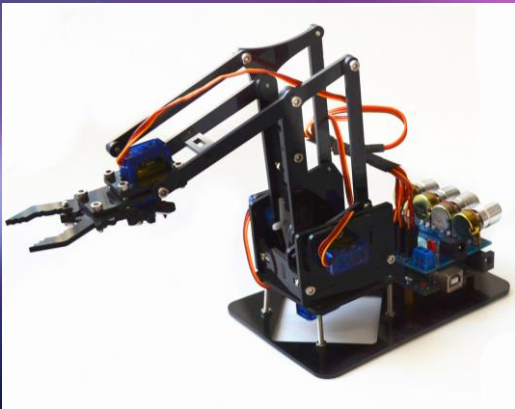
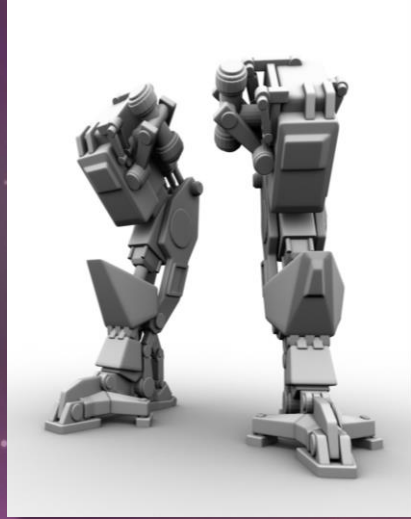


Design of Robots



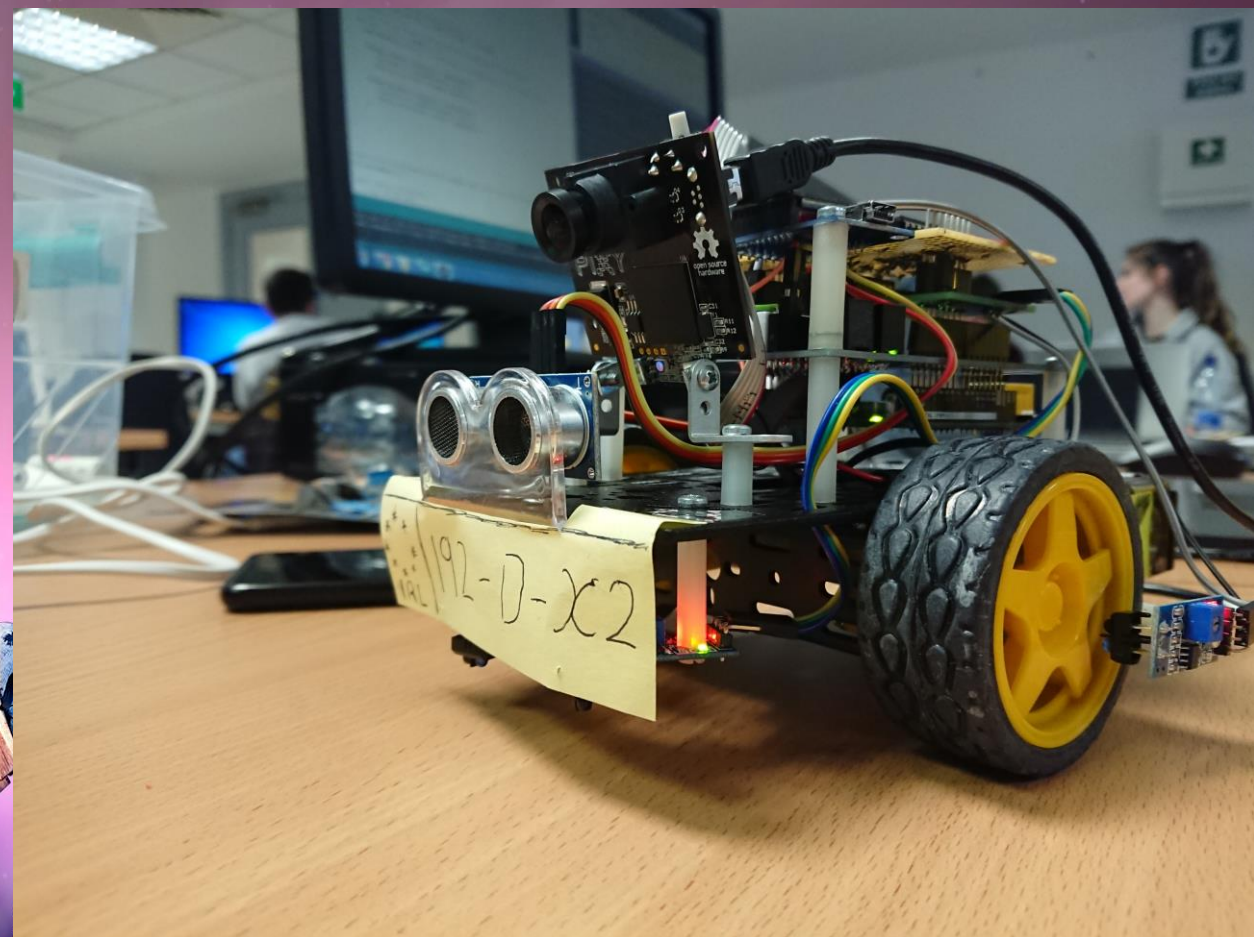
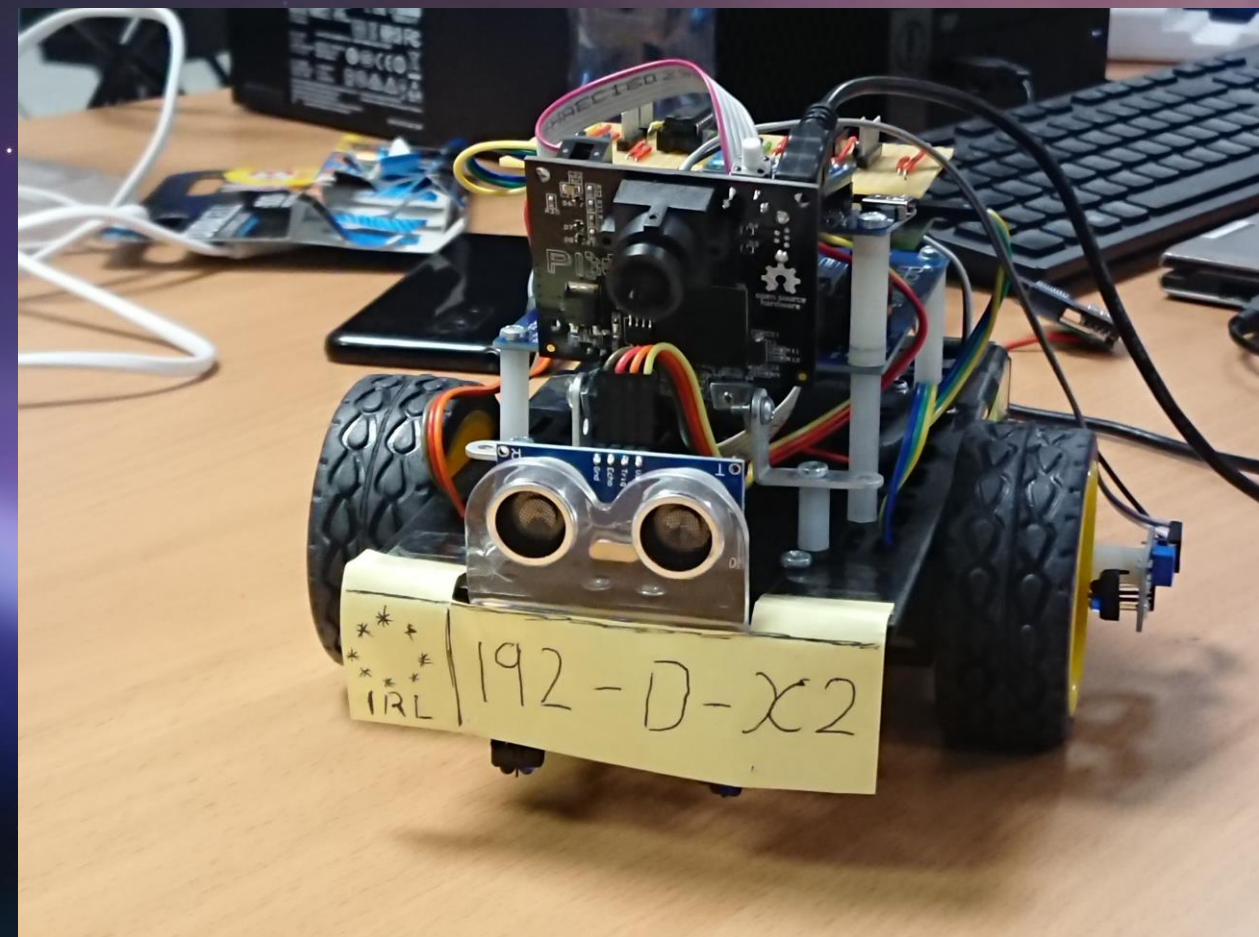
- What are some elements that make up a robot?
- How does it interact with things?
- How does it move?
- How does it sense things?





Design Activity

- Think of a common task or problem that a robot could solve.
- Design your robot for this task.
- The way it **moves** around the world and the way it **senses** and **interacts** with the world will depend on what your robot is meant to do.
- Draw a quick sketch of your robot and **label** the different parts.
- Don't add **unnecessary** parts.



Artificial Intelligence in Robots

- Still very basic.
- Three types of A.I.
- Currently we have only developed Artificial Narrow Intelligence (ANI)
- Progress could suddenly increase at a rapid pace.

ANI

Artificial Narrow
Intelligence
aka
Weak AI

NARROW
CAPABILITY

Present

AGI

Artificial General
Intelligence
aka
Strong AI

GENERAL
CAPABILITY

Future?

ASI

Artificial Super
Intelligence
aka
Strong AI

TRANSCENDENT
CAPABILITY

Possible?



Artificial Intelligence in Robots

- Will Artificial Intelligence be harmful or helpful?
- Could a very advanced robot be considered a person?
- Should intelligent machines have rights?

