Robotics

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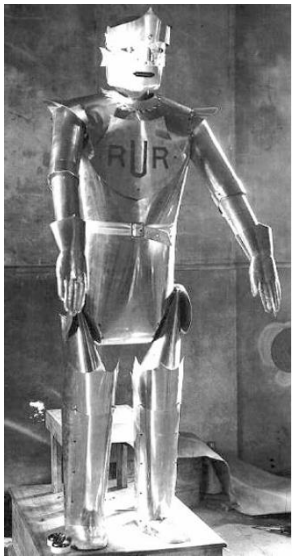
Robotics



- **The term robot comes from the Czech word "*Robota*"**

Means forced labor and was first used in machines used in the famous novel "Rossum's Universal Robots" by the author Karel Čapek in 1921.

A robot is a mechanical or virtual artificial agent, usually an electro-mechanical machine that is guided by a computer program or electronic circuitry.

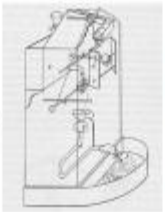
ROBOTICS HISTORY

- 1st century AD

Descriptions of more than 100 machines and automata, including a fire engine, a wind organ, a coin-operated machine, and a steam-powered engine, in *Pneumatica* and *Automata* by Heron of Alexandria

- < 1948 Semi-automatic mechanical mechanisms







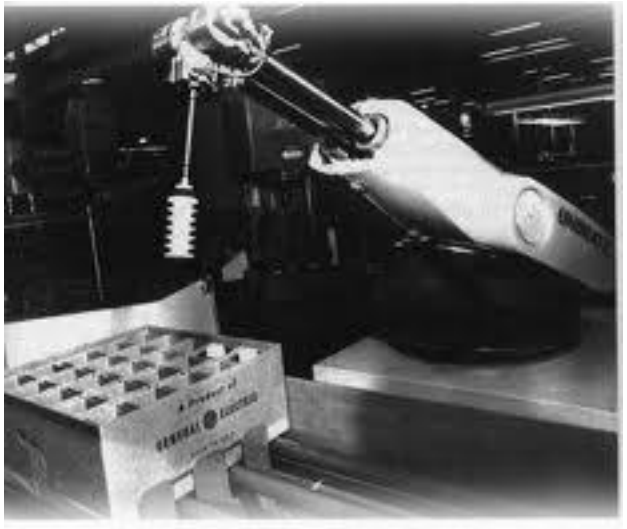




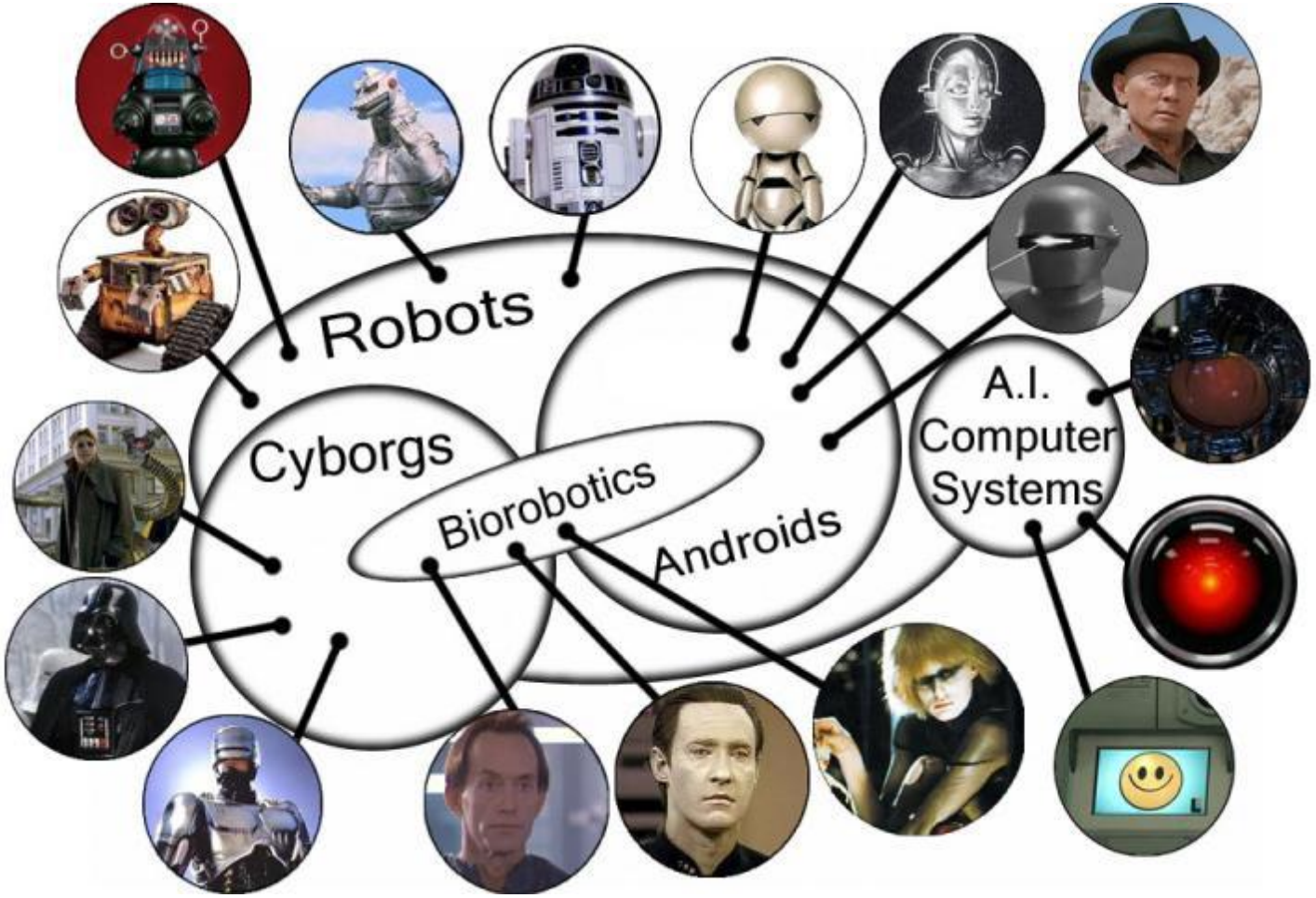

ROBOTICS HISTORY

- 1956 – Marks the beginning of a new era

The First commercial robot, from the Unimation company founded by George Devol and Joseph Engelberger, based on Devol's patents



ROBOTS CLASSIFICATION IS DIFFICULT!



ROBOTS CLASSIFICATION IS DIFFICULT!

- **Types of robots by application:**

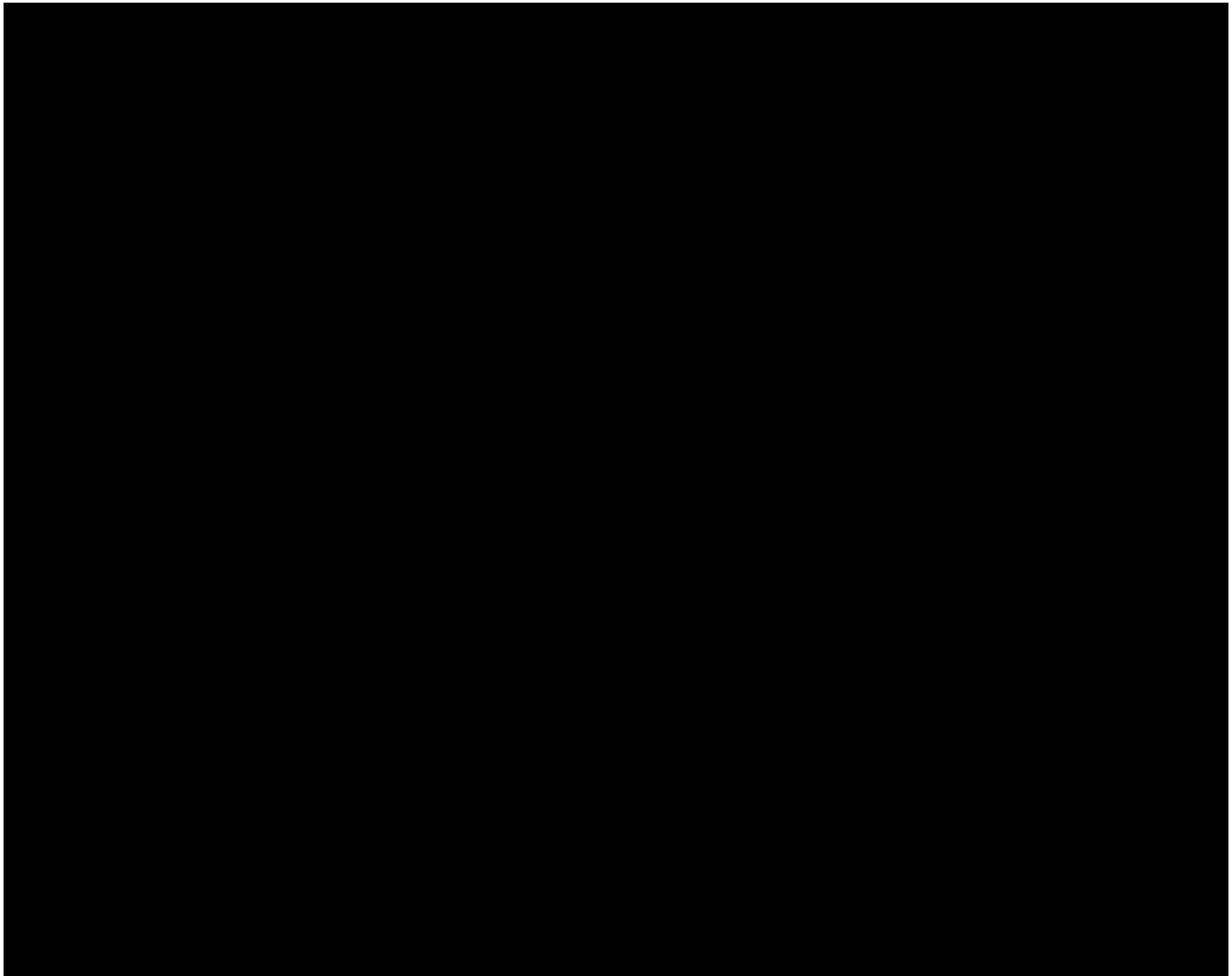
- Industrial robots
- Domestic, household robots
- Medical robots
- Service robots
- Military robots
- Entertainment robots or personal robots
- Space robots
- Hobby and competition robots
- Others

ROBOTS CLASSIFICATION IS DIFFICULT!

- **Types of robots by locomotion and kinematics:**

- Stationary robots (including robotic arms with a global axis of movement)
- Wheeled robots
- Legged robots
- Swimming robots
- Flying robots
- Mobile spherical robots (robotic balls)
- Swarm robots
- Others

HUMAN – ROBOTS INTERACTION



HUMAN – ROBOTS INTERACTION

Bio inspired approachs

- Bio-inspired robots are part of a area of research process known as biomimetics. This area of research aims to mimic the structures, materials, and “manufacturing” processes that are seen in nature.

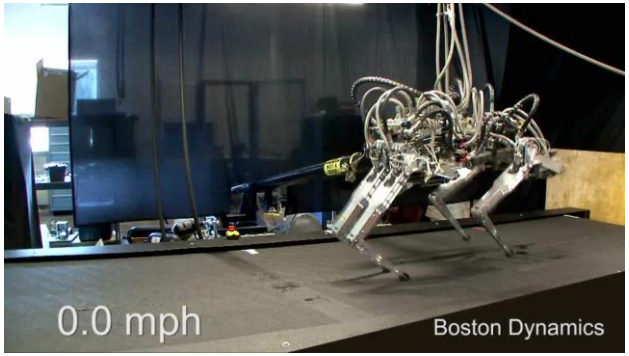
- The earliest known example of biologically inspired engineering can be traced back about 3,000 years. The ancient Chinese attempted to create artificial spider silk in order to produce cheaper cloth. The Chinese never succeeded; however, even today we are unable to replicate the much desired spider silk…

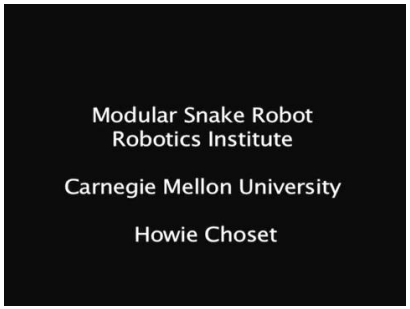
Bio inspired approachs

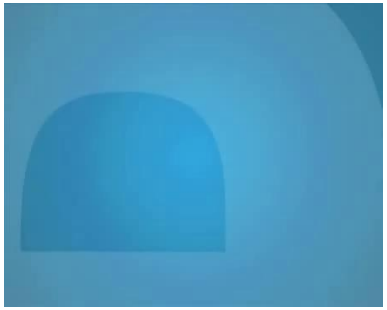
- One of the biggest successes were the bio inspired swimsuits inspired in the shark "dermal denticles"—tiny V-shaped hydrofoils that reduce the drag.

- In robotics there are many inspired robots trying to imitate examples found in nature...

Bio inspired robotics videos





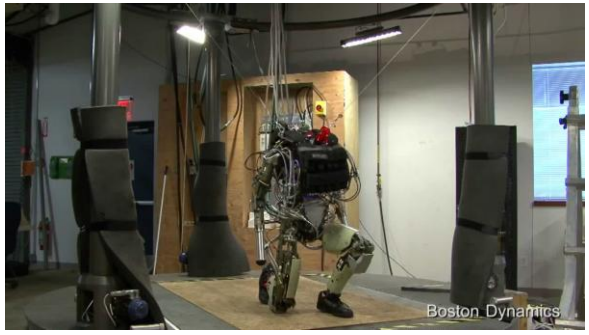


Humanoid robotics

- Researchers need to understand the human body structure and behavior (biomechanics) to build and study humanoid robots. On the other side, the attempt to simulate the human body leads to a better understanding of it.
- Advanced robotics will facilitate the enhancement of ordinary humans with real examples as Exoskeletons, Prosthesis, Artificial organs, etc.
- Best adaptation to our environment, our tools, our machines and equipment, etc.
- Easier for a person without specific skills to teach and to adopt in the day life routines
- Increasingly popular for providing entertainment too.

- **On the other hand, humanoid robots can be horribly terrifying…**

Humanoid robotics videos



Exoskeletons videos

SOCIAL ROBOTS

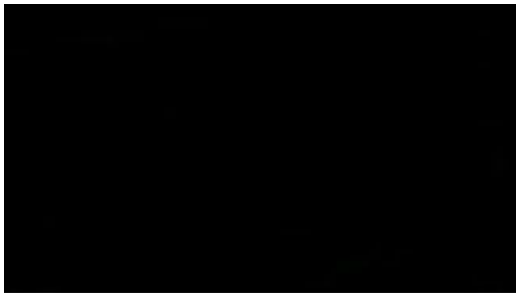
- Unlike industrial robots, Social Robots or "Mental Commitment Robots" are developed to interact with human beings and to make them feel emotional attachment to the robots.

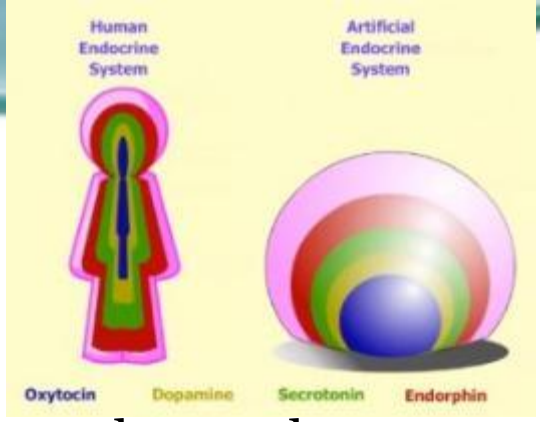
- These robots trigger more subjective evaluations, evoking psychological impressions such as "cuteness" and comfort.

- Mental Commitment Robots are designed to provide 3 types of effects:

- psychological, such as relaxation and motivation;
- physiological, such as improvement in vital signs;
- social effects such as instigating communication among inpatients and caregivers.

SOCIAL ROBOTS VIDEOS





Sex in robotics (LOVOTICS)

- Samani has outlined — and begun to develop — an extremely complex artificial intelligence that simulates psychological and biological systems behind human love.

- Samani's robots are equipped with artificial versions of the human "love" hormones — Oxytocin, Dopamine, Seratonin, and Endorphin — that can increase or decrease, depending on their state of love.

- The ultimate goal, according to the lovotics research team, is to usher in an era of human-robot relationships — and if we can have a meaningful relationship with an online friend or our pet dog, why not a robot?

Sex in robotics Videos

Robots in medicine

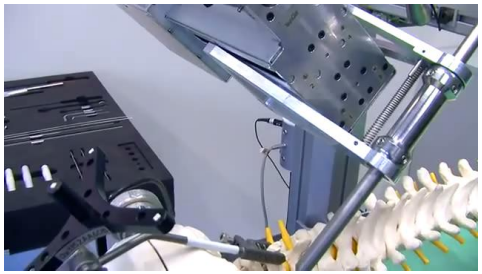
- Robots are now being used in almost all type of operations from heart surgery (Uk – Vinci Robot) to brain surgery (Canadian NeuroArm)

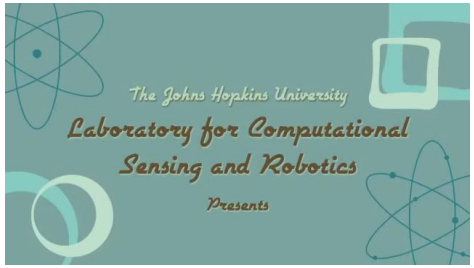
- Because robots are able to perform major operations while only making small incisions, patients receive many benefits: lessened trauma, fewer infections, etc.

- Approximately only one-fourth of the 15 million surgeries performed each year are done with small incisions or what doctors call 'minimally invasive surgery'." Robots could raise that number substantially (Stark 2002).

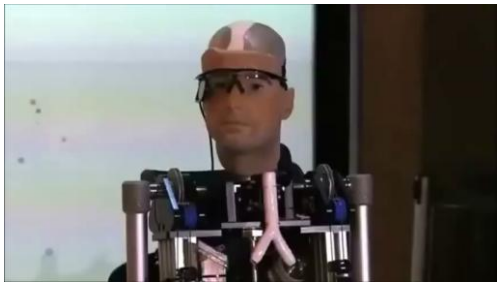
- The use of robot-assisted surgery improves quality of care because the patient experiences less pain after the surgery.

Robots in medicine videos





Bionics

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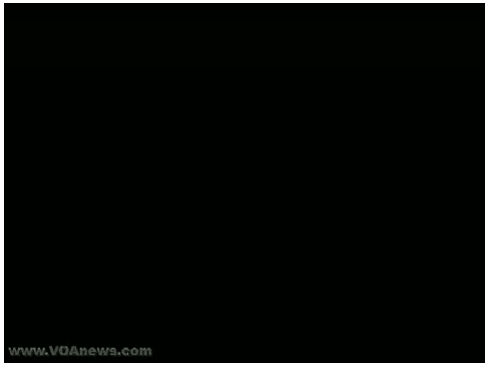
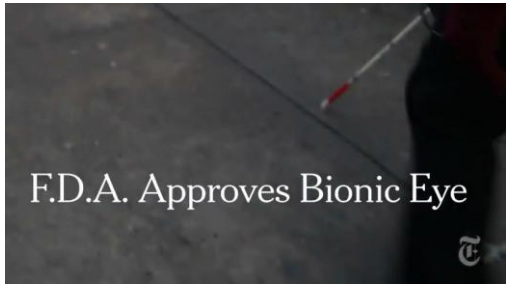

www.VOAnews.com


MEGAN MURPHY


F.D.A. Approves Bionic Eye

Entertainment robots videos

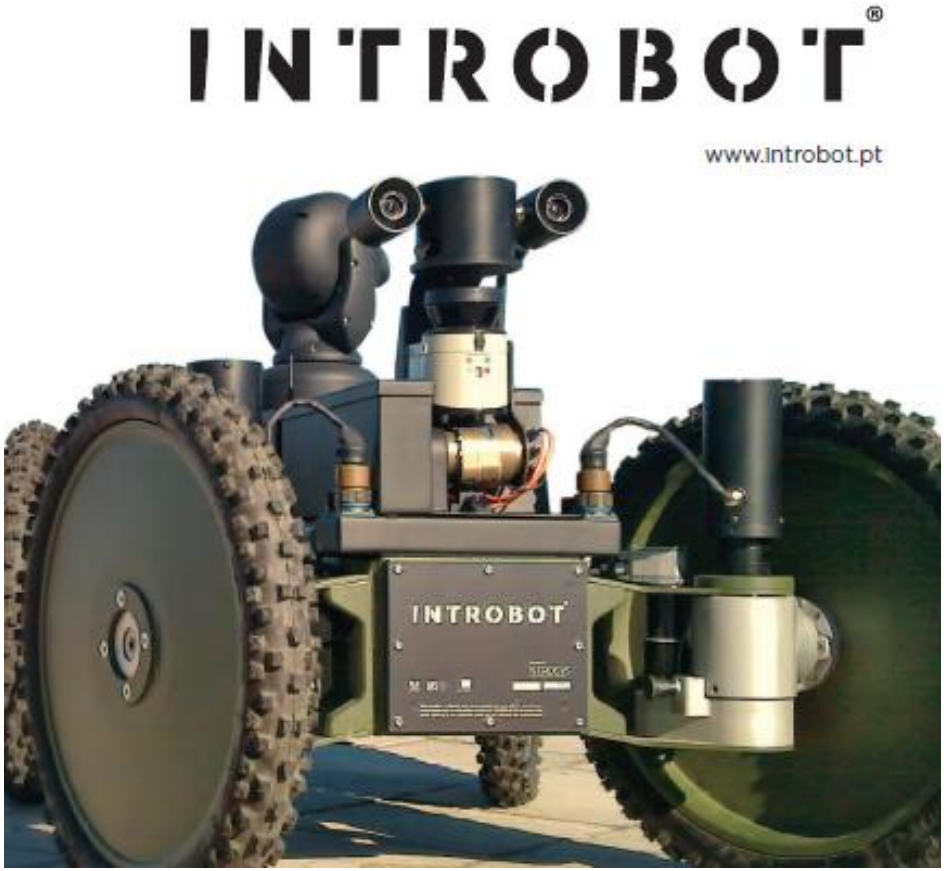
Military robots

- Many of the current investigation actually in mobile robotics is propelled by military applications many times camouflaged as civil applications, like rescue Robots, des mine robots, flying robots, etc. Military robots date back to World War II and the Cold War in the form of the German Goliath tracked mines and the Soviet teletanks.

Military robots Videos

Some of Our work…

- Terrestrial robots (INTROBOT)



Main characteristics:

- An independent four-wheel drive system
- Up to 350 Kg Payload;
- A central rotary shaft with limiters;
- A pan/tilt camera with 18x optical zoom;
- 360° on-board video capture;
- 45 ° maximum allowable slope;
- Four hours of average battery life.

Introbot

Main characteristics:

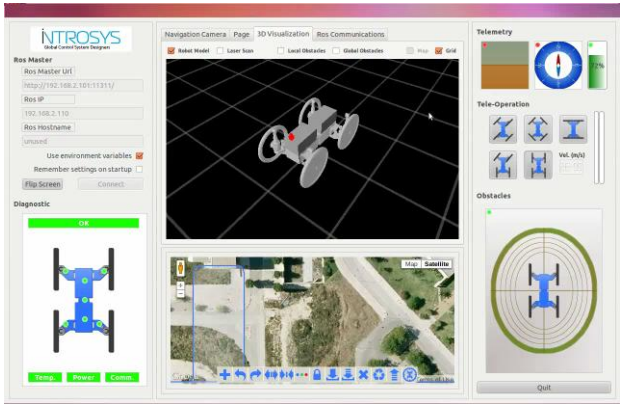
FLEXIBILITY *offered by an open source system. The modular implementation both on hardware and software allows for an easy reconfiguration and offers enough room for improving the current system.*

ROBUSTNESS *because it makes resistance a valuable tool. The solid but still light build reduces the wear making it immune to external forces that may result from the operation site or environment. Thanks to this thoughtfulness the number of fails is decreased and maintenance times reduced.*

VERSATILITY *because it allows for different control methods. Different, wired and wireless, control methods are available depending on the mission requirements and environment constrains. The ease of swap between each of the modes ensures a broaden application range.*

MANEUVERABILITY *because it is provided with a rotating shaft and directional four-wheel drive. These maximize wheel-ground contact time and allow for five locomotion modes: omnidirectional, lateral, Ackerman, Double-Ackerman and turning point.*

Introbot videos



… How to start in robotics

3 ways (all valid and fun…)

1st – You don't understand nothing about mechanics, programming or electronics (or your age is bellow 10 … ☺)

Choose one of the following kits:

Lego Mindstorms

Fisherteknik

Vex Robotics Kit

…How to start in robotics

2nd – You understand electronics and programming but you don't want to spend lots of time developing PCBs our mechanics

Choose one of the following kits:

ARDUINO

Parallax (Basic Stamp)

3rd – You understand electronics, programming and mechanics. So you spend lots of days and you can get something as the IntroBot …

Thank You Very Much