

Humanoid Robots

Senad Ličina, Christopher Schewe

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From automats to robots

The czech writer Karel Čapek formed the term robot in his 1921 published novel R.U.R. (Rossum's Universal Robots).



Definition

"A humanoid robot is a robot with an overall appearance based on that of the human body"

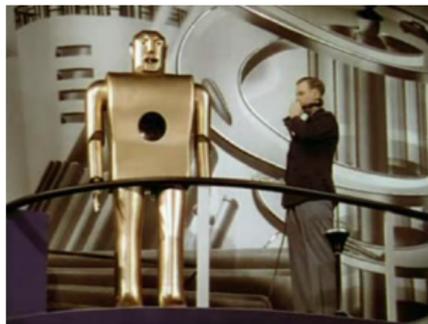
(Hirai et al., 1998, Hirukawa et al., 2004).

Timeline

- 1495 - Leonardo DaVinci designs a humanoid automaton (Leonardos Robot).
- 1921 - Czech writer Karel Čapek introduced the word "Robot".
- 1939 - Elektro (introduced in next page).
- 1970 - Miomir Vukobratović has proposed Zero Moment Point a theoretical model to explain biped locomotion.
- 1973 - In Waseda University, in Tokyo, Wabot-1 is built.
- 1985 - Developed by Hitachi Ltd, WHL-11 is a biped robot capable of static walking on a flat surface at 13 seconds per step and it can also turn.
- 1993 - Honda developed P1 (Prototype Model 1) through P3, an evolution from E series, with upper limbs. Developed until 1997.
- 2000 - Honda creates its 11th bipedal humanoid robot, ASIMO.
- 2001 - Sony unveils small humanoid entertainment robots, dubbed Sony Dream Robot (SDR). Renamed Qrio in 2003.

the first humanoid robot

The first humanoid robot was Elektro, he was introduced on the world show New York in 1939.



Sony QRIO

CPU 64 bit RISC processor (x2)

Memory 64MB DRAM (x2)

OS Aperios (Sony's original real time OS)

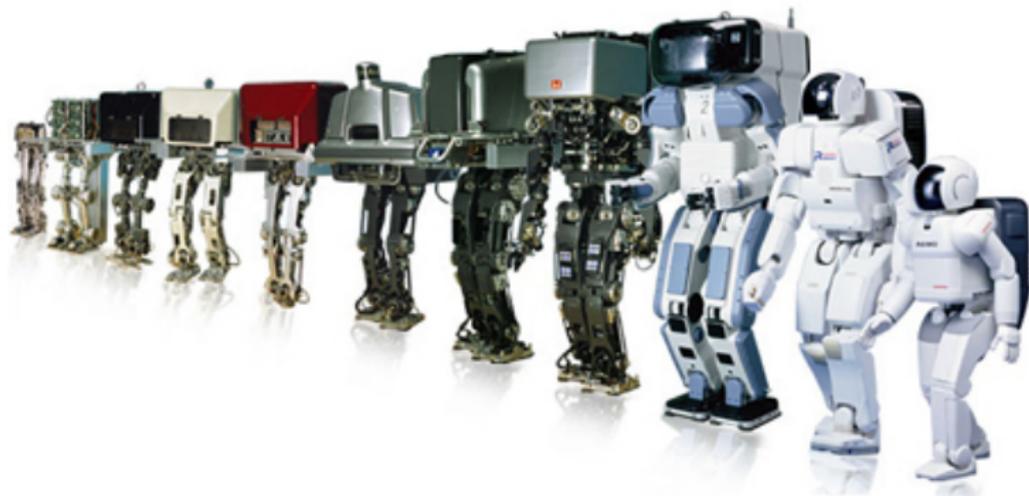
DOF 28 + 5 fingers on each hand

Speed 6m/minute (irregular surface)
20m/minute (flat, smooth surface)

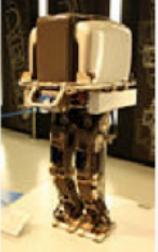
PAL Technology REEM

REEM-A (2006)	REEM-B (2008)
40 kg	60 kg
140 cm	147 cm
30	41
	

Evolution



Honda E-Series

E0 (1986)	E1 (1987)	E2 (1989)	E3 (1991)	E4 (1991)	E5 (1992)	E6 (1993)
16.5 kg	72 kg	67.7 kg	86 kg	150 kg	150 kg	150 kg
101.3 cm	128.8 cm	132 cm	136.3 cm	159.5 cm	170 cm	174.3 cm
6	12	12	12	12	12	12
						

Honda P-Series

P1 (1993)	P2 (1996)	P3 (1997)
175 kg	210 kg	130 kg
191.5 cm	182.0 cm	160.0 cm
30	30	28
		

Honda ASIMO

ASIMO (2000)	ASIMO (2005)
52 kg	54 kg
120.0 cm	130.0 cm
26	34



Why do we need humanoid robots

- Prosthesis/Orthosis
- Entertainment/Education
- Space exploration
- Dangerous/Dirty tasks
- Everything a human can do

Advantages and disadvantages of humanoid robots

- Advantages
 - Robots...
 - ...are tough
 - ...are strong
 - (...cannot be exhausted)
 - ...have no emotions
 - ...do not complain
- Disadvantages
 - Robots...
 - ...are not well developed yet
 - ...have no emotions

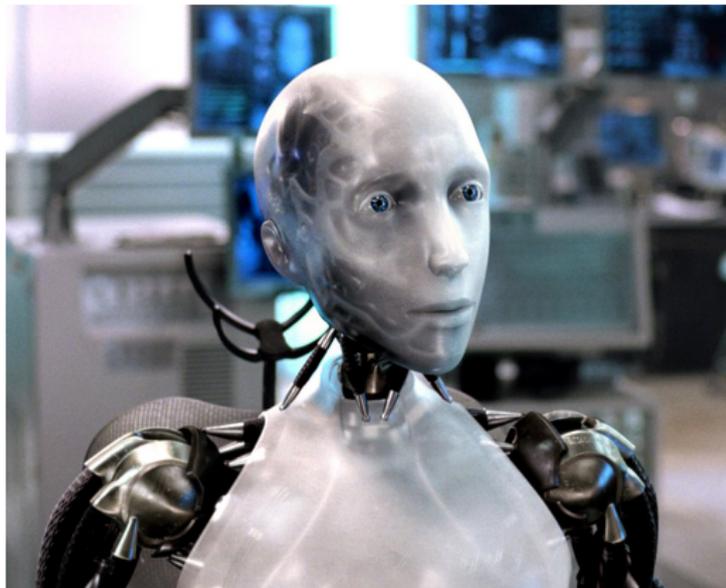
Development in the next few years

- Artificial Intelligence
- Human Cognition
- Human Locomotion

Humanoid robots in the Science-Fiction

- Ltd.Cmdr. Data (Star Trek)
- C3PO (Star Wars)
- Bishop (Alien)
- Replicants (Blade Runner)
- T-800/T-1000/T-X (Terminator 1/2/3)
- Johnny 5 (Short Circuit, german: Nummer 5 lebt)
- Sonny (I, Robot)

Conclusion



Overview

History

Robots

What are they good for?

Conclusion

Conclusion

Any Questions?

Sources

Any Questions?



Sources

- <http://en.wikipedia.org>
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Thanks for listening

