

IRH 2017 / Group 10

Hosen Gakuen High School Risu inter

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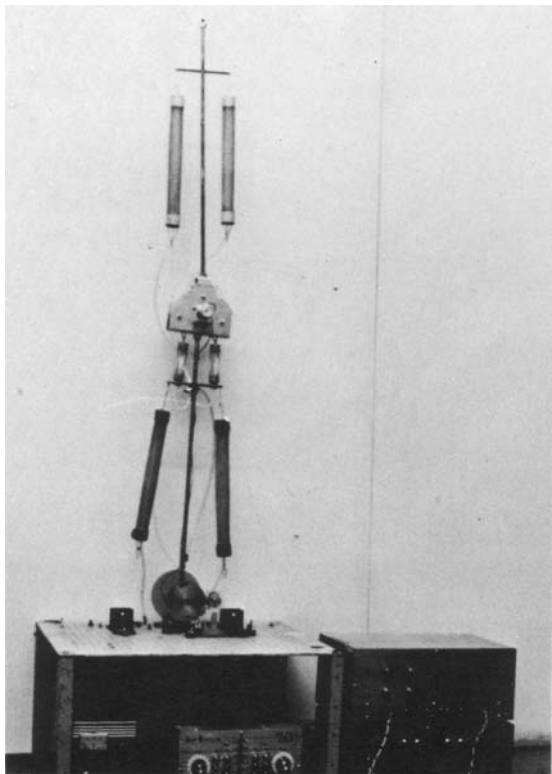
Theme3

Most advanced technologies of robots

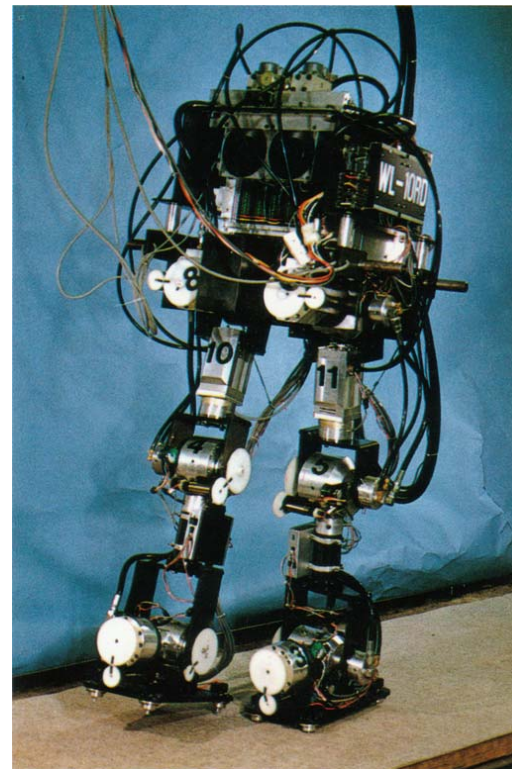
Do you
know this ?



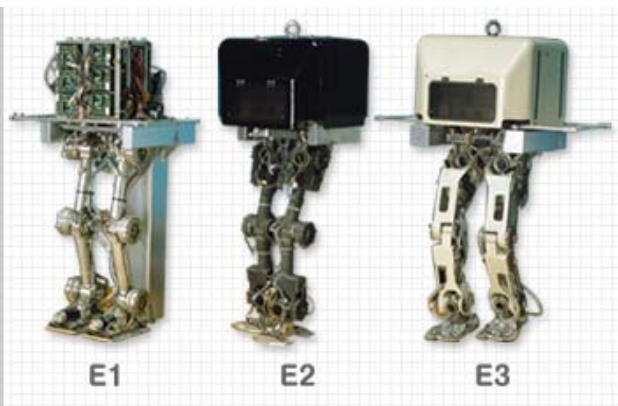
Bipedal robot



Double inverted pendulum
model
1968



ZMP theory
1984



1987-1991



1991-1993



1993

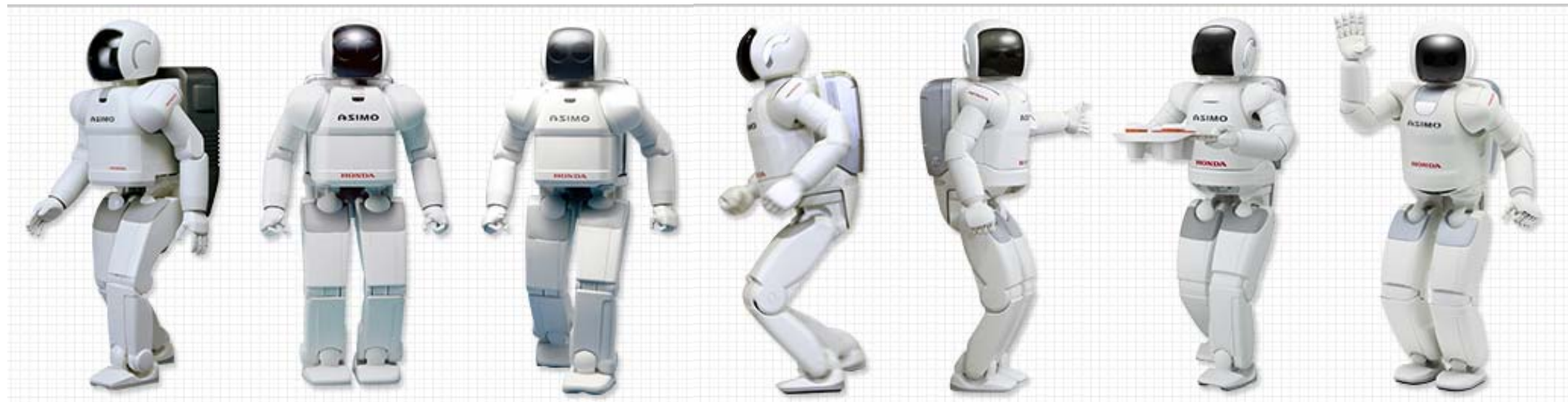


1996



1997

ASIMO



2000

2001

2002

2004

2005

2007

2011

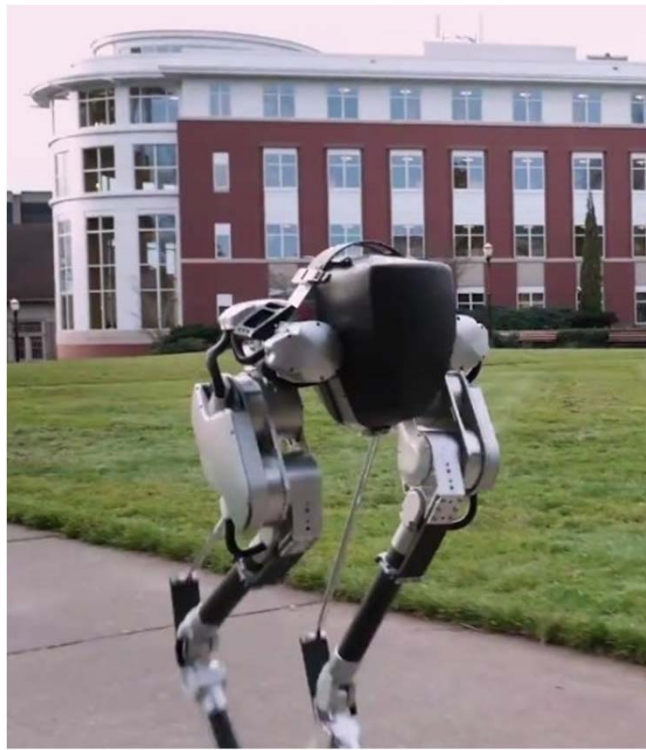
Newest Research

- **Innovation of material**
- **Innovation of the computer**



Cassie

Cassie has a 3-degrees-of-freedom hip, allowing it to move its legs forward and backward, side to side, and also rotate them at the same time. And with powered ankles, it can stand in place without having to constantly move its feet.

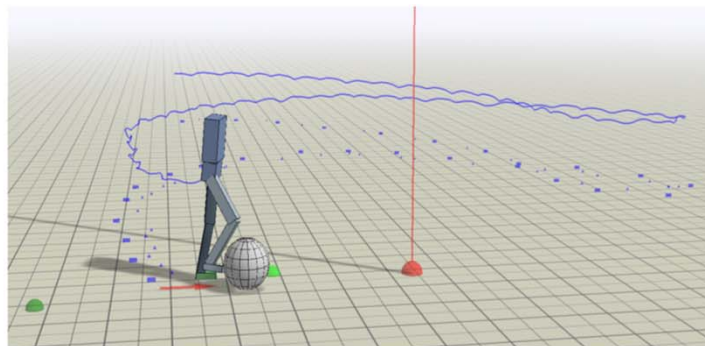


DeepLoco: Dynamic Locomotion Skills Using Hierarchical Deep Reinforcement Learning

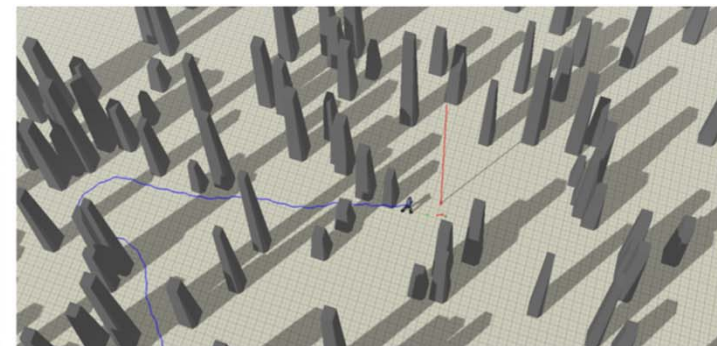
XUE BIN PENG and GLEN BERSETH, MICHEL VAN D PANNE: University of British Columbia
KANGKANG YIN: National University of Singapore



Following
a varying-width
winding path.



Dribbling
a soccer ball.



Navigating
through
obstacles.



ATLAS

The World's Most Dynamic Humanoid

Atlas uses balance and whole-body skills to achieve two-handed mobile manipulation.



1.5 m
Height



75 kg
Weight



11 kg
Payload



Battery
Power



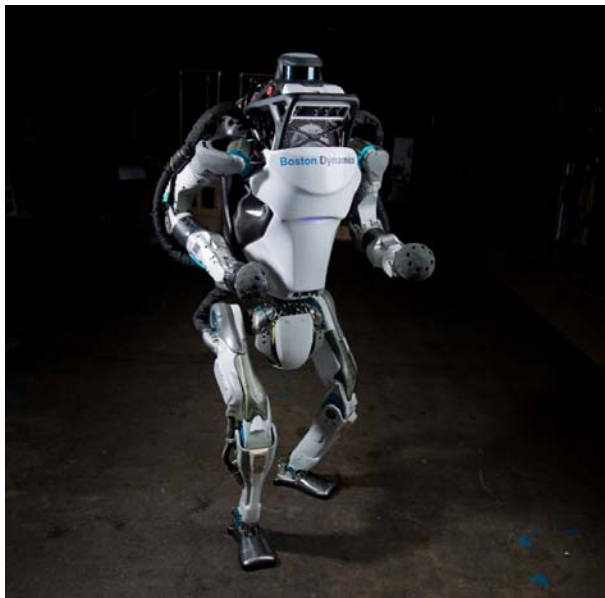
Hydraulic
Actuation



LiDAR and
Stereo Vision
Perception

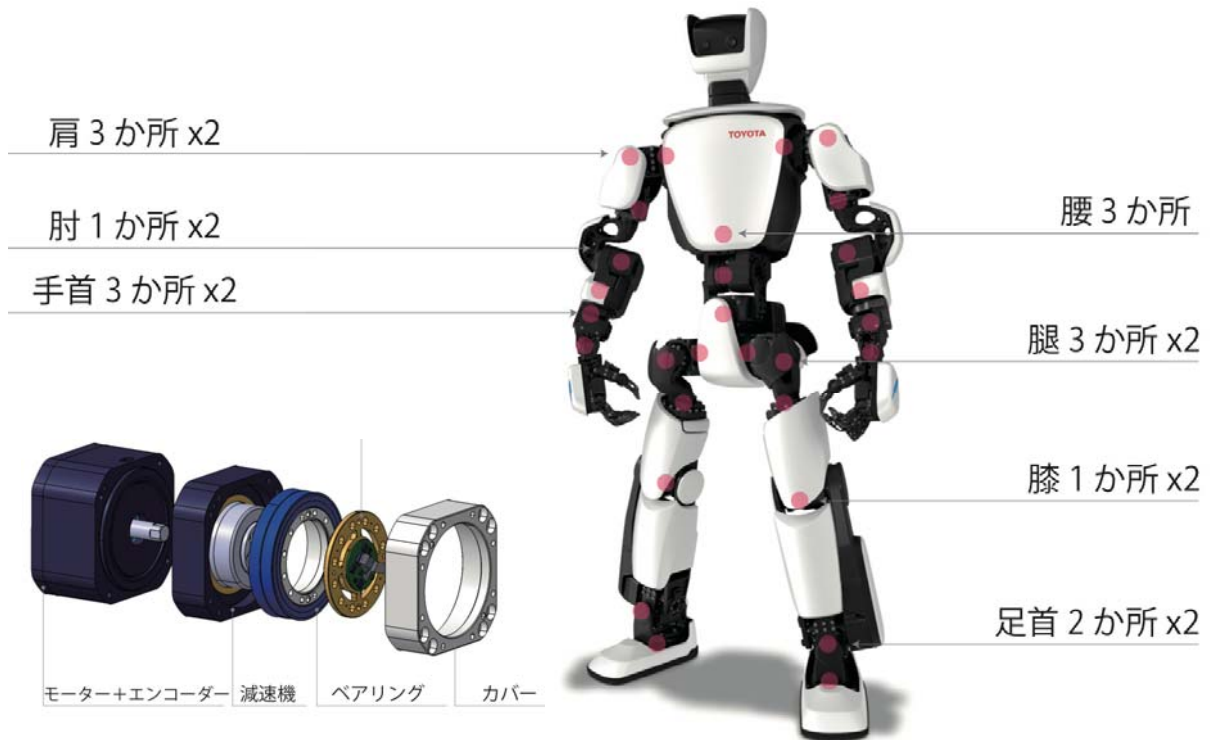


28
Joints



<https://www.bostondynamics.com/atlas>

TOYOTA T-HR3



Question

- Q.1 Do you think the bipedal robots have matured for some extent?**
- Q.2 What is the main condition that can lead bipedal robots to new epoch?**
- Q.3 In what place can these robots play an active role?**
- Q.4 In the future, what do you think about the relationship between human and robots?**
- Q.5 Do you think these robots are required?**

Q.1 Do you think the bipedal robots have matured for some extent?

Yes(0) • No(9)

- The bipedal robots still cant adapt to the dangerous places like mountains.
- There is no universal method for controlling the balance.
- Humans physical performance is far better than those robots.
- It can walk, but doesn't directly help people.
- The price is too high.

Q2. What is the main condition that can lead bipedal robots to new epoch?

Innovation of material (2)

- Making the material lighter
- Innovation of the actuator

Innovation of computers (1)

- The establishment of new theory

Innovation of Artificial Intelligence (3)

- Image recognition
- Circumference recognition
- Prompt decision

Other new approaches (3)

- Knowhow of human clearing their difficulties to different terrain.
- Making the device, which can easily access to artificial intelligences order.

Q3. In what place can these robots play an active role?

Home/Recreation(2)

- Because our goal is to make the robots, which we can live along with.

Rescuing(3)

- Grounding spaces are small that they can act more widely.

Nursing care(0)

Other (4)

- When we build big things, which entail danger.

Q4. In the future, what do you think about the relationship between human and robots?

Live together(7)

- They can work on behalf of human beings.
- The measures for the Japanese aging society and birthrate problem.
- It is necessary to live along with robots.

Terror(0)

I don't know(2)

Q5. Do you think these robots are required?

Yes(5)

- Working for the replacement of the human beings. (space, polar regions, and etc.)
- Only effective when the user interface is human.

No(1)

- It doesn't have to be in human shape.

I don't know(3)

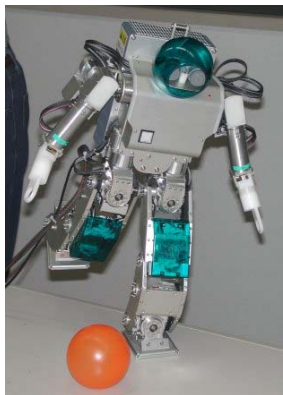
- Depends on time and space.
- It doesn't have to be bipedal.

RoboCup

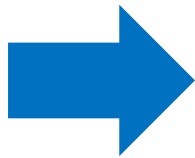


1997

By the middle of the 21st century (2050), a team of fully autonomous humanoid robot soccer players shall win a soccer game, complying with the official rules of FIFA, against the winner of the most recent World Cup.



2002



2017



2050

Thank you