

# Robots

## Different designs and applications

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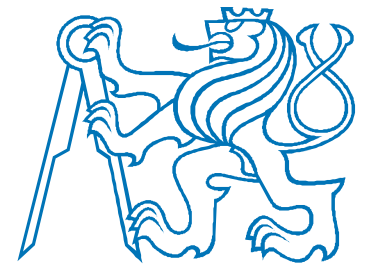
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# Lecture outline



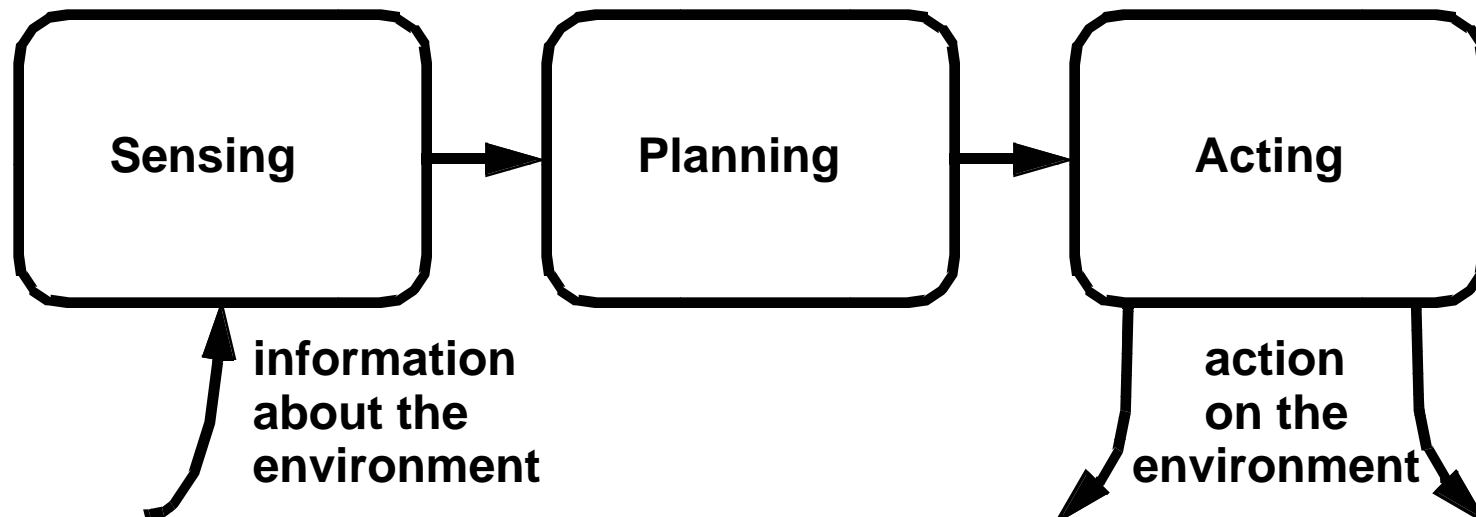
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- Various robot designs for different applications
- Robot sensors
- Robot actuators

# What makes a machine a robot?



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# Industrial robots, applications 1



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Laser welding



Arc welding

Courtesy: Kawasaki, Japan



# Industrial robots, applications 2



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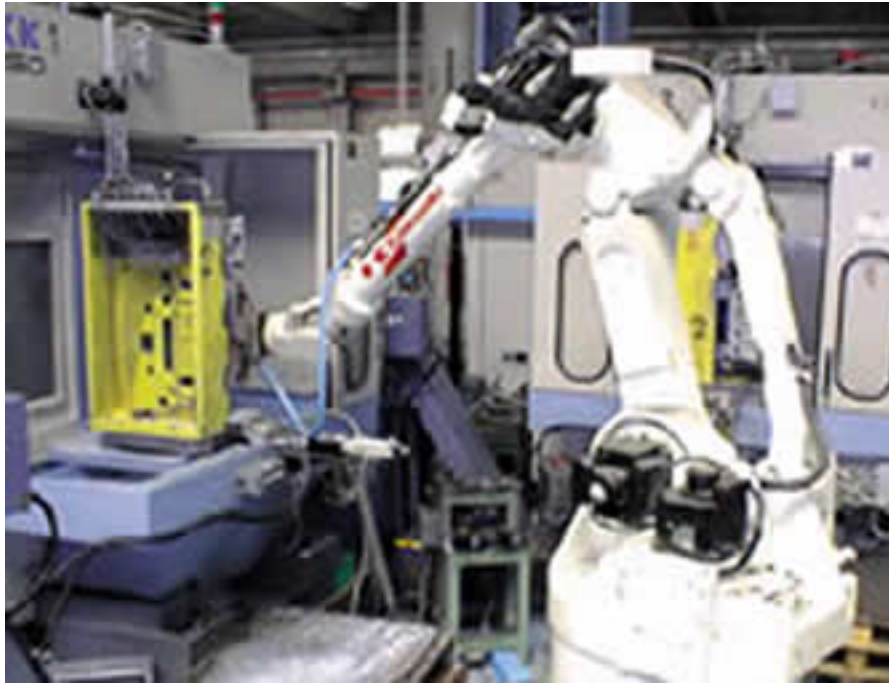
Paint shop robots

Courtesy: Kawasaki, Japan

# Industrial robots, applications 3



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Tending machining  
center



Applying sound  
defender

# Industrial robots, applications 4



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Manipulator



Washdown robot

# Industrial robots, applications 5



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## Handling molds

Video

## Car seat testing

Video

## Handling door frames

Video

# Industrial robots, applications 6



## **Decontaminating Robot**

Cleaning the main circulating pump housing in the nuclear power plant

# Industrial robots, applications 7



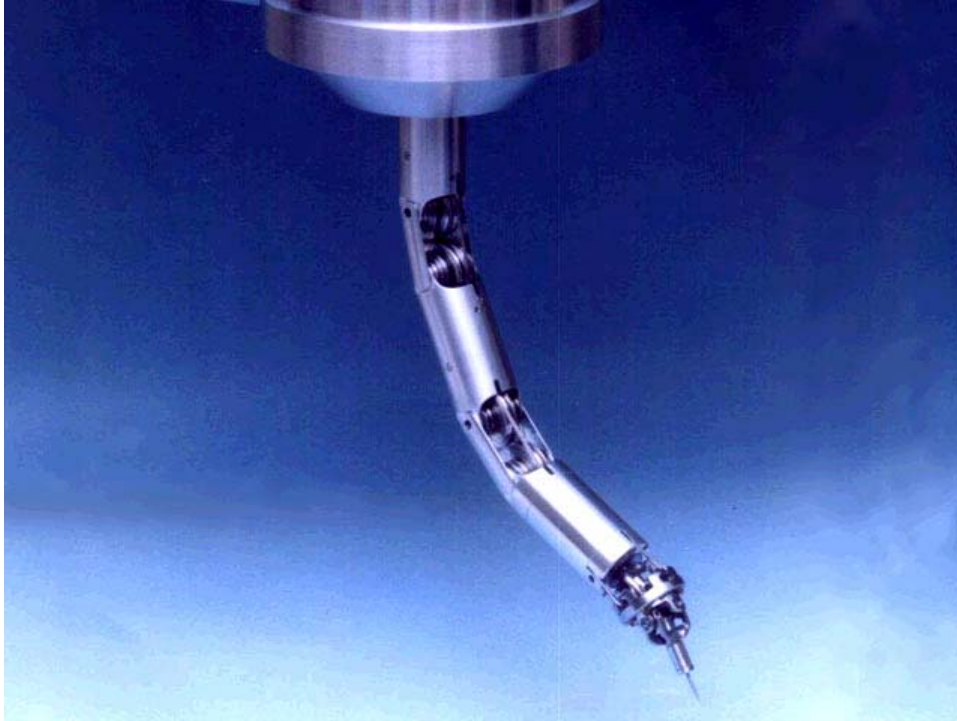
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Menial tasks that human don't want to do



# Medical robots



Robotic assistant for micro surgery

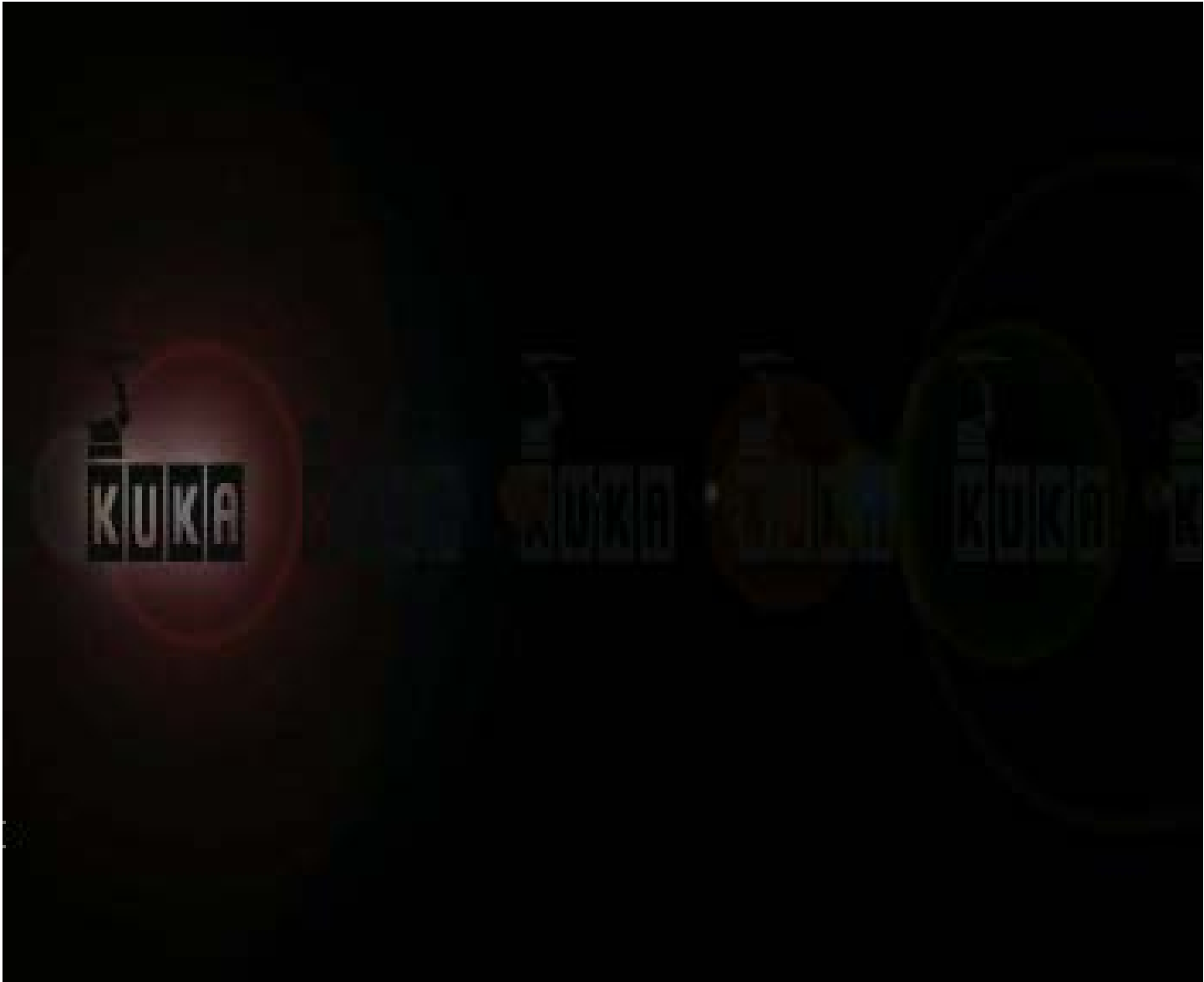
# Surgical robot, da Vinci system



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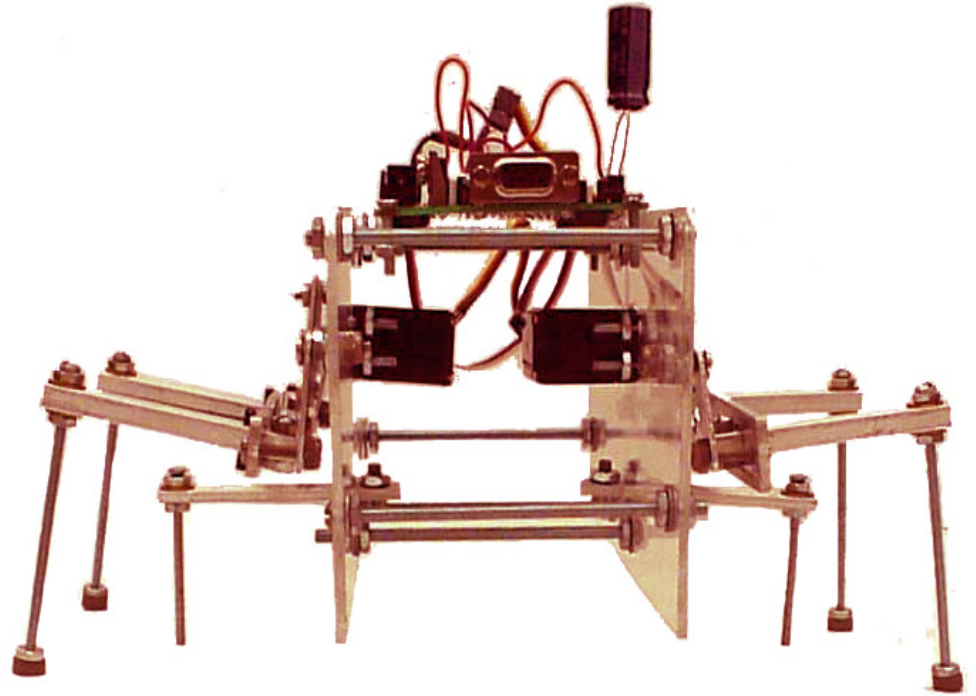
# Production of an industrial robot



# Robot base: fixed vs. mobile



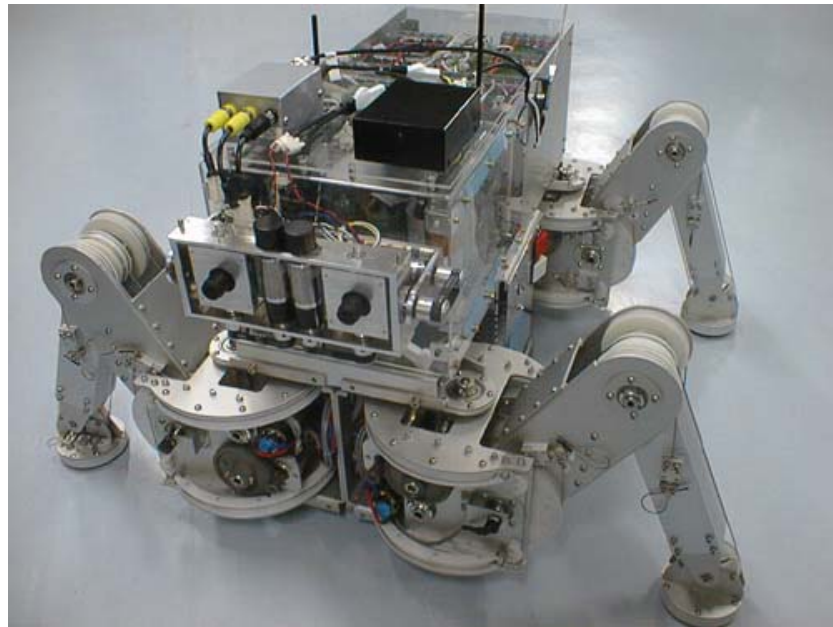
A255 robot



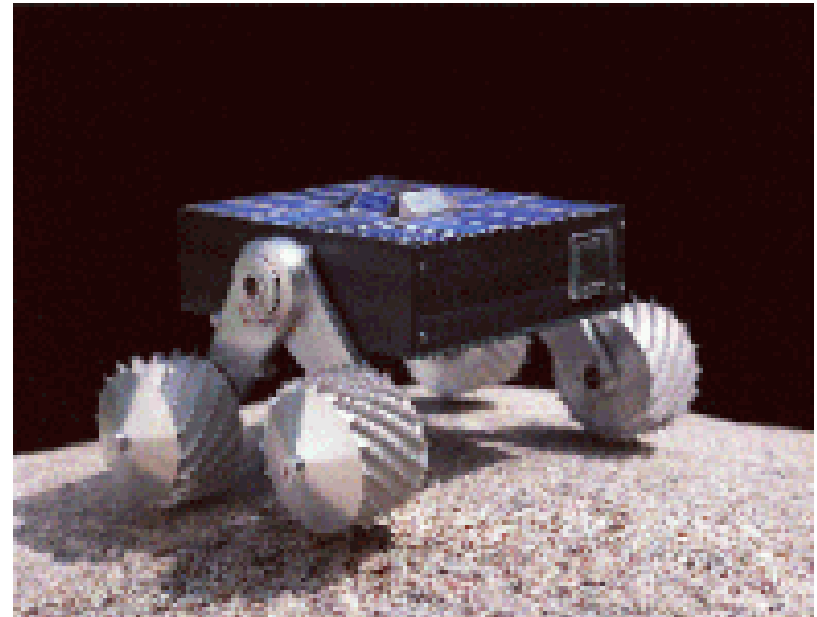
# What is robot ? (1)



Legged Robot



Wheeled Robot



# What is robot ? (2)



Autonomous Underwater Vehicle

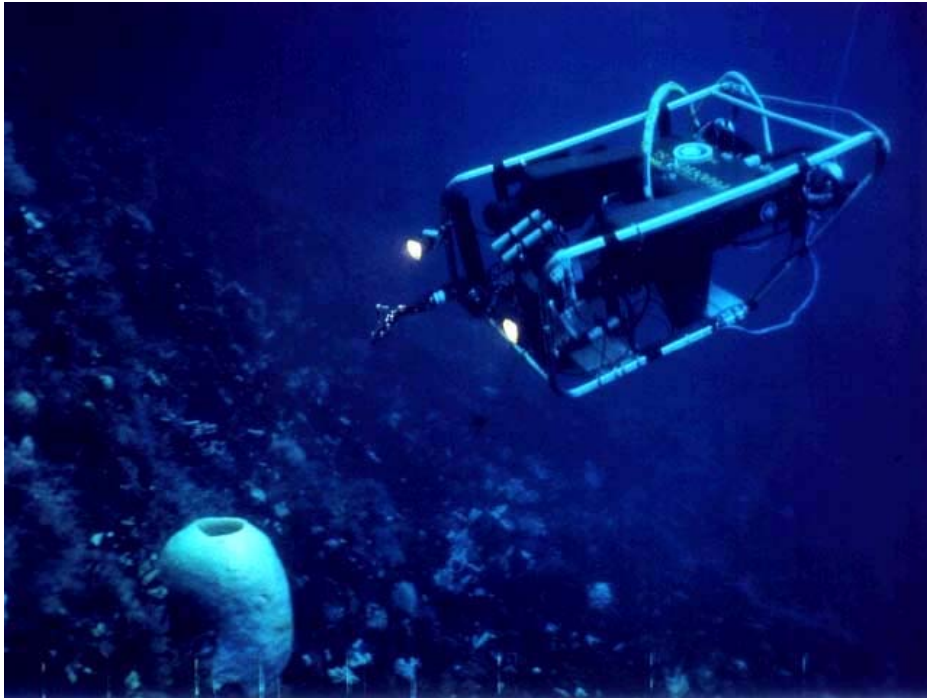


Unmanned Aerial Vehicle

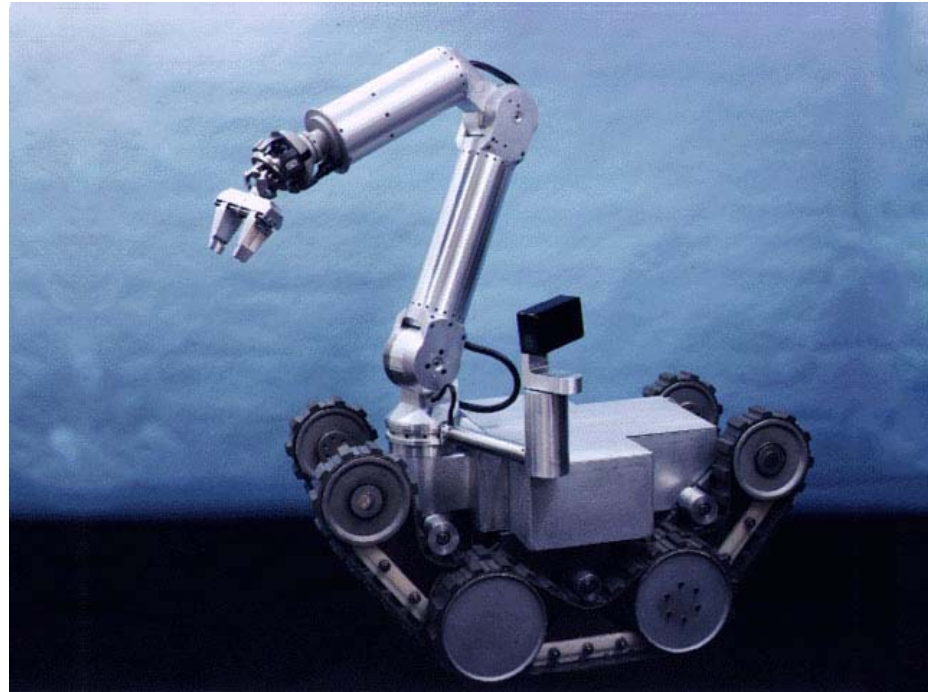




# Robots in hazardous environments



TROV in Antarctica  
operating under water



HAZBOT operating in  
atmospheres containing  
combustible gases

# Robots in entertainment 1



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Sony SDR-3X Robot



Sony Aibo

# Robots in entertainment 2



# My real baby



## Capabilities

- Facial muscles: smile, frown, cry
- Blink, suck its thumb and bottle
- Baby noises
- Realistic facial expressions and emotional responses
  - E.g. if not fed: gets hungry and cries
- No longer in production, but expect more of this type...





# Home robot Roomba



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- Detects bumping into walls and furniture,
- Accessories: "virtual wall" infrared transmitter units
- Automatically tries to find self-charging homebase
- Simple behaviours: Spiral cleaning; Wall-following; Random walk angle-changing after bumping
- Effectiveness
  - Takes longer than a person
  - Covers some areas many times and others not at all



Over 2 million Roombas sold (approx. US \$ 400)

- The most successful household robot

# Home robot Trilobite,



- Electrolux, Sweden
- (Was much more expensive than Roomba, EUR 1400)

## Capabilities

- Automatically makes a map of the room
- Cleans efficiently
- Remembers where it has been





# Wakamaru



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- Companion for elderly and disabled people.
- Detection of moving persons.
- Face recognition of 10 persons.
- Voice recognition 10,000 words.
- Memorizes his owner's daily rhythm of waking up, eating, sleeping, etc.
- Calling for help if something goes wrong.
- Remind to take medicine on time.
- Detects a moving objects around him while you are away (e.g. intruder).
- Provides internet connection.

