Mobile Robots

Introduction

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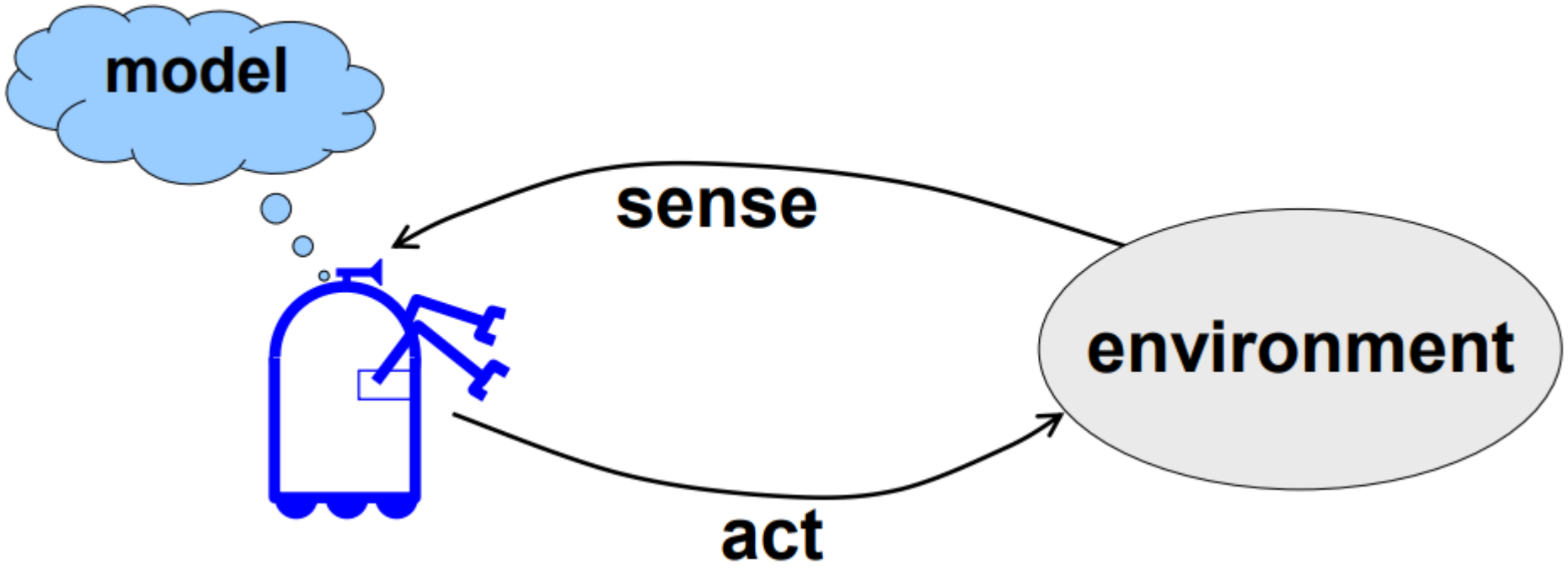
Definition

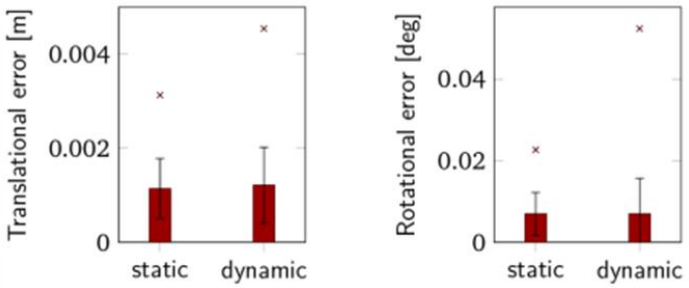
- A mobile robot is an autonomous machine, able to move in the surrounding environment, sensing, acting and interacting to achieve a task.



From fixed robotics to mobile robotics

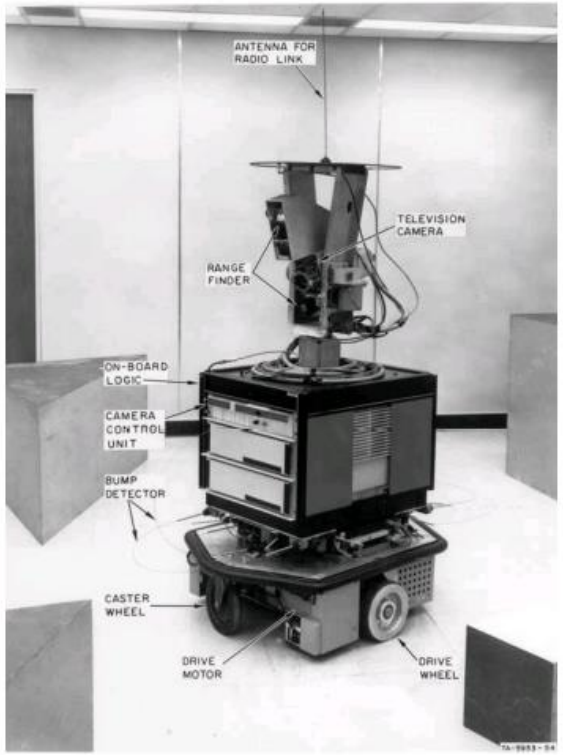
Repetitive on site tasks, and structured environment

Indoor and outdoor multi-task, dynamic environment



History

Shakey 1966 (California university)



Goliath 1940 (cable driven, electric actuation)

Mobile robots .... now

- Mobile robots are now being tested in a wide range of challenging application scenarios.
- They need perception which gives them a suitable level of understanding of their complex and changing surrounding.

Potential applications

Indoor

- Cleaning
- Services (shops, museums, hospitals…)
- Merchandise and warehouses
- ……

Outdoor

- Space and underwater exploration
- Civil protection and forests monitoring
- Automated agriculture
- Mine clearance
- Military

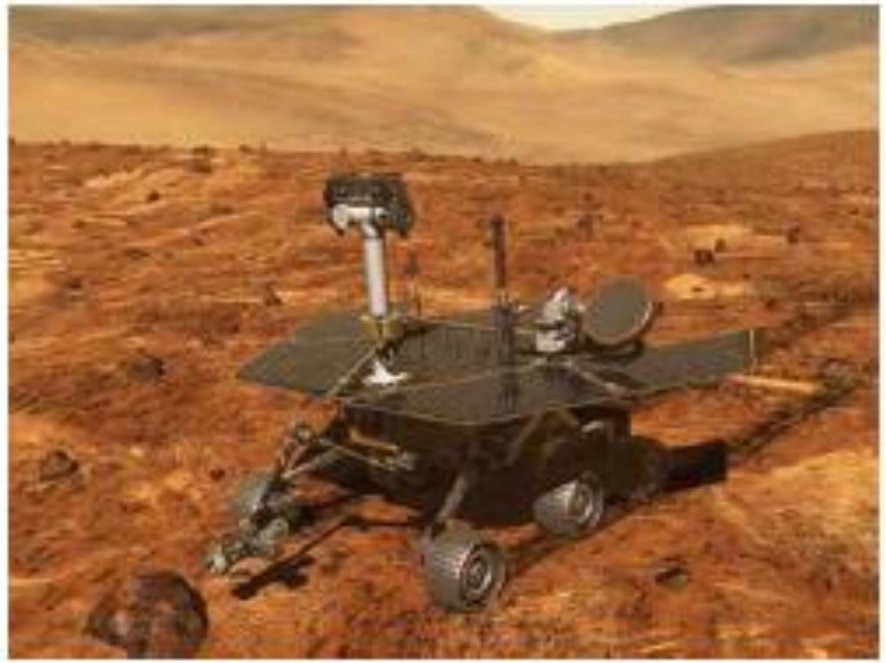
Example: AVG Automated Guided Vehicle

- Used for the management of production line end.
- They carry the pallets of stored products from the warehouse to the truck loading spots.
- They can work in groups of 30 robots

Service robotics: Helpmate robot

- Used in hospital to transport medicines and sanitary materials.
- It perceive the hospital as stations connected by corridors, intersections and elevators.
- Unicycle kinematic model and four wheels for static stability.
- Equipped with sonar and touch sensors for obstacle avoidance.

Space robotics: Mars Rovers (Spirit and Opportunity)



Agriculture Robotics (ad-hoc orchards)

- Designed to automate agriculture operations
- Colors recognition to tell when a fruit is ripe, cleaning, harvesting .....
- In service since 2016

Hostile environment: Pioneer Robot

- Designed by Stanford university
- Chosen to explore Chernobyl sarcophagus
- Sonar and Camera integrated
- Robotic arm with gripper

Autonomous car: DARPA (Stanley 2005, Boss 2007)

- Stanley: Stanford university, 175 mile autonomously in 6 hours 54 minutes, guided by GPS, road following and obstacle avoidance using laser range-finder and vision.
- Boss: designed for Urban area by Carnegie Mellon university, obeying traffic laws and avoiding other cars and humans. Laser, cameras and radars to achieve all-around awareness.

Spot 2019

- Designed by Boston dynamics
- 5 active stereo sensors give all around perception for localization and mapping.

Thanks

Our focus is wheeled mobile robot