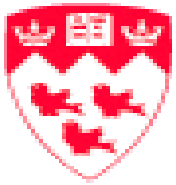
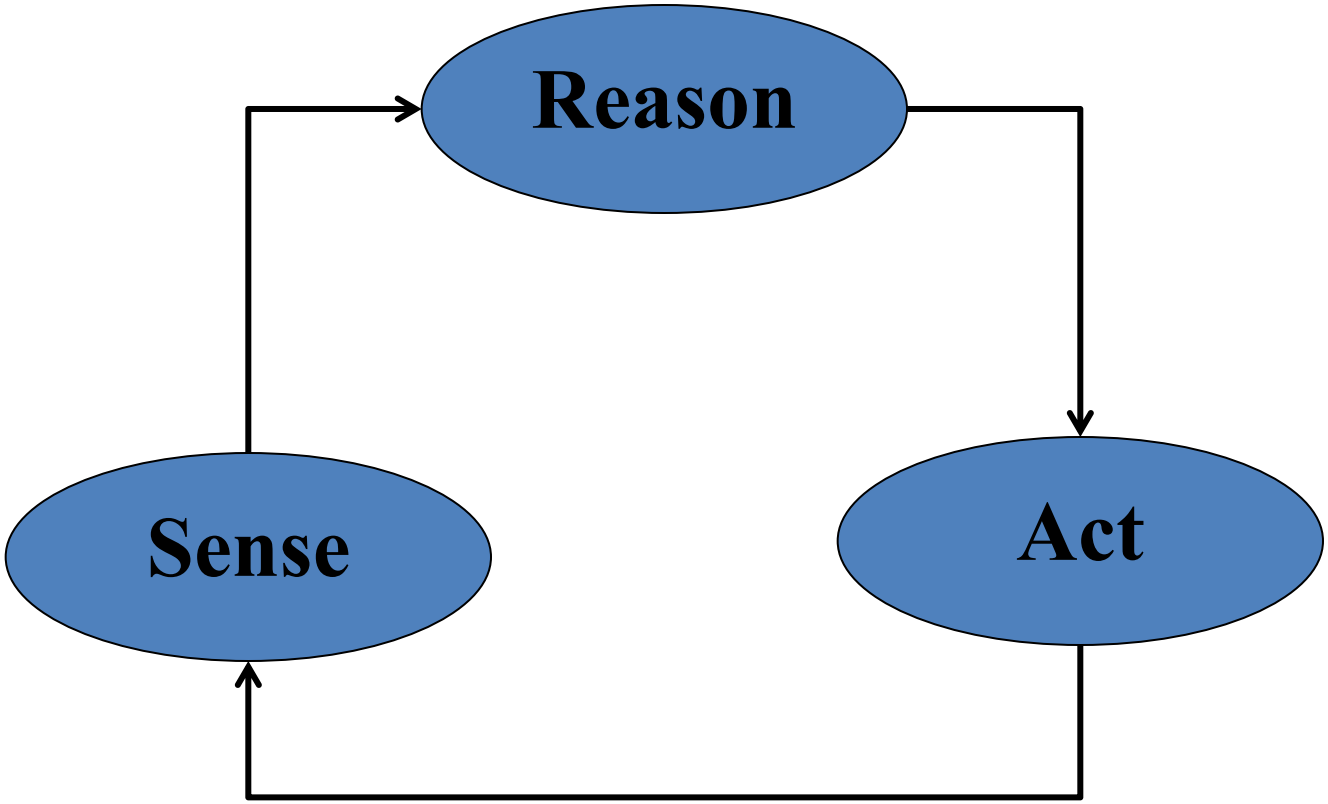


CS-417 INTRODUCTION TO ROBOTICS AND INTELLIGENT SYSTEMS

A Quick history

Ioannis Rekleitis

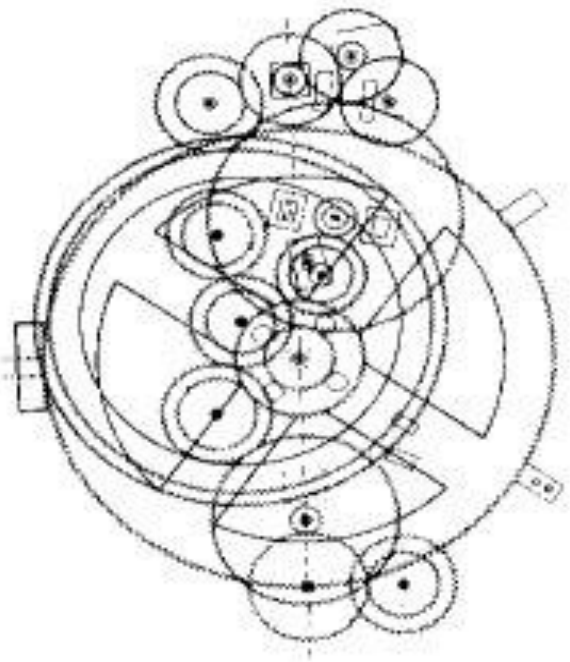
Robot



Talos (Τάλως/Τάλων) 400 BC

- A giant man of bronze who protected Europa in Crete, circling the island's shores three times daily while guarding it.
- Shore-length of Crete is 1.046 km.
- Average speed 130 Km/h

Automatons

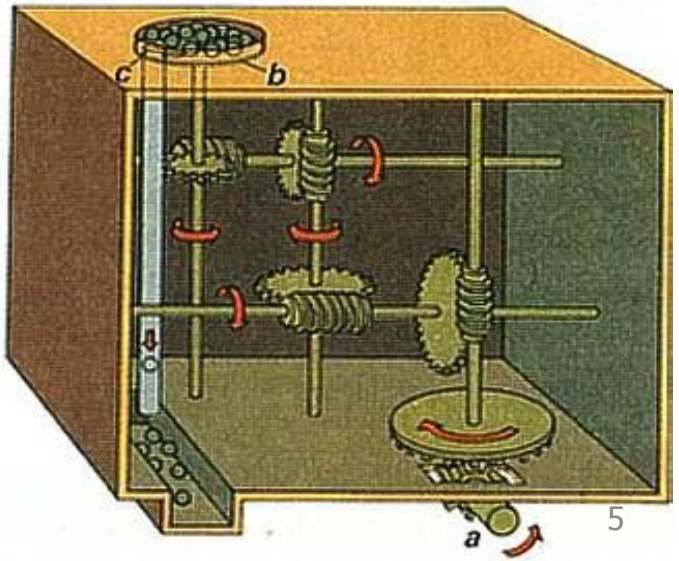


Antikythera, 150–100 BC

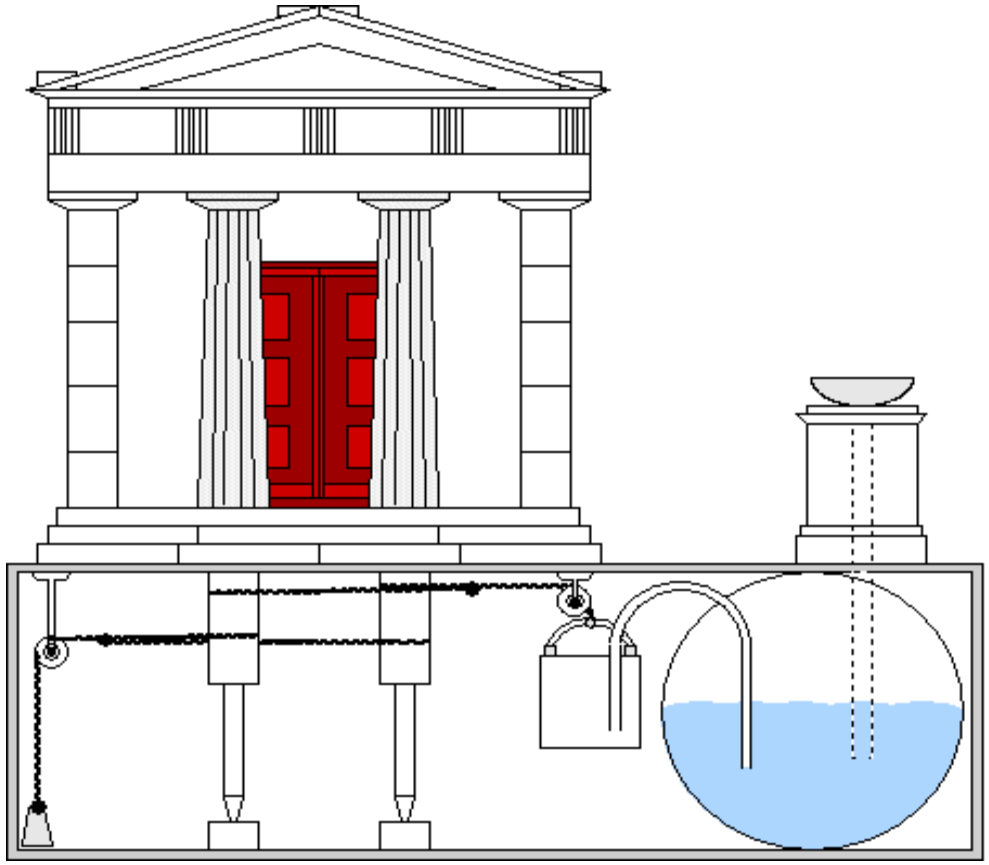
Heron of Alexandria (Ηρων ὁ Ἀλεξανδρεύς)

10-70AD

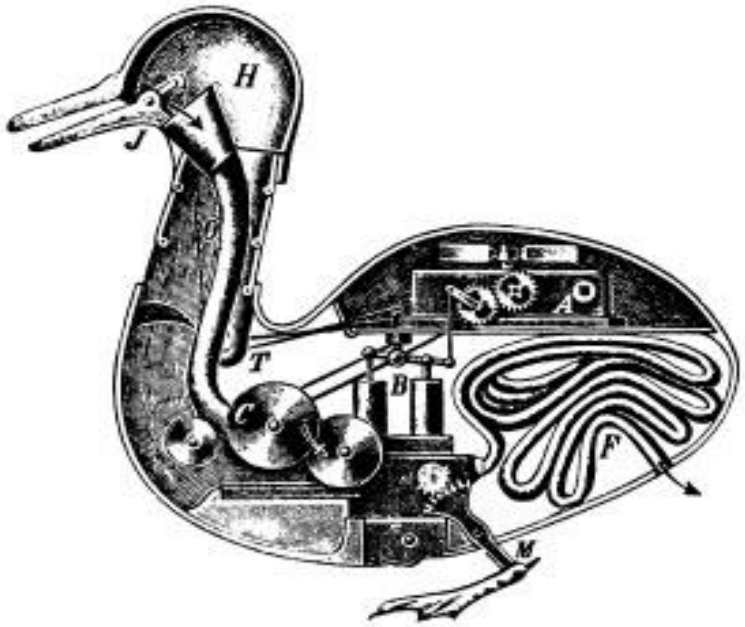
One of the first sensors: Odometer.



Heron of Alexandria

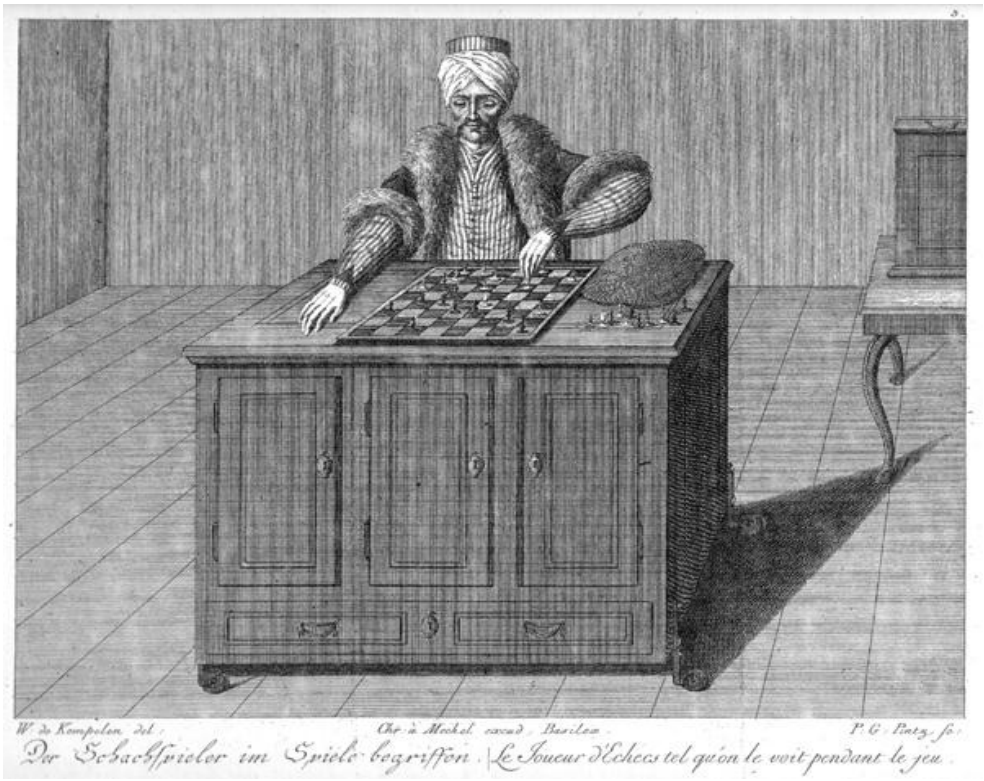


Automatons



"Canard Digérateur",

1793



"The Turk"

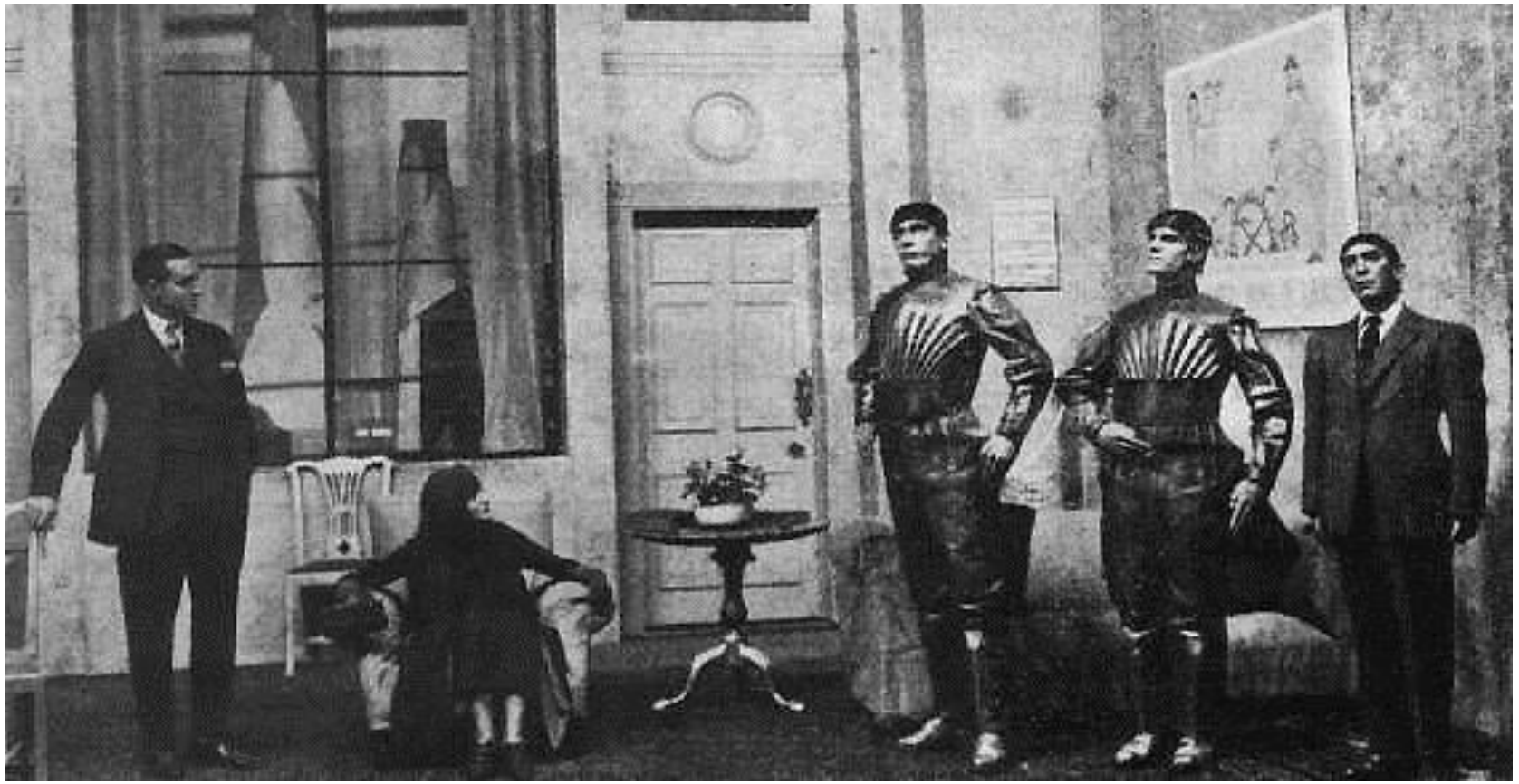
1770

Tea serving automaton

19th Century, Japan

Word "*Robot*"

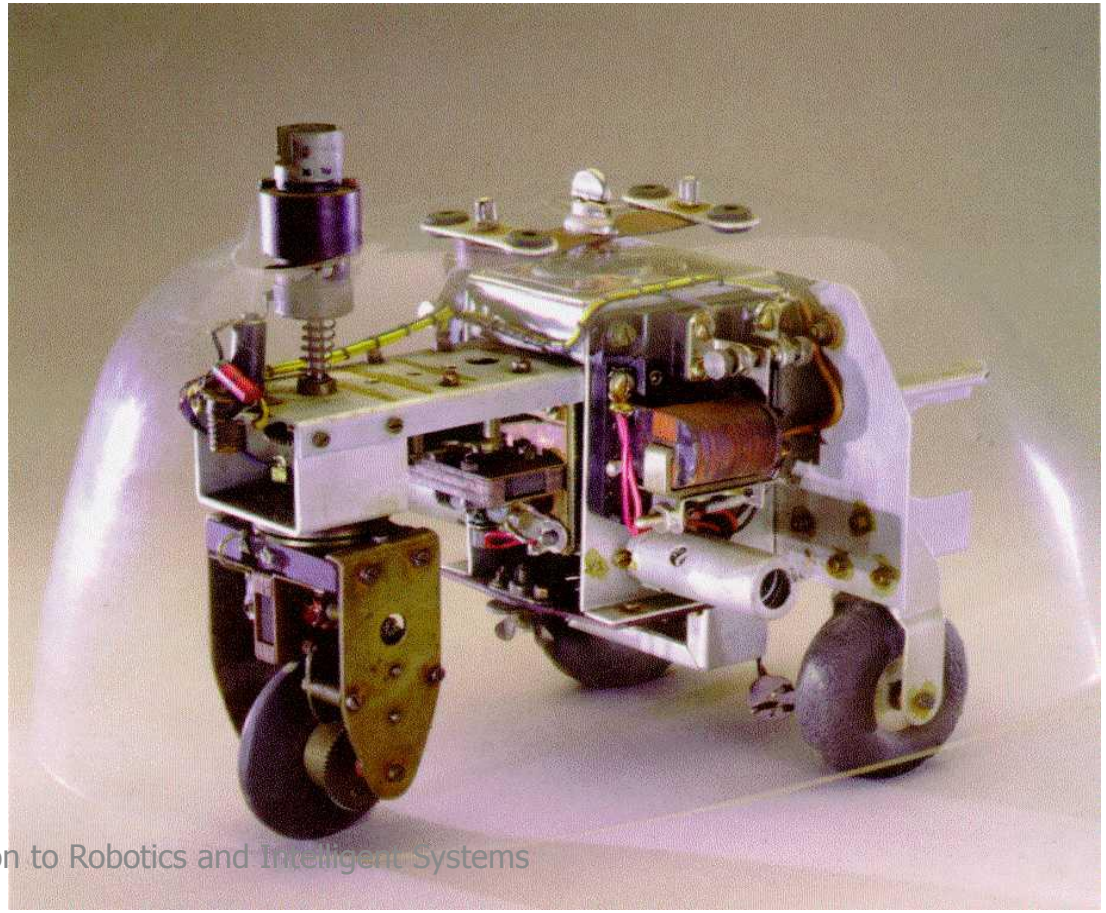
- *"Rossum's Universal Robots" a novel by* Karel Čapek, 1920.



Mobile Robots: 1950

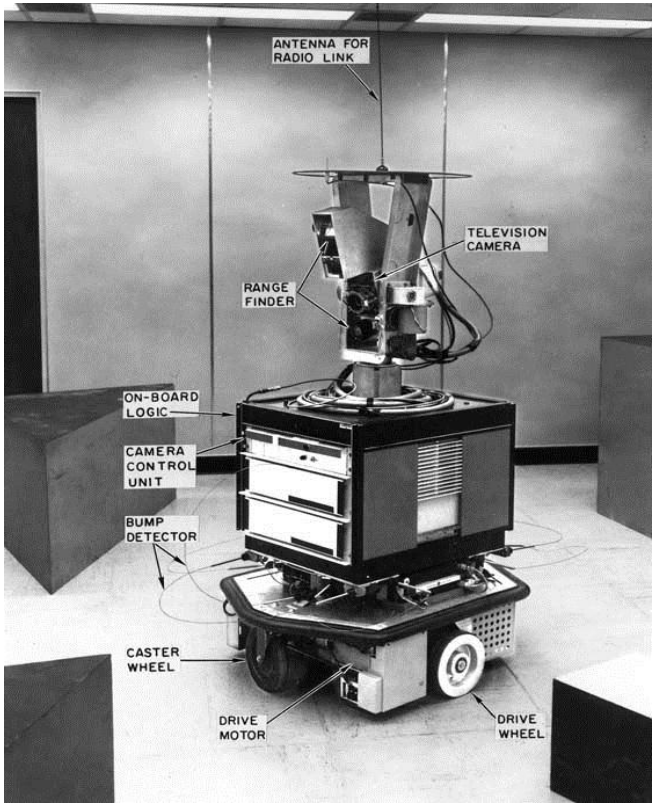
- Walter's *Tortoise*

  http://www.youtube.com/watch?v=lLULRlmXkKo



Shakey (1966 -1972)

- **Shakey** (Stanford Research Institute/SRI)
  - the first "autonomous" mobile robot to be operated using AI techniques
- **S**imple tasks to solve:
  - To recognize an object using vision, given a very restricted world
  - Find its way to the object
  - Perform some action on the object (for example, to push it over)
  - Perform compound actions and basic planning.



Stanford Cart

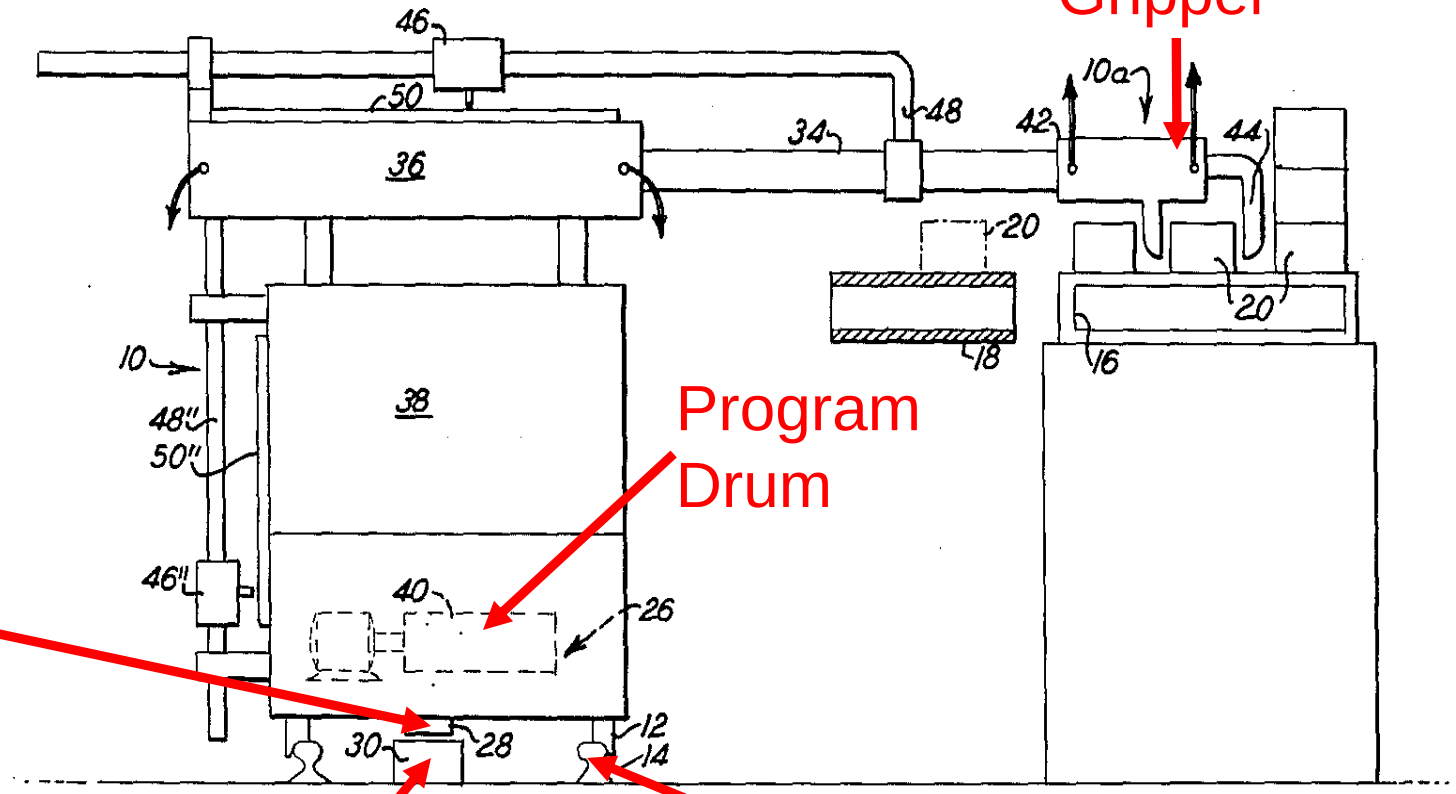
- 1973-1979
  - Stanford Cart developed by Hans Moravec
  - Use of stereo vision.
  - Took pictures from several different angles
  - The computer gauged the distance between the cart and obstacles in its path to do basic collision avoidance
  - About **15 min** to think about each image, then drives 1 foot or so.

Industrial history: 1961

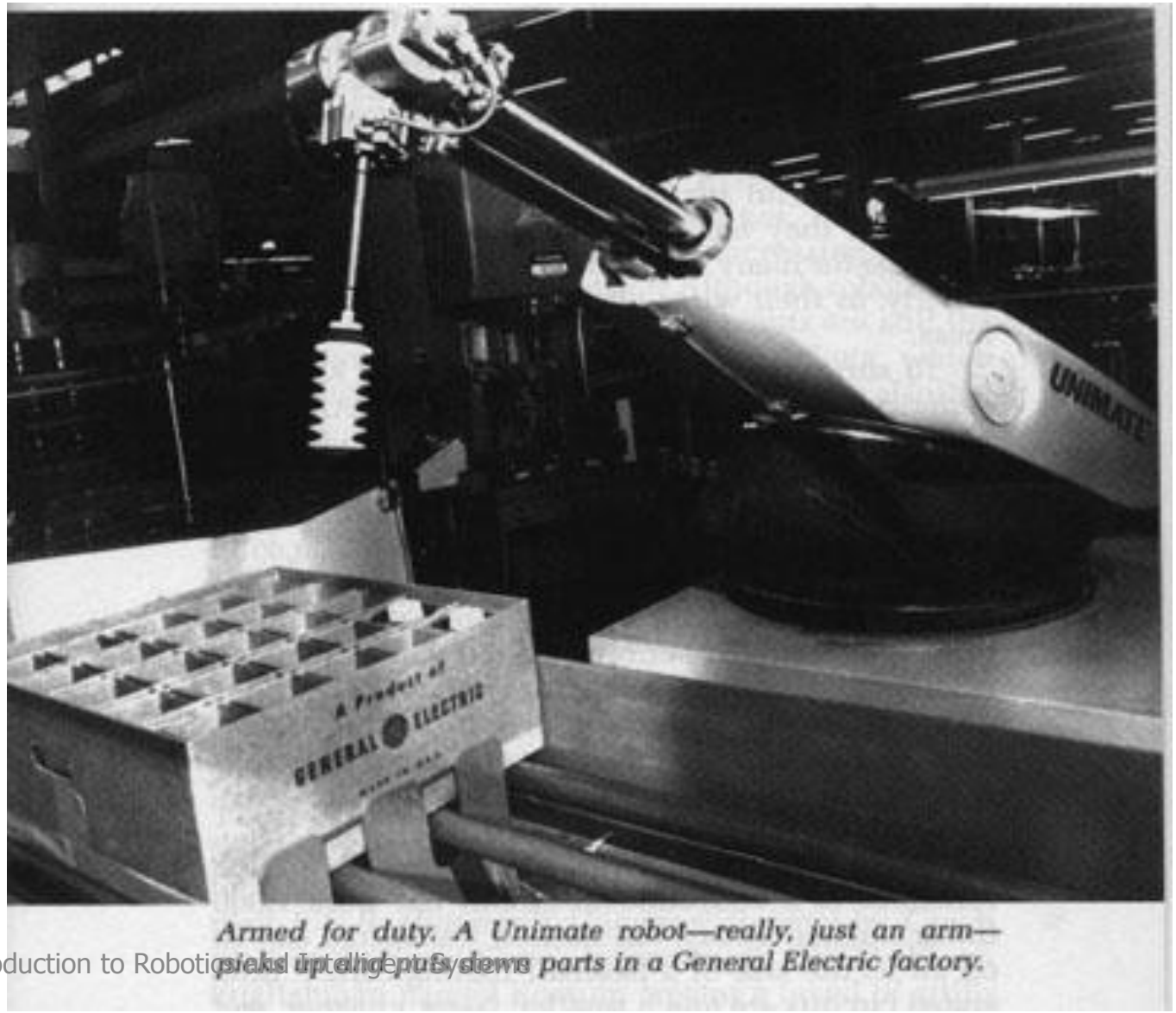
June 13, 1961 G. C. DEVOL, JR 2,988,237

PROGRAMMED ARTICLE TRANSFER

Filed Dec. 10, 1954 3 Sheets-Sheet 1

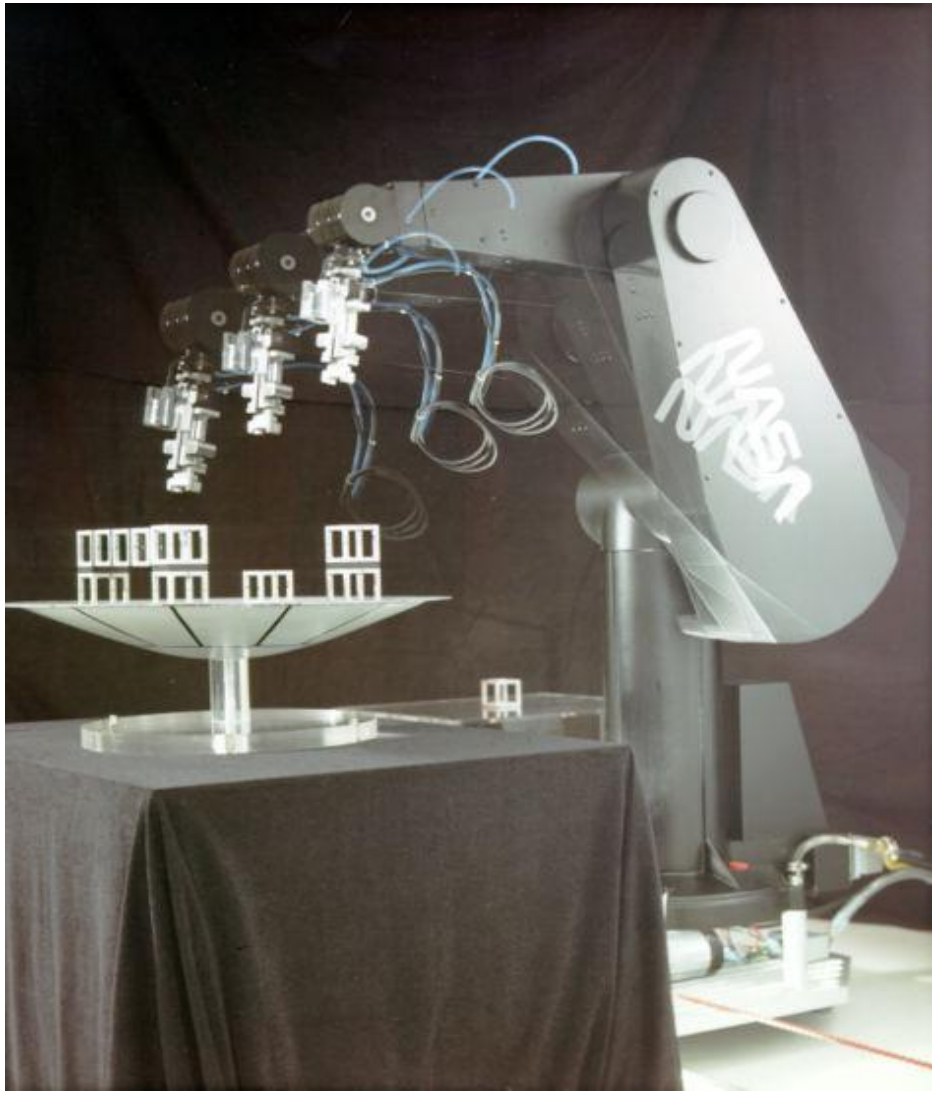


Industrial history: Unimate



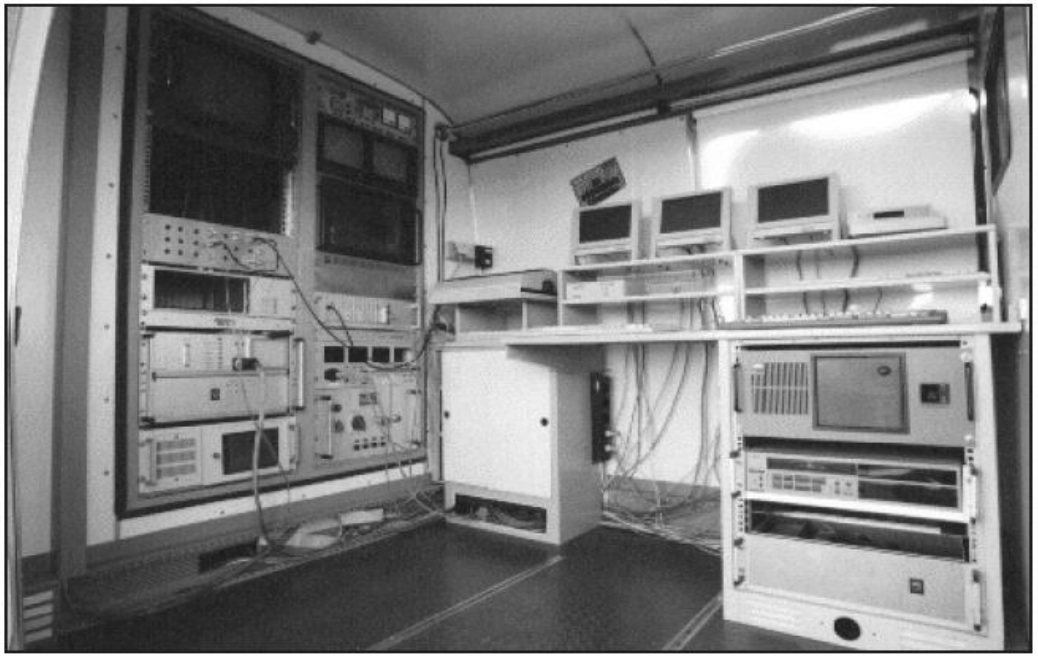
Armed for duty. A Unimate robot—really, just an arm—picks up die castings parts in a General Electric factory.

Industrial history: Puma 1978



Robot Vehicle (Late 80's)

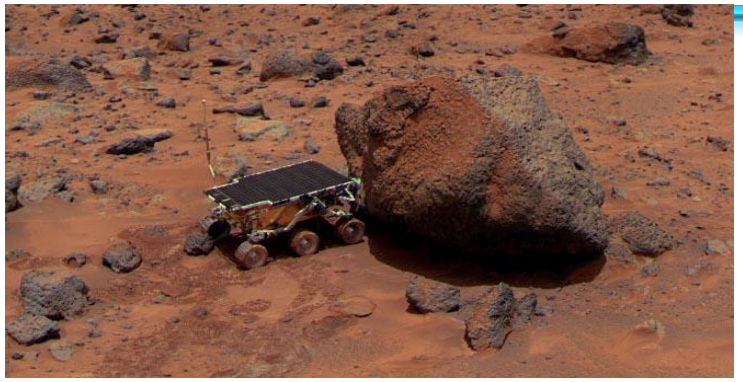
- *VaMoRs*: Highway driving
- Tracking white lines with Kalman filtering (Dickmanns)



Mid 90's: CMU's Navlab 5

- Drove 2797/2849 miles (98.2%) on highways
- Throttle/Brake manually handled.

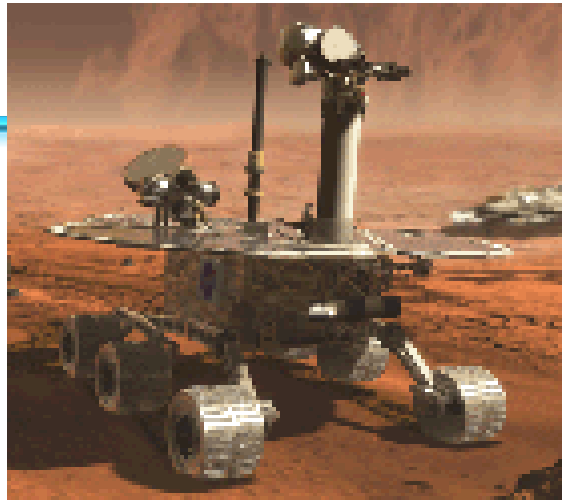
Exploring Mars



Sojourner
1997

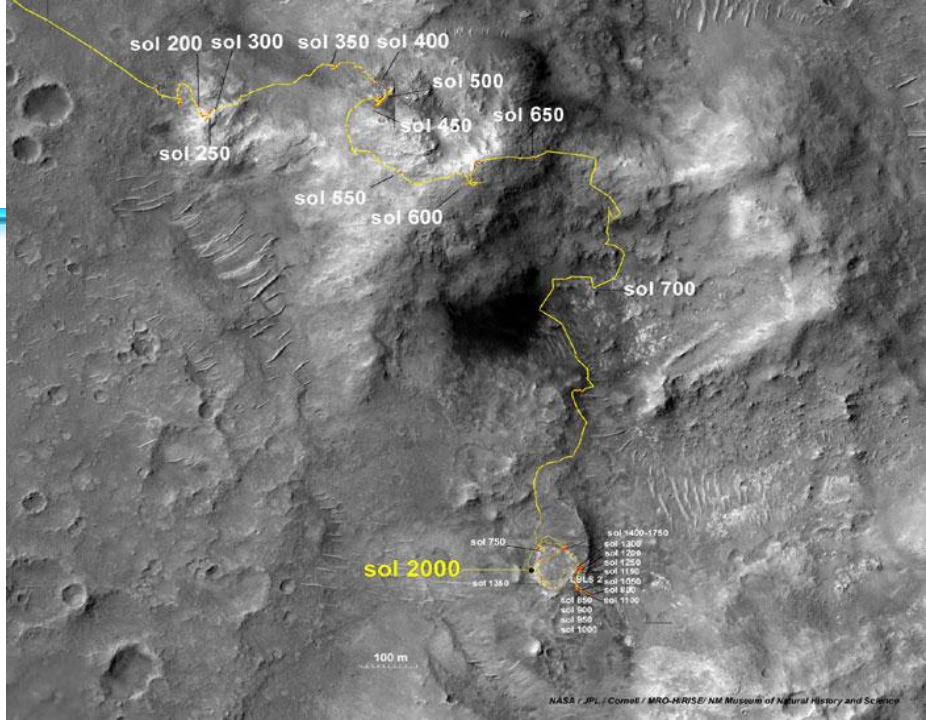
Phoenix-2008

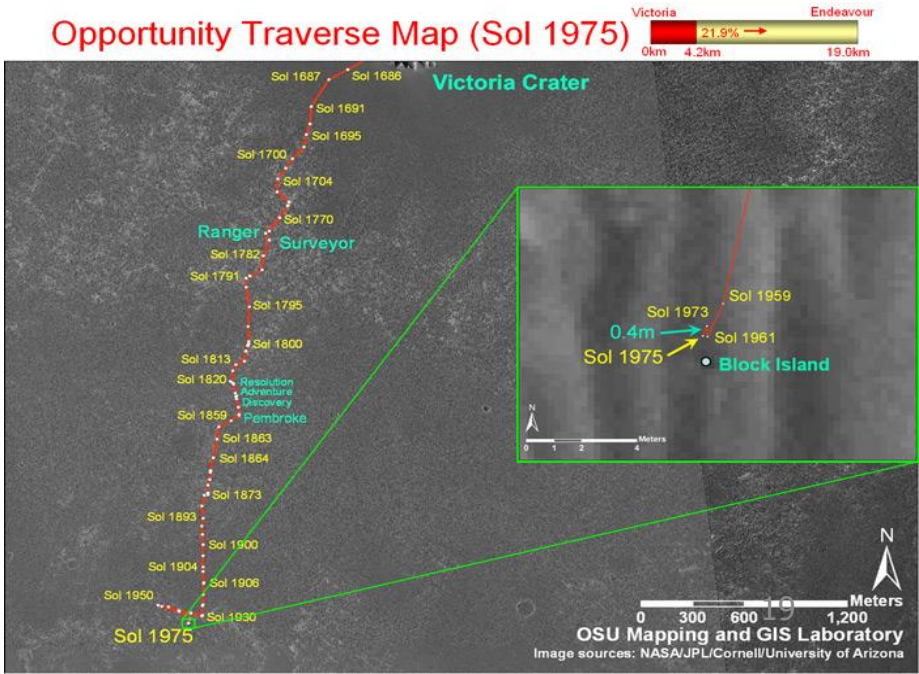
Spirit and
Opportunity
2003



Mars Exploraton

- As of Sol 2010 (Mar. 22, 2010), Spirit's total odometry remains at 7,730.50 meters (4.80 miles).
- As of Sol 2702 (August 31, 2011), Opportunity's total odometry was 33,525.68 meters (20.83 miles).





DARPA Grand Challenge '04

- Autonomous driving on 240 km
  - Best team drove only 11.8 km!

DARPA Grand Challenge '05

- Autonomous driving on 240 km
  - 5 teams finish the race!

DARPA Urban Challenge '07

- Autonomous driving for 96 km in a city.