AUTONOMOUS ROBOTS THAT CAN NAVIGATE & EXPLORE

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COM SCI 35L - LAB 3

AUTONOMOUS ROBOTS

- ROVINA Project
  - Autonomous robot used to navigate and explore dangerous places to reach.

- DARPA Challenges
  - Sought to find autonomous robotic solutions for various situations.

- Navigation Systems for Autonomous Flying
  - Commercial use or navigation and exploration.

WHAT TOOLS WOULD ROBOTS NEED?

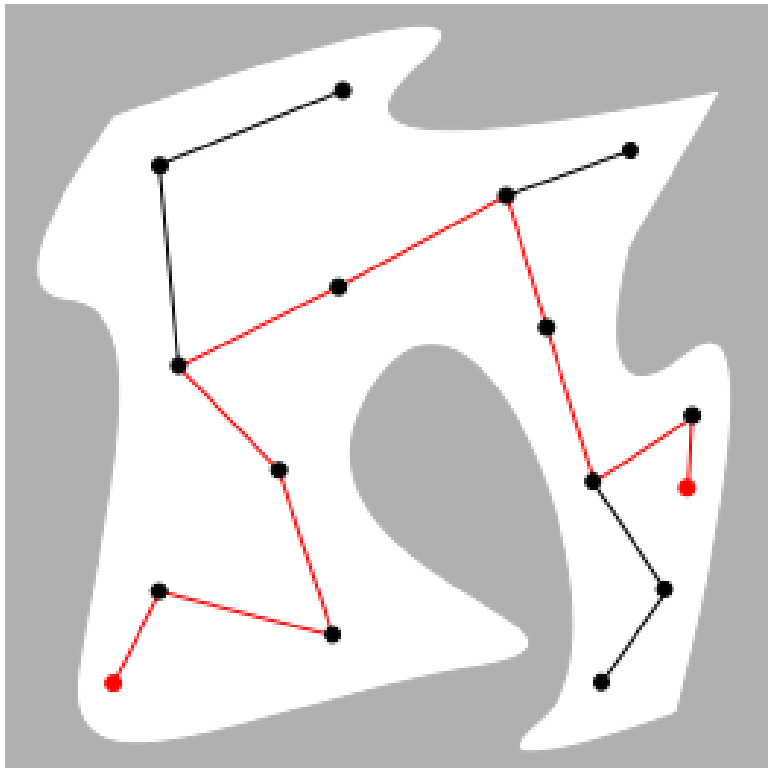
- Using the Mikrokopter as an example:
  - Gumstix embedded PC
  - WiFi network card
  - Laser sensors
  - Inertial measurement unit (IMU)
  - Mirror

- Sensors are the most important part in gathering data!
  - RE05 3D LIDAR[1]

[1] http://www.ocularrobotics.com/products/lidar/re05/

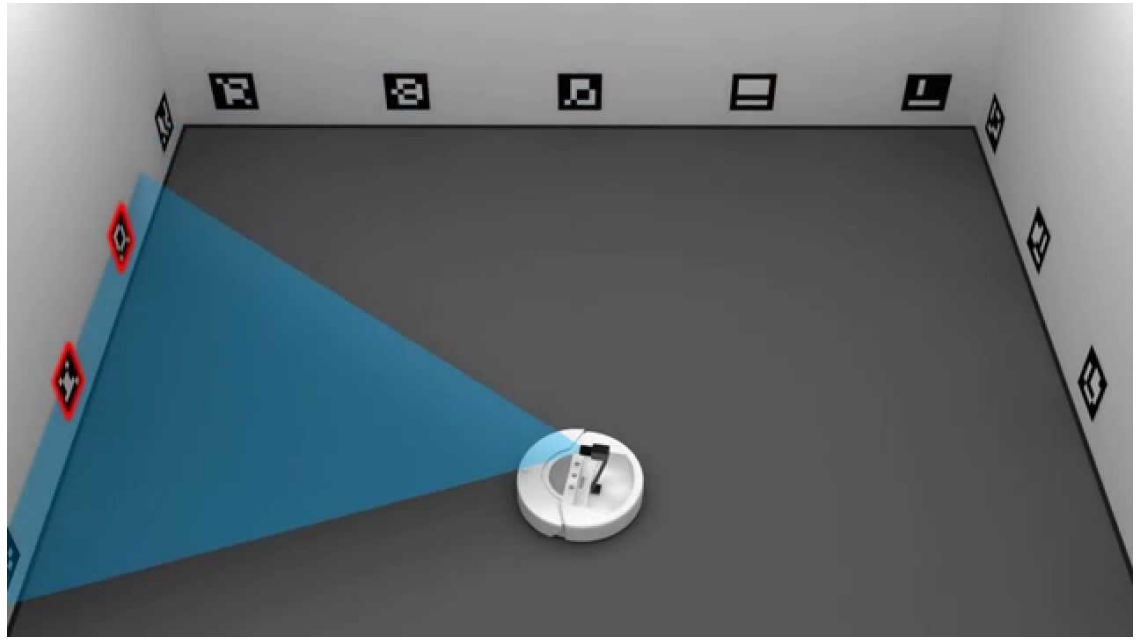
ROBOTIC MAPPING

- A type of cartography
- Metric versus topological framework
  - spatial coordinates or relative placement
- Motion planning



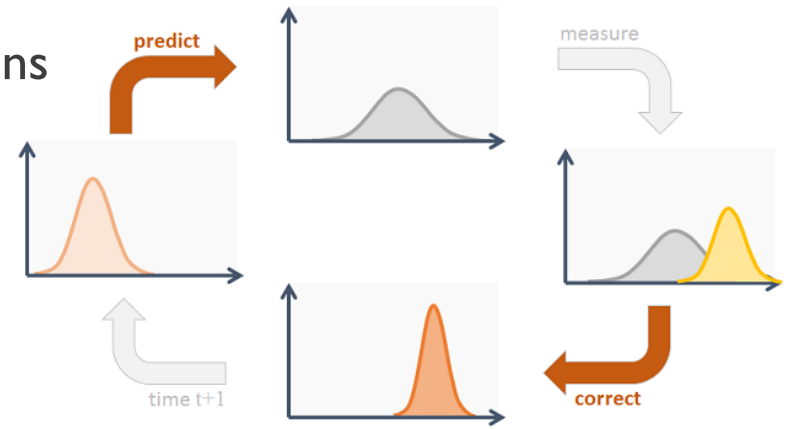
WHAT IS LOCALIZATION & MAPPING?

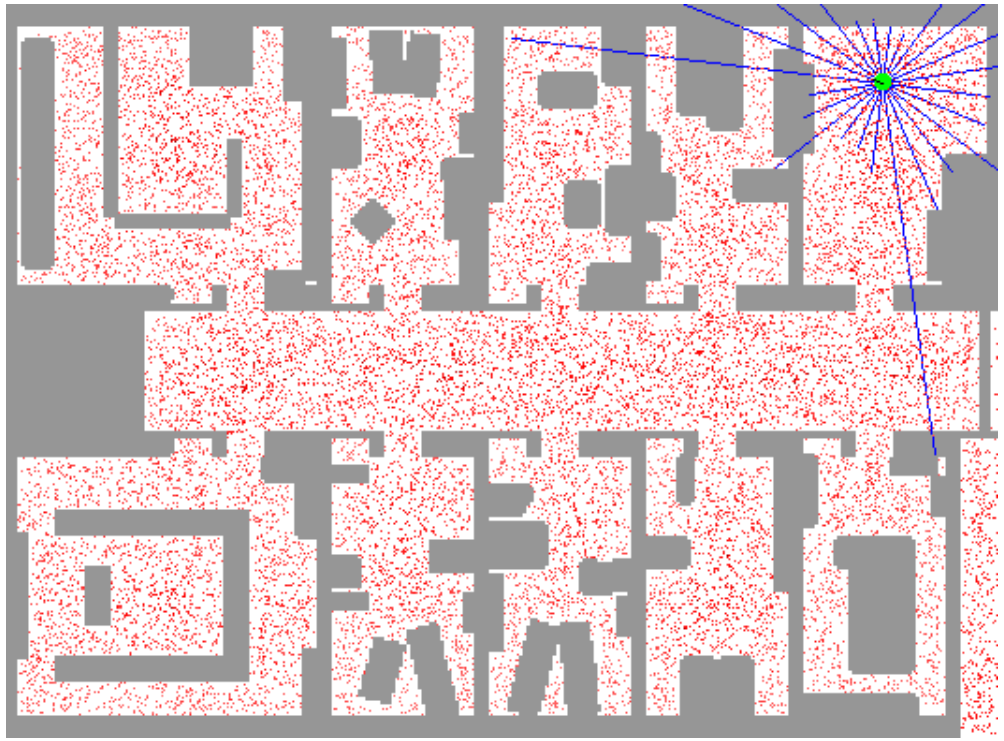
- Localization – where you are
- Mapping – where everything else is relative to you



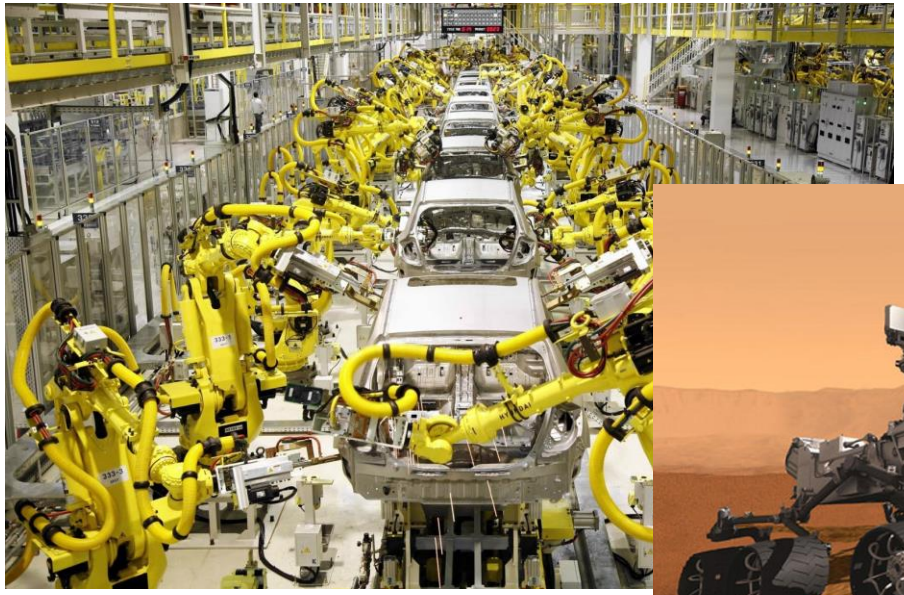
SIMULTANEOUS LOCALIZATION AND MAPPING (SLAM)

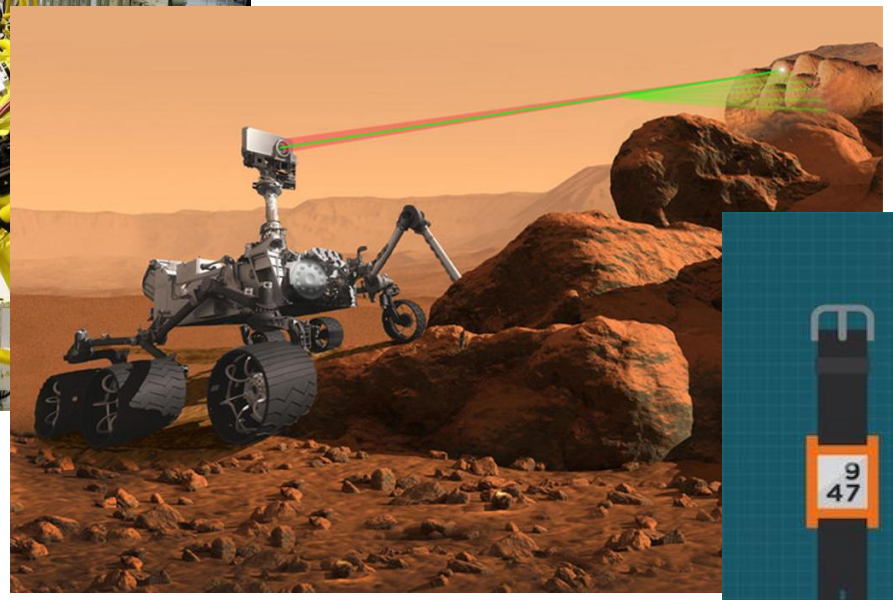
- Egg & chicken problem
- Based on hypotheses and observations
- Subject to sensor noise
- Approximate solutions
  - particle filtering
  - Kalman filter

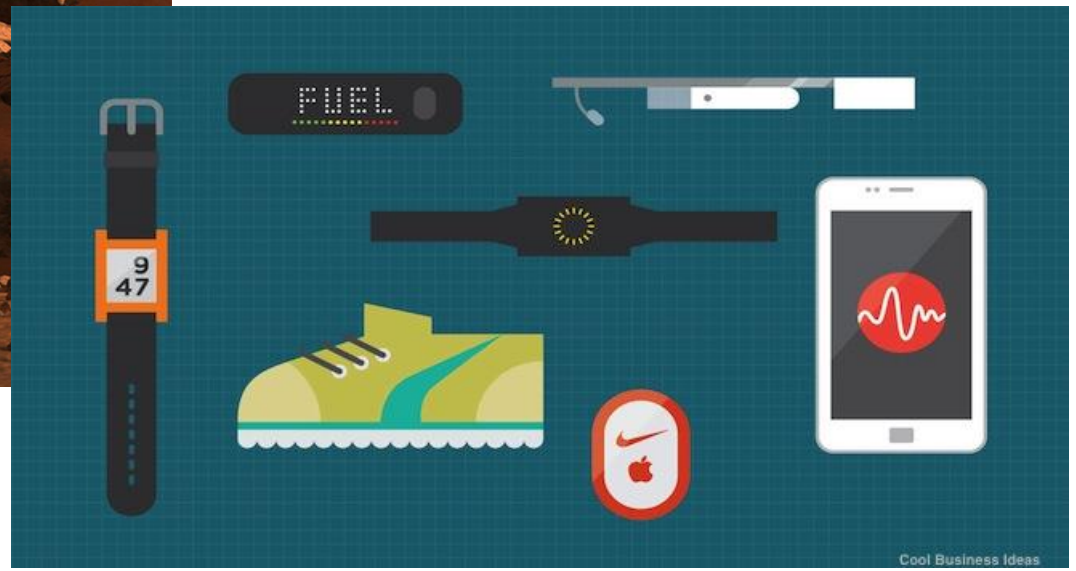




SOME APPLICATIONS







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