

CS494/529: Autonomous Mobile Robots

Fall 2011

Tuesday/Thursday 2:10-3:25 PM

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TA:
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Outline

- Overview syllabus and class policies
- Introduction to class
- Overview of Reading #1: Artificial Intelligence article

Overview of Syllabus and Class Policies

(See handout)

What is a Robot?

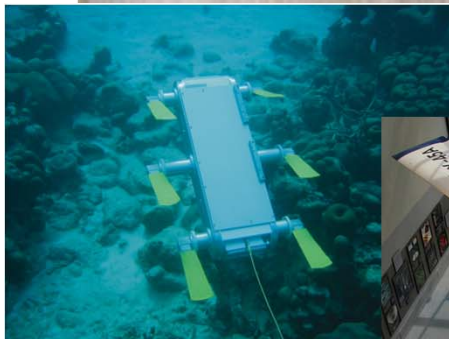
- Notion derives from 2 strands of thought:
 - Humanoids -- human-like
 - Automata -- self-moving things
- “Robot” -- derives from Czech word *robota*
 - “*Robota*”: forced work or compulsory service
- Term coined by Czech playwright Karel Capek
 - 1921 play “R.U.R” (Rossum’s Universal Robots)”
- Current notion of robot:
 - Programmable
 - Mechanically capable
 - Flexible
- Our working definition of *robot*: physical agent that generates “intelligent” connection between perception and action



We'll be studying *mobile* robots

- What is a “mobile” robot?
 - One whose entire body moves with respect to the environment

- Examples of *mobile* robots:



- Examples of *non-mobile* robots:

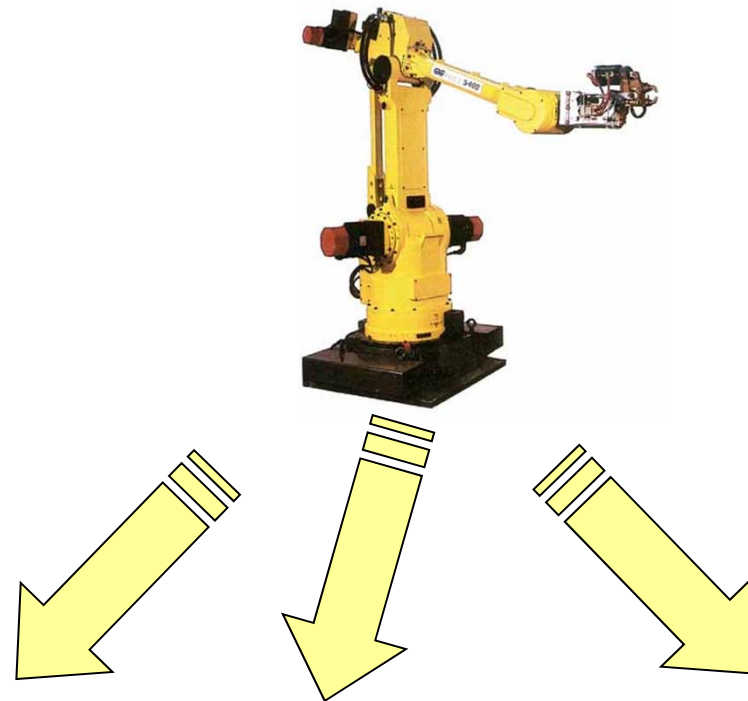


Strengths: What are mobile robots good at?

- **Providing specialized access** – hazardous environments (no air, melting nuclear power plants, etc.), distance/time (Mars)
- **Reducing operating costs** – lower overhead, reduced maintenance costs (gentler treatment of the machinery)
- **Increasing productivity** – “permanent” availability, more hours, higher throughput
- **Improved product quality** – accuracy, consistency
- **Inventing new human services!** – human interactivity

State of Robotics Applications

- Moving from manufacturing, industrial manipulators to:
 - Entertainment robotics
 - Personal service robots
 - Medical robots
 - Industrial applications beyond factory (e.g., mining, agriculture)
 - Hazardous applications (e.g., military, toxic cleanup, space)
 - And others...



Purpose: What Could Mobile Robots Do? (i.e., applications)



- Space (Robonaut, Sojourner, Opportunity, Spirit, etc.)



- Cleaning (Roomba)



- Agriculture (Demeter harvesting robot)

Purpose: What Could Mobile Robots Do? (i.e., applications)

(con't.)



- Medical service



- Mining/excavation
(Groundhog robot)



- Entertainment robots

Purpose: What Could Mobile Robots Do? (i.e., applications)

(con't.)



- Security (MDARS interior robot)



- Distance driving (Stanley)



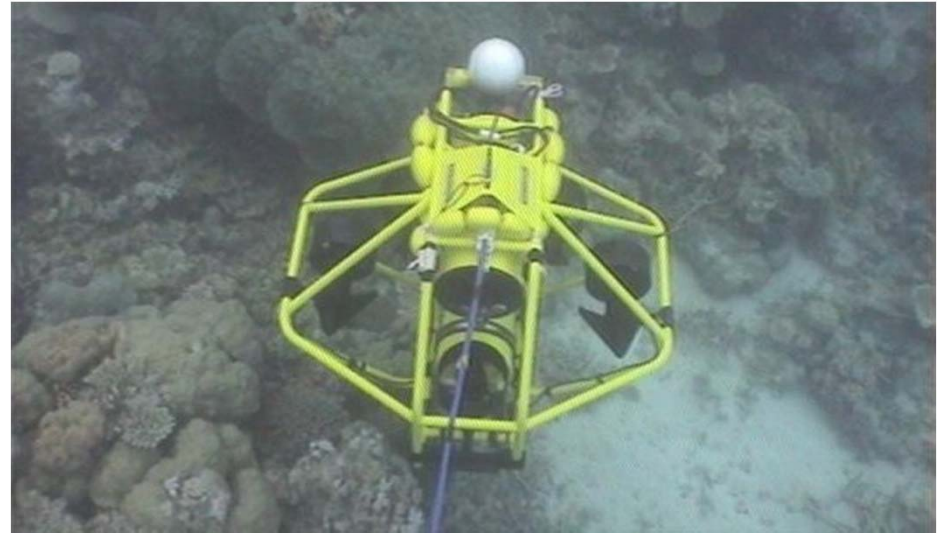
- Military (Packbot)

Purpose: What Could Mobile Robots Do? (i.e., applications)

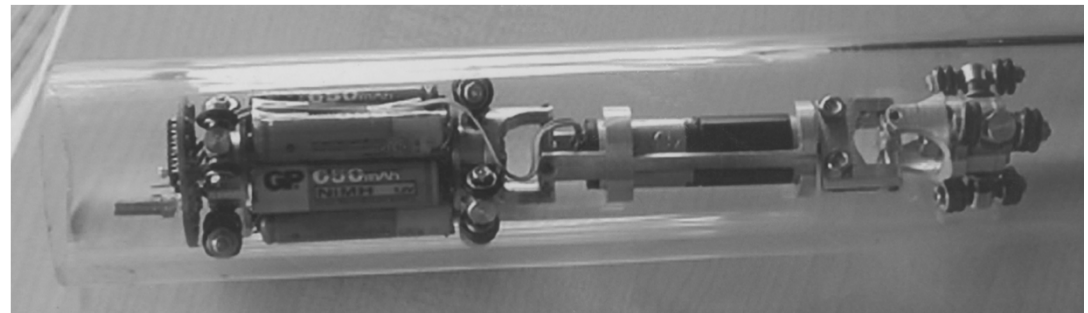
(con't.)



- Handicapped Aides
(Japan's WL-16RIII)



- Undersea (Oberon)



- Pipe inspection

Purpose: What Could Mobile Robots Do? (i.e., applications) (con't.)



- Lawn Care (Cyber Blue)



- Power Line Inspection (WireMonkey)

And many, many more applications!

Example Robot Systems

(Movies)

- Hexapod1.mpg
- 3-robot-deploy-fast-clipped.wmv
- SwarmBot-followTheLeader.mpg
- OmniTread_UMich_Borenstein.wmv
- asimo2.mpg

Youtube:

- NAO
- Swarmanoid

Assignment #1: Read article distributed today

- Read-by date: BOC (Beginning Of Class) Thursday, Aug. 25
- Remember “mini-quizzes”!!