Research Introduction

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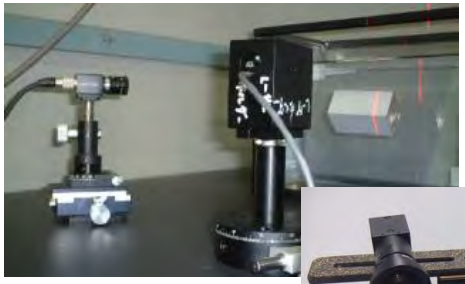
Overview of laboratory

- Recognition and control of robots
  - Yuichi Kobayashi, Associate Professor
  - Bachelor candidates, Master & Doctor course students

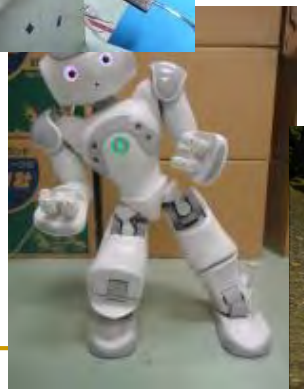
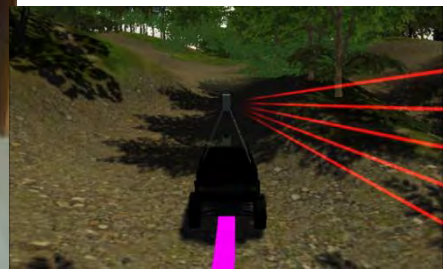
Yuichi Kobayashi

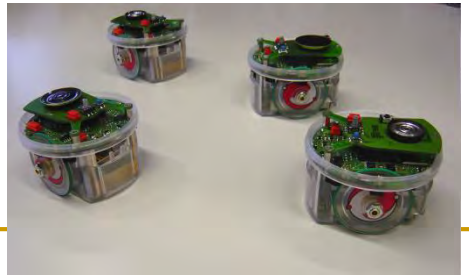
Robots in lab.

- Stereo camera, omni-directional camera
- Laser range finder
- Arm robot x 2
- Mobile robot (Pioneer) x 2
- Small mobile robot (e-puck) x 10
- Humanoid robot (NAO) x 1
- Unmanned Ground Vehicle simulator x 1





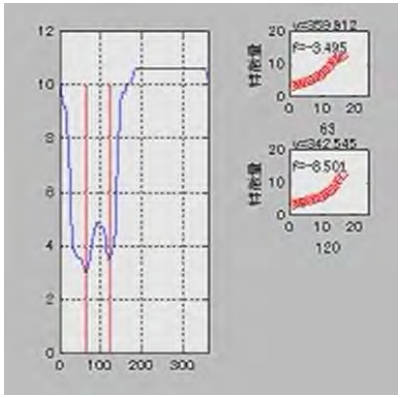


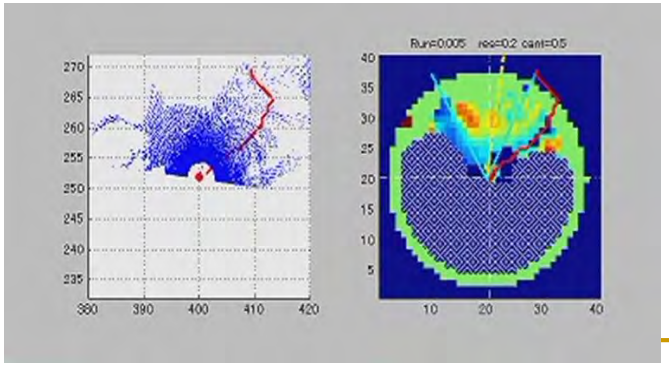
Research motivation (1/3)

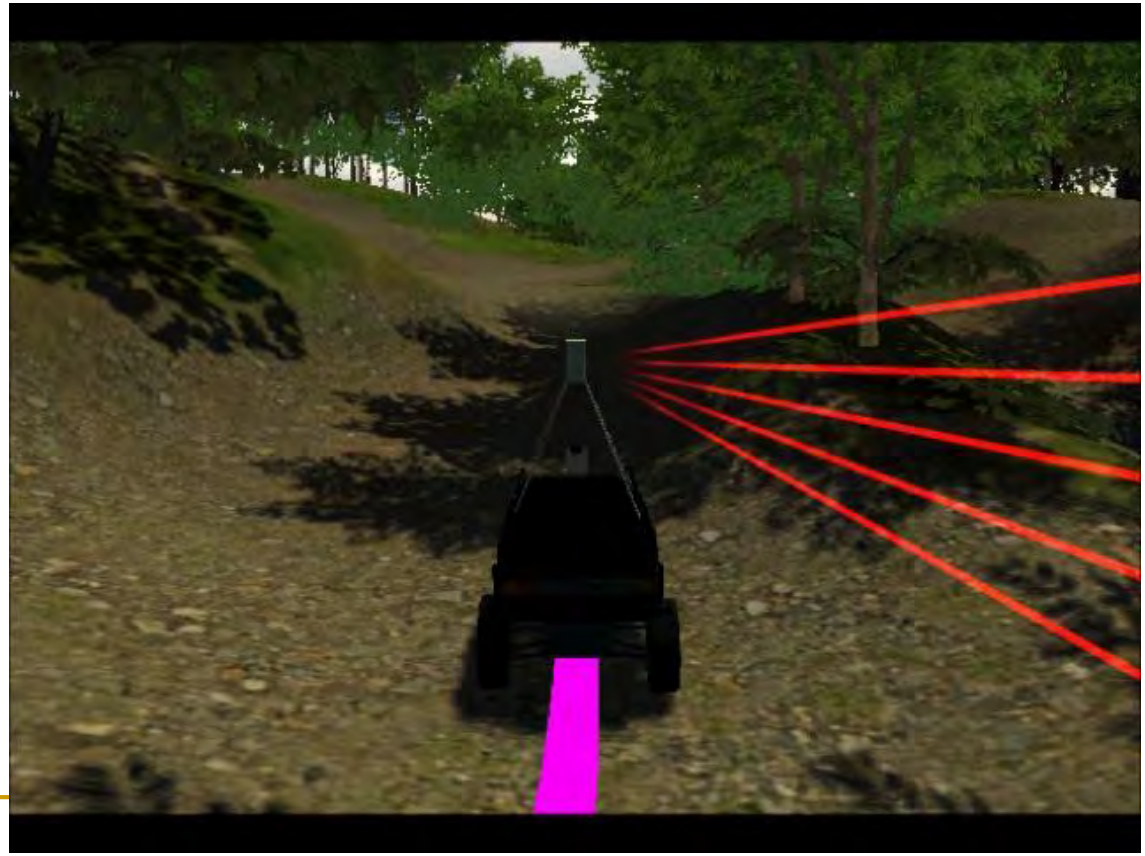
- Intelligence of robot has not been at sufficient level for decades, especially in environment not specifically structured for the robot.
  - Partly related to the frame problem of artificial intelligence
  - Typical autonomous robots are very weak to unexpected changes of tasks and environment, even if they are very slight.
  - Every time something unexpected happens, human designers have to detect, analyze and modify the program of the robot.

Control of unmanned ground vehicle

- Autonomous navigation in rough terrain environment
- Intelligence for maneuver in uneven environment

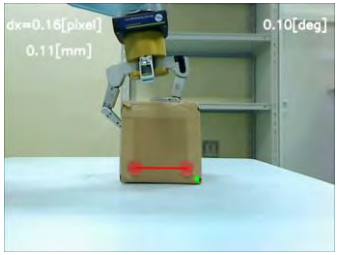






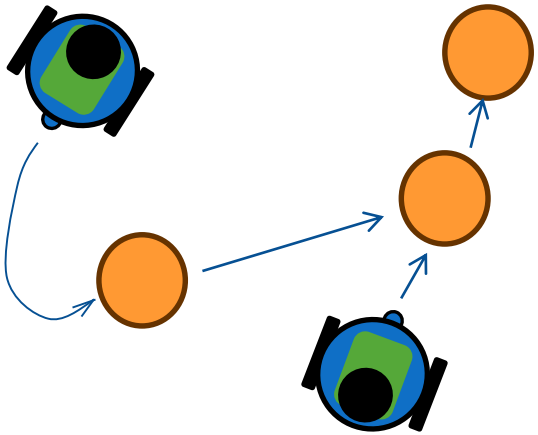
Object manipulation

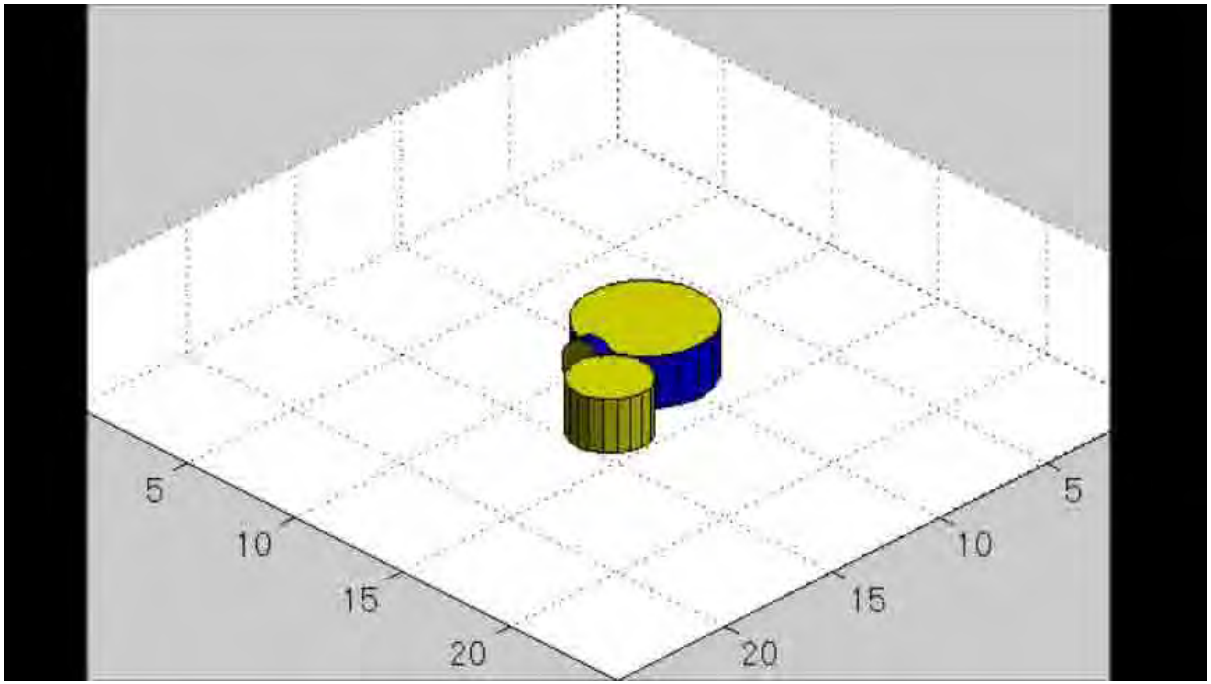
- Object manipulation by hand-arm robot
  - Ability to acquire skill of manipulation through trials, even without knowing precise model of objects
  - **Robot should be able to LEARN from experience**



Cooperation of multiple mobile robots

- Passing and planning enable multiple robots to achieve tasks which cannot be done by a sole robot





Key word for research is …

- Adaptation and Learning
  - It is impossible to prepare and embed every information of environment in advance.
  - Robots should acquire knowledge through interacting with environment like a human infant!