COMP4411: Experimental Robotics

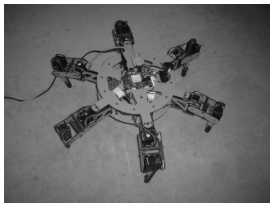
Project Suggestions 08s1

RoboCup@Home

- New robotics competition that focusses on real-world applications and human-machine interaction
- Tasks
  - Follow a human
  - Navigate
  - Manipulate
  - Open challenge

Hexapod

- Develop gaits for the 6-legged hexapod
- Enable it to cover different terrain
- One particular challenge is to allow it to navigate over the step-field in the Level 3 lab



Snake Robots

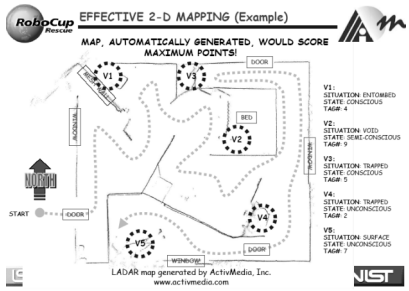
Snake Robots

- Use servos to implement a snake robot
- Use some form of learning to learn gait
- Previous project (05s2) used 11 servos in 2D and applied genetic algorithm to learn walk.
- In this project servos will be arranged in 3D (already available). We also have Bluetooth modules.
- Navigate over step-field.

Volksbot

- Use the 360 degree panoramic camera on the Volksbot to navigate around the Level 3 lab.

Simultaneous Localisation and Mapping (SLAM)



DP-SLAM vs PMAP

- Compare DP-SLAM (http://www.cs.duke.edu/~parr/dpslam/) with pmap (playerstage.sourceforge.net)
- Write a Player/Stage driver for DP-SLAM algorithm and use it to map
  - Level 3 maze
  - Level 3 open plan area
- If time allows compare results with SLAM code in Orca (orac-robotics.sourceforge.net)

Remote-Controlled Car

- RC car equipped with controller running Linux
- Develop control algorithms for car
- Use wireless spy-cam to develop vision based algorithms for controlling car.

RoboRPS

- Robotic rock-scissors-paper

Autonomous Insult Delivery

- A robot wanders a lab giving personalised insults to those it meets.

Feng Shui Robots

- Autonomous water features, indoor potplants, wind chimes, etc., self-organise to maximise the chi of a room.

Victim Locating

Victim Locating - Where's Manny?

Victim Tag Recognition

- Identify ID tags placed randomly in environment
- Perform character recognition to identify text on tag
- Previous project (04s1) has looked at this problem
- Can you improve on this approach?

Landmark Localisation

- Using mobile autonomous robot placed in known locations
  - Discover fixed landmarks and their locations from camera images
  - Use landmarks to move to given location or perform an action

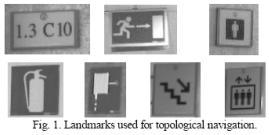


Fig. 1. Landmarks used for topological navigation.

Controlling the Scorbot via Gesture Recognition

- Camera mounted in fixed position observing human subject
- Using various gestures how well can you control the Scorbot?
- Can you pick up objects and place them in another location?

Micro-Camera

- Extend previous project (05s1)
- Put micro-camera on Rug Warrior base or another platform
- Develop a small scale robot for rescue tasks or as a more sophisticated replacement for the Rug Warrior that can be used for teaching robotics concepts

Sound Control of Pioneer

- Use speech processing software to control Pioneer
- We have used IBM Via Voice in the past
- Navigation in the maze is one possibility
- Speech synthesis using text to speech software (e.g., Festival) might also be a possibility (although Pioneer doesn't have a sound card!)

DARPA Grand Challenge

- Autonomously navigate car
- Some of this has been done in 07s1
- Guide pioneer through road-like environment as quickly as possible