Motility Can Improve Sensor Coverage in Anisotropic Media

- Mobile sensors can:
  - Concentrate sensing resources on relevant regions
  - Minimize the effect of obstacles
- Challenges:
  - Determining where the obstacle are
  - Planning motion using distributed methods
  - Keeping motion overheads reasonable

Discovering Obstacles Using Range Sensors

Laser range scans combined to generate medium map

Mapping performance can be improved using:

- Adaptive Scanning
  - Use past laser range data to learn structure in the environment and reduce number of points at which range is measured
- Efficient Data Sharing and Storage
  - Range data stored in a distributed manner and local medium maps generated at sensors on demand
  - Reduced communication overhead and faster updates

Obstacle spatial coordinates need to be mapped to image pixel coordinates

- Extrinsic Calibration
  - Projection of spatial coordinates to the image plane
- Intrinsic Calibration
  - Correcting pixel coordinates by accounting for lens distortion and camera internals

Relating Medium Maps to Sensor Coverage

Implementation

System Overview

Camera Controller Software (Java)