Willow Garage

Head Monitoring
Persistent Collision Map
Multi Table App

Summer 2010 Projects

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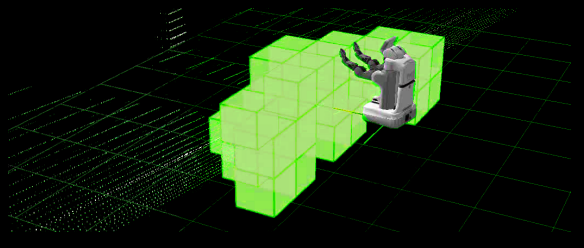
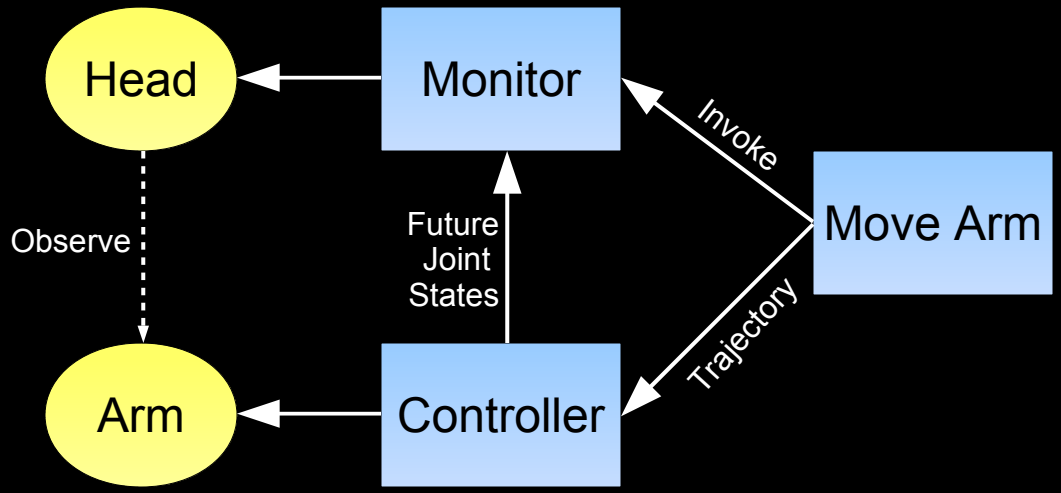


Head Monitoring

- Laser limited, use stereo vision
- Integrated into move_arm



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Head Monitoring

- Location: move_arm_head_monitor
- Usage:
  - pr2_arm_navigation_actions
  - head_monitor_x_arm.launch
  - move_x_arm_active.launch

Persistent Collision Map

- Currently amnesic
- Want to remember
- Other desired features

Persistent Collision Map

- OcTree structure
- Hierarchical, 8 children
- Octomap package
  - (Uni. Freiburg)

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Persistent Collision Map

- Advantages:
  - More compact
  - Probabilistic update
  - Query resolution
  - Free & unknown space
  - Can degrade
  - Templated

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Persistent Collision Map

- Implementation:
  - Replacement for collision_map
  - Volume difference per insertion
  - Increased query speed
- Location:
  - octomap2
  - collision_octomap

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Multi Table App

- Mobile manipulation
- Build world with Octomap
- Identify tables, objects
- Get manipulation points
- Navigation & grasping
- Head monitoring

Multi Table App

- Multi table detector service
- Table detection:
  - Point clouds from collision_octomap
  - Filter z direction
  - Cluster points
  - Fit plane
  - Project inliers

Multi Table App

- Manipulation pose generation:
  - Expand table perimeter
  - Check for reachability
- Object detection:
  - Cluster volume over table
  - Find distance to perimeter poses
- Pose ranking

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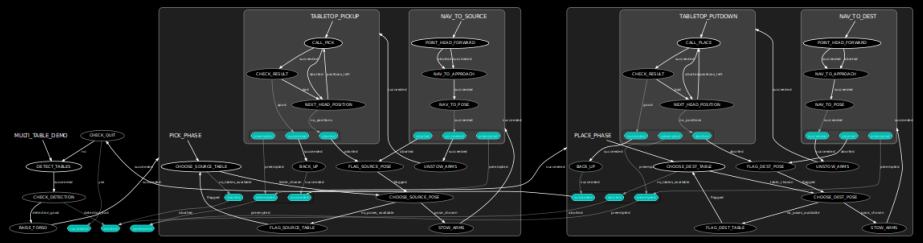
Multi Table App

Multi Table App

- Implemented in SMACH
  - Table and pose selection
  - Navigation
  - Grasping via wrapping PickAndPlaceManager



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Multi Table App

Future Work

- Octomap:
  - Make it faster
  - Operations directly on octree?
  - Solve clearing problem
- App:
  - Improve table/object detector
  - Use both arms
  - Make it faster

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Package Locations

- move_arm_head_monitor in *arm_navigation*
- collision_octomap in *collision_environment* (soon)
- multi_table_detector and multi_table_app location (and name) t.b.d.

Thanks

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- Fellow interns
- Willow Garage