

Project Proposal

Robot Manipulation

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1 Introduction

1.1 Team name

Manipulator is fit.

1.2 Project title

Optimal Inverse Reachability

1.3 Names of members

Name	Git Id
Dharmin Bakaraniya	DharminB
Vajra Ganeshkumar	vajrag
Hossam Mohammed	Hibrahim1

2 An introduction about our project

Given an area with objects that need to be manipulated, the project will find out which is the best position for the base so that the biggest number of objects are contained in the

dexterous workspace of the youbot.

3 Available software packages (or available approaches)

- Reuleaux(3)(7)
- Extend move_base_to_manip(6)
- Implementing our own wrapper on *Moveit!* using concepts of (1) (2) or (4)

4 A small qualitative comparison

Table 1: Qualitative Analysis

Reuleaux	Extention	Our Wrapper
C++	Python	Python
moveit_ikfast	moveit	moveit

5 2 Best approach

1. Reuleaux
2. Extend move_base_to_manip

6 Experimental methodology

7 Work plan

7.1 What needs to be done

- Figure out Reuleaux package and how to use it
- Figure out move_base_to_manip and how to use it
- Build an extension for move_base_to_manip
- Run these in simulation

- Run these on real youbot

7.2 By when does it need to be done

By the end of June.

7.3 Who is the responsible person for it

All the team members.

References

- [1] Abdel-Malek, Karim, Wei Yu, and Jingzhou Yang. "Placement of robot manipulators to maximize dexterity." International Journal of Robotics and Automation 19.1 (2004): 6-14.
- [2] Park, F.C.; Brockett, R.W., Kinematic dexterity of robotic mechanisms, International Journal of Robotics Research, v 13 n 1 Feb 1994 p 1-15
- [3] Makhal, Abhijit, and Alex K. Goins. "Reuleaux: Robot Base Placement by Reachability Analysis." 2018 Second IEEE International Conference on Robotic Computing (IRC). IEEE, 2018.
- [4] Rastegar, J.; Singh, J.R., 1994, New probabilistic method for the performance evaluation of manipulators, ASME Journal of Mechanical Design, v 116 n 2, pp. 462-466.
- [5] [Ros forum question for inverse reachability](#)
- [6] [ros move_base_to_manip](#)
- [7] [ros reuleaux](#)