Kinematics solver for serial 6-DOF manipulators (ROS1 version)

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1 Introduction

This manual describes ROS package solving forward and inverse kinematics of serial 6-DOF manipulator. Package provides complete solution of 6-DOF kinematics and it's integration into ROS.

2 Estimated Kinematics Model

This solver uses kinematics model 1 for computation. Red circles represent rotation joints and their normal vectors correspond to rotation axis of the joint. Joint directions are shown with arrows. The zero position of each joint is shown by thin black line and zero symbol.

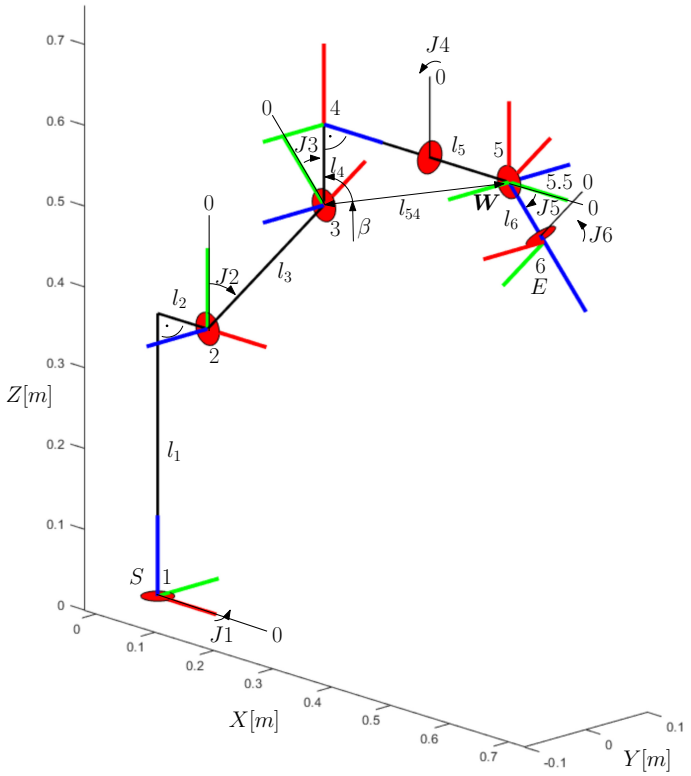

Figure 1: Used kinematics model

The solver uses rotation representation by Euler's angles with axis order ZXZ.
As your robot is very likely different, please follow the guide in chapter 3.

3 Configuration

Solver needs for it's correct function following parameters. These are set in file `kinematics.yaml` in config/ directory.

- `kinematics_solver` - kinematics plugin to be used
- `eef_transformation` - rigid body transformation from 6th frame of model 1 to end effector. Transformation is set by six parameters (if Euler angles ZXZ are used) or seven if quaternions are used.
  The format is

  Euler angles:
  - X translation
  - Y translation
  - Z translation
  - Z Euler angle
  - X Euler angle
  - Z Euler angle

  quaternion:
  - X translation
  - Y translation
  - Z translation
  - X quaternion
  - Y quaternion
  - Z quaternion
  - W quaternion

- `base_transformation` - rigid body transformation from world frame to frame S of model 1. The format is same as above.
- `link_lengths` - list of link lengths in order $l_1, l_2, ..., l_6$.
- `joint_offset` - zero position in relation to model 1 in order $J1_{offset}, J2_{offset}, ..., J6_{offset}$.
- `joint_directions` - list of symbols. If joint positive direction of n-th joint is same, the n-th element of list is '+' and '-' otherwise.
- `configuration` - string of 3 bits. Defines required pose. konkretni k
- `joint_limits_names` - list of joint names which are used in system. These are used to download joint limits.

Important: By default file `kinematics.yaml` sets the the `SRVKinematicsPlugin` to be used! Remove the kinematics settings from your MoveIt configuration if you use it!

4 Launching