

# Robot Manipulation - Assignment 01

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## 1 Lab Class

- Introduction to ROS.
- Concept of URDF (Universal Description Format).
- Launching Robot and Related Topics.
- Introduction to TF.

## 2 Mind Map

3 Points

- Provide a mind-map for the Chapter “ Spatial descriptions and transformations ” of [1].
- For participants who have not been introduced to Frames, the video lecture from Prof. Khatib is recommended <sup>1</sup>.
- The e-book is available in the Resources Section of LEA.

## 3 Exercise

10 points

- Solve Matlab Exercise 2a (a,b,c,d) from Chapter 2 of the book [1].

## 4 ROS -1

5 Points

- Review through the concepts of ROS (nothing to be submitted for this item) <sup>2</sup> .
- Compare the values listed down in youbot-store <sup>3</sup> and compare how is it related to URDF. Relate in terms of a table.

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<sup>1</sup>Video Lectures can be found in the LEA Resources Section

<sup>2</sup>Original Paper of ROS can be found in the resources section.

<sup>3</sup><http://www.youbot-store.com/youbot-developers/software/simulation/kuka-youbot-kinematics-dynamics-and-3d-model>

## 5 ROS -2

2 Points

- Rotation Matrices were introduced in the lecture. How many angle-set convention exists ?
- Name some other ways of representing orientation in 3-D ?

## References

- [1] J. J. Craig. *Introduction to Robotics: Mechanics and Control*. Addison-Wesley Longman Publishing Co., Inc., Boston, MA, USA, 2nd edition, 1989.