Automation and robotic project 1

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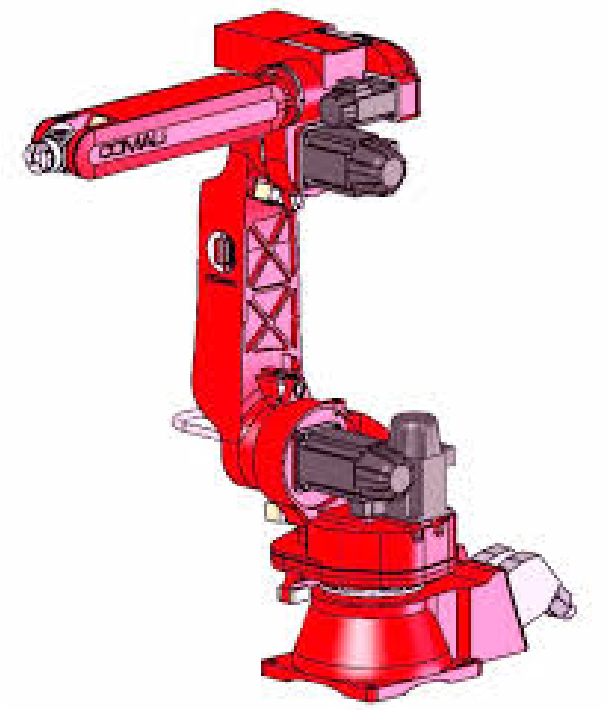

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Chapter 1

Introduction

In this project we apply the theory seen in automatic and robotic course. The aim is creating a function that returns the most important parameters for moving the end-effector of the robot. We can see it on the figure 1 with it's own axes "ANS". This parameters are the position and the orientation of the end-effector, the rotation matrix of the end-effector and the roto-translation matrices for the differents input parameters (angles and translations of the joints).

The function takes two parameters, the first is a vector values reprensenting the translation or the rotation of each axe. The is the type of representation we are in. It can be "ZYZ" or "RPY" (roll, pitch, yaw).

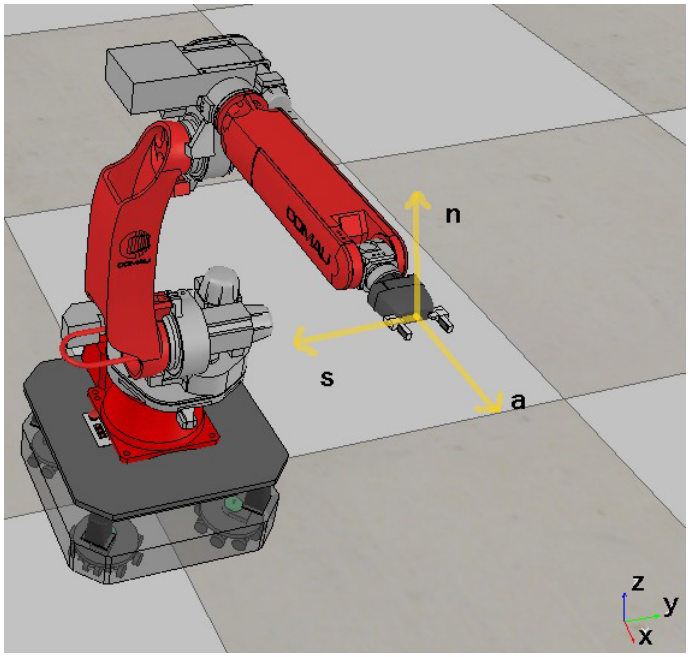

Figure 1.1: Robot smart5 six with a pince on the end-effector

Chapter 2

Work

2.1 Compute the roto-translation matrix

2.1.1 Required

To get the roto-translation matrix we need to multiply the different matrices for each junction and the A_0^b and A_e^n which are two constant matrix respectly represent the b to 0 transformation matrix and the n to e transformation matrix.

We also need the α angles for each junction. We put them in a vector called alpha_i which is $\begin{bmatrix} \frac{\pi}{2} & \frac{\pi}{2} & \frac{-\pi}{2} & 0 & \frac{-\pi}{2} & \frac{\pi}{2} & \frac{-\pi}{2} & 0 \end{bmatrix}$. We obtain this values by comparing the junction i's Z axis with the $(i-1)$'s Z axis.

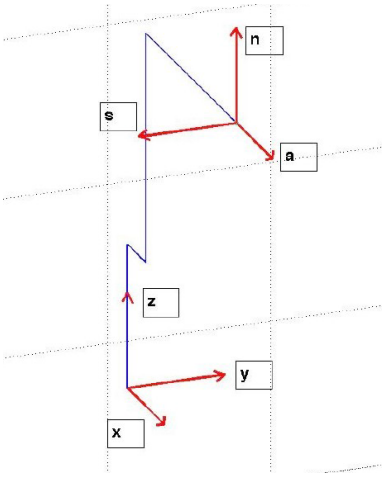

Figure 2.1: Stick view of the Smart5 Six

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