Robotics
Problem Sheet 3

Andreas Birk

Notes

The homework serves as preparation for the exams. It is strongly recommended that you solve them before the given deadline - but you do not need to hand them in. Feel free to work on the problems as a group - this is even recommended.

1   Problem

Given the planar (2D) robot arm from figure 1 with a rotational joint in the origin of the world frame and a prismatic joint linked to it with the respective DoF's α (rotation) and l (translation), with $l \in [500, 1000]mm$.
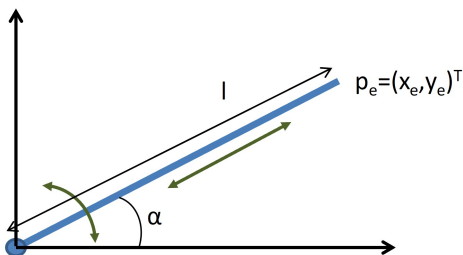

Figure 1: A planar robot arm with a rotational and a prismatic joint.

Provide the forward kinematics for the position $p_e = (x_e, y_e)$ of the end-effector of this robot.

2   Problem

Given the planar (2D) robot arm from figure 2 with 3 DoF:

- a rotational joint in the origin of the world frame with DoF α_1,

- followed by a fixed link of length $l_1 = 10$ with rotational joint at its end with DoF α_2,

- and a prismatic joint linked to it with the DoF l_2 with $l_2 \in [5, 10]$, which is co-aligned with l_1 for $\alpha_2 = 0^o$ (see figure 2, right).
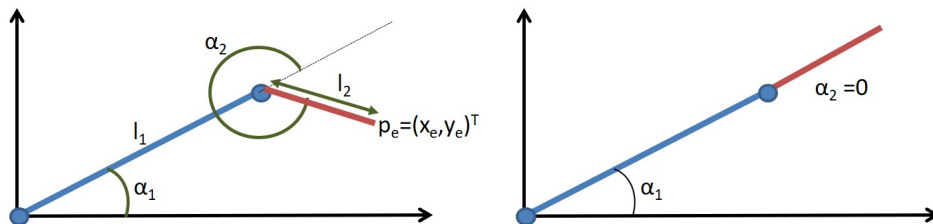

Figure 2: A planar robot arm with 3 DoF. The alignment of the prismatic joint l_2 for $\alpha_2 = 0^o$ is shown on the right.

Provide the forward kinematics for the position $p_e = (x_e, y_e)$ of the end-effector of this robot.