Project Louis

Articulated Robot Arm

Funded by Eik Lab (pretty please)

Authors

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1 Introduction

Our goal is to create a simple proof of concept for an articulated robot arm, with the ability to operate in the task space of $\mathbb{R}^3$. Utilizing iterative development strategies we will research and learn new tools in order to deepen our understanding of robotics. Our aim is a robust project utilizing industry standard notation, protocols and user guidelines.
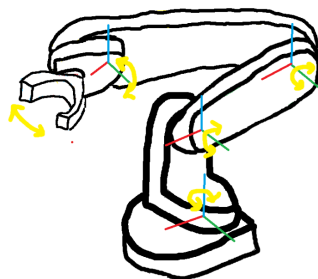

Figure 1: Truly artistic sketch handpainted by Johannes with trackpad and MS Paint

Our inital articulated arm will consist of rigid bodies and rotational joints. We will follow TRR anatomy and will be equipped with a simple claw. Using a transrotational joint at the base, followed by two rotational joints for our arm. The claw will consist of a gripper mechanism attached to a rotational joint. For the first iteration we will use servo motors as they have the benefit of setting specific angles, reducing need for sensors. This will somewhat limit our task space, however it will still be able to operate in task space in $\mathbb{R}^3$ bounded by our servo's angle limitations.

The robot should be remote controlled by a controller with joystick / trackpad functionality as well as buttons for functions such as closing / opening the claw. The program should also be equipped with methods for both forward kinematics and numerical inverse kinematics. Utilizing this we can select arm positions in $\mathbb{R}^3$ space. The claw should be self aligned to always match the xy-plane of our robots base. This will allow simple grab operations

2 BOM

Component	Function	Model	Reason	Amount
MCU	Provides electrical signals	STM32	Functions as the "hub" of all electricity in the project. Can deliver what we need on command.	1
SBC	Provides Computational Power	Raspberry Pi 5	Functions as the "hub" of all complex computation and mathematics in the project	1
Servo	Rotation	DS3218MG	Provides movement control	3
Servo	Grabbing	MG90S	Provides claw control	2
Breadboard	Wire hub		Provides a versatile way to prototype electrical circuits	1

3 Project links

https://github.com/JohannesStandal/Eik---Project-Louis