



Human arm musculoskeletal simulation for day to day activities

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Abstract and introduction

Abstract

This project aims to replicate simple arm movements using basic musculoskeletal models in the MyoSuite platform, with the objective of employing Reinforcement Learning (RL) techniques to successfully tackle associated tasks.

Introduction

MyoSuite consists of musculoskeletal environments and tasks. These are simulated using the MuJoCo physics engine. OpenAI Gym enables the use of RL algorithms on models.

Objectives

- The objective is to enhance the efficiency of musculoskeletal movement during tasks by optimizing the mechanics involved.
- Aimed to execute simple motions across different models such as MyoFinger, MyoArm, and MyoElbow.

Completed list of tasks

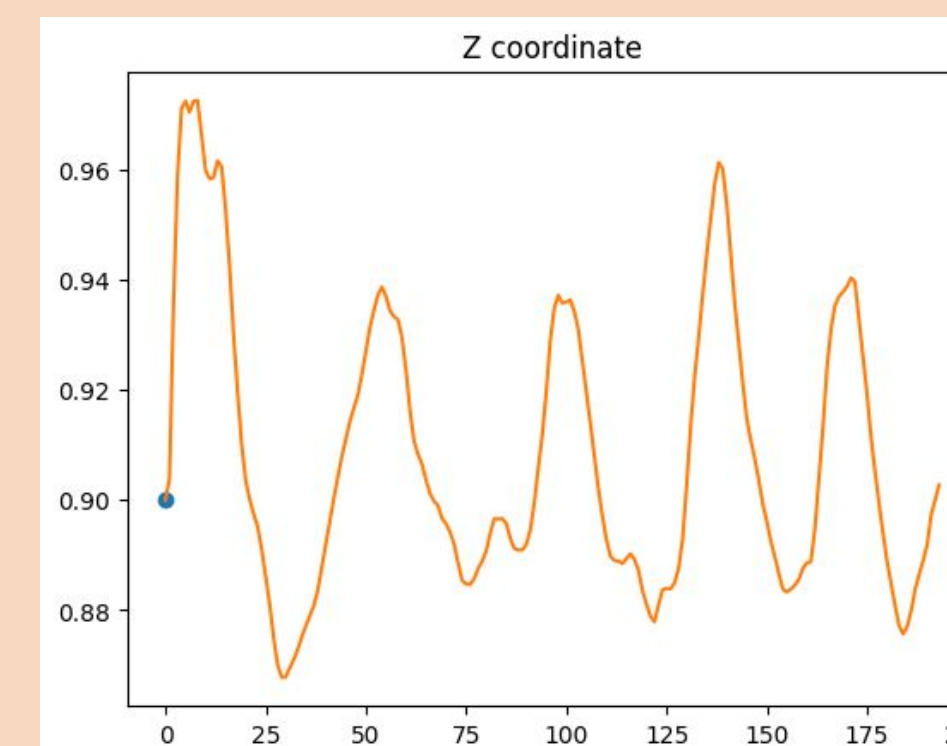
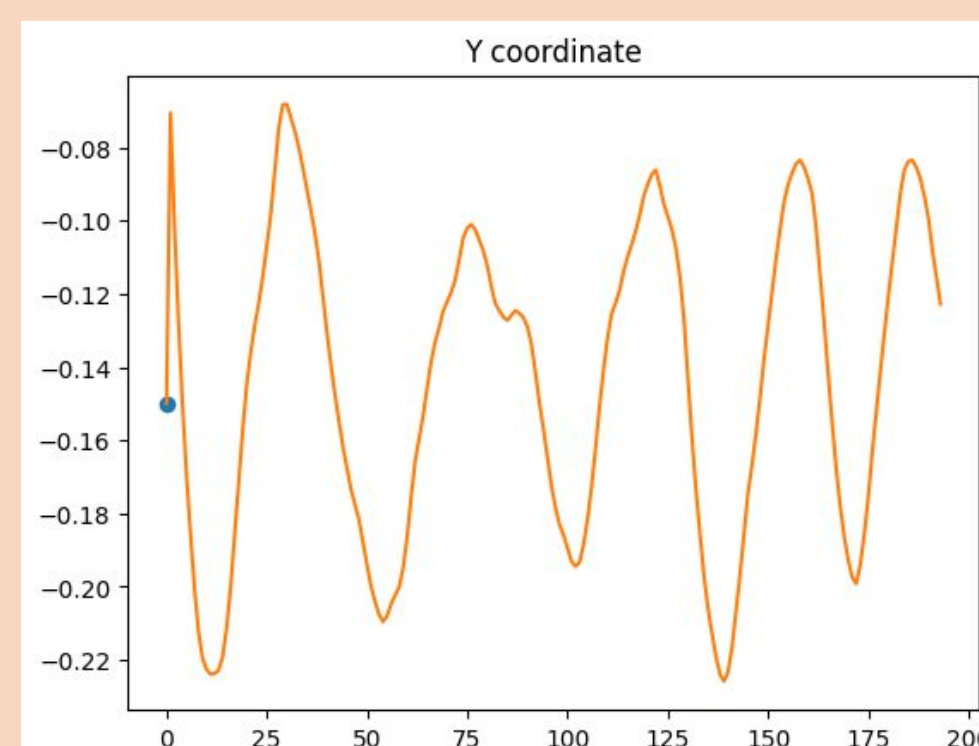
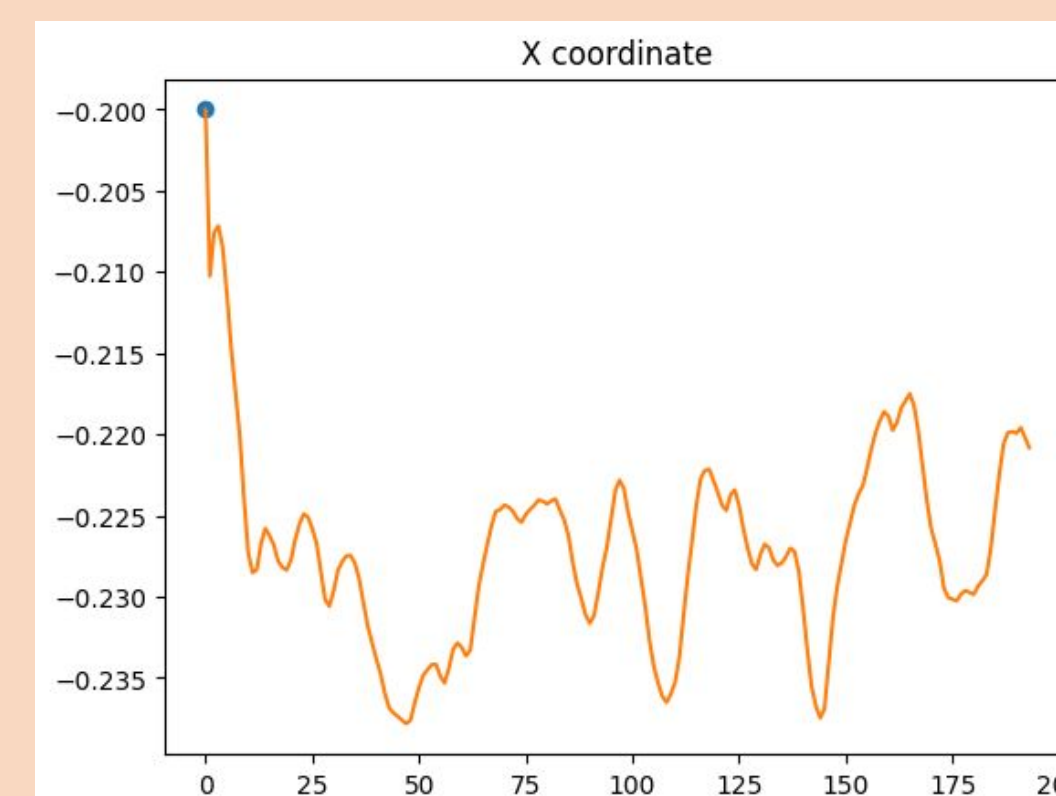
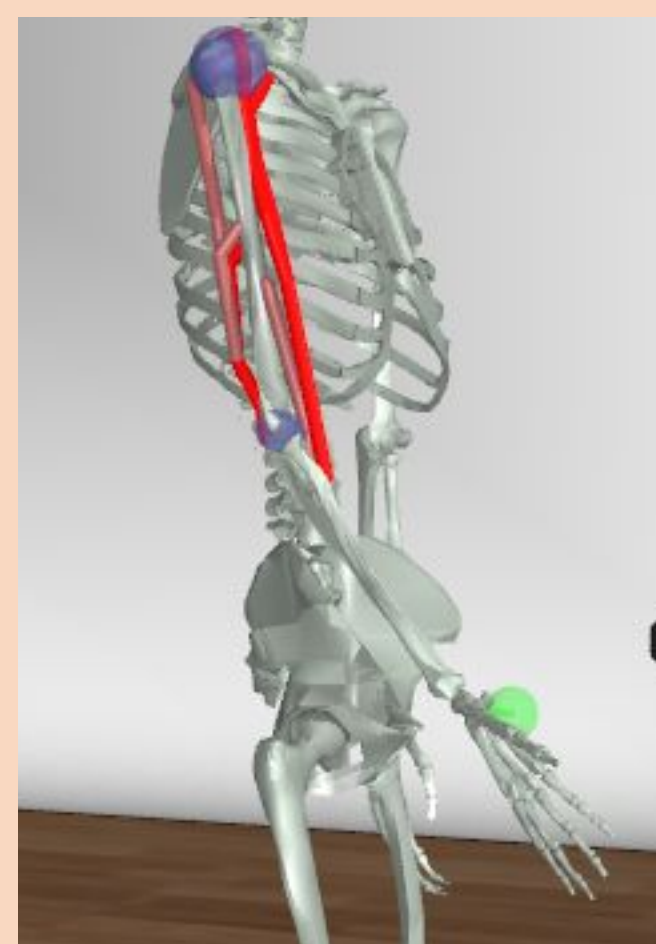
We have achieved the following:

- Achieved basic movements of the elbow and finger model.
- Implemented code to achieve a designated target location.
- Applied an RL algorithm to the MyoArm model and achieved some irregular movements due to the high complexity of that model.

Learnings

- Attained proficiency in integrating the Myosuite environment and Mujoco physics engine for seamless simulations.
- How to initialise a Reach Environment and simulate it using the specified coordinates of the target location.
- Achieved further understanding of the mechanics of finger and elbow models.

Results



Future Scope

- Simulate more variety of movements which resemble real life actions.
- Focus on utilizing the Myo Arm environment to execute precise tasks and navigate to designated targets.

Acknowledgement & references

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References:

- <https://github.com/MyoHub/myosuite/tree/main>
- <https://github.com/google-deepmind/mujoco>
- <https://www.gymnasium.dev/index.html>
- <https://stable-baselines.readthedocs.io/en/master/>

