

ABOUT MYSELF

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Presentation and Motivation

I am Enrico Moro, a Bachelor's student in Mechatronics Engineering at the University of Padua. I am very interested in your proposals, and I believe the "Payload Visualization and Metrics" project is the most relevant to my background. I have studied forward kinematics and I am currently taking a course on multibody simulation in MATLAB. This project could significantly enhance my knowledge and experience in robot simulation, an area that is becoming increasingly crucial for future engineering challenges.

Previously, I developed a robot with a similar structure to your Tiago, where determining the maximum payload was a critical aspect. Throughout my engineering studies, I have learned the importance of optimization in motor selection and material usage to reduce costs and extend the machine's lifespan. This project would be a valuable opportunity to apply and deepen my understanding of these concepts, contributing to better hardware choices and efficient system design.

Project timeline

My goal this summer is to work in an environment that will significantly improve my skills, and GSoC presents a fantastic opportunity. I will complete my Bachelor's degree in June, so during the first part of the month, I may have limited availability. However, after that, I plan to dedicate myself to GSoC as a full-time commitment for the summer. Since I will start my Master's degree in October, I will have ample time to focus on coding.

Possible key element for the project:

- Get the `robot_description` with all actuation constraints and display them in a custom RViz panel.
- Develop a ros package containing a script to compute the available payload for a given configuration and publish the results to a specific topic for visualization in the RViz custom panel.
- Implement another script to manage torque, power, and stiffness calculations for the motors. A possible initial approach is to use the `rnea()` method from the Pinocchio library. Then the results will be published to a topic and displayed in the RViz panel.

Technical information

I have been using ROS2 for two years especially in my main project, SBEM. You can find SBEM in my GitHub repository: [Sbem](#). I regularly work with Ubuntu 22.04, leveraging it for both personal and school-related projects.

Recently, I have been exploring AI agents and integrating them into SBEM to enhance human-robot interaction. I have achieved some promising results in this area. Additionally, my GitHub repository includes a GUI interface built with Electron.js, which enables users to chat with an AI model and interact with the robot seamlessly.

Beyond the three exercises I provided for selection, I also created a simple plugin in RViz2 (GitHub repository: [repo](#)) to integrate the Pinocchio library. This could serve as a starting point for the future development of the project.

Additional skills:

I am proficient in CAD software for designing 3D-printed objects and have considerable experience in 3D printing. Additionally, I have a strong background in electronics and mechanics, which I studied extensively during my bachelor's degree in Mechatronics.

Other achievements:

In my final year of high school, I participated in a national robotics challenge, where my team won first prize. As a result, we had the opportunity to present our prototype at Maker Faire 2022 in Rome. Our project was an exoskeleton built using a Teensy board and two AK motors from Cubemars Robotics.

I thought about participating in GSoC 2024, but last year I didn't feel ready for the opportunity.