

Bachelor's Thesis, Term Project

Parallel Manipulator Platform Based on Origami Structures

Supervisor (s): (Assist. Prof. Dr. Eng. Amir Roushdy)

This project applies a new class of parallel manipulators inspired by origami folds. This project investigates both position and geometry of these manipulators and identifies the closed form solutions for the inverse kinematics problem. We will replace the linear actuator in the typical Stewart platform which is the robot in the right picture below with an Origami linear actuator and record the results for it during the project. **There is a Master's student from Mechatronics engineering Department and the Lab Engineer from ARATRONICS, guiding and directing the student with Assist. Prof. Dr. Eng. Amir Roushdy.**

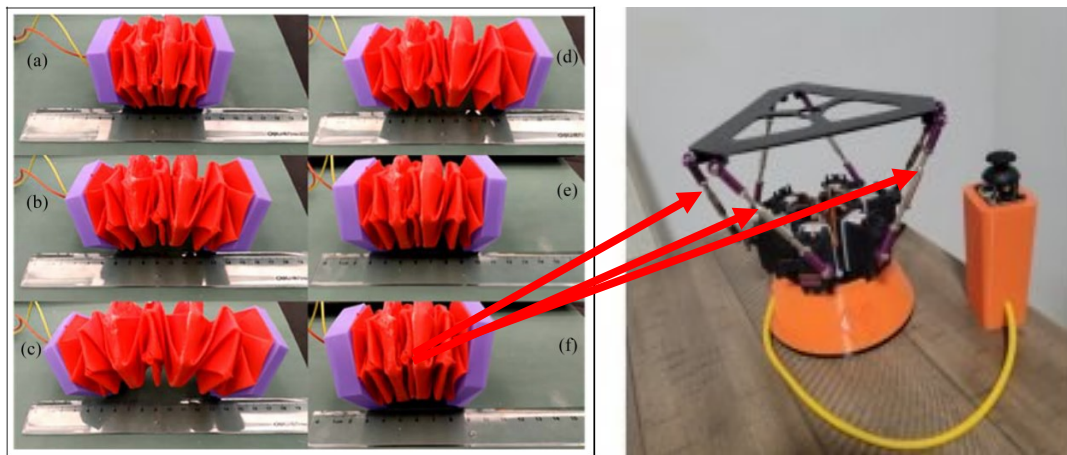


Fig.: Parallel Manipulator Platform Based on Origami Structures

Project description and objective:

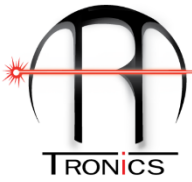
From the study of an origami, this paper proposes a type of parallel mechanisms using “technomimetics” as inspiration, i.e. imitating the motion and structure of an artifact in an origami pattern. One of the application for the project that we are going to compare the results with the common Stewart Platform, the typical parallel manipulator with possesses six degrees of freedom

Research focus of this project:

- Literature review on the project should be studied properly.
- Not only, creating a software control system for the project but also the hardware.
- Experiments using the gadget and control system should be built properly.

For more details please contact:

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- The outcomes must be documented.

Requirements:

- Passionate to learn more about 3D Printing design, Robotics and control.
- Prior mechatronic design expertise is desired like “SolidWork and Arduino”.
- Enthusiasm for completing actual practical work with 3D printing staff (design fabrication and construction).
- A method of working that is both structured and self-contained.

General tasks of the project:

- The complete methodology is already available in the ARATRONICS Lab, so we will discuss it from the first day to start the automation process for it
- Fabricate the machine/system using 3D printer/CNC machine (small parts).
- Assembly all parts of the Robot.
- Changing the working variables and see the effect on the locomotion of the robot.

Other notes:

- A weekly meeting with the advisors will be required for this project, as well as weekly progress updates (*The meeting could be more than once during the week based on your progress and based on your achievements*).
- You should to be in the Lab two days per week (*It could be more than two days based on your progress and based on your achievements*).
- All reports must be prepared in the style of a research paper.
- The outcome of this research will be published in one of the coming international Conferences and , or Journal