

Bachelor's Thesis, Term Project

Control, Design and Fabrication for a Parallel Continuum Robots

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

This project presents a parallel continuum robots which they are new mechanisms that are expected to combine dexterity and manipulability of continuum robots with accuracy and stiffness of parallel robots. The parallel coupling of several serial-kinematic chains in parallel kinematic manipulators result in both, high dynamics and high accuracy. The architecture of these manipulators also has disadvantages such as a relatively small workspace and increased occurrence of singularities. On the other hand, continuum robots consist of flexible or soft materials and exhibit a high number of degrees of freedom, which leads to high dexterity and advanced motion capabilities. In contrast to conventional serial robots, their structure is very compliant, which leads to limited manipulation forces. **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.**

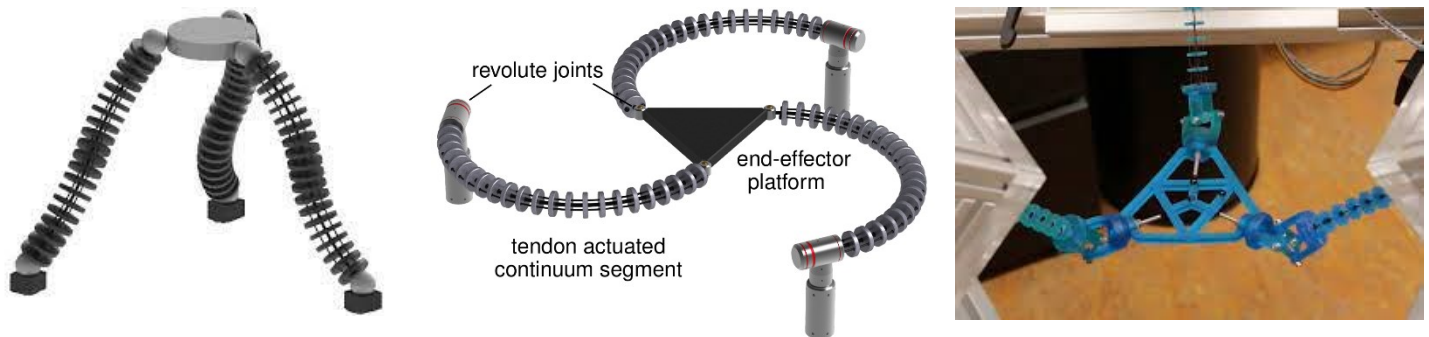


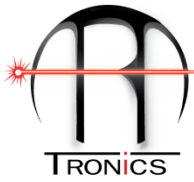
Fig.: A Parallel Continuum Robots

Project description and objective:

Developing high-strength Parallel continuum robots can be challenging without compromising on the overall size of the robot, the complexity of design and the range of motion. In this work, we will explore how the load capacity of continuum robots can drastically be improved through a combination of backbone design and convergent actuation path routing.

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.
- 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