

Bachelor's Thesis, Term Project

Design, Control and Fabrication for Continuum Robot with Embedded Sensors

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

The purpose of this project is to present a novel hybrid pre-tension mechanism for continuum manipulators to prevent wire slack and improve continuum robot payload capacity, as well as to present a new method to control continuum manipulators' shape. The Continuum robot, aka snake robot, aka elephant's trunk robot with 3DOF. It uses three servo motors to pull three strings. In this project we will use compression spring in the centre of the trunk to provide rigidity. This robot looks really strange, almost disgusting :). **There is a Lab Engineer from the ARATRONICS Laboratory, guiding and directing the student with Assist. Prof. Dr. Eng. Amir Roushdy.**

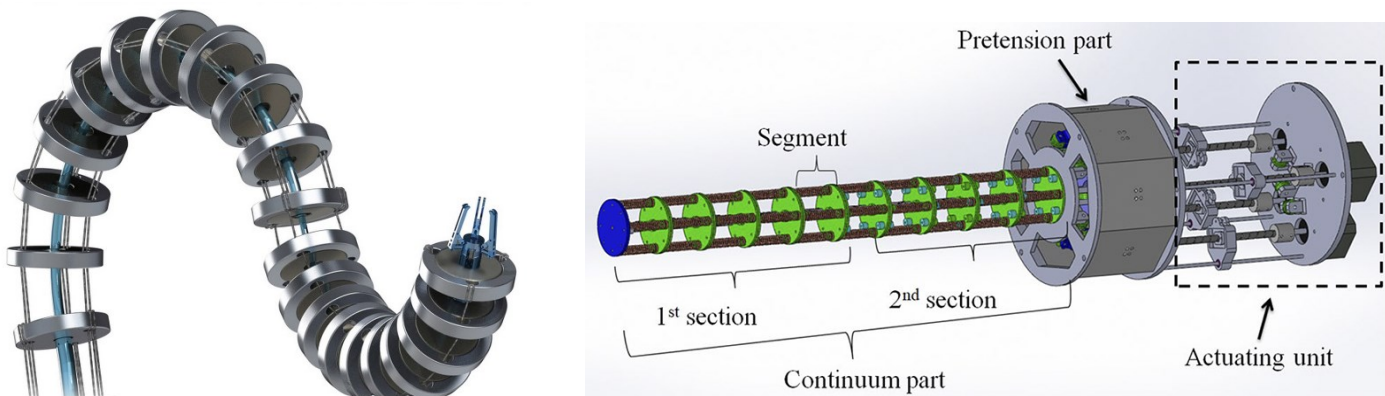


Fig.: Continuum Robot

Project description and objective:

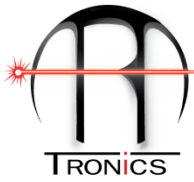
The main feature of continuum structures is their inherent smoothness. Instead of bending at discrete points (joints, or “elbows”) along the “backbone”, they can smoothly bend anywhere along their structure. Several designs, including the OctArm robots discussed in this project, additionally feature the ability to extend (elongate) along the length of the backbone. Almost all continuum robot designs exhibit significant compliance, i. e. they inherently present a “soft” rather than “stiff” interface to the environment.

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