

Bachelor's Thesis, Term Project

Soft Robotic Actuator/Gripper Based on Origami (the art of folding)

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

When most people picture robots, they see machines with rigid parts. In this project the robots will be developed are soft, with parts made from deformable plastics and rubber. Soft robots are safer to operate around people and are ideally suited to carry out a variety of tasks that their traditionally rigid cousins can't, including moving snake-like through confined spaces. But their ability to bend in many axes and change their shape make them unable to carry heavy loads, which limits their utility. So that a new class of variable-stiffness robots that have which have rigidity and softness. This innovative designs draw on the ancient art of paper folding, known as origami. **There is a Lab Engineer from the ARATRONICS Laboratory, guiding and directing the student with Assist. Prof. Dr. Eng. Amir Roushdy.**

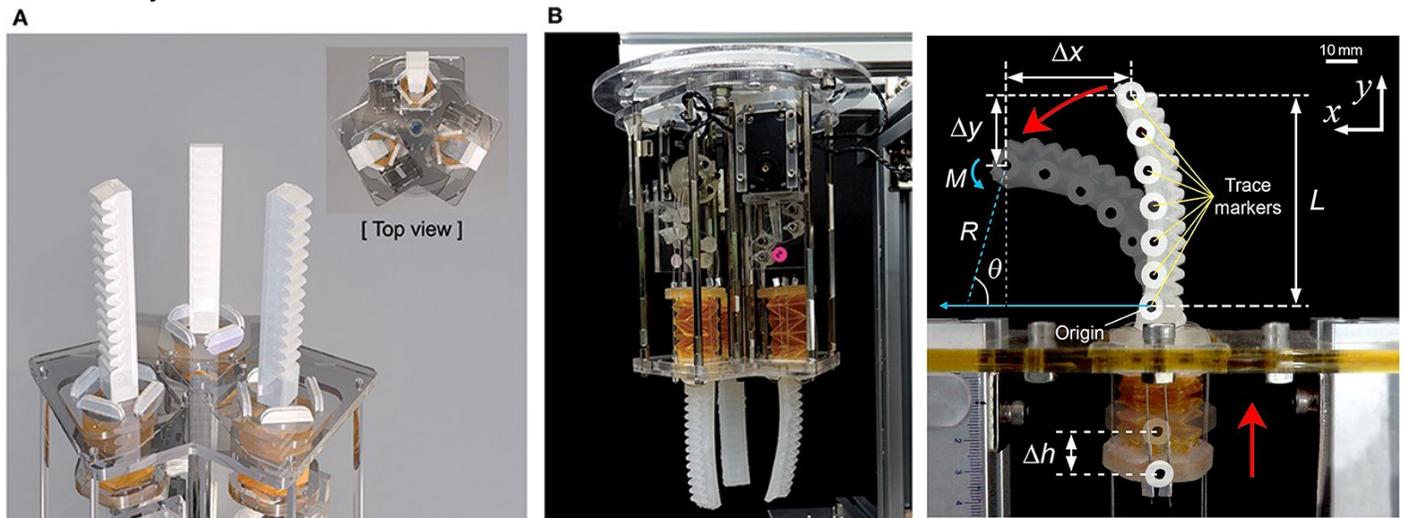


Fig.: A Soft Robotic actuator / Gripper

Project description and objective:

In this project, we will construct several experimental setups to evaluate the performance of the soft pneumatic actuator with the tendon-driven origami pump. To measure the deformation of the soft pneumatic actuator and the height variation in the origami pump, we attach markers to the finger module and record the actuation video using a camera at a rate of 30 fps. Additionally, we will use a post-processing tracking program to extract the deformation data from the video.

For more details please contact:

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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, Soft Robotics, 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