

Bachelor's Thesis, Term Project

Trajectory Tracking Control for the Four Legged Robot with Soft Tensegrity Spine Mechanism

Main Advisor(s): (Assoc. Prof. Dr. Eng. Amir Roushdy)

Co-Advisor(s): (Eng. Malek Mahmoud, Eng. Abdelrahman Ibrahim)

The purpose of this project is researching flexible tensegrity spines for walking robots. Robots with flexible spines have many potential advantages over those with rigid body structures. Motion between a robot's hips and shoulders could allow for more complex and efficient locomotion for quadrupeds, as well as greater ability to traverse unknown terrain and interact with unknown environments while keeping stable and safe. This project, the walking quadrupeds is designed to utilize a tensegrity spine as its backbone. **There is a Master's student from Mechatronics Engineering Department, Senior Researchers from ARATRONICS also available to help and advice and The Lab Engineer from ARATRONICS, guiding and directing the student with Assoc. Prof. Dr. Eng. Amir Roushdy.**

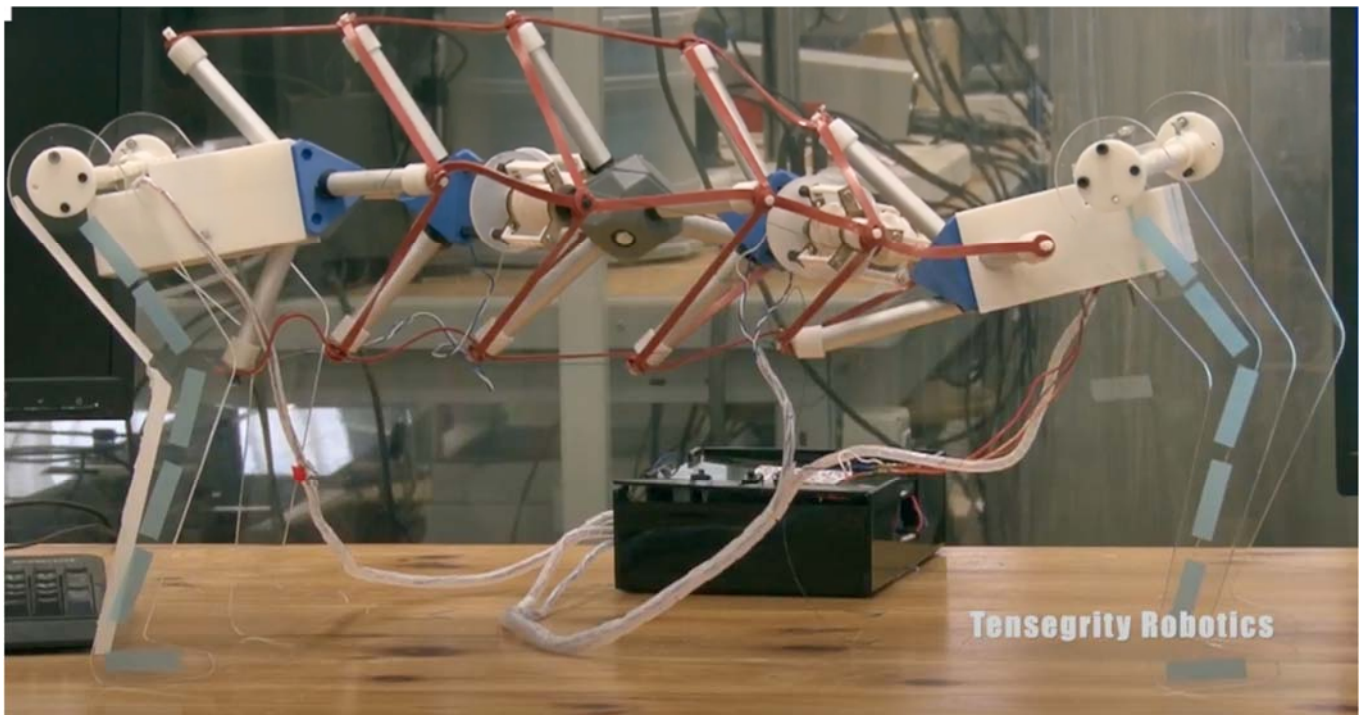


Fig.: The quadruped robot with a tensegrity spine at the ARATRONICS Research Center

For more details please contact:

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Project description and objective:

We will work on the quadruped robot's spine itself, the Underactuated Lightweight Tensegrity Robotic Assistive Spine, as well as the supporting hardware for robot's legs.

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