

Bachelor's Thesis, Term Project

Stability Analysis for the Dynamics of the Four Legged Robot with Soft Tensegrity Spine

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

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

The purpose of this project is to study the stability analysis for the dynamics of a four-legged robot with a soft tensegrity spine which is a challenging task due to the complexity of the system. The stability of a robot can be analyzed in several ways. **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.**

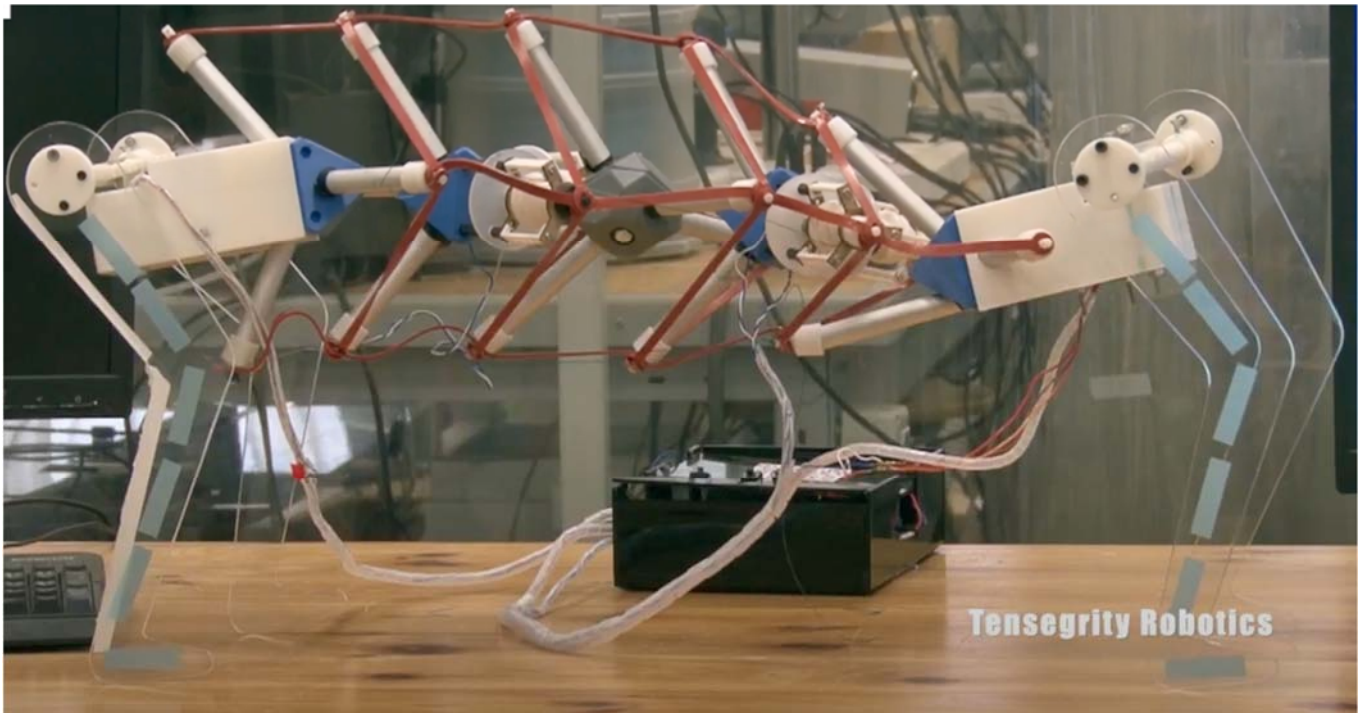


Fig.: The quadruped robot with a tensegrity spine at the ARATRONICS Research Center

Project description and objective:

It's important to note that the stability analysis of a four-legged robot with a soft tensegrity spine is a complex task and will likely involve a combination of these approaches. Additionally, the stability properties of the system may change with different operating conditions, such as the robot's speed and terrain.

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 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