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# A Novel Lockable Spring-Loaded Prismatic Spine To Support Agile Quadrupedal Locomotion

Tech ID: 33697 / UC Case 2024-726-0

## **FULL DESCRIPTION**

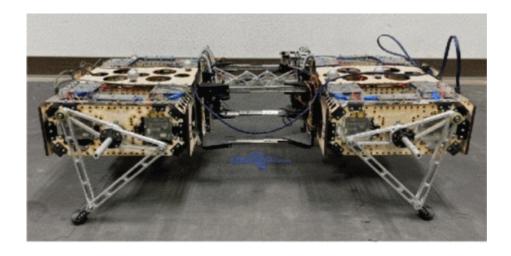
### **Background**

Quadruped robots are designed to move on four legs and have gained significant attention due to their versatility and potential applicability across industries. Existing quadrupedal platforms adopt a single, rigid body design - but these have limited agility both in terms of locomotion and maneuverability. Extending the morphological degrees of freedom (DoFs) may be the key to achieving more agile locomotion.

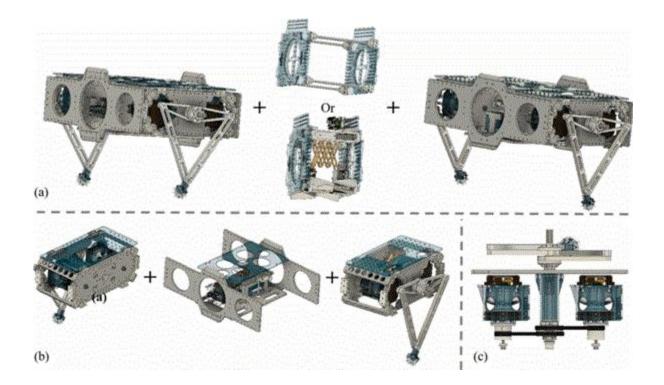
# Technology

Inspired by vertebrate studies, the research team led by Prof. Karydis at UCR have advanced the locomotion capabilities of quadrupedal robots by developing a novel, spring-loaded, lockable spine modules and a new spinal compliance-integrated quadruped (SCIQ) platform. The unique locking mechansim allows the spine to switch between a rigid state for controlled motion and a compliant state for energy storage and release during actions like jumping.

## **Images**



The SCIQ robot prototype with the lockable compliant prismatic spine in place.



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#### OTHER INFORMATION

KEYWORDS

quadruped robots, robot locomotion,

compliant spine, motion control,

search and rescue

#### **CATEGORIZED AS**

**►** Engineering

► Robotics and Automation

RELATED CASES

2024-726-0

The SCIQ robot design - (a) the robot assembly comprises one half-body, a spine module and the other half body; (b) each half-body consists of 2-DoF leg modules and a half-body trunk; (c) each leg module adopts a flat-symmetric servo layout and links to leg limbs via timing belts and co-axial shafts.

## **ADVANTAGES**

- ▶ Enhanced agility through spinal compliance enables dynamic and more efficient movements
- Lockable spine for versatile locomotion allows for precise, low-speed movement and agile dynamic maneuvers
- ▶ Degressive spring for **enhanced energy management** making the spine effective in absorbing the energy and efficiently releasing the energy
- ▶ Improved performance in challenging landings improving the robots stability and robustness
- ▶ Platform for spine research

#### **SUGGESTED USES**

Quadrupedal robots for applications in:

- ► Search and rescue
- ► Inspection and monitoring
- Surveillance and recon
- Agriculture
- ▶ Research platform to study animal locomotion

## **INVENTOR INFORMATION**

- ▶ Watch a video demonstrating the invention
- ▶ Please review all inventions by Prof. Karydis and his team at UCR
- ▶ Please visit the Prof. Karydis's group website to learn more about their research at UCR

# **RELATED MATERIALS**

▶ A Novel Lockable Spring-Loaded Prismatic Spine to Support Agile Quadrupedal Locomotion

## **PATENT STATUS**

Patent Pending

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