

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

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## FULL DESCRIPTION

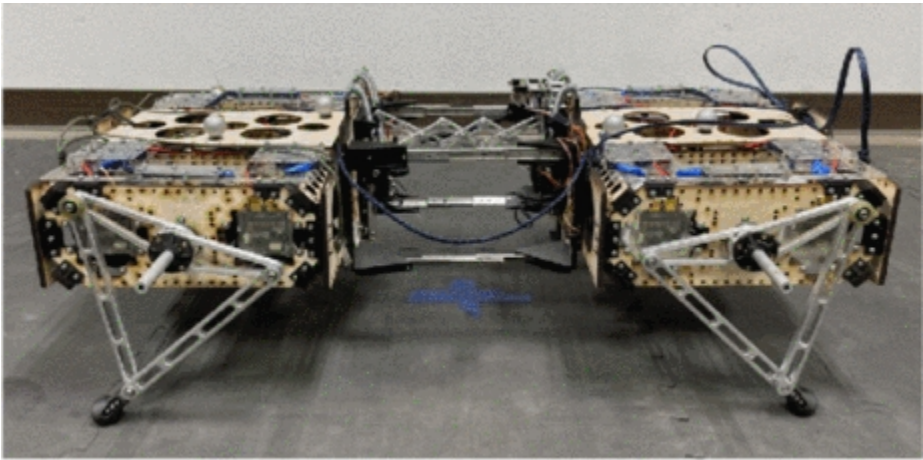
### Background

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.

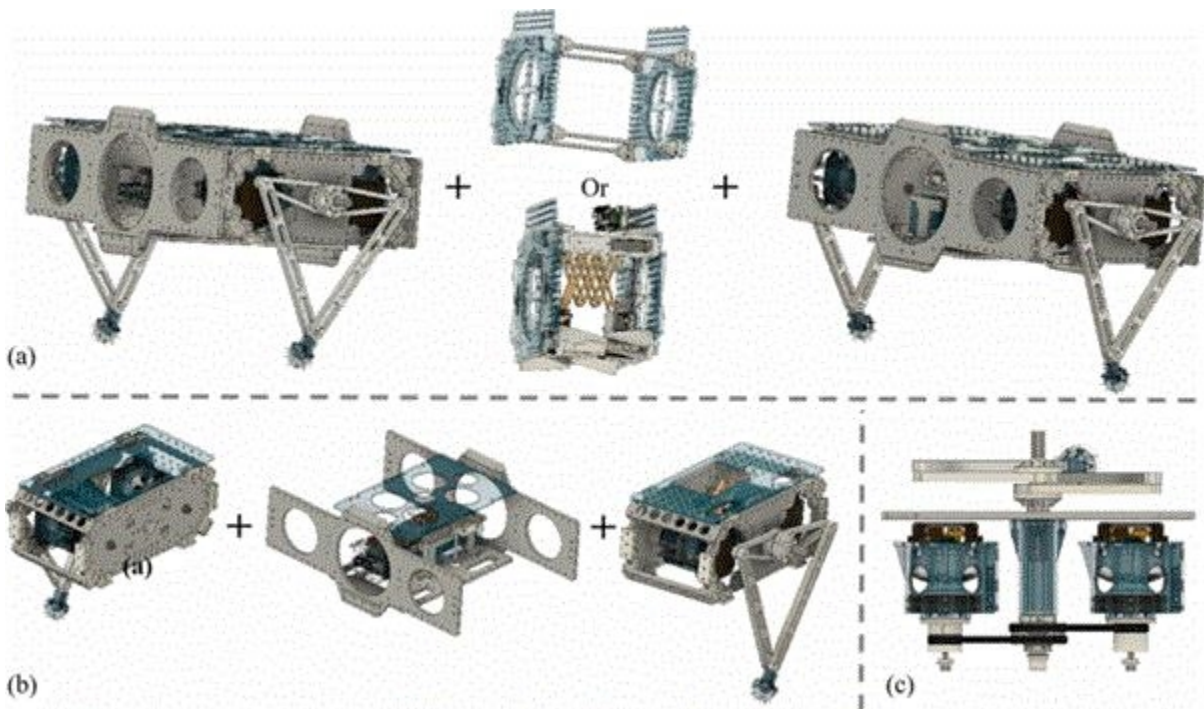
### Technology

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 mechanism 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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