



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

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

FULL DESCRIPTION

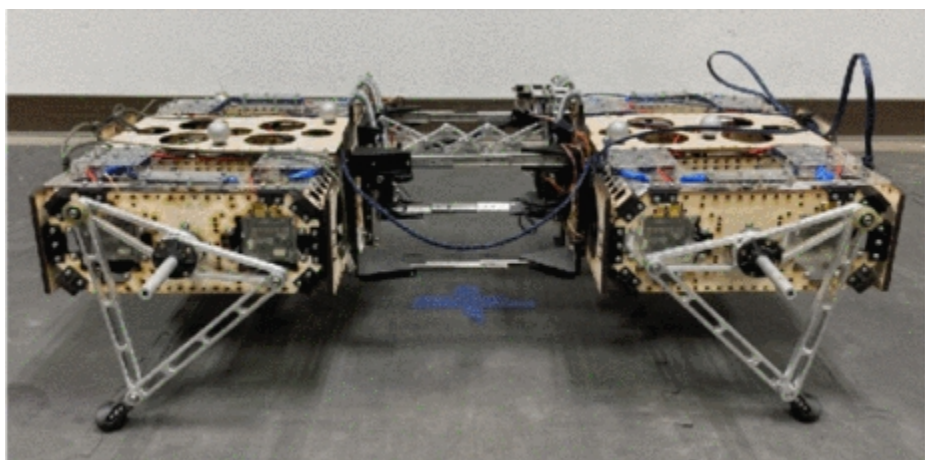
Background

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.

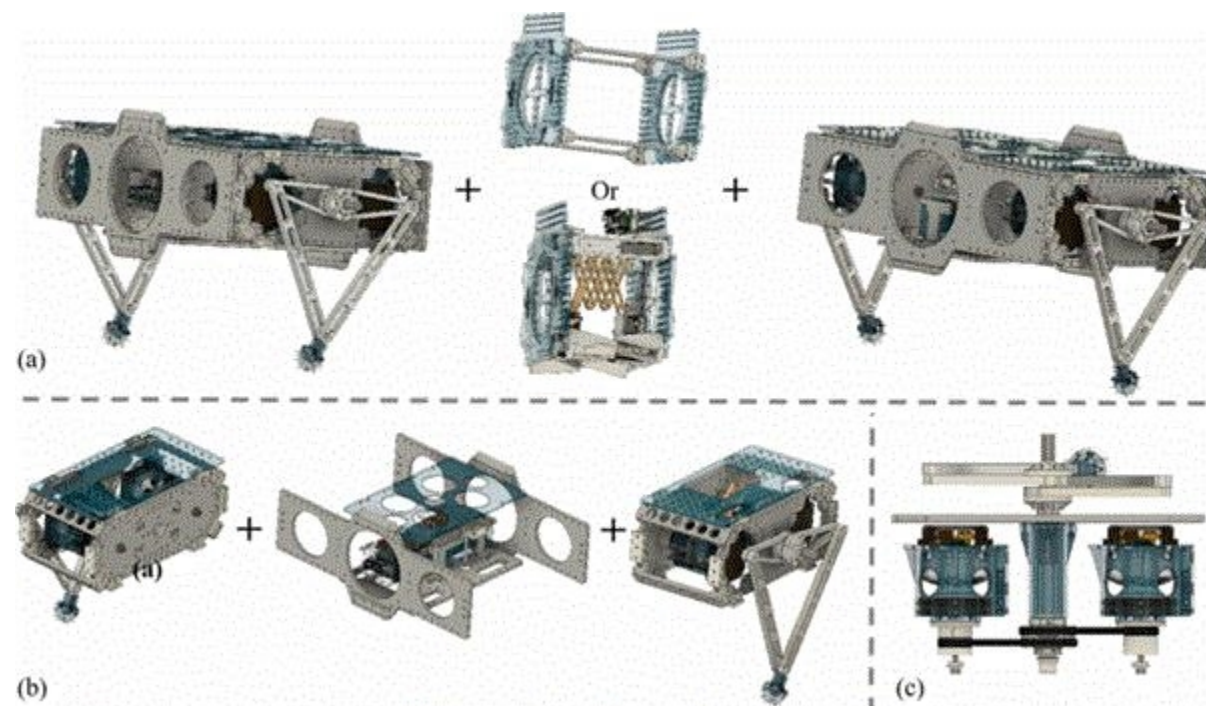
Technology

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 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

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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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