

Cable-Driven Four-Bar Link Leg Mechanism

A cable driven four-bar link mechanism for actuating robotic legs to improve the performance of articulated legs and increase the longevity of the mechanism

This four-bar leg mechanism uses a cable system to control the movement of the leg, which works in conjunction with a spring mechanism to allow to movements in opposite directions. Two four-bar leg mechanisms are linked together through a single cable whose movement or change in length can be used to actuate each leg independently or in conjunction. Actuators are confined within the system and allow for both symmetrical and asymmetrical movement of the legs in unison. Linking the two leg mechanisms also reduces the loads experienced by each component of the mechanism by distributing contact forces across the entire mechanism.

Summary Bullets

- Reduces the weight and improves performance of the mechanism by placing all actuators inside the body
- Structurally efficient – significant portion of loads are carried by the cable which is an efficient structure
- Actuator loads are significantly reduced through mechanism linking, increasing the longevity of the mechanism

Solution Advantages

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Potential Commercial Applications

This technology has applications in any field making use of articulated arms or legs including:

- Robotic terrestrial
- Aquatic
- Aerial vehicles
- High potential for use in articulated landing gear

Background and More Information

Four-bar leg mechanisms utilize a four-bar system to create a mechanism with one independent movement to control the entire system. These mechanisms are desirable for high force applications because the force can be distributed across the four different components but it only needs one actuator, the component responsible for controlling movement in the system. Current systems require an actuator for each four-bar leg, which can add significant weight to a system, and are typically placed outside of the four-bar leg mechanism, adding bulk. Thus there is a need for a four-bar leg mechanism that reduces the weight and bulk of the system.

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Publications

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Images

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