Cable-Driven Four-Bar Link Leg Mechanism (#7592)

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.

Benefits/Advantages

- 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

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/Context for This Invention

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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More Information

Publications

For more information about this technology, please visit:
https://licensing.research.gatech.edu/technology/cable-driven-four-bar-link-leg-mechanism

Images:

The automated sequential delivery of multiple fluids. A varying number of delay gates imprinted in the branches are shown in the figure.

COVID-19 and flu saliva test on paper: (A) The automatic sequential delivery of multiple reagents required for virus test; (B) Water pouring into the device triggers the virus assay, allowing the presence of SARS-CoV-2 and influenza A & B viruses to be visually identified by the color changes in the corresponding detection spot