Researchers at the University of South Florida have invented a compliant device with adjustable constant-force output. The axial force output of the device can either remain constant as it's compressed, or be dynamically adjusted according to positional feedback.

Constant-force mechanisms (CFM) are used to maintain a constant output reaction force throughout a large range of compressive motion. These devices already exist in various forms, but they are not adjustable. They must be designed around a single force output which limits their use.

In order to fulfill the need for precise force output control in robotic systems, our inventors have designed a CFM that is easily adjustable in a way that directly affects the output force. This is accomplished by rotating the flexible member of a compliant crank slider about its longitudinal axis while constraining it to always bend in the same plane. The force output of the device increases several times over as the compliant beam is rotated. The system is adjusted electronically, presenting a large potential for feedback control.

Constant-force devices, such as those in robotic end effectors, become highly adjustable with the option of dynamic adjustment under computer control. Robotic armatures could also employ this system in their joints to maintain static balance in a wide range of positions, improving power efficiency.

**ADVANTAGES:**
- Precise force output control
- Dynamic adjustability
- Improved power efficiency
- Large potential for feedback control

**Adjustable Constant-Force Mechanisms for Robotic End Effectors**

**Compliant Crank Slider Mechanism**

Tech ID # 16B130