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Fluid Power System for Energy Recovery from Assistive Actuator Loads and Redistribution via Fluid Connections

A new hydraulic system topology enhances efficiency, captures previously lost energy, and increases reliability through component failure bypass capability.

A new hydraulic system topology developed by researchers at Purdue University offers improved efficiency, reliability, and performance. The fluid power system allows energy recovery from assistive actuator loads to be immediately used by other resistive loads in the system or stored in a common rail accumulator for later use.

In this hydraulic system, any port on any actuator can be connected to any other actuator via a common rail system. Therefore, the system controller can intelligently control each valve to recover the maximum possible energy from an actuator. The configuration of the network of valves is such that it allows the hydraulic system to operate with characteristics of multilevel load sensing, displacement control, independent metering, energy recovery, and energy storage (if an accumulator is added). These operating modes can coexist depending on which combination provides the best overall efficiency and effectiveness for a given application and load cycle. The system includes the capability to reroute power in the event of component failure, leading to increased reliability and the ability to bypass the failed components in order to complete the desired task safely.

Advantages:

-More efficient use of hydraulic energy

-Captures energy that would have previously been lost

-Ability to bypass failed components and still function

Potential Applications:

-Hydraulics systems industry

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Category
Energy & Power Systems/Energy Storage
GreenTech/Circular Economy & Waste Reduction
Robotics & Automation/Automation & Control

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