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COGGING-TORQUE ACTUATOR

MECHANICAL, CIVIL, & ENVIRONMENT

Electromagnetic motor where cogging torque is maximized, allowing the motor to rotate slowly and deliberately across acute angles and enabling energy-efficient motion for robotics applications.

TECHNOLOGY TYPE
Equipment

STAGE OF DEVELOPMENT
- Simulations to demonstrate proof of concept in progress.

- Preliminary studies indicate large passive holding torques are achievable.

- Prototype construction and additional testing required.

IP PROTECTION
PCT filed.

LEARN MORE
Reference Number: U-6435

Nick Wilkes
Technology Manager
nick.wilkes@tvc.utah.edu
801-587-0515

TECHNOLOGY SUMMARY
Motors were designed and optimized for industrial processes that require continuous smooth rotation, which typically requires minimization of cogging torque. These motors operate efficiently at high speeds, but must be geared down to achieve velocities and torques typically needed for robotics. This leads to inefficient motors with no inherent compliance. As compliance ensures safety and prevents damage to the robot, researchers have attempted to address the issue. Current solutions, however, require auxiliary components resulting in large, ineffective, and complex systems.

University of Utah researchers are developing a new type of robot actuator, comprising an electromagnetic machine combined with a local controller implementing bioinspired motion primitives. The cogging-torque actuator will accept high-level commands and adjust its own behavior according to its local experience through a combination of controlled passive dynamics and high-bandwidth feedback control. This design will facilitate more robust operation by enabling distributed control, inherent sensing capability, controllable compliance, and leveraging the nonlinear dynamics of the actuator.

FEATURES AND BENEFITS
- Improves operation in highly dynamic environments.
- Increases energy efficiency.
- Facilitates passive holding torque.
- Enables controllable compliance.
- Enables distributed control.

INVENTOR PROFILE
Jake Abbott, Ph.D., Associate Professor - Mechanical Engineering
Shad Roundy, Ph.D., Associate Professor - Mechanical Engineering
Jacob Aman, Graduate Research Associate

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