Single Stage, High Performance Transmission Mechanism

VANDERBILT UNIVERSITY
CTTC Center for Technology Transfer & Commercialization

Summary

A researcher from Vanderbilt University has created a novel single stage transmission with a high transmission ratio that was born from the physics of a coin wobbling as it rolls on a table. This innovation offers a great advantage over existing single stage transmissions in terms of a smaller and lighter weight design, increased efficiency, and a reduction in manufacturing cost.

Addressed Need

Electric motors offer exceptional power density and are commonly used in a myriad of different applications. Although electric motors provide high power density, the utilization of all the available power requires operation at higher speeds and lower torques than many applications require. Thus, most applications utilize multi-stage transmission systems between the motor and the drive shaft, resulting in reduced speeds and higher torques. The penalties for using a multi-stage transmission are increased size, weight, and complexity. Such transmissions are also plagued by high inertia and lower efficiency due to friction. The present device overcomes these challenges with a single stage design that has a high reduction ratio and can be manufactured at low cost using standard gear manufacturing procedures.

Technology Description

Through an innovative design based on a coin wobbling on a table, the present technology can achieve transmission ratios on the order of 100:1 using a single stage, making it suitable for a wide array of potential applications, particularly those where space is at a premium. The device achieves this transmission ratio while maintaining a high efficiency, and does not require complex manufacturing unlike competing transmissions such as harmonic and cycloid drives.

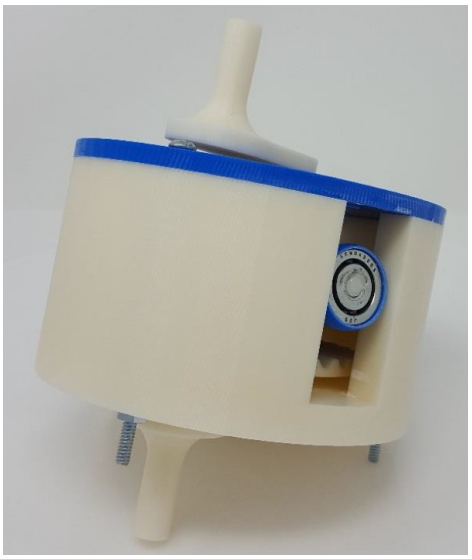

Figure 1: This innovative drive can achieve transmission ratios up to 100:1 in a single, compact stage. A benchtop prototype of the device is shown here.

Technology Features

- High transmission ratio up to 100:1 in a single stage
- Utilizes conventional gear manufacturing techniques
- Lower cost than existing complex single stage transmission devices

Technology Development Status

- A working prototype has been manufactured
- Testing of the prototype is ongoing, and future work includes the manufacturing of additional prototypes with varying performance specs

Intellectual Property Status

A patent application has been filed.

CTTC CONTACT:

Ashok Choudhury
(615) 322-2503
ashok.choudhury@vanderbilt.edu

INVENTORS:

Harrison Bartlett
Department of Mechanical Engineering
Center For Intelligent Mechatronics

VU REFERENCE: VU17153

Visit **http://cttc.co/technologies** for available Vanderbilt technologies for partnering