UNIVERSITY of DEBRECEN

TECHNOLOGY TRANSFER CENTER
H-4028 Debrecen, Kassai út 26. Kancellária 2. Bldg. Room 105.
Phone: +36 52/518-640 | http:// techtransfer.unideb.hu

Alternating current drive controlled with frequency converter for electric vehicles

Researchers at the Electrical Engineering and Mechatronics Department of the University of Debrecen have developed an alternating current (AC) drive controlled with a frequency converter. It can be used to effectively control the revolution and drive dynamics characteristics of electric car motors.

Background

At present, direct current (DC) motors are typically used for electric (battery-powered) cars. In order to power hybrid cars and high-performance electric vehicles, special motors and control electronics are needed, as it is difficult to control the revolution of a three-phase motor with traditional tools, and the precision of control is not adequate for road transport. A general problem is that as the voltage of the battery decreases, the revolution of the DC motor and consequently the speed of the car and its dynamical performance decrease.

Technology

The researchers have invented a uniquely programmed and fitted performance electronics device, which controls the frequency of an AC motor in a way that it is able to power any traditional asynchronous or synchronous motor. This solution leads to an increase in torque and not revolution as it is the case with DC motors. As a result of this special programming, the parameters of drive dynamics improve, and the torque of the motor becomes controllable in the whole revolution range. The revolution of the motor does not decrease as long as the battery level is above a given level. Based on the technology the researchers built a concept car, where the drive is equipped with the function of charging the battery while braking.
In normal city or road transport circumstances with a pre-planned distance, a vehicle with such a drive is able to run for 100-120 km with an average speed of 80-90 km/h. The vehicle is able to accelerate by 1 km/h per meter until it reaches its top speed. In order to protect the batteries, an economy mode can be set, whereby the operating software adjusts the system for optimal performance to maximize battery lifetime. As a result, the vehicle is able to run farther, up to 15% of its whole range, e.g. to proceed to a charging point.

Benefits

- maximum torque of the motor even in higher revolution range,
- torque is controllable in the whole revolution range,
- higher speed does not entail a shorter range,
- the battery level does not affect the speed of the vehicle,
- when the battery gets low, the vehicle is able to proceed with an adjustment performed by the operating software,
- the drive can be charged while braking,

IP status

European patent is pending.

Contact: Mr. Tamás Bene, Head of TTO | mobile: +36 70 7091486 | email: tbene@unideb.hu
www.techtransfer.unideb.hu

Further steps

The inventors are currently working on a vehicle that is suitable for city transport. We are seeking partners for the widespread exploitation of the new technology.