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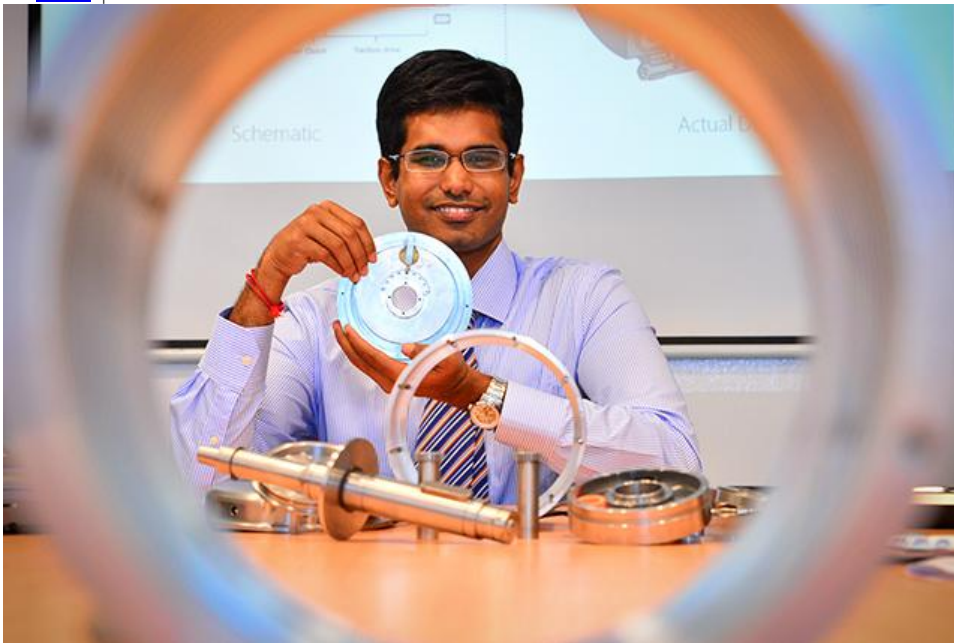


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Two-in-one motor increases electric vehicle driving range

30 September 2014

By Tereza Pultarova

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Research Scholar Satheesh Kumar from NTU Energy Research Institute and his award-winning invention [Cedit: NTU] the electric vehicle, allowing the designers to use larger batteries, increasing the driving range by up to 20 per cent.

The motor was developed by researchers from Singapore's Nanyang Technological University (NTU) in cooperation with German Aerospace Centre (DLR). The researchers believe that especially electric vehicle drivers in countries with a hot climate would benefit from the innovative solution as air-conditioning consumes a large portion of the battery capacity.

“The biggest challenge with electric cars in tropical megacities is the range that they can travel on a full-charge, because their batteries are needed to

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An innovative engine integrating an electric motor with air-conditioning compressor promises to extend electric vehicle driving range.

By integrating two usually separated units, the two-in-one motor saves space inside the electric vehicle, allowing the designers to use larger

power both the engine and the air-conditioning,” said Professor Subodh Mhaisalkar, executive director of the Energy Research Institute at NTU. “In tropical countries like Singapore, up to half the battery’s capacity is used to power the air-conditioning system.”

The new two-in-one design allows the electric motor to be more efficient in powering the car’s wheels, while its integrated air-conditioning compressor uses less power due to synergy between the engine and the compressor, which can also tap into energy regenerated directly from the car’s brakes.

With the potential boost in range through the efficient use of energy, the invention recently won the Best Originality Award at the TECO Green Tech International Contest held in Taiwan.

The German aerospace centre will conduct further tests and fine-tune the engine with the aim of eventual commercialisation.

“With the global population of electric vehicles set to grow rapidly to 20 million in 2020, a more efficient electric motor cum air-con compressor will enable cars to travel further on a single charge,” added Prof Mhaisalkar. “This energy efficiency will in turn reduce overall greenhouse emissions and promote sustainable transportation solutions.”

The two-in-one solution would also reduce manufacturers’ costs as it can be built with less material.

“By integrating the refrigerant compressor directly into the electric motor, we save components, weight and cost,” said Michael Schier from the German Aerospace Agency’s Institute of Vehicle Concepts. “Simultaneously, the more regenerative braking part of the kinetic energy is passed directly to the refrigerant compressor and thus the efficiency is further increased.”

The novel concept presents a departure from the conventional layout that dates back to the 1960s when air-conditioning first became popular.

“Back then, air-conditioning was something new that was an add-on feature to a car’s combustion engine,” said NTU researcher Satheesh Kumar, inventor of the engine.

“Since we are now designing electric vehicles from scratch, I see no reason why we should keep both units separate. As we have proven, combining the two gives us synergy – a more efficient use of electricity – and it also improves engine braking, which stops the car faster with lesser wear on the brake pads.”

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