Toward temperature-resilient EVs

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Credit: AI-generated image (disclaimer)

The OSEM-EV project has come up with an entirely new concept of heat management for electric cars. These advances should enable a new generation of EVs with a greater and more predictable driving range.

Limited driving range is widely acknowledged as being the main obstacle to electric vehicle (EV) market growth. And whilst increased capacity could seem like the most natural way forward, it wouldn't solve the

other, closely related problem EVs are currently facing: unpredictable range due to fluctuations in temperature.

When subjected to extremely cold or hot temperatures, batteries tend to lose up to half of their initial capacity. Achieving temperature resilience would considerably boost confidence in ELVs, and it therefore comes as no surprise that an 11-strong consortium has made its priority improved mileage and predictable range, without adding further cost and weight, since 2015.

"Our core objective under the OSEM-EV project was to make battery temperature resilient by using heat from the car, and cooling or heating it up thanks to a heat pump," says Reiner John, coordinator of the project on behalf of Infineon Technologies.

All in all, the project has developed a range of thermal management solutions including insulation, thermal energy storage, innovative heating and cooling approaches, electronic control of electro-thermal energy and power flows, increased energy efficiency of electrified components and subsystems, energy substitution as well as energy harvesting functions. But its heat pump concept and the mobilization of waste heat from other subsystems is what truly makes OSEM-EV (Optimised and Systematic Energy Management in Electric Vehicles) stand out.

Thanks to the in-depth quantitative understanding of energy flows in electric vehicles they gathered over the duration of the project, the consortium was able to design and optimise the vehicle's energy architecture and to develop control algorithms for effective coupled electro-thermal energy management. These improve not only the energy efficiency of the powertrain, but also the reliability and lifetime of every subsystem in the car.

The technology was successfully demonstrated in two different classes

of electric vehicles: one in the A-segment and one in the C-segment. These two segments were selected due to their very different requirements and topologies and, most importantly, for their high market potential.

Whilst commercialisation plans are still being discussed, John points out that Daimler will follow up on its own prototype and intends to include the novel components in future models. IFEVS, on the other hand, will follow up on their own demonstrator (a small truck devised for food delivery) and has made detailed plans available to all project partners.

One thing is certain: sooner or later, a new generation of electric cars working under almost all weather conditions will be on our roads, boasting minimal use of energy to keep the passenger and battery compartment thermally conditioned, as well as a radical reduction in self-discharge and energy use.

Provided by CORDIS

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