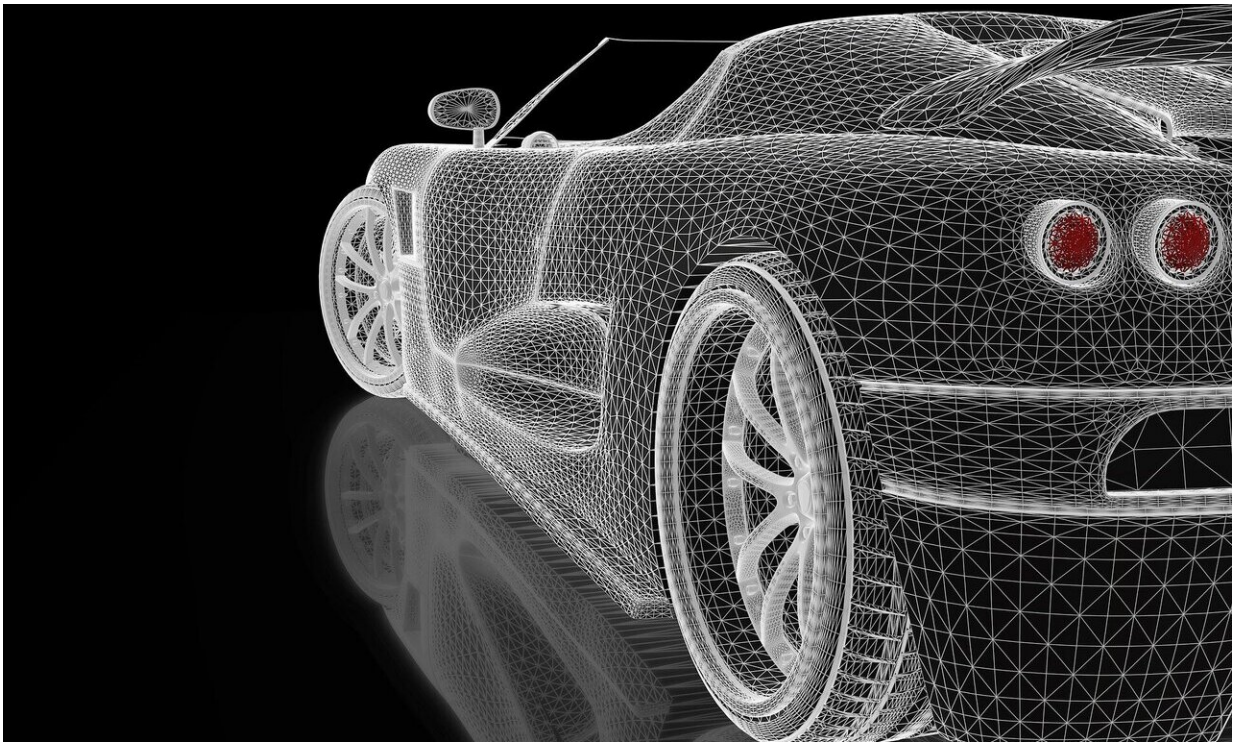


Research team charges on with 'power suit' as a new battery for electric cars, spacecraft

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University of Central Florida scientists are charging on with an experimental battery capable of reinventing how automobiles and spacecraft are made.

By reworking the idea of energy sources, a UCF research group is

creating a lightweight battery that would double as the outer shell of a vehicle in what the group is calling its "power suit" project.

Led by UCF College of Engineering Professor Jayan Thomas, the group plans to accomplish this with nanotechnology—supercapacitor composite material involving [graphene](#) arranged over carbon fiber in a fan-like structure, Thomas said.

"The advantage is it's lightweight, and can increase the mileage because you're reducing the weight of the car, and in addition to that, you can store energy like your battery in the same composites," said Thomas, who conducts his research at UCF's NanoScience Technology Center.

While reducing weight, the suit is thought to increase an electric car's range by 25% to 30%; equating to about 200 miles per charge, Thomas said. The suit would get its power through charging, like a battery, as well as when the car brakes.

"Its charge-discharge cycle life is 10 times longer than an electric car battery," Thomas said.

The suit's ability to repurpose energy captured while braking is why a member of the research group, Deepak Pandey, relates their power suit to the science fiction of Marvel's Black Panther.

"Black Panther, you know whatever you shoot at him, his suit absorbs the energy and repurposes it. That's exactly the thing we're doing," said Pandey, a Ph.D. student who's been working on the project since it started four years ago. "When you're braking, [the suit] absorbs the energy and then when you see a green light and press the gas, it immediately discharges and gives a high burst of current to give you that initial push acceleration."

The Wakanda King, T'Challa, used his power suit—capable of storing energy from concussive blows—to chase down a Lexus through the neon streets of Busan, South Korea. UCF isn't looking to do anything quite as explosive. Actually, quite the contrary. The UCF vehicle power suit wouldn't be explosive at all—at least that's the goal.

After all, having the battery on the outside of a car is potentially problematic in the event of a collision, but explosions wouldn't be a threat in the case of UCF's suit.

"In this case, we use a water-based electrolyte. So, then you don't need to worry about gasoline or any kind of material that could catch fire," Thomas said.

But with water lies a problem of its own, as batteries can't hold as much of a charge per cell. However, by using a technique called "asymmetric supercapacitors" the battery can come pretty close to a standard charge per cell. A typical lithium ion battery can hold 3.4 volts per cell. UCF's asymmetric supercapacitors can hold 2.2, Pandey said.

"And we believe we can enhance that further," he said.

For the moment, the research group has only developed a small prototype for a remote control car—the suit itself looks almost reminiscent of Black Panther's the way the black-scale surface shimmers in the light, and although the carbon fiber material is not as expensive as Marvel's fictional metal "vibranium,"—it is still pretty expensive.

Aerospace companies are moving toward using carbon fiber as [building material](#) since it is both light and strong. For UCF's purposes, carbon fiber is great for conducting electricity. However, the power suit is looking down the road toward other less expensive shell material.

"Basically we are still working with some of these materials that would be 10 times cheaper than [carbon fiber](#) and would be useful for this type of research," Thomas said. Thomas didn't reveal what those materials might be as they're a bit of a trade secret for now, he said.

Thomas' group saw success in its composite material powering the wheels of a toy car after charging for about a minute. As the composite material hooked up to a toy car with batteries, its wheels whined at a high pitch while quickly rotating, to the delight of Thomas and Pandey.

The group is working in tandem with NASA scientists in developing the technique for future space travel and satellite development. However, NASA declined to comment on the story, explaining it had legal concerns about disclosure. However, in a story published by UCF, co-author of the project's study Luke Robinson said, "There are lots of potential infusion points within the economy as well as for future space exploration.... This is, in my mind, a huge advancement of the technology readiness level to get us to where we need to be for NASA mission infusion."

As for readiness, the project is near the desired level for NASA's use; but commercial use development could take around five more years, Thomas said. But an unnamed car manufacturer has already expressed interest in the power suit and is in discussions with Thomas and his group about its applications.

"For this product to be on an electric vehicle or spacecraft, that is the dream, right?" Thomas said.

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