Modular Robotic Vehicle developed at Johnson Space Center

April 16 2015, by Nancy Owano

We all know Google's star act for driving's future with its self-driving car. What if NASA were to step up and give us its rendition of a self-driving vehicle? A new video reveals how NASA handles the role.

NASA actually has been working on something autonomous and has posted a video of its electric robotic prototype wonder on YouTube. The Modular Robotic Vehicle (MRV) has been created by NASA at the Johnson Space Center.

This is a battery-powered electric vehicle that looks more like a site-to-site transportation cart or transporter at an airport. After watching the video, one can see why Christopher DeMorro in *Gas 2* described it as "an all-electric planet-hopping uber go-kart." Nelson Ireson in *Motor Authority* had a story with a headline that called it an Autonomous Electric Drift Buggy.

What grabs the viewer first and foremost is that the MRV is capable of agile movements including driving sideways. "Imagine all the places the MRV could get on an undeveloped planet like Mars?" said *Gas 2*. "It could also be charged by solar panels, as getting fuel that far from Mother Earth might be a bit difficult." The vehicle is electric and powered by batteries.

The car has "drive-by-wire" systems, according to the video. What does that mean? A NASA publication explained: "With no mechanical linkages to the propulsion, steering, or brake actuators, the driver of an MRV relies completely on control inputs being converted to electrical signals and then transmitted by wires to the vehicle's motors. A turn of the steering wheel, for instance, is recorded by sensors and sent to computers at the rear of the vehicle."

Gas 2 said "The drive-by-wire system can be controlled either from the MRV itself, or remotely by another operator."

Among the features listed in the video is the MRV's "redundant fail-operational" architecture, four independent wheel modules, and 180-degree steering actuation. This makes the vehicle agile. The NASA

publication also spelled out this feature: "Each e-corner can be controlled independently and rotated ±180 degrees about its axis. This allows for a suite of driving modes allowing MRV to maneuver unlike any traditional vehicle on the road. In addition to conventional front two wheel steering, the back wheels can also articulate allowing for turning radiuses as tight as zero. The driving mode can be switched so that all four wheels point and move in the same direction achieving an omni-directional, crablike motion." What's more, the MRV has remove driving capabilities and can deliver vehicle feedback to the driver.

With NASA's MRV technical accomplishments, are we looking at a next-gen automobile? Imaginations are already being exercised, with some comments on sites envisioning its performance on the road. One reader said you could see drunk drivers coming at you from angles you never thought possible. Many comments were one-liners, fundamentally, "Where do I get one?"

Stephanie Mlot in *PCMag* said, ideally, NASA wants it to traverse the extreme terrain of other planets. *Motor Authority* noted its liquid-cooled motors, steering wheel, and seats operating in space as an autonomous robot car.

So is the MRV designed for space or closer to earth? The answer is yes and yes. The NASA publication last year called "Game On" discussed the aims of the team that worked on the MRV. "The Modular Robotic Vehicle, or MRV, was developed at NASA's Johnson Space Center in order to advance technologies that have applications for future vehicles both in space and on Earth," said the publication. "This work allowed us to develop some technologies we felt were needed for our future rovers," said Justin Ridley, Johnson Space Flight Center. "These include redundant bywire systems, liquid cooling, motor technology, advanced vehicle control algorithms. We were able to learn a lot about these and other technologies by building this vehicle."

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