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Windowless War Vehicles Will Show the Outside World Via Virtual Reality

More information than the human eye can spot, and all while making the tank harder to kill.



DARPA



By Eric Tegler Feb 22, 2016

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It's tough to see out of a vehicle with no windows. But eliminating something as fundamental as a windshield can make a military vehicle harder to kill, and give soldiers a greater awareness of their surroundings than they can get by just looking outside.

DARPA's Ground X-Vehicle Technologies (GXV-T) program is an effort to combine new technologies to improve survivability, agility, and mobility for the next generation of military ground vehicles. GXV-T was first announced in 2014, but now Honeywell has signed on and is proposing a virtual reality instrument panel concept, which the company says could provide drivers with an enhanced 360-degree view outside the vehicle.

"If we put a panoramic display system inside this GXV-T vehicle, maybe it doesn't need windows or maybe it can use a different kind of window that, for example, wouldn't let ambient light out of the vehicle that a foe could see from a distance," says Honeywell senior technical manager Doug Harris.

Honeywell's plan is to bring together aerospace user interfaces it's been working on for years to provide a panoramic view in the sky. The company's SmartView Synthetic Vision, already in use in the latest Gulfstream and Dassault business jets, provides a synthetic outside view on a heads-down display. In a DARPA tank, the general outside-vehicle picture conveyed by SmartView would be coupled with a "near-to-eye display" that's in the works at Honeywell. Near-to-eye is a stereoscopic high resolution inset overlaid on top of a panorama display. Think of it as the way human eyes can focus on one subject while maintaining simultaneous peripheral vision.

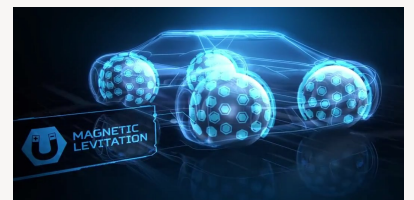
"As the operator moves his head around, he sees the high resolution inset where his eyes would focus as they scanned around the cockpit," Harris says.

Even so, a camera is not a human eye, which raises a few interesting challenges. Harris explains that a man can naturally move his head but stay focused on same object using what's called the vestibular ocular reflex (the fastest human reflex). But replicating this virtually, using the near-to-eye inset, can cause nausea or motion sickness. Honeywell thinks it can compensate, but it will also have

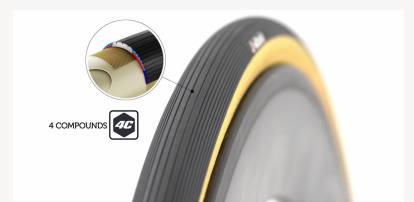
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to reduce latency in the display, which must have very high refresh rate.

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Honeywell is still figuring out what pieces make sense for the virtual instrument panel/panorama display. A host of onboard (and offboard) sensors could be integrated to provide inputs from good guy-bad guy recognition to thermal views. For now, Honeywell is trying to narrow down what the display medium might be: from flat panel screens or flexible OLED displays to curved displays with embedded nanoparticles. Perhaps the operator will use a helmet-mounted display.

One design key is not to overwhelm the user with information. "What do you really want to see in a firefight?" Harris asks. Understanding the operator's head position is key to understanding what he wants and changing visual acuity to accommodate. "For example if they're looking down in the vehicle where a control panel is, we could make a virtual control panel and paint that picture for them."

The developers will go into the lab with human subjects and develop the camera system this spring. The second phase of the program, testing the system on a vehicle, could begin before year's end. Depending on how it goes, Honeywell expects interest from non-defense players, too.

So long, windows.

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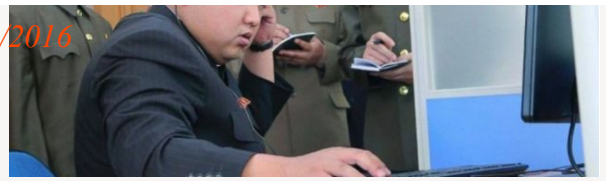


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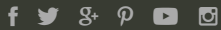
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