



The Focus

Tech's Border Battle

As The Defense Industry Looks To Its Next Frontier, Southern Arizona Companies Are Busy Building War 'Toys' Of The Future

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describing the innovative fuel system in the new stealth hybrid vehicle that his Tucson-based engineering firm is helping develop for military use, Michael Lupien can't help sounding a bit like "Doc" Emmett Brown of "Back To The Future," demonstrating how the "Mr. Fusion" energy reactor built into the back of his futuristic time machine can convert discarded banana peels and beer suds into super-charged electrical power.

"What's really cool is the base of the unit is all lithium-ion batteries, powered by 10 gallons of mixed fuel," says the director of business development for Tucson Embedded Systems, which created the integrated dashboard architecture for the prototype vehicle.

"So let's say you get a gallon of petrol, then you get a gallon of diesel, a gallon of corn oil, a gallon of chicken fat, and a gallon of rocket fuel. You can mix this inside of the turbine, it generates power in the batteries, and then off you go. So you get, with a full tank, 350 miles worth of coverage in this one little unit that can also go from zero to 60 in four seconds."

Code-named the HYDRA—short for Hybrid-Defense Recon Assault vehicle—and built in collaboration with Raytheon's Missile Systems division in Tucson and hybrid technology players Bluway and A123 Systems, the lightweight all-terrain vehicle is primed to become the military's new secret weapon in what's shaping up as its next battlefield: the U.S.-Mexico border.

"The best part about this vehicle is that if you shut off the engine, you've got 25 miles of travel on batteries, and you cannot see it with a heat gun," Lupien says. "So it's totally quiet and it cannot be detected with a sensor. And with this instrumentation, you're able to hook up all these other devices—night vision, forward-looking infrared and gunshot detection system. This is what the future will look like for the military or border management."

United Effort

Setting aside all the divisive political debates surrounding the immigration issue, the battle over the border is clearly proving a boom to Southern Arizona technology firms. The U.S. Department of Homeland Security already has awarded a \$15 million grant toward establishment of a research center led by The University of Arizona to focus on new technologies in border security. Christened the Center of Excellence for Border Security and Immigration, the funds will be split with an educational arm led by the University of Texas at El Paso.

Since then, the UofA has enlisted the participation of other universities, government agencies and defense technology firms, including Raytheon's Tucson division (whose spokesman John Nelson says is contractually barred from discussing most of the projects they're working on), and Tucson's Safety Dynamics, makers of a gunshot recognition sensor previously used by police in high-crime areas.

"What our engineers developed was a biology-based approach that essentially looks at how the brain processes sound patterns, and then we trained the system to look for very specific sounds," says Safety Dynamics COO Wayne Lundeberg. "If there's a gunshot, we're able to detect that sound in less than half a second, and then do something with that, like activate a camera, sound an alarm, turn on a light, whatever."

For border security, Safety Dynamics has expanded the range of its sensors to detect not only gunshots but even the patter of a donkey's hoof steps—a popular animal for drug smugglers—and the rattling of a chain link fence.

"With the fence, we've trained it so you can brush by it or push up against it, but if you try to climb it, it will send out an alert to the people monitoring that fence," Lundeberg says.

Protecting Trade

For companies such as Safety Dynamics, led by Tucson's Hispanic Businesswoman of the Year Sally Fernandez, the question of how its software might be used by the border patrol can be a dicey issue.

"Obviously, you don't want it rigged up to automatically shoot someone when they try to climb the fence," says Lundeberg, a former Army engineer. "But you also want it to do more than just turn on a light and take a picture, because people won't care; they'll know that by the time anyone gets there, they'll be long gone. At some point, there'll have to be some consequence for tripping the sensor."

But the technology initiative isn't just about nabbing illegals and smugglers, says Bruce Wright, associate vice president for economic development at the UofA. By also using the latest technology to identify, say, a truck used by a legitimate produce shipper in Sonora with a barcode that can be electronically scanned at the border, installing motion and chemical sensors in the cargo bay to ensure nothing funny goes on en route, and a GPS device to keep the truck on track, those doing legal trade with the United States will be able to move across the border faster without their produce spoiling in the heat.

"Mexico is the U.S.'s second largest trading partner, which is particularly important to the economy of the Southwest," Wright says. "So there's a concern that as you clamp down on the border to combat terrorism and illegal traffic of drugs and immigration, you're also not negatively impacting the legitimate trade that needs to happen across the border."

Or, as Michael Lupien more simply sums it up, "You want to use this technology to catch the bad guys while also helping the good guys."