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Yokota airmen's underground mapping software wins Air Force innovation competition

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Tech. Sgt. Raymond Zgoda, left, a civil engineer with the 374th Airlift Wing; Master Sgt. Sarah Hubert, center, the wing's superintendent of religious affairs; and Lt. Col. Mark Wagner, commander of the 374th Contracting Squadron, pose with their Spark Tank award at Yokota Air Base, Japan, March 15, 2023. (Jeremy Stillwagner/Stars and Stripes)

YOKOTA AIR BASE, Japan — Underground mapping software developed by airmen at this airlift hub in western Tokyo took first place at a competition aiming to promote innovation and creativity within the Air and Space Forces.

The winning entry, Infrastructure in an Augmented Reality World, pairs augmented reality technology with microwave scanning to create underground maps. The maps are used to identify subterranean infrastructure that is not accurately mapped on military bases; they can also identify sinkholes.

The airmen made their successful Spark Tank pitch on March 8 during the Air and Space Forces Association 2023 Warfare Symposium in Aurora, Colo.

The team includes Lt. Col. Mark Wagner, commander of the 374th Contracting Squadron; Master Sgt. Sarah Hubert, superintendent of religious affairs for the 374th Air Wing; and Tech. Sgt. Raymond Zgoda, a civil engineer with the wing.

Their invention surpassed more than 235 ideas submitted through the Guardians and Airmen Innovation Network and six that were presented at the symposium.

Hubert thought of the idea in May 2022 when YokoWERX, an innovation lab at the air base, sponsored a trip to a Tokyo trade show.

“I saw this technology at one of the booths and started geeking out about it and stuck my phone through the glasses, got a picture of it and thought it was amazing technology,” she told Stars and Stripes Wednesday.

Months later, Hubert realized she needed help from civil engineering to complete her pitch.

“In the Air Force there isn’t a great map system of all buried utilities, pipes, electrical lines, communication lines; and most of the utilities that we have are buried underground,” Zgoda said.

The location of underground utility lines buried during the initial construction of many U.S. air bases originally appeared on hand-drawn maps, Zgoda said. When the Air Force digitized those maps, it stitched together short sections from many maps into one digital map.

“What ended up happening is the maps are very far off from what we what we actually dig in the ground,” Zgoda said. “There will be extra pipes and extra lines that we didn’t account for and that ends up getting hit and then power goes out to a building or communication goes out in a building. And it causes us a lot, a lot, of issues.”

Much like on the ABC TV network show “Shark Tank,” in which contestants seeking investment funding pitch ideas to celebrity entrepreneurs, the Air Force Spark Tank competitors have three minutes to pitch their ideas to a panel of judges.

“There were over a dozen, maybe two dozen different script rewrites that we wrote over the month preceding it,” Zgoda said.

Now the team is after funding to produce its software.

Hubert said the military must continue to find new, innovative ideas.

“We can’t stay stagnant and doing something just because that’s the way it’s always been done,” she said. “As technology emerges and the commercial world changes, we need to change alongside that to become a more lethal and agile military.”

Spark Tank 2023 finalists take center stage at AFA Warfare Symposium



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AURORA, Colo. (AFNS) --

Finalists in the Department of the Air Force's capstone innovation campaign, "Spark Tank," presented their ideas to a panel of judges in an event on the last day of the Air and Space Forces Association 2023 Warfare Symposium, March 8.

A total of 235 ideas were submitted in Guardians and Airmen Innovation Network. All of the ideas were evaluated, and the top 15 were presented to be voted on by Department of the Air Force members. The top six were selected as finalists for presentation at AFA.

"There is a feeling of empowerment that Airmen and Guardians sense when they witness support from their leadership," said Maj. Aaron Beebe, Air Force Spark Cell program manager and Spark Tank production manager. "However, this event is more than that — they are seeing the support of their peers. Sometimes that validation can speak louder, knowing that you are not alone in the fight."

The six innovation proposals selected to compete as 2023 finalists were:

Accelerated Development of Multi-Capable Airmen/Guardians, Maj. Caitlin Harris, 351st Special Warfare Training Squadron, Kirtland Air Force Base, New Mexico, Chief Master Sgt. Michael Rubio, Air Education and Training Command, Randolph Air Force Base, San Antonio, Texas, and Maj Caitlin Harris, Ramstein Air Base, United States Air Forces in Europe – Air Forces Africa

Advanced Maintenance and Troubleshooting System, Master Sgt. Aaron Cordroch and Master Sgt. David Nunez, Air Force Special Operations Command, Hurlburt Field, Florida, and Technical Sgt. Andrew Crafts, 27th Special Operations Communications Squadron, Cannon Air Force Base, New Mexico

Infrastructure in an Augmented Reality World, Lt. Col. Mark Wagner, 374th Contracting Squadron, Master Sgt. Sarah Hubert, 374th Airlift Wing, and Tech. Sgt. Raymond Zgoda, 353rd Special Operations Wing and 374th Civil Engineer Squadron, Yokota Air Base, Japan, Pacific Air Forces

Project Kinetic Cargo Sustainment, Capt. Andrew Armor, Master Sgt. Brandon Allensworth, Master Sgt. Peter Salinas, Master Sgt. Jet Nesle and Tech Sgt. Justin Sprinkel, 18th Logistics Readiness Squadron, Kadena Air Base, Japan, Pacific Air Forces

Real-Time Asset Management System, Michael Dolan, Space Sensing Directorate, Space Systems Command, Los Angeles Air Force Base, California

Project Oregon Trail, Staff Sgt. Michael Sturtevant, 353rd Special Operations Support Squadron, Air Force Special Operations Command, Kadena Air Base, Japan

The Spark Tank judging panel was made up of the DAF senior leaders and two special guests, Michael Moe, founder and chief executive officer of GSV Holdings, a growth-focused investment platform based in Silicon Valley, California and retired Lt. Gen Michelle Johnson, the first female superintendent of the Air Force Academy. Panelists listened to pitches from each of the six idea creators, conducted live evaluations, and selected a winner.

The winning proposal was “Infrastructure in an Augmented RealityWorld.” This idea originated from a deployment to Iraq in 2006 in which Tech. Sgt. Raymond Zgoda accidentally hit a fiber optic cable while digging a trench that was not marked on any of the underground maps his unit possessed. The incident knocked out all communications at his forward operating base for two days.

Years later, Zgoda met Hubert and Wagner, who had recently seen a demonstration at a trade show of augmented reality technology paired with microwave scanning to create underground maps that can identify sinkholes. Zgoda didn’t see any immediate value to his mission in identifying sinkholes, but when he reviewed the augmented reality software with Hubert and Wagner and understood its 3D mapping capabilities, he knew that it could also be used to identify underground infrastructure not accurately mapped on military bases.

“The hard part is in front of us,” Zgoda said. “We now have to take this idea and implement it on a large scale. We have to work with the contractors and outside entities to get this going. That’s going to be challenging in a variety of different ways, but it’s going to be rewarding too because it is going to positively impact everybody on base. Nobody wants to lose communication or water or anything else underground, and this will ensure that doesn’t happen.”

Spark Tank 2023 is the sixth in a series of annual events. The program encourages Airmen and Guardians from around the Department of the Air Force to develop innovations to improve operations. In addition to the judges’ choice of Infrastructure in an Augmented Reality World, the fan-favorite winner was “Project Kinetic Cargo Sustainment.”

“To everyone who helped us make this a reality, thank you,” Wagner said. “To all the other innovators and Spark Cells out there, you have the ideas. Be professionally curious, engage with industry, engage with your people most connected to the mission, and understand their problems to develop solutions.”



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