

# CONFRONTING THE

OU Advanced Radar Research Center lead engineer Redmond Kelly debugs a circuit board.

SHEVAUN WILLIAMS

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*Oklahoma Aerospace and Defense Innovation Institute marshals OU expertise  
to meet a modern-day arms race.* BY CHIP MINTY

### A 35-MINUTE DRIVE IS ALL THAT

separates the University of Oklahoma's Norman campus from the main gate of Tinker Air Force Base. There was a day when few people would have connected OU and one of the nation's most prominent military installations, but that changed when Tomás Díaz de la Rubia arrived on campus in 2019.

Today, Díaz de la Rubia, OU's vice president of research and partnerships, is at the helm of a major research and technology initiative encompassing disciplines from across the university in support of America's national defense mission. He explains OU is in a unique position to fill this critical role at a time when the rapid advancement of technology and innovation is at the heart of a worldwide, modern-day arms race.

"Russia, China, North Korea and Iran are threatening U.S. national security with an array of cyber weapons, missiles, nuclear arms, offensive technology and foreign proxies," says the former deputy director and chief research officer at Lawrence Livermore National Laboratory.

Díaz de la Rubia has a deep background overseeing hundreds of millions of dollars of federal research investment in science and technology, nuclear security, defense, counterterrorism, energy and technology commercialization.

"We feel very strongly that, as a public university, we have a responsibility to innovate and help create technologies that will protect our country from adversaries, and to help retain and maintain our freedoms, our liberties and our way of life," he adds. "It's a dangerous world out there, and our adversaries are making tremendous progress, moving very fast. We need to do everything we can to make sure that we stay ahead of our competitors."

In response to those challenges, Díaz de la Rubia helped establish the Oklahoma Aerospace and Defense Innovation Institute, or OADII, in 2020 to coordinate the full range of OU's defense-related research and technological and intellectual capabilities. These assets are now serving as an ongoing source of holistic solutions for aerospace, defense and global security challenges.

OADII is a fast-growing and evolving enterprise for the university, notes Robin Rand, the institute's executive director.

"I'm excited about where we're going," says Rand, who retired as a U.S. Air Force 4-star general in 2018. "We're experiencing a great opportunity, and there is reason for optimism about what OADII can do to serve our country."

In less than four years, OU has established a link with the U.S. Department of Defense, serving the Air Force, Army, Navy and Space Force with services that include advanced radar research, aircraft sustainment and modernization technology, additive manufac-

turing, software engineering, cyber innovations and the development of national security policy.

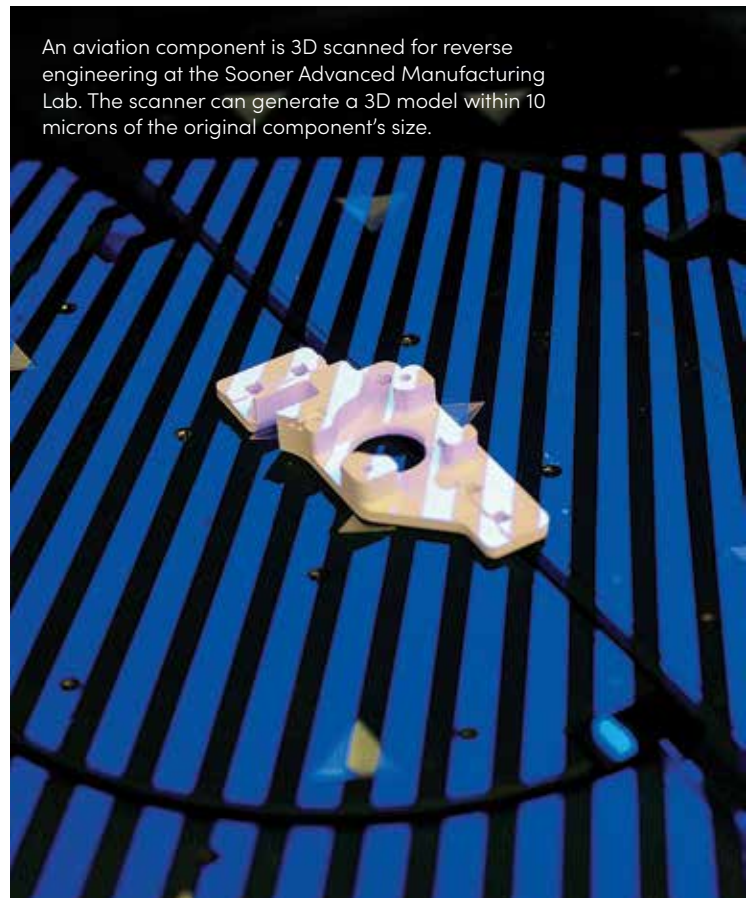
"I think we're going to be looking at very large programs with the Navy, Air Force and Army that deploy our strengths and capabilities to advance the defense mission," he says.

"I feel very strongly that scientists, engineers, social scientists and others on OU's campuses have a responsibility to help maintain our security."

OU is well positioned for that role, Díaz de la Rubia says, because the national defense presence in the Sooner State is enormous, led by Tinker Air Force Base, home of the Air Force Sustainment Center and widely considered a crucial military center. In addition, Oklahoma is home to Altus Air Force Base, Vance Air Force Base, Fort Sill and the McAlester Army Ammunition Plant.

Oklahoma's congressional delegation is very supportive of national security, Díaz de la Rubia points out, and aside from Maryland, Virginia and Hawaii, it is hard to find a state with a larger military presence than Oklahoma. That topic came up when he sat down with Oklahoma Gov. Kevin Stitt while considering a move to OU in 2019.

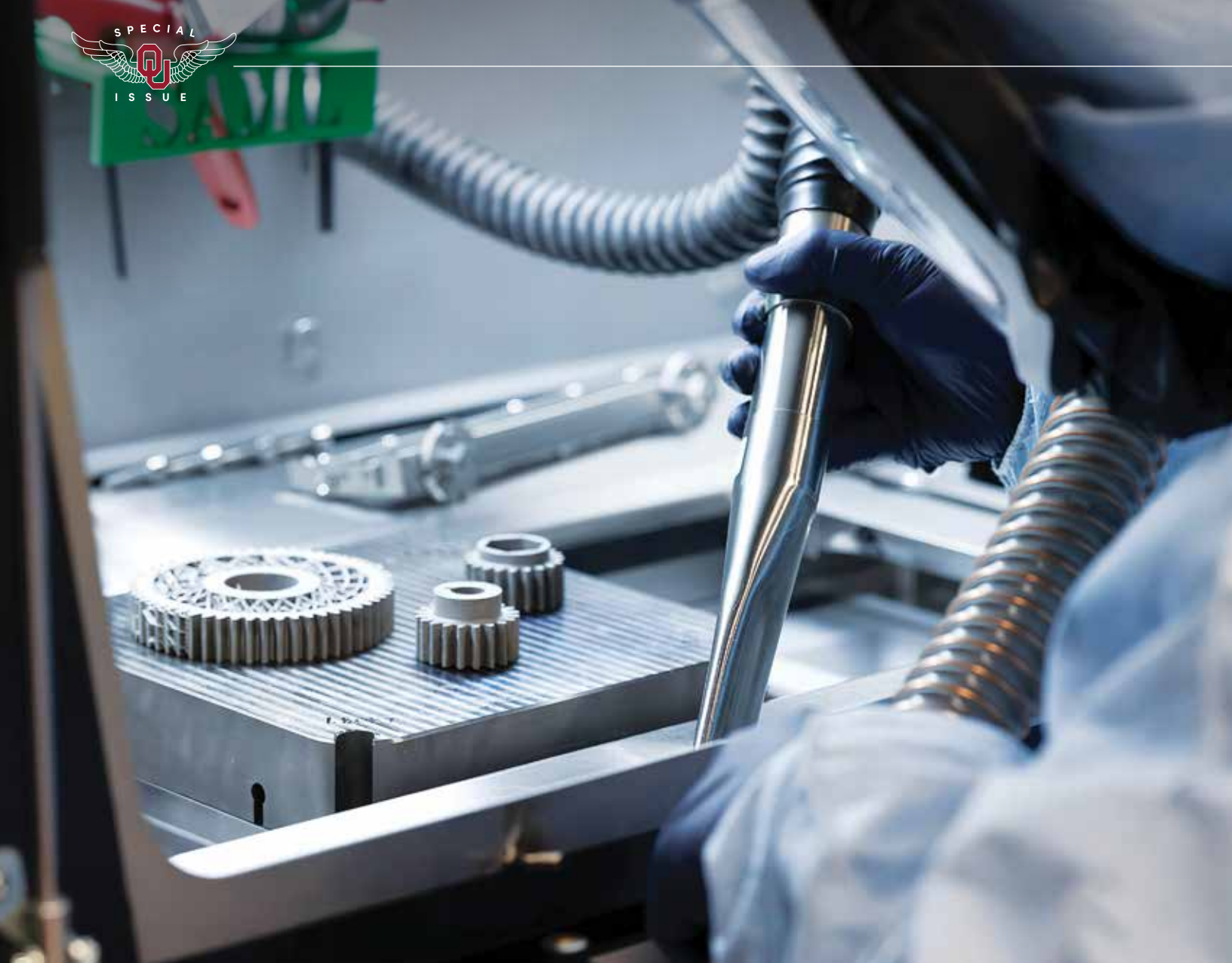
"There was a lot of interest from the governor," Díaz de la Rubia says. "He wanted to know how we could drive more



An aviation component is 3D scanned for reverse engineering at the Sooner Advanced Manufacturing Lab. The scanner can generate a 3D model within 10 microns of the original component's size.

OU Advanced Radar Research Center lead engineers (from left) Redmond Kelly, Matt McCord, Matthew Herndon and David Schwartzman stand before Horus, the world's most advanced phased array weather radar system. The ARRC team is developing similar radar technology for national defense in collaboration with OADII.





Above: Joshua Hall, a SAML graduate research assistant, vacuums excess titanium powder out of a 3D metal printer while wearing gear necessary to avoid inhaling harmful particles.



PAIGE OWENS

Left: SAML undergraduate research assistant Cotton McCullough holds an original gear, left, and a duplicate produced using 3D metal printing, which reduced the gear's weight by half and increased its strength by 10%.

research and innovation in national defense and aerospace because it is a growing industry for Oklahoma.”

Nearly five years later, Stitt says he’s glad Díaz de la Rubia became a Sooner.

“Oklahoma retains some of the most talented and dedicated professionals in the industry, which makes us a leading contributor to our country’s national security,” the governor says. “With the help of the University of Oklahoma, we’ll continue to innovate and push the boundaries of what’s possible. I’m proud of the partnerships and advancements Tomás Díaz de la Rubia has made to grow Oklahoma’s strong aerospace and defense sector.”

So far, such advancements include research and development in specific areas of military interest, such as radar and sensing, autonomous vehicle guidance, cybersecurity, quantum technologies, artificial intelligence and advanced manufacturing.

For example, OU’s Advanced Radar Research Center, the largest university-based radar center in the nation, has embarked upon a large, multi-year U.S. Navy and U.S. Air Force effort to develop the most advanced digital, phased-array radar. This work will counter the growing threat of unmanned aerial systems—otherwise known as drones—among other threats posed by peer adversaries around the world.

The university also is supporting Tinker’s mission in sustainment and modernization with a range of talented researchers and engineers.

Through a developing affiliation with Tinker’s Air Force Sustainment Center and the Oklahoma City Air Logistics Center, OU established the Sooner Advanced Manufacturing Lab, or SAML, which uses 3D printing technology to produce and certify parts for aging aircraft no longer supported by original manufacturers.

The lab is part of a strong and growing partnership with Oak Ridge National Laboratory and is supported by millions of dollars in research grants from the Air Force, Díaz de la Rubia says. SAML can produce parts out of titanium and stainless steel from two advanced, \$1.3 million 3D printers capable of critical specification requirements established by the aerospace industry.

OU also recently became a member of the Cybersecurity Manufacturing Innovation Institute, a national network solving challenges facing cybersecurity in the U.S. manufacturing and supply chain industries.

In April, OU announced a new contract with NASA to enhance air traffic management systems. Researchers are using artificial intelligence technology to improve navigation capabilities that unmanned aircraft systems need to communicate, sense other aircraft and avoid obstacles. OU’s work in this area will improve the safety of unmanned aircraft systems and further the potential for them to be used as urban transportation in high-traffic environments.

Meanwhile, the U.S. Department of Defense has funded an OU study aimed at improving supply chain resilience, an ongoing concern since the COVID-19 pandemic exposed the potential for acute disruptions. OU is using



## Defense Alumni Notables

Below is a short list of OU alumni whose work has made an impact on defense technology. If you know of others we should recognize, please share them to [sooner magazine@oufoundation.org](mailto:sooner magazine@oufoundation.org).

**Professor Emeritus Bobbie Foote, OU '61 BS math, '63 MA math and '67 Ph.D. eng,** headed a team that designed the next-generation Missile Defense System, often known as the Strategic Defense Initiative. Foote served on OU’s faculty for 30 years and was twice director of the School of Industrial Engineering. He frequently taught at the U.S. Military Academy, for which he received the U.S. Army Outstanding Civilian Service Medal.

**Jarrod Calhoun, OU '04 BS mech eng,** is chief engineer of Boeing Special Projects Dallas on behalf of Boeing Defense. Calhoun, who received OU’s Regent’s Alumni Award in 2023, gives generously of his time as the Boeing/OU executive deputy for all university engagement activities.

The late **Brian Bent, OU '08 aero eng,** worked for 17 years for Northrop Grumman on the B-2 Spirit, F-35 Lightning II and a classified project unveiled after Brian’s death as the B-21 Raider.

OADII's advancements include research and development in specific areas of military interest, such as radar and sensing, autonomous vehicle guidance, cybersecurity, quantum technologies, artificial intelligence and advanced manufacturing.



multi-million-dollar DOD grants to develop an artificial intelligence-enhanced information search and risk analysis system that can evaluate supplier vulnerabilities and establish risk indexes for Air Force suppliers.

“With Tinker Air Force Base responsible for the maintenance of one-third of all U.S. Air Force aircraft, it is now more critical than ever to create a system capable of withstanding major disruptions while ensuring seamless delivery,” says David Ebert, associate vice president for research and partnerships and director of OU’s Data Institute for Societal Challenges.

OADII’s continued growth in areas such as cybersecurity and international policy will create new research opportunities and make OU an attractive career destination for the nation’s best faculty and researchers in computer science, political science and other fields, Díaz de la Rubia says.

He explains that the institute is at the center of a campuswide initiative with an “all-hands-on-deck” mentality. OU’s approach to solving complex national defense problems draws heavily from the Gallogly College of Engineering, as well as from sociology, psychology and international studies.

“Our research strategy is about convergence. If you’re looking at providing solutions to global challenges, you need to take advantage of all the academic disciplines to provide holistic solutions,” Díaz de la Rubia says. “Many OU faculty are working together through OADII, and it’s coming together very nicely.”

Another important aspect of the institute is its potential to commercialize technology resulting from OU research, he says. OU will license intellectual property to create Oklahoma-based, private-sector companies within the defense industrial base.

Whether OU is working directly for the Department of Defense, the private sector or creating private companies that support the greater mission of defense, Díaz de la Rubia believes it’s all part of the university’s role in the fight to preserve international peace.

“These are global issues,” he says. “We cannot take for granted the stability of the world as we know it. Not everyone thinks democracy is the right approach to life. There are authoritarian regimes that would like to establish a new order. OU wants to do everything in our power to protect what we have.”

*Chip Minty is a Norman-based writer and the principal of Minty Communications, LLC.*



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Manufacturing Lab, scan  
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