## HYPERSONICS

#### Technologies available through the UArizona National Security Program



## World-Class R1 Institution

- UArizona is ranked among the top 20 public universities in the nation with \$824M in annual research activity.
- The school is No. 1 in Astronomy & Astrophysics R&D expenditures.
- UArizona is No. 5 in NASA-funded activity among public universities in the United States.
- UArizona demonstrates exceptional entrepreneurship. In 2022, it achieved 274 invention disclosures, 124 licenses and options for university inventions, 100 patents issued, and 17 start-ups launched.
- Long-term relationships with industry and government, faculty expertise and superior infrastructure make UArizona uniquely suited to fill urgent and growing hypersonics research and workforce needs.

### TOP-TIER HYPERSONICS RESEARCHERS

Meet several of the UArizona researchers doing groundbreaking work:

With a \$4.5M grant from UCAH, Dr. Roberto

Furfaro, Systems & Industrial Engineering, is developing

AI-driven guidance, navigation and control systems for

autonomous vehicles operating at hypersonic speeds. He is also deputy director of the university's Space4 Center.









**Dr. Erica Corral**, Materials Science & Engineering, an expert in ultra-high temperature ceramics designed to withstand hypersonic conditions, serves on a \$100M DOD initiative, the University Consortium for Applied Hypersonics (UCAH) governance board and the technical leadership team.

**Dr. Stuart "Alex" Craig**, Aerospace & Mechanical Engineering, is leading a \$12M+ expansion of the high-speed wind tunnel complex anchored by the Mach 5 Quiet Ludwieg Tube and the Arizona Polysonic Wind Tunnel. The world-class facilities are used heavily for basic and applied aerodynamics research and testing.

**Drs. Sammy Tin and Andrew Wessman**, Materials Science & Engineering, are developing novel metallic alloys optimized for 3D printing that can withstand hypersonic flight with a \$1.2M grant from the Office of Naval Research. The researchers hold more than a dozen patents in alloy development.

Building National Security Collaborations through Research Development Services https://nationalsecurity.arizona.edu = (520) 621-8585 = resdev@arizona.edu



Research, Innovation & Impact

# UNIVERSITY OF ARIZONA

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### SECURE STATE-OF-THE-ART RESOURCES

#### WIND TUNNELS

T&E-scale wind tunnels spanning Mach 0.8 to 5.0 with classified research capability. Through state and federal funding, UArizona recently acquired

- a Mach 5 nozzle for the 15-inch Arizona Supersonic Wind Tunnel, the largest of its kind at a U.S. academic institution.
- a new air supply system, fastopening valve and automation system, and a quiet nozzle for the 5-inch-diameter Mach 5 Ludwieg tube.

#### MATERIALS FOR EXTREME ENVIRONMENTS

Develops and manufactures novel ceramic materials for extreme environments, including high temperature RF windows and leading edges. Focuses on accelerating the development of advanced 3D metal printing processes and novel high-temperature metallic alloys.

#### UA APPLIED RESEARCH CORPORATION

Works with government and corporations to deliver high-tech products, services and solutions for national security. Has expertise in classified research.

#### CENTER FOR DIRECTED ENERGY

One of only two of its kind nationally in academia, CDE collaborates with five industry partners and the U.S. Navy to research the use of advance lasers to affect targets. A collaboration between the UA College of Engineering and the Wyant College of Optical Sciences, the center works closely with ARCH and UA's Center for Quantum Networks (CQN).

#### HIGH-PERFORMANCE COMPUTING CENTER

Capable of CUI/ITAR/CMMC Level 2 compliant simulations and data storage, this ONR-funded resource enables hypersonic research applied to high-temp materials, manufacturing and flow physics using state-of-the-art computational models.

#### ARIZONA RESEARCH CENTER FOR HYPERSONICS

Three engineering departments (AME, MSE & SIE) join forces for projects involving wind tunnel testing; high-temp ceramics and metals; and guidance, navigation and control systems. The center is home to a High Power Computing Controlled Unclassified Information (HPC-CUI) server, the first of its kind in academia.

#### COMPUTATIONAL HYPERSONICS AND NONEQUILIBRIUM LABORATORY

Develops and applies physical models and computational methods to simulate complex phenomena such as nonequilibrium and reactive flows experienced during hypersonic flight.

## CONTACT US:

Nate Gahr Senior Director National Security Programs ngahr@arizona.edu

#### **Cody Nicholls**

Associate Director National Security Programs rcn1@arizona.edu

#### Tel: 520-621-8585

Please leave a message and we will get back to you within two business days.





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