



# Capability Statement



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POC Information	
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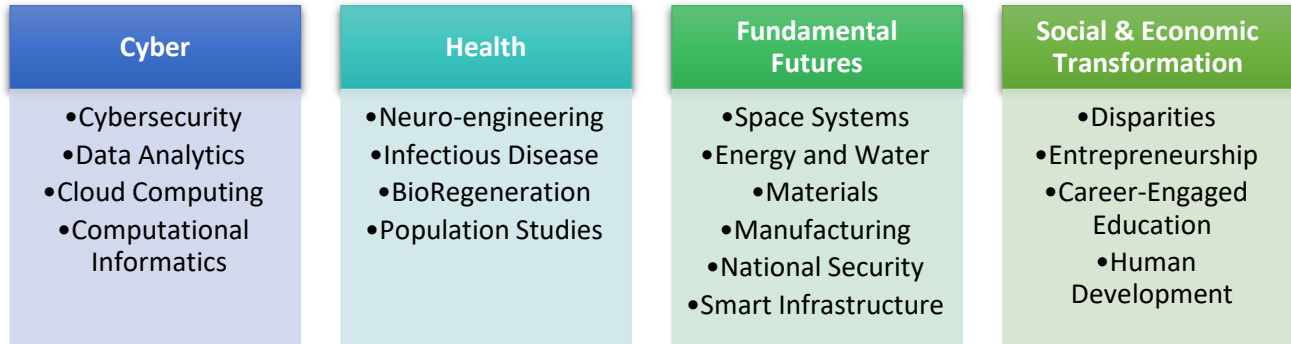
## 1. OVERVIEW

**The NASA MIRO Center for Advanced Measurements in Extreme Environments (CAMEE)** at The University of Texas at San Antonio ([www.utsa.edu/NASA-CAMEE](http://www.utsa.edu/NASA-CAMEE)) was established in 2019 to support NASA's Science, Aeronautics, and Space Technology Mission Directorates, with the vision of building a sustainable source of diverse, highly trained researchers to enter the Nation's workforce in NASA fields of earth system sciences, remote sensing and imaging technologies, computational fluid dynamics and data analytics, and experimental fluid mechanics. **Educational Goals:** (1) form highly-skilled diverse professionals in STEM disciplines that support NASA's mission; (2) develop an integrated education and research program in measurements, modelling, and data fusion supporting NASA's future workforce needs; (3) increase the interest of underrepresented minority undergraduate students in graduate STEM education; (4) implement a K-12 teacher's training and outreach program with the purpose of engaging the underrepresented minority students in pursuing STEM careers; and (5) increase the research capacity of UTSA related to NASA research priorities. **Research Goals:** (i) characterize changes in polar sea ice and ice sheets, especially areas undergoing rapid change; (ii) improve our understanding of extreme atmospheric and oceanic processes with data-driven models using improved measurement techniques; (iii) develop new data assimilation and modeling methods and algorithms to combine multi-sensor measurements for resolving turbulent fluxes across a variety of surfaces (atmosphere-ocean; ice-ocean; atmosphere-ice) and flow scale regimes; and (iv) execute a synergistic experimental and computational effort to develop improved turbulence models with applicability over a range of flow scale regimes.

**Institutional Overview:** Established in 1969, UTSA was the first public, state-supported, four-year university in San Antonio, Texas. Now, the 3rd largest component in the UT System, UTSA, designated as a Hispanic Serving Institution (HSI), currently offers 157 degree programs (67 bachelors, 65 masters, and 25 doctoral) and is one of the state's fastest growing public universities. The institution has a \$1.2B impact on the local economy, is ranked in the U.S. as the No. 1 HSI by Bloomberg Businessweek, No. 1 cybersecurity program by Hewlett-Packard and the Ponemon Institute, and No. 3 for Military Friendly Schools. In Fall 2020, UTSA hit a record high enrollment of 34,742 with the majority of students self-identifying as Hispanic (56%), contributing to a 65% underrepresented minority student population. In STEM fields, since 2014, UTSA has seen a nearly 79% increase in degrees conferred to Hispanic students and a 41.5% increase in degrees awarded to other underrepresented minority students. FY20 research expenditures totaled \$134M, a record high in the University's history. Over the last 10 years, UTSA has completed over \$250M in construction projects that dramatically increased research infrastructure. In addition, construction has just been completed on a new nearly \$10M Large Scale Testing Laboratory (LST) that, amongst other attributes, includes a floor region capable of testing loads of up to 4M pounds, giving UTSA a capability unique in the U.S. (and possibly the world) for testing large-scale systems and components with spans of up to 70 feet. In June 2020, a new \$95M, 160,349 sq. ft. state of the art science and engineering building was completed, including research and instructional laboratories as well as innovation space. Finally, UTSA expects to break ground at its Downtown campus in December 2020 on a \$90M School of Data Science and

National Security Collaboration Center (NSCC) and is planning for a proposed \$162M Innovation, Entrepreneurship and Careers Building.

## 2. RESEARCH CAPABILITIES



### Cybersecurity & Computation

- **Center for Infrastructure Assurance & Security (CIAS):** center for multidisciplinary education and development of operational capabilities in the areas of infrastructure assurance and security; conducts scenario-based cyber security preparedness exercises to test an organization's communication, incident response, disaster recovery, business continuity and security awareness
- **Cyber Center for Security & Analytics (CCSA):** conducts high impact research in information assurance and security, educates the cybersecurity workforce needed now and in future, and offers leading edge solutions to solve problems of national scope
- **Institute for Cyber Security (ICS):** established through an NSF CREST Center for Security and Privacy Enhanced Cloud Computing (C-SPECC) award, in partnership with colleges across campus, OCI and the CCSA; focused on cyber security models, architectures, protocols and technologies, with world-class laboratories for basic and applied research
- **Open Cloud Institute (OCI):** a neutral, third party research and education laboratory that encourages research, development, and adoption of standards-based open technologies such as open compute, OpenStack, and OpenFlow by providing infrastructure, platforms and software
- **MATRIX: The UTSA AI Consortium for Human Well-Being:** one of UTSA's newest centers, striving for scientific excellence in AI and solving challenges by fostering transdisciplinary teams that span academia, government, industry, and healthcare ecosystems to make a tangible difference for human well-being.
- **Center for Simulation, Visualization & Real-Time Prediction (SiViRT):** houses research teams in the areas of Imaging & Visualization, Uncertainty Quantification & Model Validation, and Simulation & Real-Time Prediction; applications range from structural reliability, UAV, particle flow simulation, nanotechnology, and biomechanics, to computational neuroscience and cancer treatment simulation

### Health

- **Brain Health Consortium (BHC):** cross-institutional team of researchers working in neuroscience, regenerative medicine, medicinal chemistry, biomedical engineering, and data analytics
- **Center for Community Based and Applied Health Research (CCBAHR):** integrates biomedical knowledge, technology, human resources, education, and policies needed for the maintenance and improvement of health, including fighting disease and adverse effects of aging
- **Center for Innovative Drug Discovery (CIDD):** joint venture between UTSA and UT Health San Antonio, composed for two facilities: a High-Throughput Screening (HTS) Facility and Medicinal Chemistry and Synthesis Core Facility; facilitates the translation of basic scientific discoveries into tangible pre-clinical candidate drugs for further development into clinical therapies for human disease
- **Institute for Health Disparities Research (IHDR):** advocates the integration of biomedical and socio-behavioral science research to address the unequal distribution and prevalence of adverse health conditions existing in Texas and the nation
- **Neurosciences Institute:** biological basis of human experience and behavior, and the origin and treatment of nervous system diseases
- **San Antonio Cellular Therapeutics Institute (SACTI):** facilitates research on aspects of cell and molecular biology in nonhuman primates, with particular emphases on primate embryology, stem cell biology, biogenesis research, regenerative medicine, and basic developmental biology

- **South Texas Center for Emerging Infectious Diseases (STCEID):** focuses on infectious microorganisms and the host immune response to these microorganisms, and committed to advancing and expanding research in bacteriology, mycology, virology, parasitology, and immunology

#### Fundamental Futures

- **Center for Advanced Manufacturing and Lean Systems:** conducts research and development and provides education and training in lean manufacturing and six-sigma, supply chain and logistics engineering, warehouse systems, automation technologies, advanced sensors and robotics
- **Cybersecurity Manufacturing Innovation Institute (CyManII):** an inclusive national institute with over 15 major leading universities and national labs, established to create economically viable, pervasive, and inconspicuous cybersecurity in American manufacturing to secure the digital supply chain and energy automation; cybersecurity, smart and energy efficient manufacturing, supply chains, factory automation, workforce development
- **Institute for Water Research, Sustainability and Policy (IWRSP):** The IWRSP serves as an entity that draws faculty within UTSA, as well as water professionals from around the San Antonio area and South Texas region, to identify water-related problems, to facilitate areas of common research interests, to address water resources for individuals, communities, agriculture, and industry, and to build an excellent research, teaching, and service center
- **Kleberg Advanced Microscopy Center (KAMC):** houses the JEOL JEM-ARM200F transmission electron microscope (one of only two in the world) used for world-class research in nanotechnology, biology, chemistry, geology, engineering, and medicine (including development of new cancer therapies and disease treatments)
- **NASA MIRO Center for Advanced Measurements in Extreme Environments (CAMEE):** focused on recruiting, educating, and mentoring an interdisciplinary and diverse group of undergraduate and graduate students to become leaders in earth system sciences, remote sensing and imaging technologies, computational fluid dynamics and data analytics, and experimental fluid mechanics.
- **National Security Collaboration Center (NSCC):** enhances U.S. defense, security and intelligence ecosystems with unique, state-of-the art facilities, capabilities and competencies where government, academia and industry partners co-locate and collaborate to create innovative solutions for our most difficult national security challenges; also developing a highly competent and accessible workforce
- **Texas Sustainable Energy Research Institute (TSERI):** integrates scientific discovery, engineering innovation and policy deliberations with pragmatic implementation and a commitment to our multicultural traditions to realize the promise of tomorrow's America as a global energy leader

#### Social & Economic Transformation

- **Center for Innovation and Technology Entrepreneurship (CITE):** interdisciplinary center creating a pipeline for UTSA faculty, students and surrounding business community to develop new technology ventures; home to UTSA's Innovation Lab
- **Institute for Demographic and Socioeconomic Research (IDSR):** multidisciplinary R&D services that encompass themes related to the social and economic characteristics of population and the effects of population change; border issues, crime, economics, education, energy, health, housing, information technology, labor force, migration/immigration, population, poverty, social services, transportation, urban/rural issues

### 3. FACILITIES

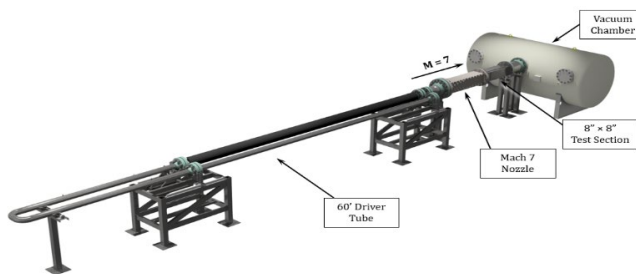
UTSA's **core facilities** include (1) Behavior, (2) Stem Cell, (3) Cell Analysis, (4) Genomics, (5) Advanced Microscopy, and (6) Proteomics and Mass Spectrometry

**Research Computing,** UTSA has an on-campus High Performance Computing research cluster, Shamu, which is free of charge for UTSA faculty and student researchers. Components of Shamu: 113 physical servers, 3580 total CPU cores, 23 TB shared memory, Dell Compellent highly fault tolerant storage array with 150 TB shared disk storage (expandable up to 1.05PB depending on disk configuration), 2 GPU nodes (each containing 4 NVidia Tesla K80 GPU cards), 1 node with 72 Xeon cores and 1.5 TB RAM, and the nodes are connected via 9 Mellanox 40 Gb/s Infiniband switches and 5 Dell Powerconnect Ethernet switches. All UTSA faculty also have access to Texas Advanced Computing Center (TACC) facilities in Austin, TX through a high-bandwidth network (10Gb/s). Faculty receive 5TB of free storage on the TACC Corral storage system, a storage and data management resource optimized to support large-scale collections and a collaborative environment.

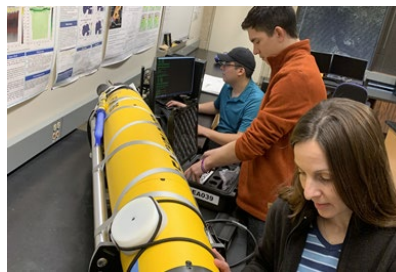
**Advanced Visualization Laboratory (VizLab),** Features: 24 32" HD monitor visualization wall (115M pixels powered by 3 tile nodes, a head node and a storage node), HTC Vive virtual & Oculus Rift reality headsets, HoloLens AR, Oculus Rift Go, and Lenovo Daydream, 3D Systems Touch Haptic Device, 85" 4K TV monitor, and 2 high performance workstations

**Research Data Center (RDC)**, Dedicated, 3,558 sq. ft. custom built, raised floor data center facility designed for research technology equipment. The RDC is connected directly to the UTSA backbone network. A 40Gb/s Ethernet connection serves the facility with a 1Gb/s Ethernet delivered out to each individual host system. 10Gb/s connectivity is delivered to 5 separate physical areas in the room. Current network gear in the facility has the capability to provide 10Gb/s connectivity to other areas of the room with a simple addition of optical transceivers, additional fiber and a top of rack Ethernet switch. UTSA is currently a full standing member of Internet2 and maintains a shared 10Gb/s link to other research institutions and universities connected to I2.

**NASA MIRO CAMEE Facility**, The major research equipment/facility of CAMEE includes (1) different types of remote sensing/GIS software (ENVI/IDL, MatLab, ESRI GIS, Pix4D, etc.), (2) field data collection equipment (ASD Spectroradiometer, Resonon Hyperspectral Imaging system, GSSI Ground penetrating radar, FM-CW snow radar, Ouster 128 plane LIDAR and stereoscopic depth cameras, GSSI/Geonic Electromagnetic induction meters, RiegI Terrestrial LiDAR scanner, FLIR Thermal imaging camera, ALSEAMAR SEAEXPLORER glider, Intelligent autonomous ocean surface vehicle (15 ft long) for ocean monitoring), (3) Mobile Sensing systems (DJI, Quad-Roter, Hex-Roter, Octo-Rotor), (4) GPU based Supercomputing Clusters, and (5) Mach 7 Wind Tunnel and Low-speed Wind Tunnel, with corresponding measurement equipment (high-speed photon SA-Z camera, LaVision IRO Image Intensifier, LAVision 15Hz Stereo PIV System, FLIR IR cameras, different types of laser systems, etc.).



(Mach 7 Wind Tunnel)



(SEAEXPLORER glider)



(Terrestrial LiDAR scanner)

#### 4. PAST PERFORMANCE

UTSA currently manages a broad portfolio of nearly \$100M in externally funded sponsored programs (grant, contract and cooperative agreement mechanisms) across disciplines from a wide range of public and private sponsors including all major federal agencies, such as NSF, NIH, DoD, USDA, DOE, NASA, ED, and DOT. The institution maintains strong research partnerships with national laboratories including ORNL, SNL, INL, and ARL as well as collaborations and funding from industry leaders such as Dell Technologies, Raytheon, CNF Technologies, IPSecure, Rackspace, CACI/LGS Innovations, and more.

The UTSA Office of the Vice President for Research, Economic Development, and Knowledge Enterprise (REDKE) promotes, supports, and administers sponsored program awards and provides the highest quality Pre and Post-Award services in generating and administering external awards in the pursuit of research, scholarly activities and public service. REDKE ensures that the administration of sponsored programs from proposal submission to award close-out is consistent with applicable laws, regulations and policies. Support operations include account set-up, account management, proposal packaging and institutional routing, sponsor liaison, invoicing, financial reporting, and close-outs, as well as contract, effort certification, development and analysis of operational metrics, and assistance with required progress/end of project reports and audit requests. Accounting practices are applied through an automated system called UTShare/PeopleSoft, by the UTSA Office of Financial Affairs to restricted funds received as grants, contracts and cooperative agreements. In addition, the Generally Accepted Accounting Principles (GAAP), Code of Federal Regulations Title 2 Part 200 (2 CFR 200), Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards, governs accounting practices for grants and contracts. The responsibility for financial management of sponsored projects is shared by Financial Affairs and Grants and Contracts Financial Services (GCFS).