The University of Texas at El Paso

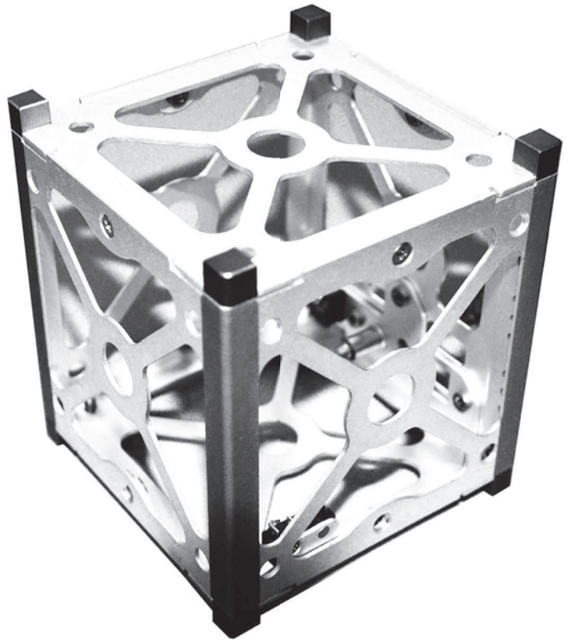
NASA MIRO Center for Space Exploration and Technology Research

A Giant Leap Forward

NASA MIRO Center for Space Exploration and Technology Research

was established under the direction of Dr. Ahsan Choudhuri at The University of Texas at El Paso to facilitate research and education in propulsion and energy.

The center conducts research using computational modeling of heat flow, fluid flow, and structural analysis to create test hardware and experimental facilities in Space Propulsion, Small Satellite Design and Combustion in the Energy Sector.



Our Vision

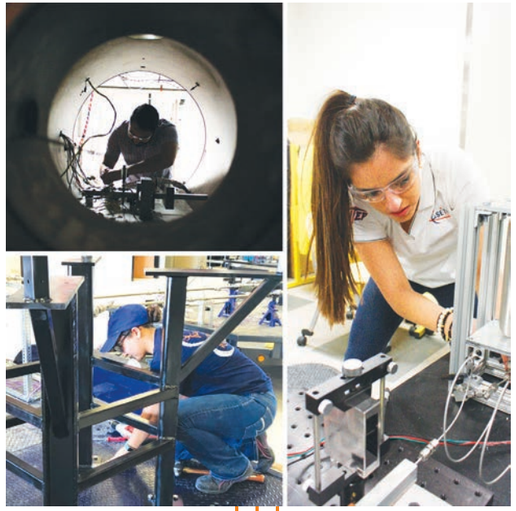
The vision of the NASA MIRO Center for Space Exploration and Technology Research is to establish a minority university *Center of Excellence* in **Advanced Propulsion** research through strategic partnerships and to educate a diverse future aerospace workforce.

Our Goals

1. Develop the next generation of engineers and scientists.
2. Inspire, excite, and engage undergraduate and K-12 students in the greater El Paso area to encourage them to enter engineering and related science fields.
3. Enable and facilitate focused research and "hands on experience" for underrepresented groups to obtain and develop engineering skill sets to qualify for employment in technical fields of propulsion and energy.
4. Create and strengthen industry support to our research and create internships to demonstrate student capabilities to increase hiring opportunity for our students.
5. Enhance and expand our engineering research and test facilities to enable more graduates to experience effective training.
6. Provide a national model for education of minority students in aerospace and energy engineering.

Space Propulsion

MIRO cSETR research includes fundamental combustion of Oxygen/Methane. These propellants may be manufactured at Moon or Mars landing sites. This will enhance exploration because propellant for return flights is available. Our focus is flame length, mixing efficiency, and heat transfer. We do research in ignition, thruster operation, and rocket performance. We measure heat transfer coefficients incorporating surface roughness and propellant state in the cooling channels to enable throttling and steady state of rockets.



Combustion in Energy Sector

Fundamental research to improve combustion processes to enable cleaner burning with less pollution. This effort involves high-pressure combustion using oxygen and coal to generate less carbon dioxide and also recovery of carbon dioxide to prevent discharge into the atmosphere. We use computer models, computational fluid dynamics, and pilot plants to verify the processes can be scaled up and applied for new industry power plants.

Research Highlights

Small Satellite

Develop processes for mission design, satellite manufacture and propulsion system configurations that use additive manufacturing to enable lightweight small satellites to be designed by students and flown on launch vehicles as auxiliary payloads. A primary effort is developing green propellant systems using hydrogen peroxide, ADN and HAN based propellants to replace the highly toxic hydrazine monopropellant that is presently used for small thrusters. These efforts include catalyst design, ignition, and analysis of plume gas constituents.

Unmanned Aerial Systems

MIRO cSETR focuses on a wide range of leading-edge UAS research. The main areas of focus are: Unmanned Traffic Mangement (UTM) systems, autonomous long/range endurance aircraft (both to fixed and rotary wing), advanced sensors and applications (to include EO, Multispectral, IR, and UV), advanced post-processing capability to produce a range of research-grade data products, and UAV Ground and flight academics.

Facilities

MIRO cSETR has established itself in progressive, world renown research in propulsion and energy. This comes from a continuous commitment to innovate and modern experimental and analytical capabilities. Five laboratories provide state of the art equipment:

Technology Research and Innovation Acceleration Park

- Large-scale combustion testing Methane, Lox, High-pressure devices
- Energy research liquid methane heat transfer
- Firing tests

Goddard Combustion and Propulsion Research Facility

- Small rocket development using Green Propellants
- Fundamental research in combustion of methane and oxygen
- Reactive materials testing

Spacecraft Design and Engineering Facility Education

- Satellite development

Computational Laboratory

- Computer Modeling CFD, Finite Element Analysis, Heat transfer etc.

Challenger Columbia Structures and Materials

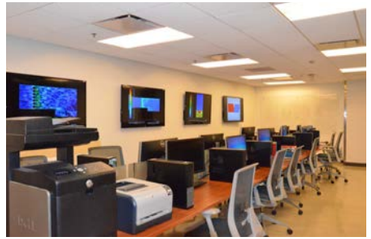
- Material properties and characterization

GODDARD COMBUSTION AND PROPULSION RESEARCH FACILITY

TECHNOLOGY RESEARCH AND INNOVATION ACCELERATION PARK

SPACECRAFT DESIGN AND ENGINEERING FACILITY EDUCATION

COMPUTATIONAL LABORATORY



CHALLENGER COLUMBIA STRUCTURES AND MATERIALS

Outreach

cSETR MUREP Aerospace Academy for the Southwest

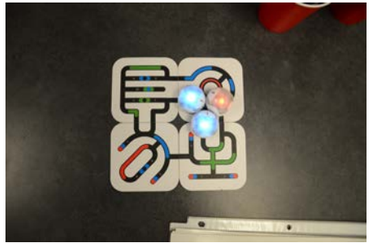
MAA Southwest, a national renowned and progressive education leading program, was founded to inspire, engage, and educate students, parents, and communities. MAA Southwest services K-12 students with age appropriate NASA provided curriculum enhancement activities in schools and though campus sessions at UTEP that conceptually enriched with science and engineering concepts.

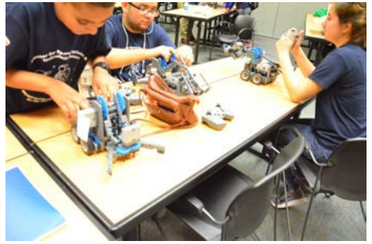
Our Vision

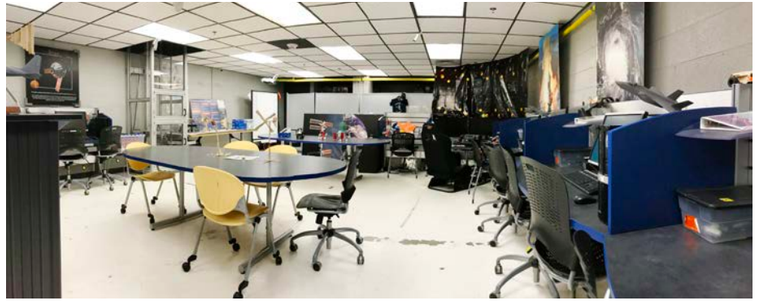
To inspire and prepare underserved K-12 students in the El Paso Southwest border region for advanced studies and careers in STEM fields.

Our Goals

- Establish classroom contact time before, during, and after school models.
- Establish out of school time NASA Mission Focused STEM Programs.
- Conduct NASA-themed outreach events and activities to geared family participation
- Conduct outreach activities with a focus on the use of specialized technology.
- Develop an intense collaboration with After School Network, Information Learning Providers, and NASA Prime Contractors for scalability and sustainability.







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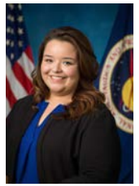

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U.S. DEPARTMENT OF EDUCATION

U.S. NUCLEAR REGULATORY COMMISSION

OFFICE OF NAVAL RESEARCH

U.S. ARMY RESEARCH LABORATORY

U.S. AIR FORCE RESEARCH LABORATORY

Industrial

LOCKHEED MARTIN CORPORATION

UNITED LAUNCHED ALLIANCE

BLUE ORIGIN

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