

Aerospace Center  
University of Texas at El Paso

# **The Department of Energy Fossil Energy and Carbon Management University Training Research (UTR) Program and Student Success at the UTEP Aerospace Center**

**Nawshad Arslan Islam, Ph.D.**

2023 FECM/NETL Spring R&D Project Review Meeting  
Pittsburg, PA  
19<sup>th</sup> April 2023



A Giant Leap Forward  
[utep.edu/aerospace](http://utep.edu/aerospace)



# The University Training and Research Program

DOE FECM UTR Program

## *The Program to Train the Next Generation Scientists and Engineers*

The UTR Program plays key role in addressing America's energy challenges by promoting innovative technologies and solutions and workforce development through the HBCU-MSI and University Coal Research (UCR) Program and provides opportunity to the underrepresented communities in the STEM field

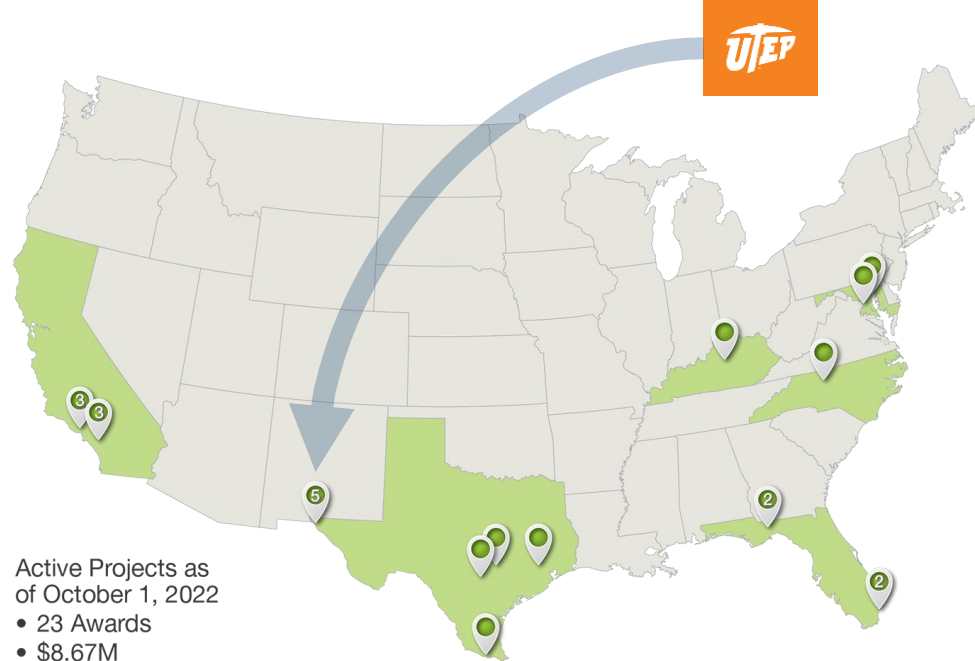
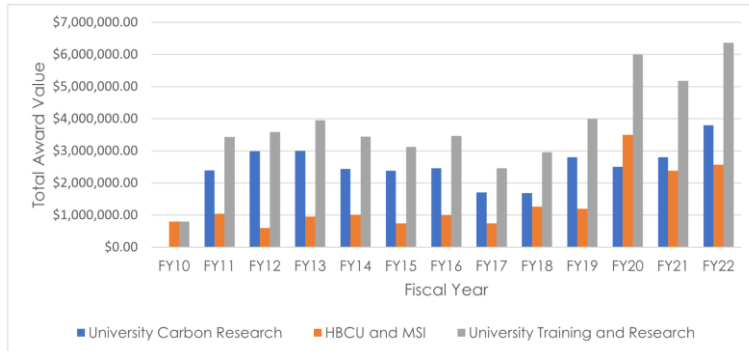


Fig. Active Projects under the HBCU-MSI program

# Aerospace Center...also known as cSETR

UTEP Aerospace Center

## ***Center of Excellence in Aerospace and Defense Systems Research***

Aerospace Center has an expansive strategic partnership with NASA and Aerospace and Defense Industries to educate a diverse future aerospace and defense workforce.



# Aerospace Center

## UTEP Aerospace Center-cSETR

650 Students/yr.  
300,000 sq. ft. Laboratories  
8,000 acres Test Facilities



2025

## UTEP Aerospace Center-cSETR

120 Students/yr.  
35,000 sq. ft. Laboratories  
8,000 acres Test Facilities



2020

## MIRO cSETR

70 Students/yr.  
15,000 sq. ft. Laboratories



2015

## URC cSETR

30 Students/yr.  
4000 sq. ft.



2009

UTEP Aerospace  
Laboratory  
Improvement  
\$1.5 million  
2009

Industry and UTEP  
Aerospace Capacity  
Development  
\$4.8 million  
2015

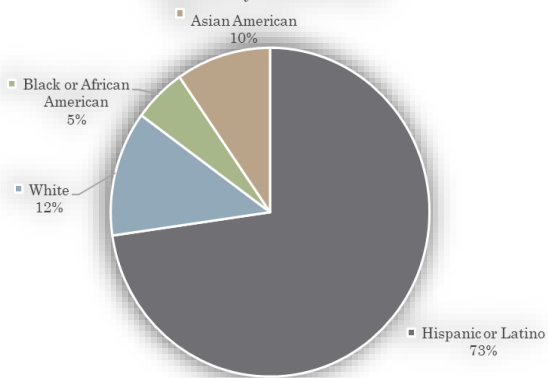
UT System Aerospace  
Capacity Development  
\$70 million  
2020

Sustainability

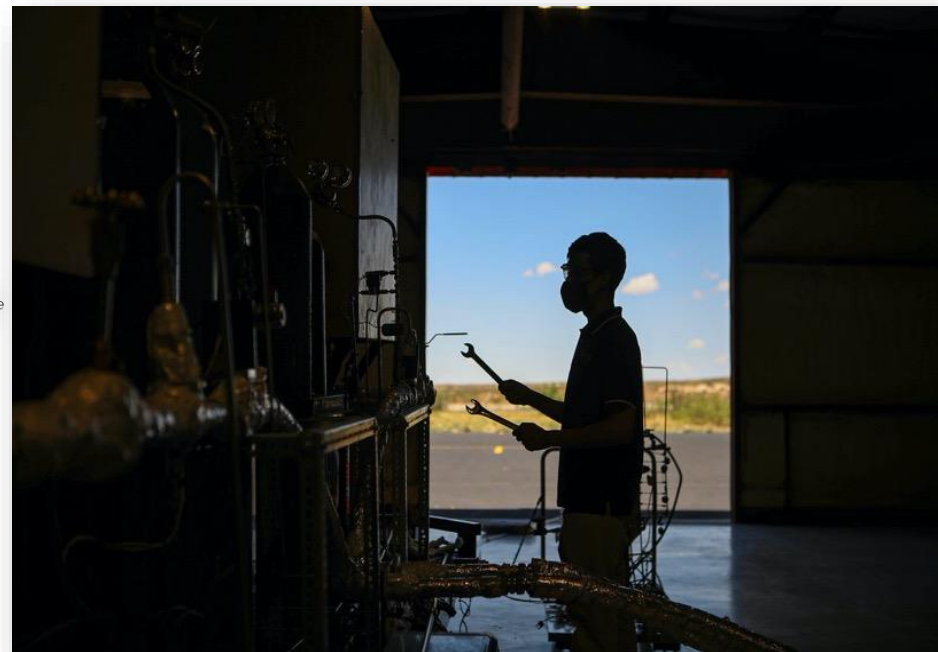
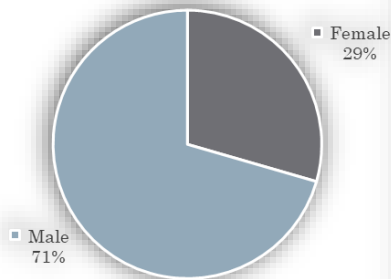
# Aerospace Center

In the 2019-2020 academic year alone, Lockheed Martin Corporation hired **101** of our students , 66 full time and 35 intern/co-op.

Ethnicity Distribution



Gender Distribution



Total	UG	MS	PhD
190	120	34	36



# Aerospace Center

## Aerospace Center / cSETR

**Space Research Division** supports NASA's Artemis program and Moon to Mars vision by focusing on strategic capabilities in propulsion and robotic lander, lunar surface exploration, and small spacecraft technologies.

**Aeronautics and Defense Division** supports the research and development of hypersonic, missile, and unmanned aerial systems technologies. Aeronautics and Defense Division aspires to support the US Space Force's Space Superiority domain through innovation in Space Domain Awareness and Space Access & Sustainment.

**Energy and Sustainability Engineering Division** provides capabilities in sub-pilot scale to commercial scale fossil, nuclear, and renewable energy technology development; prototype to commercial product demonstration as well as test and evaluation.

**Economic Development and Workforce Excellence Division** supports the development of an advanced and technology-based industrial economy for El Paso and West Texas and an integrated workforce with all skill spectrum for small and medium high-tech business expansion.



## Facilities

### University Campus Facilities | 17,915 sq. ft.

Goddard's Combustion & Propulsion Research Facility

Includes ultra-high velocity projectile resistance bunker

Challenger-Columbia Structures & Materials Research Facility

Digital Engineering Facility

Generative Design Laboratory

Sensitive Compartmented Information Facility (SCIF)



### Off Campus Facilities

Technology Research & Innovation Acceleration Park | Fabens, TX

- General Aviation Airport | 4200 ft. & 2300 ft. Runways | 400 acres
- HQ Site | Propulsion and Energy Systems Integration Facility | 10,200 sq. ft.
- Alpha Site | Propulsion and Large-Scale Testing Facility | 18 Acres + 600 Acres
- Aeronautics Research & Learning Facility (Planned) | 10,000 sq. ft.

Bravo Site: Tornillo Unmanned Aerial System Flight Test Range | Tornillo, TX | 600 acres

- 400 ft. Runways | Test Support Facility
- LSTAR Radar | 100 KW Power Trailer

Spacecraft Design and Engineering Facility | Francis St, El Paso, TX | 8,840 sq. ft.

- Including | Satellite Ground Station | 2.4 m S-b& antenna | 436 MHz UHF antenna
- (9) Training Rooms, (10) Office Spaces, & Student Collaborative Space

## Advanced Manufacturing and Aerospace Engineering Research Building

- \$80M Awarded by Board of Regents
- 100,000 square foot building dedicated to house Aerospace Center & W.M. KECK Center for 3D Innovation
- Building will house Aerospace Center Capabilities
  - Spacecraft Engineering Facility
  - Mission Operations Center
  - Space Environment Testing Facility
  - Cleanroom 100,000 Class (ISO 8) & 10,000 Class (ISO 7)
  - Hypersonic Thermal Management Facility
  - Flight Dynamics Laboratory
  - Structural and Mechanical Testing Laboratory
  - Digital Engineering Facility
  - Unmanned Aerial Systems Laboratory





## Build Back Better – Phase 2

### Advanced Manufacturing Campus

- 250 acre campus
- Master planned to co-locate aerospace, defense and advanced manufacturing
- Potential to minimize business expense through shared infrastructure
- Manufacturers can choose to locate their operations in a shared facilities or in single operator, designed-to-suit facilities



# Advanced Manufacturing District



- Groundbreaking in 2023
- Down payment by the City and EDA





# TECH ONE CAMPUS

UTEP AEROSPACE CENTER

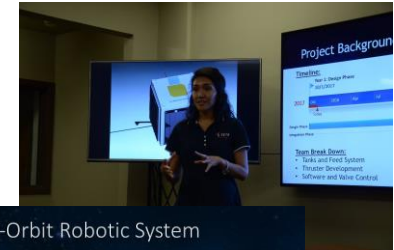
# Digital Engineering Aerospace and Defense Design Centers



Youngstown, OH



Huntsville, AL



Digital Twin: On-Orbit Robotic System

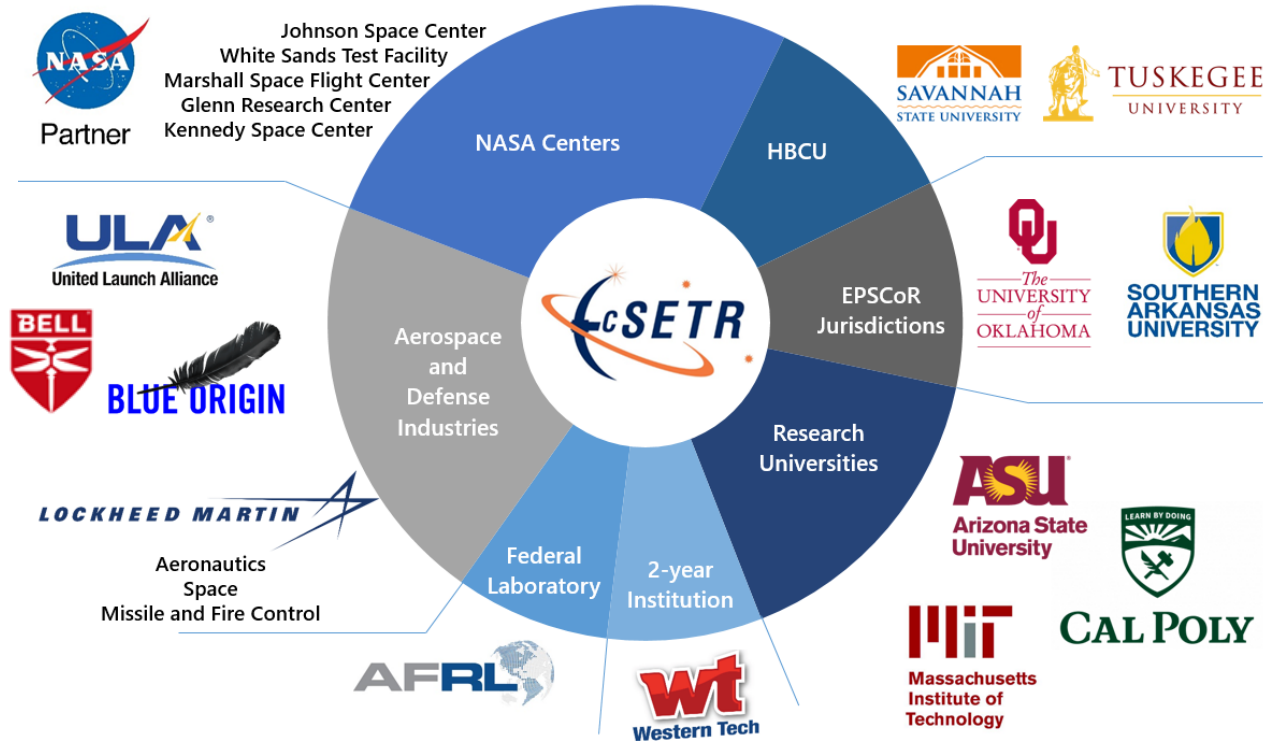


El Paso , TX  
Houston, TX (Requested by NASA)





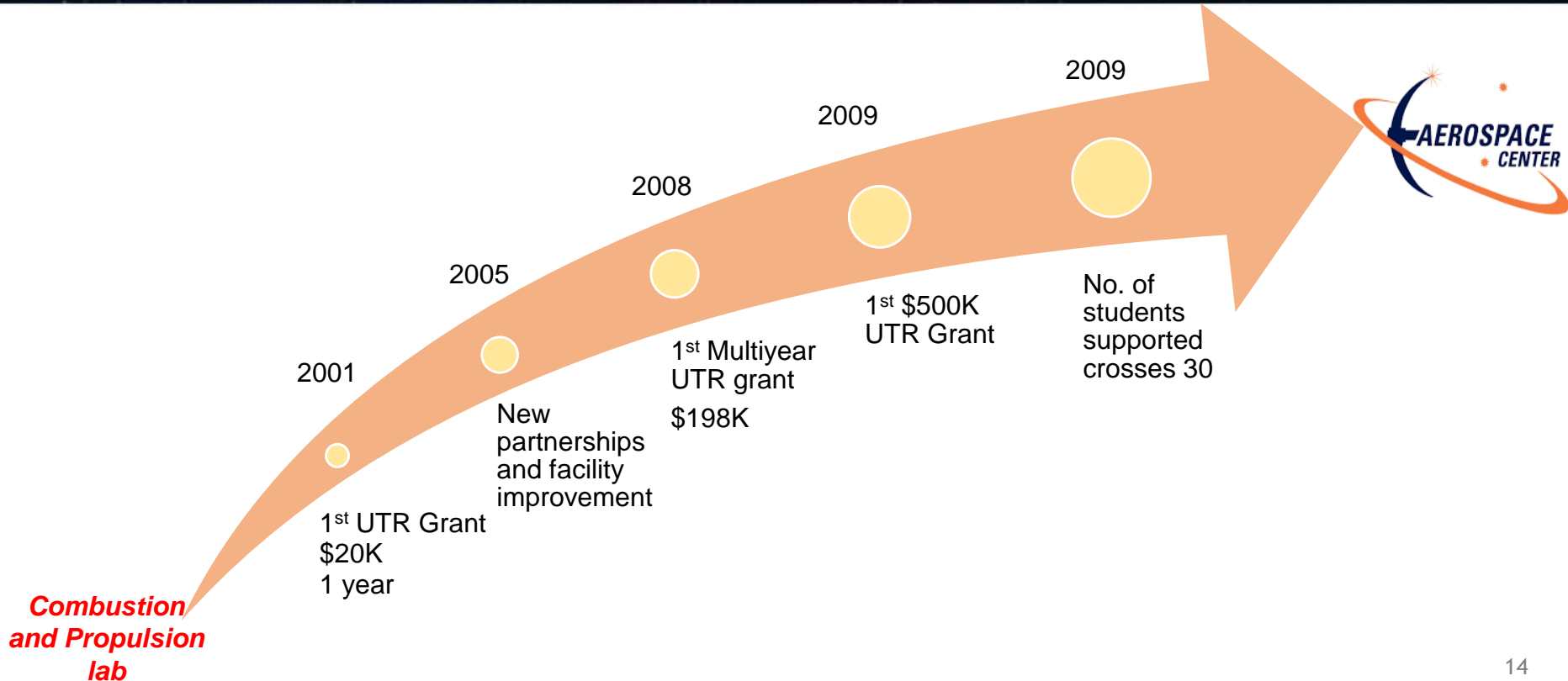
# Strategic Partners



## New Digital Engineering Alliance



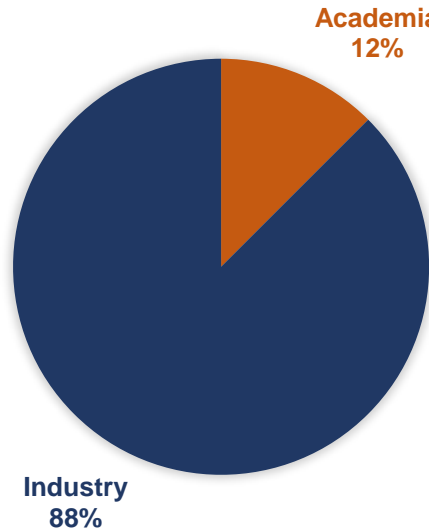
# UTR and Aerospace Center



# Aerospace Center UTR Student Success

In the past decade, **100%** of our UTR supported students had a job offer before graduation.

## POST GRADUATION PLACEMENT



# UTR Student Success – Memory Lane



*Moved to US in 2016*

*F1 Student - PhD in Mechanical Engineering*

## BANGLADESH INFOGRAPHICS

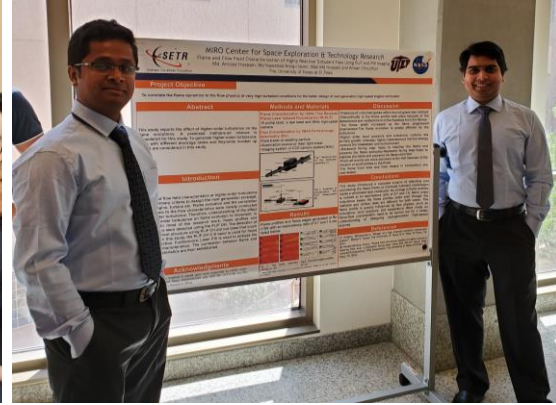




# UTR Student Success – Memory Lane

## *Early Grad Days!*

Working on a Planar Laser Induced Fluorescence (PLIF) System for Highly Turbulent Flame Characterization

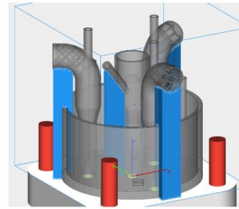


# UTR Student Success – Memory Lane

*Fabens Days!*

DOE's Low NO<sub>x</sub> AM Fuel Injector Demonstration

Learning Burner System Design, Additive Manufacturing and High Pressure Combustion Systems



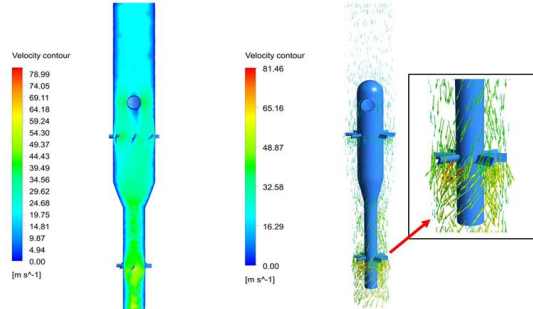
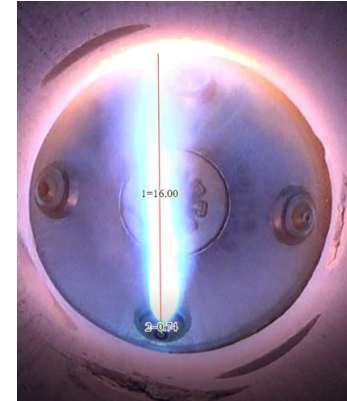
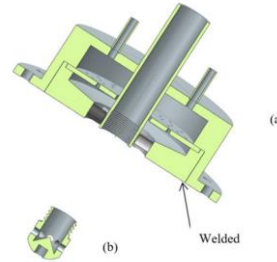


# UTR Student Success – Memory Lane

**Graduation 2021!**

DOE's Pressurized Swirl Combustor  
Demonstration

Developing understanding on Full System  
Design and Integration, CFD, FEA, Experiment  
Design and Extensive Testing Activity



# UTR Student Success – Memory Lane

## *Aerospace Center Research Associate*

Developing new energy research capabilities and creating opportunities for next-generation STEM workers from El Paso Zip codes and beyond



### OVERCOMING TECHNICAL AND COMMUNITY BARRIERS TO ADOPTING GASIFICATION TECHNOLOGIES



PI: Ahsan Choudhuri  
Co-PI: Md N Islam, Richard D Pineda  
Sponsor: U.S. DEPARTMENT OF ENERGY  
Aerospace Center  
Amount awarded: \$750,000

This project investigates the interrelation between gasifier operating conditions (pressure, temperature, gasifying agent, residence time) and feedstock parameters (feedstock constituents, blending ratio, moisture content, particle size) to improve H<sub>2</sub> production, syngas quality and efficiency.

Posting date: Mon, 12/19/2022

Award start date: Wed, 02/01/2023

Award end date: Sat, 01/31/2026

### CAPABILITIES DEVELOPMENT AT THE UNIVERSITY OF TEXAS AT EL PASO FOR HYDROGEN GENERATION RESEARCH AND EDUCATION



PI: Md N Islam  
Co-PI: Ahsan Choudhuri, Joel Quintana  
Sponsor: U.S. DEPARTMENT OF ENERGY  
Aerospace Center  
Amount awarded: \$200,000

This project explores gasification-based systems to improve hydrogen generation from feedstock waste to achieve net-zero/net negative carbon emission.

Posting date: Wed, 01/04/2023

Award start date: Sun, 01/01/2023

Award end date: Sun, 12/31/2023



# UTR Student Success – Memory Lane

**Amzad Hossain, PhD**

- Aerospace Center, UTEP

**Mehrin Chowdhury, PhD**

- Aerospace Center, UTEP

**Ashiqur Rahman**

- Blue Origin

**Rashedul Hasan Sarker, Ph.D.**

- Assistant Professor, University of Indianapolis

**Brian Lovich**

- Toyota

**Luisa Cabrera, Ph.D**

- Intel Inc.

**ASM Arifur R. Chowdhury, PhD**

- Intel Inc.

**Manuel Hernandez**

- General Electric

**Mohieminul Islam Khan, PhD**

- Cummins Inc.

**Antara Badhan, PhD**

- Intel Inc,

**Wali M. Hossain**

- Outrider (Autonomous Vehicles)

**Diaaeldin Mohamed, PhD**

- Valmont Newmark

**Bidhan Dam, PhD**

- Woodward FST

**Jad Aboud, PhD**

- Raytheon Missiles & Defense

**Viswanath Ardha, PhD**

- GE Energy

**Mario Ruvalcaba, PhD**

- Federal Mogul

**Mahesh Subramanya, PhD**

- Wood PLC.

**Jorge Camacho, PhD**

- University of Wisconsin Platteville

**Luis Sanchez, PhD**

- Blue Origin

**Gilberto Corona**

- Alstom Power

**Md Islam**

- Boeing

**Mahamudur Rahman, PhD**

- University of Texas El Paso

**Rogelio Franco**

- NASA KSC

**Hasanul Karim, PhD**

- Intel Inc.

# UTR and Aerospace Center

1. Autonomous Aerial Power Plant Inspection in GPS-denied Environments, Department of Energy, Amount Funded 400,000, October 2018-September 2021.
2. Technology Demonstration of a High Pressure Swirl Oxy-Coal Combustor, Department of Energy, Amount Funded \$1,501,559, (the total award includes \$401,559 American Air Liquide Inc. and Institutional Cost Commitments), Oct 16-Sep 19.
3. Metal 3D Printing of Low-NOX Fuel Injectors with Integrated Temperature Sensors, Department of Energy, Amount Funded \$250,000, Sep 15-Aug 17.
4. High Temperature and High Velocity Direct Power Extraction Using an Open-Cycle Oxy- Combustion System,
5. Rapid Manufacturing of Smart Parts with Embedded Piezoceramic Sensors for High Efficiency Energy System, Amount awarded \$1,150,894 (the total award includes \$237, 532 matching fund from UTEP)). Sep 13-Sep 16
6. Development of "Lick and Stick" Wireless Temperature Sensor, Department of Energy, Amount Funded \$200,000, February 13-January 14.
7. Design Optimization of Liquid Fueled High Velocity Oxy-Fuel Thermal Spraying Technique for Durable Coatings for Fossil Power Systems, Department of Energy, Amount Funded \$200,000, October 2012-September 2015
8. Investigation of Gas-Solid Fluidized Bed Dynamics with Non-Spherical Particles, Department of Energy, Amount Funded \$200,000, July 2010-June 2013.
9. Investigation on Flame Characteristics and Burner Operability Issues of Oxy-Fuel Flames, Department of Energy, Amount Funded, \$300,000, Dec 09- Nov 12.
10. Hafnia-Based Nanostructured Thermal Barrier Coatings for Advanced Hydrogen Turbine Technology, Department of Energy, Amount Funded: \$389,883, Oct 09- Oct 12.
11. Effects of Combustion Induced Vortex Breakdown on Flashback Limits of Syngas Fueled Turbine Combustors; Department of Energy; Amount Requested: \$198,802, Apr 2008-Mar 2011.
12. Flame Synthesis of Carbon Nanotubes using Low Calorific Value Fuels; DOE, Amount: \$20,000, December 2005-December 2006.
13. Investigation of  $H_2$  Concentration and Combustion Instability Effects on the Kinetics of Strained Syngas Flames Department of Energy, Amount Funded \$20,000, Aug. 05-July 06.
14. Investigation of the Effects of Composition and Combustion Instabilities on the Flashback Propensity of Syngas Premixed Flames, Department of Energy, Amount Funded: \$19,999. Jun 04-May 05.
15. Investigation on the Flame Extinction Limit of Fuel Blends, Department of Energy, Amount Funded: \$19,999, Sep 03-Aug 04.
16. Passive Control of Particle Dispersion in a Particle-laden Circular Jet using Elliptic Co-annular Flow; Department of Energy, Amount Funded: \$20,000, Sep 01-Aug 02.

# UTR Student Success – Memory Lane



**Sumit Chanda**

Ph.D. Research Assistant



**Anika Farhat Tasnim**

Ph.D. Research Assistant



**Daniel Reyes**

Undergraduate Research  
Assistant



**Luis Alvarado  
Mendoza**

Undergraduate Research  
Assistant

# Aerospace Center

**Aerospace Center** aspires to be one of the most significant national research programs supporting 650 students annually in a R1 minority-serving institution to contribute to our nation aerospace, exploration, and defense research and energy workforce development priorities





# Thank You



## Contact Information



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