

California State University, Long Beach

Long Beach, California

Principal Investigator: Dr. Thomas Strybel

The Center for the Human Factors in Advanced Aeronautics Technologies

The Center for the Human Factors in Advanced Aeronautics Technologies (CHAAT) at CSULB will contribute to the evaluation and design of air traffic management (ATM) concepts and technologies necessary to achieve the goals of NextGen, and will advance and expand NextGen-relevant human factors training to students from underrepresented groups in technological and aeronautics fields.

We will ensure the competency of human factors professionals by providing new opportunities for education and experience, and publicizing these opportunities through outreach efforts. We will develop air-traffic-management-related human factors courses offered at CSULB, and offer these courses to a wider range of students. We will provide opportunities for student participation in human factors research, and develop student internships at NASA, other universities, and industries to allow students to apply skills and core competencies in real world settings.

Introducing new NextGen concepts and technologies will significantly impact performance of human operators. Successful implementation of these solutions for achieving JPDO goals demands require that we identify the information required of each new operator role, and assess the impact of these changes on operator performance. Research in CHAAT will validate existing performance measures in NextGen and develop new metrics that are sensitive to the changes in operator performance brought about by NextGen innovations. We will partner with the Flight-Deck-Display-Research-Laboratory at NASA-ARC. Our collaborations will use human-in-the-loop simulations to evaluate ATM concepts and to validate operator performance metrics. These collaborations will greatly leverage our current efforts in education, lab supervision, and internship development. The URC will allow us to create a nationally recognized center for human factors in advanced aeronautic technologies and for the training of students in human factors, engineering, and related fields. Consequently, the center will be a gateway for diverse student populations to enter careers in aerospace organizations.

Delaware State University

Dover, Delaware

Principal Investigator: Dr. Noureddine Melikechi

Establishment of a NASA Optical Sciences Center for Applied Research at Delaware State University

Delaware State University launches a NASA-URC Optical Sciences Center for Applied Research (OSCAR) committed to excellence in research and education. OSCAR will (1) foster new NASA-related science and technology developments based on optical sciences and technology, (2) inspire and engage students from underrepresented groups in science, technology, engineering and mathematics (STEM) fields, (3) enhance the national aerospace science and technology workforce, and (4) develop partnerships with industry, NASA research centers and other federal laboratories, and minority and non minority-serving colleges and universities. The URC will consolidate and integrate an established research center: the Center for Research and Education in Optical Sciences and Applications (CREOSA) funded through the National Science Foundation-Center for Research Excellence in Science and Technology program. The proposed integration will leverage CREOSA resources to form a solid foundation for OSCAR.

The research focus of OSCAR will be centered on three main topics: (i) Planetary Science, (ii) Space Communications & Navigation, and (iii) Astrobiology. The proposed projects will support the goals of NASA's Exploration Systems Mission Directorate (ESMD), the Science Mission Directorate (SMD) and the Space Operations Mission Directorate (SOMD). OSCAR's research is subdivided into two core topics. Core 1 projects will focus on developing optical instrumentations for space operations infrastructure. These include developments of space atomic clock and optical gyroscope, polarimetric laser detection and ranging (LADAR), and an augmented reality visor interface for human-robot interactions and emergency medical support of astronauts. Core 2 projects will conduct research and development of Mars exploration using ChemCam Mars Rover LIBS instrument, and a remotely-operated laser scanning confocal microscope for *in situ* analysis of extraterrestrial environment. The center will collaborate with Goddard Space Flight Center (GSFC), NASA/NSSTC Astrobiology Laboratory, the Jet Propulsion Laboratory (JPL), Los Alamos National Laboratory (LANL), Northwestern University, Juxtapia®, and the Delaware Aerospace Education Foundation on various projects.

North Carolina Agricultural and Technical State University

Greensboro, North Carolina

Principal Investigator: Dr. Kunigal Shivakumar

Center for Aviation Safety (CAS)

The vision of the Center for Aviation Safety (CAS) is to establish a strong aerospace engineering research and education program by bringing together highly competent and dedicated faculty members at North Carolina A&T State University (A&T) through the NASA funding to address the challenges of Aeronautics Research Mission Directorate's Fundamental Aeronautics and Aviation Safety Programs. The research goal of the CAS is through an understanding of science and engineering to develop materials, tools, models, and technologies that support the safe operation of aerospace vehicles. This goal is accomplished through three objectives: Advancing Composites and Structures; Integrating Vehicle Health Management; and Advancing Aeromechanics and Propulsion.

The educational objective is to develop a high-quality aerospace engineering graduate program within the Department of Mechanical Engineering (first among the HBCUs) to produce a world-class engineering workforce through outreach activities, explained in the Human Resource Development task. The Chair of ME department has committed to add new faculty, provide release and research support for aerospace engineering that is consistent with the vision and goals of UNC Tomorrow. The CAS plans to accomplish these goals through partnership with NASA (GRC & LaRC), major aerospace industries, academic advisors, small business, and A&T administration. A letter of support is included in the proposal. Utilizing the current research facilities and the existing activities of the team, CAS will quickly start-off and become productive with the new NASA funds.

North Carolina Central University

Durham, North Carolina

Principal Investigator: Dr. Branislav Vlahovic

NASA Center for Aerospace Device Research and Education at North Carolina Central University

The objective of the proposed NASA University Center for Aerospace Devices Research and Education at NCCU is to provide a framework for broadly based, competitive, multi-disciplinary science and engineering research that will advance NASA Science Mission Directorate programs. The center, located in the College of Science and Technology at NCCU, will foster synergy between (i) design and fabrication of new materials and devices, (ii) fundamental and applied theoretical and experimental research, and (iii) computational simulation, modeling and design of astrophysical processes, new materials, and devices. The proposed center will provide an interdisciplinary environment that allows investigators to carry out collaborative research of a scope and complexity that is not possible through traditional funding modes. Our overall mission is to leverage our strong theoretical and experimental programs to advance the frontiers of fundamental and applied research while educating a new cadre of STEM students.

Intra- and inter-institutional collaborations (NASA Ames, NASA Glenn, NASA Goddard, Duke and Cornell University) advanced by the center will further develop a research infrastructure able to address some of the most important questions in modern astronomy, physics and materials science. The research will focus on the following projects: 1) Development of nanoscale materials for advanced optoelectronics devices (high efficiency photovoltaic cells and infrared photodetectors); 2) Development of a new type of polarimeter for high-energy gamma-ray astrophysics; 3) Development of a novel neutrino detector; 4) Development of an original highly sensitive and selective type of biochemical sensor; 5) Cooperative autonomous intelligent mobile robotic systems; and 6) Seed projects: a) Modification of solar cell materials by laser irradiation; and b) Use of metallic nanostructures to control light.

The center will also establish novel cross-disciplinary undergraduate and graduate educational training programs at NCCU, enhancing the participation of minority students in NASA-related STEM fields and preparing them for future aerospace careers.

University of Texas at Brownsville

Brownsville, Texas

Principal Investigator: Dr. Mario Diaz

Center for Gravitational Wave Astronomy

This proposal seeks to expand the research portfolio of the Center for Gravitational Wave Astronomy (CGWA) to include experimental and applied physics. The CGWA has successfully attracted more than \$12 million in research grants in addition to the \$6 million received from NASA for its creation. The result is a high-quality, world-renowned research program that has been mainly theoretical in nature. Due to the prestige and reputation built by its core group of researchers over the past several years, the CGWA is uniquely situated to expand its research into experimental and applied physics areas. This new research, focusing on the instrumental side of gravitational wave astronomy will be smoothly integrated with the current theoretical and observational expertise of the Center.

This new thrust will be directed by a new team of outstanding experimentalists who have recently joined the CGWA and it will be relevant to the LISA mission. As before, the CGWA will remain tightly focused on research associated with NASA's Science Mission Directorate. In particular the research in phenomenological astrophysics, source modeling and data analysis will continue to be developed in association with the Laser Interferometer Space Antenna (LISA) and other missions which may complement gravitational wave observations. The addition of an experimental program in lasers and optics will allow the center to address instrumental needs for LISA as well as other Science Mission Directorate missions.

University of Texas at El Paso

El Paso, Texas

Principal Investigator: Dr. Ahsan Choudhuri

Center for Space Exploration Technology Research

The University of Texas at El Paso (UTEP), the only Doctoral/Research Intensive University in the U.S. with a student population that is majority (75%) Mexican American, proposes the creation of the Center for Space Exploration Technology Research (cSETR) supporting NASA's vision on space exploration by focusing on advanced capabilities in the areas of green propulsion and in-situ resource utilization. The proposed center's goals are to perform advanced research on exploration technologies, to educate underrepresented minority students in aerospace sciences, and to build research capacity and infrastructure in aerospace areas.

The center researchers will perform fundamental research on ignition, high heat transfer thrust chambers, and injector dynamics and develop enabling technologies for LOX/Hydrocarbon (especially LOX/Methane) engines. The research on in-situ resource utilization is aimed at identifying and developing promising scientific approaches to find and exploit in-situ resources for the production of propellants and other valuable materials. Specifically, the focus will be on the production of oxygen, structural materials, and metals from lunar and Martian regolith. The center will initiate and maintain an interdisciplinary graduate program in aerospace sciences, support undergraduate and graduate student research, and provide outreach activities for K-12 students and teachers. The proposed outreach activities will be integrated and coordinated with numerous existing and sustained programs at UTEP. Strategic partnerships with NASA centers, DOD agencies, NASA contractors, and academic institutions are the basis of proposed center's roadmap for growth and sustainability.

The activities of the center and the critical metrics of success (research, education, and capacity building) will be assessed and evaluated by the Center of Institutional Evaluation, Research and Planning (CIERP). Using closed loop processes, CIERP will distribute evaluation results to University leadership, investigators and advisory board members. The Board, with adequate representation from NASA, NASA centers, NASA prime contractors, and exceptional universities, will perform semi-annual reviews.