

NASA Science & Technology Institute for Minority Institutions (NSTI-MI))
Grant # NNX09AV17A
Administered by UNCF Special Programs Corporation
Type of Agreement: Grant
FY 2012 Annual Report (10/1/11 – 9/30/12)
Project Manager: Brenda J. Collins, Chief, Education & Public Outreach
Ames Research Center 650-604-3540

Project Description

The NASA Science and Technology Institute for Minority Institutions (NSTI-MI) was established in 2006 to provide leading-edge research opportunity for faculty and students from MIs that complement NASA's research programs and make original contributions to NASA. The first phase of the program consisted of two main components: research clusters and summer programs at NASA Glenn and NASA Ames Research Centers. Ten students and two faculty members from two MIs make up one cluster. During the academic year, clusters conduct research in NASA-related topics and bring their results to their assigned NASA Center for collaboration with NASA scientists and researchers. The Summer Programs provide the students the opportunity to engage in authentic NASA research and also give faculty members the opportunity to enhance their course curriculum and research programs through collaboration with NASA subject matter experts.

In FY 2012, NSTI expanded to 6 research clusters in 4 NASA Centers. The clusters are listed below:

NASA NSTI Academic Scholar Research Clusters:

1. **NASA/NSTI Goddard I:** Virginia State University and Elizabeth City State University: Development of Super Resolution Synthetic Aperture Radar (SAR) Image Processing Techniques in Framework of Undergraduate Research, Training and Outreach
2. **NASA/NSTI Goddard II:** Tuskegee University and Alabama A&M University Analog Synthesis of Mixed Signal Specific Integrated Circuits (ACIS) of Flight Electronics at NASA
3. **NASA/NSTI Johnson:** Texas Southern University and Prairie View A&M University Development of Technologies for Elucidation and Mitigation of Bone Loss in Microgravity, Osteoporosis and Inflammatory Disease
4. **NASA/NSTI Marshall I:** Tuskegee University and Alabama A&M University Improved Mechanical Properties of COPV Composites and SHM Sensor Efficiencies for increased Safety and Reliability

5. **NASA / NSTI Marshall II:** Texas Southern and University of Texas - El Paso
Proposal Subject: Evaluation of Behavioral of Optical Fibers for Structural Health Monitoring of Composite Pressure Vessel
6. **NASA/NSTI Ames:** Tuskegee University and Norfolk State University
Development of an integrated Microfluid Ion-specific carbon nanofiber array electrode biosensor for point of care clinical diagnosis

Project Goals

Goal #1 Research: NSTI achieved this goal by placing 12 faculty members in the role of Principal Investigator, with access to NASA research at one of 4 NASA Centers, for their NSTI research cluster. Each university collaborates with a NASA scientist on research specific to their cluster.

Goal #2 Training: Since the inception of the program, Principal Investigators (Faculty) have achieved a remarkable success rate for funding of submitted proposals. Almost 50% were funded for an average of \$1.3 million. In FY12, PI's reported 79 publications and presentations with 15 authors publishing results of research and activities directly attributed to this award. Additionally, three out of nine proposals submitted by NASA clusters received funding.

Goal #3 Workforce Development: Since the inception of the program, 142 students have benefited from the NASA center-based research experience. In FY2012, 61 students conducted research at 4 different NASA centers.

Project Benefit to Outcomes 1 and 2

The NSTI Project directly supports NASA's Strategic Plan and the Office of Education's Outcomes One and Two:

Outcome 1: *Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals through a portfolio of investments.*

Outcome 2: *Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty.*

NSTI achieved outcomes one and two by providing 61 underrepresented undergraduate students in STEM fields and 12 faculty members at minority institutions opportunities to work on NASA-related research. The program provides up to three years of funding for students and their faculty to work together in research clusters on NASA-related research

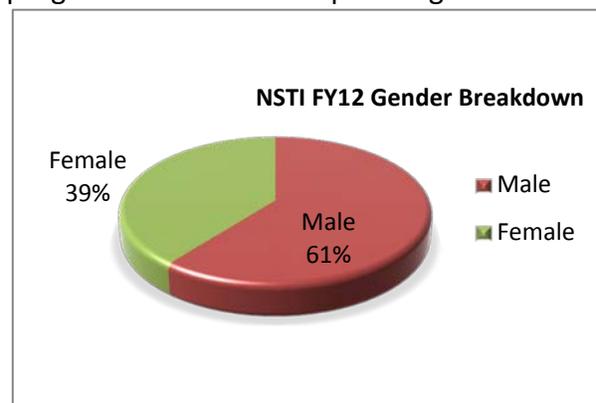
both at their home institution and at their assigned NASA center.

NSTI exemplifies NASA's vision to inspire, engage, educate, and employ in the STEM disciplines. The NSTI Project serves as a major link into the NASA student pipeline.

Project Accomplishments

To date, NSTI has accomplished the following:

- Since the inception of the program, 142 students have benefited from the program through NASA center-based research experiences.
- 61 students participated in the program in FY12. All are pursuing undergraduate degrees in STEM disciplines at Minority Institutions.
 - 37 males; 24 females
 - Scholars include 4 Hispanic (6%); 55 African Americans (90%); 1 Native American (2%) and 1 Pacific Islander (2%)
- 15 authors have published results of research/activities directly attributed to this award
- 3 out of 9 proposals submitted by NASA clusters were funded
- 6 websites have been established based on cluster research
- 6 new courses have been created at cluster universities based on NSTI research and 13 courses have been modified.
- 19 non-NASA partnerships have been formed to facilitate research related to this award



Project Contributions to Annual Performance Indicators (API) Measures

Since the project's inception in 2006, NSTI has continued to meet the goal of increasing the number of the underserved and underrepresented in STEM disciplines at NASA Centers.

Measure Number	Annual Performance Indicator Description (API)
PART Measure 1	Achieve 40 percent participation of underserved and underrepresented (race and/or ethnicity) in NASA higher education projects

In FY12, 100% of NSTI Academic Scholars reported being from an underserved or underrepresented in STEM population. Specifically four Hispanic (6%); 55 African Americans (90%); one Native American (2%) and one Pacific Islander (2%). These percentages exceed the API Measures.

Improvements Made in the Past Year

The NSTI Project made the following improvements in FY12:

- Increased awareness and highlighted project opportunities through professional organizations such as the National Science Teachers Association and the Public Broadcasting Service
- Developed a quarterly report system for PI use
- Enhanced the IGCCE website

For Cohort 2, based on an Agency emphasis on supporting student integration into research, the NSTI research clusters were selected and redesigned to focus on the development of undergraduate student researchers. In addition to the participating NASA Centers and Minority Institutions, each of the cluster institutions supported five undergraduate students throughout the academic year. The cluster institutions engaged academic scholars in conducting research at their home institutions and prepared them for their NASA -related research opportunity at a NASA center through a mandatory 10-week internship experience. As a result, NSTI is now capable of providing up to 60 undergraduate academic scholars with NASA center-based research experiences.

Project Partners and Role of Partners in Project Execution

UNCFSP has worked in partnership with NASA to administer the NASA Science & Technology Institute for Minority Institutions since 2006 and is the Principle Investigator of the project.

NSTI cluster universities have leveraged partnerships with other institutions to improve upon their NSTI cluster research activities by sharing best practices as well as creating opportunities for additional funding.

Below is a list of the partners that have been formed by the NSTI Cluster Institutions:

Type of Institution	Institution Name
Federal Agency	Department of Homeland Security
Federal Agency	Brookhaven National Laboratory
Industry	CCAM
Industry	KBR
Industry	SAIC
Industry	Triad Semiconductor
Industry	Mentor Graphics
Other	Bangladesh University of Engineering and Technology
Other	Nuclear and Energy Research Institute IPEN-CNEN/SP, Sao Paulo, Brazil
Other	Savannah State University
Other	Jarvis Christian College
Other	Tougaloo University
Other	University of Massachusetts Lowell
Other	Auburn University
Other	University of Arizona
Other	Kansas State University
Other	University of Tennessee at Chattanooga
Other	Purdue University
Other	East Carolina University