Indiana Space Grant Consortium
Lead Institution: Purdue University
Director: Barrett Caldwell, PhD
Telephone Number: 765-494-5092
Consortium URL: insgc.org
Grant Number: NNX15AI07H
Lines of Business (LOBs): NASA Internships, Fellowships, and Scholarships; Stem Engagement; Institutional Engagement; Educator Professional Development

A. PROGRAM DESCRIPTION

The National Space Grant College and Fellowship Program consists of 52 state-based, university-led Space Grant Consortia in each of the 50 states plus the District of Columbia and the Commonwealth of Puerto Rico. Annually, each consortium receives funds to develop and implement student fellowships and scholarships programs; interdisciplinary space-related research infrastructure, education, and public service programs; and cooperative initiatives with industry, research laboratories, and state, local, and other governments. Space Grant operates at the intersection of NASA's interest as implemented by alignment with the Mission Directorates and the state's interests. Although it is primarily a higher education program, Space Grant programs encompass the entire length of the education pipeline, including elementary/secondary and informal education. The Indiana Space Grant Consortium is a Designated Consortium funded at a level of $760,000 for fiscal year 2017.

B. PROGRAM GOALS

INSGC Goals are as follows:

- *be a preferred source of information, materials, and opportunities for inspiring, preparing, and supporting individuals for NASA-related STEM education / careers.*
- *be an effective and preferred vehicle for enhancing the engagement of K-20 educators and students in NASA-related STEM activities and opportunities.*
- *raise awareness of and access to NASA-related activities, events, and opportunities for the government, institutions, and residents of the State of Indiana.*

We have also devised clear SMART Objectives in order to measure the attainment of the INSGC goals and ensure alignment with NASA PART measures. The use of SMART objectives assures that there is a clear connection between INSGC funded activities and Consortium goals in quantifiable, measureable outcomes. The SMART objectives for 2015-18 include:

1) All doctoral fellows who receive INSGC funding will report increased research capacity and competency as a result of their awards.
2) Students who participate in INSGC higher education programs will demonstrate an increased: a) interest in STEM study and careers, b) understanding of NASA programs, and c) perception of leadership skills.

3) At least 65% of student participants who graduate after participation in INSGC higher-education programs will seek employment with NASA, aerospace contractors, universities, and other educational institutions.
4) At least 30% of undergraduate students who graduate after participation in NASA higher-education programs will move on to advanced education in NASA-related fields.
5) At least 35 underrepresented and underserved students (minimum 25% of total students participating in funded programs) will participate in INSGC-funded higher education programs in each year of the three-year program.
6) At least 3 new or revised STEM courses targeting STEM skills relevant to NASA research areas will be created through INSGC support in 2015-18.

INSGC is on track to meet or exceed all 6 objectives.

C. PROGRAM/PROJECT BENEFITS TO PROGRAM AREAS

INSGC has awarded funding to projects within the targeted outcomes in alignment with our proposed allocation percentages (Outcome 1: Current 74%, Proposed 74%; Outcome 2: Current 25%, Proposed 25%; Outcome 3: Current 1%, Proposed 1%).

NASA Outcome 1
Scholarship/Fellowships/Internships: The competitive award mechanism for scholarship/fellowship support includes students at affiliate institutions across Indiana. Scholarship awardees for FY 2017 were 65% female, 31% male, and 4% gender not reported. In terms of underrepresented minority (URM) students, a full 30% of our scholarship applicants chose not to report their ethnicity. This obviously poses an unfortunate problem in reporting. Based on the information we have, 17% of scholarship recipients were under-represented. There were 5 disabled awardees and 2 veterans. Fellowship awardees were 58% female and 42% male. Underrepresentation is again impacted by the fact that 17% of fellowship awardees did not report ethnicity. Based on available data, 8% of fellowship awardees are URM. NASA internships are placed and supported based on selections by NASA Centers.

Higher Education Anecdote:
Selective Stiffness Adaptability of Multi-Stable Morphing Structures
José R. Rivas-Padilla, Purdue University- West Lafayette
Project Intro: My selected area of research will focus on the dynamics and structural properties of multi-stable elements and morphing aircraft structures. This will be done through analytical and numerical modeling methods that predict the static and dynamic behavior of multi-stable elements. The objective is to create purely elastic aircraft structures (e.g. aircraft wing or control surface) that are designed to have multiple stable states, each with its unique corresponding structural stiffness. Manufacturing methods will be developed to tailor the multi-stable element functionality and embed these elements in a morphing wing rib. The structure can then be actuated to "snap", like a snap on bracelet, between stable configurations to increase or decrease the structural stiffness. The change in stiffness can allow the structure to withstand greater aerodynamic loads when needed or shift to a more flexible configuration when greater morphing compliance is required (e.g. varying airfoil camber or changing angle of attack).
Progress Update and Expected Results: This semester, I worked primarily with two finite element models in Abaqus FEA involving bi-stability in composites in order to become familiar

with these concepts. The first model was an un-symmetric composite square laminate. This simple model was used as a "first step" in understanding the concept of bi-stability and how to model it numerically. When exposed to a temperature gradient, thermal stresses are induced in a composite laminate due to the mismatch of thermal expansion coefficients between the longitudinal and transverse directions of the fiber of the laminate. If a material is stacked un-symmetrically bending and twisting moments are developed within the laminate structure during the cooldown step of a temperature curing process. This results in the laminate developing out of plane displacements and curvatures. At room temperature, the build in residual stresses will cause the laminate to curve and exhibit two states of minimum potential energy, thus making the laminate bi-stable. This behavior was successfully modeled in Abaqus FEA using composite shell elements to model the laminate and applying displacement boundary conditions to "snap" the structure between stable states. This exercise was helpful in getting a fundamental understanding of classical lamination theory. The second model I worked with was an expansion of the first model. In this case the laminate had two sections, a symmetric and an un-symmetric square region. The symmetric region was completely restricted of any displacement or rotation as if it was "clamped". The un-symmetric region is free to displace and deform. The same temperature gradient is applied causing the un-symmetric region to develop bi-stability while the symmetric region remains clamped. This model was more challenging to design since restricting the displacements of the entire symmetric region proved to be too restrictive and thus the model remained mono-stable. After many attempts, only two nodes where restricted from displacement and rotations in the symmetric region and this relaxed the boundary conditions enough for the model to develop bi-stability. In this case, one stable state is structurally stiffer and has a higher potential energy than the other. This change in stiffness is what we want to exploit when developing morphing aircraft structures as explained previously. Further work is needed to properly understand how to apply the boundary conditions that best approximate the reality of a clamped laminate. I will continue working on this model next semester, performing a parameter sweep analysis in order to study how the geometric parameters of the cantilever beam correlate to the multi-stable behavior of the structure. After working through these modeling exercises and parameter sweep analysis, I will be prepared to begin developing optimization tools for bi-stable elements embedded in an aircraft wing rib structure.

INSGC Fellowship Impact: This fellowship has provided an alternative funding resource that was very helpful when I had to take care of my initial relocation expenses at the beginning of the semester. It also allowed me to travel to the International Institute of Teaching and Mentoring conference in Atlanta, GA to meet other minority students and professors in academia and develop a support group network to better prepare me as a future professor.

NASA Outcome 2: Pre-College Anecdote:

Science Central's Coding Club provides participating children the opportunity to have hands-on experience with this STEM discipline, while also participating in NASA activities they would not have the opportunity to participate in otherwise. Geared toward youth on the Autism spectrum, each workshop focuses on basic principles of coding, and allows participants to practice coding hands-on, while continuing to build upon their coding knowledge as the program progresses. The Coding Club encourages team-building among participants, fostering communication skills along the way. In addition to coding, these workshops allow the participants to gather insight about the current activities and missions of NASA.

To date, seven Coding Club sessions have been held with 24 participants. There are five sessions scheduled for the remainder of the year. Participants have worked diligently to create their own comic strip utilizing HTML and CSS. They have also created their own video games using Scratch, a project of the Lifelong Kindergarten Group at the MIT Media Lab. The Education Specialists have created a safe and inclusive environment for the Coding Club by integrating all ages and skill-levels together in a mixed seating arrangement. This has encouraged an interactive and collaborative environment for participants. Additionally, this arrangement allows for Science Central staff to easily navigate the classroom and provide quick and personalized attention to all participants. The Coding Club looks forward to using NOAA's Science on a Sphere (a permanent exhibit within Science Central) to look at various NASA and JPL datasets throughout the remainder of the sessions scheduled.

NASA Outcome 3: Informal Education Anecdote:
Terre Haute Children's Museum, "Fiddling With Physics" Exhibit
On Friday, June 2, 2017, the Terre Haute Children's Museum celebrated the opening of the "Fiddling With Physics" exhibits, funded, in-part, by the Indiana Space Grant Consortium.

Place a rocket on the launch pad and experience Sir Isaac Newton's First Law of Motion first hand. Suspend light-weight spheres in mid-air all while learning how a hefty jumbo jet is able to sail and fly as though it's lighter than air. Connect a maze of circuits to make things spin, sound-off and light up -- without any external power. Utilize electromagnetism to your advantage by launching an object into the atmosphere. And then, customize a car for speed, and experience the laws of motion while racing a friend to the finish line. Museum guests young and old can experience all of these things in the "Fiddling With Physics" exhibit area.

The set of exhibits, which are being sponsored by the Indiana Space Grant Consortium, the Duke Energy Foundation, and Powered Equipment/Lee and Sally Shipley, are all multi-user experiences with multiple variables and outcomes. The multi-user aspect of the exhibits not only allows more guests to interact with the exhibits simultaneously, but it also allows them to observe the exhibits in use. Some kids learn by doing and others learn by watching. The exhibits also have multiple variables, which means there are also multiple outcomes. This allows museum guests to define their own objectives and choose their variables depending on desired outcome.

Since opening this exhibit, we have had almost 25,000 visitors to the Museum, and we have received nothing but positive feedback from our guests regarding the exhibit. We have also witnessed interactions that appear to be positive in nature as well. For example, in the race car area of the exhibit, some children are racing with pre-built cars. Others are building their own, either on their own or with the assistance of an adult. Kids are noting the designs of the different car bodies, the different weights, and the different speeds. "Mine is fastest!" They are seeing the success of their cars when they are built correctly, and then they are noticing the flaws in their cars when they are not assembled properly and the cars fall apart on the track, or they do not launch as they should. These design or assembly flaws then prompt them to reevaluate their car and then make modifications so they can try to race again. Adults are assisting their kids with the building, and they are often building their own cars to race as well. One parent indicated that they spent an hour and a half in the "Fiddling with Physics" exhibit, which is not surprising considering some guests have spent 15-20 minutes in just the race car portion of this exhibit. The "Fiddling with Physics" exhibit area is truly a place where the whole family can participate and learn together. This exhibit has been a significant addition for the Museum, and we are so very grateful for the support that we received from the Indiana Space Grant Consortium.

D. PROGRAM ACCOMPLISHMENTS

- **NASA Internships, Fellowships, and Scholarships (NIFS):**

Nine internships, 54 undergraduate scholarships, eight Master's fellowships, and four PhD fellowships were awarded by INSGC. Based on longitudinal tracking (INSGC has over 90% reporting in our longitudinal tracking over the years) 78% of our awardees, and 72% of URM awardees, with Significant Awards are now employed in a STEM field.

- **Higher Education projects:**

Collaboration Station: An Educational Video Game about Science and Engineering Aboard the International Space Station increased learning opportunities and provided curriculum materials involving undergraduate students in a multidisciplinary research project, preparing them for the modern STEM workforce.

Electrochemical Reduction of CO2 on Graphene Supported Bimetallic Dimers at Valparaiso University provided several undergraduate and community college students with laboratory research experience. Mentoring was also provided by faculty and by the undergraduate students at the university to the community college students.

The *AIAA Design, Build, Fly Program* provided real-world aircraft design experience for 10 engineering students at Trine University, building increased interest in aerospace programs, increasing retention, and better preparing them for STEM employment.

Foundations in Science and Math, led by an undergraduate and graduate student team, provided intensive sessions to over 100 high school students including Introduction to the Universe, Astrophysics for Beginners, Algebra I and II, Mathematical Topics, Trigonometry, Standardized Math Tests Review, Introduction to Physics, Introduction to Chemistry, Chemistry in Food, Introduction to Biology, Accelerated Biology, Zoology, and Computer Programming. Each course is designed to prepare students for upcoming STEM courses by providing a strong foundation in the concepts and skills.

Providing an Early Research Experience for Freshman Environmental Science Majors -

Each year approximately 850 Indiana State University students complete the Introduction to Environmental Science and accompanying lab. This project enabled all students to work collaboratively on a research project including experimental design, collecting samples, preparing samples for analysis, and interpreting results. The project was then presented at a local/regional meeting, the Indiana Academy of Sciences or the North-Central Section Meeting of the Geological Society of America.

Taylor University's project *Magnetically Induced Tethered Orbit adjustment Satellite (MagnITO-Sat)* trains engineering students on the techniques of systems design. The team has performed literature searches, detailed technical analyses, and held discussions with scientists from Naval Research Labs, the University of Michigan, and Tethers Unlimited, Inc., providing workforce development.

Undergraduate Observational Astronomy for Research and STEM Engagement involved training UG STEM majors to carry out scientific research and provide hands-on science engagement for 120 non-STEM students, with the goal of creating STEM-literate citizens.

Funding for *Planet Nine* at the Ball State University Planetarium provided the planetarium team of faculty, staff, undergraduate and graduate students with a new program about space exploration and technology.

Circuits 1 Online Course Development at the University of Evansville was developed as an online summer course benefiting all engineering disciplines. The course includes video lectures, labs that can be completed remotely, and homework, solutions, and examples.

Purdue Space Day provides professional development to approximately 275 university student volunteers. They are an integrated mix of multidisciplinary freshman through graduate students who promote the interdisciplinary nature of space exploration. These students work with approximately 675 3rd-8th grade students to learn about engineering and space exploration.

MURI at IUPUI is a 9-week summer research program for undergraduates that builds core research skills, research professionalism, academic/professional success skills, and discipline–specific methods and techniques.

Research Experience for Community College Students: Cold acclimatization genes in Neurospora at Valparaiso University provides two undergraduates and one community college student with hands-on research experience. Students and faculty prepare a poster of results at VU's Celebration of Undergraduate Scholarship and the spring meeting of the Indiana Academy of Science. Goals are increased involvement in research, improved retention, and conversion of community college students to 4-year programs.

Advancing STEM Undergraduate Student Research at Purdue Northwest funded 75 undergraduate students to participate in high-quality, faculty mentored research projects in STEM. There was a strong emphasis on URM participation. Over 350 students participated in the associated Student Research Day which included many preliminary events to foster STEM workforce development.

Anderson University's *Research Experiences in Mathematics* introduces the experience of original mathematical research to undergraduate students. Students learn how the mathematical community gains and advances knowledge as well as teaching them how to ask questions that effectively help further understanding.

Regulation of Fluid Secretion in Intestinal Epithelial Cells was researched at Valparaiso University, providing direct research and mentoring experience for two community college students and one undergraduate student along with indirect experience for three additional students. Skill development includes cell biology and biochemistry along with experimental design and collection/interpretation of data.

Purdue University's *MATE ROV* team includes over 40 members from many various majors, simulating real world design projects. They design, construct, and test an innovative underwater vehicle. A significant portion of the score is from professional presentations given to industry leaders such as Oceaneering, NASA, and more.

Improving STEM Student Persistence via Early, Structured Team-Based Research Engagement at Valparaiso University is expanding on last year's project involving freshman in ongoing research, promoting student growth, stimulating curiosity, preparation for STEM careers, and improving retention. Students receive mentorship from faculty and upperclassmen.

Purdue Northwest participation in the *Human Exploration Rover Challenge* allows students to fulfill their Experiential Learning requirements for graduation. PNW promotes STEM education throughout Indiana using the Rover and Moonbuggy in displays including the PNW Fall Student Convocation, Senior design presentations, freshman seminars, engineering recruitment dinner for HS students, NWI Space Camp, halftime of PNW basketball games, and many more resulting in well over 10,000 people interacting with the vehicles.

Biomedical Engineering Senior Design Instrumentation Lab at Trine University enables students to perform cutting edge research on how humans can live in space for extended

durations. The project revolves around miniaturizing several standard blood analysis equipment devices to one device the size of a smart-phone.

The SARA Telescope program at Valparaiso and Ball State Universities provides access to two research-quality telescopes for faculty and student research and used in general education, outreach, and research programs. Four undergraduates travel to Arizona to use the telescope, and the data is also used for science education (Astronomy 101 – 100 students) and outreach (Public Open House programs – 100+ participants).

The Beamline Architect project at Anderson University allows a hands-on experience with accelerator simulations for undergraduate students. Applications include health physics radiation dosimetry problems, medical imaging mechanics, security scanner simulations, and of course accelerator channel design for particle physics experiments.

Science Central Community College Interns - One intern is dedicated to the "Science on a Sphere" exhibit (learning how to operate the SOS exhibit; present current scientific data on SOS utilizing NASA and NOAA datasets; and develop new presentations of the data), and the other is working in the Exhibits and Facilities Department (working with the Executive Director and Exhibit & Facilities Director to determine which new exhibits are needed, assisting with researching alternatives for creating new exhibits, design and construct the exhibits and help install them). This is providing STEM workforce development.

Analyzing Unnatural Amino Acids is a project at Valparaiso University involving three 4-year college students and two community college students investigating the degradation patterns of natural vs. unnatural amino acids exposed to conditions that might exist on extraterrestrial bodies. The project provides research training and mentoring.

University of Southern Indiana Eclipse Project provided one of the State's highlights relative to the 2017 Eclipse. A team from the USI's Engineering Department joined in a special program coordinated by NASA nationwide. They launched a helium balloon 95,000 feet into the atmosphere, almost to the edge of space, all with a camera attached to get some of the most remarkable photos of the eclipse happening from above. There was a significant amount of publicity surrounding this event (http://44news.wevv.com/usi-balloon-captures-eclipse-shadow-edge-space/).

A Novel Approach to Exploring Mosquito Populations and Associated Disease Risk in Indiana at IUPUI utilized remote sensing platforms and the accompanying data to determine vector habitat as it relates to disease risk. This study will further assist in coordinating an effort with the University, state, and local health agencies to develop a robust data driven model that will assist in mosquito treatment by determining locations of risk and will also provide spatial models of disease risk based on proximity to determined mosquito habitat. The incorporation of satellite based imagery, UAV imagery and mosquito population numbers via deep learning artificial neural networks is novel and has promise for its potential capabilities.

Electronic Educational Kits for Middle/High School Students from the Department of Electrical and Computer Engineering at IPFW developed hands on electronic educational kits for exploring modern electronics. The kits are intended for use by middle and high school students.

The Internet of Things in Space at IPFW developed and implemented a test-bed to apply the IoT framework to space exploration. Funding enabled the development of an Internet of Things undergraduate/graduate technical elective course.

- **Research Infrastructure projects:**

Novel Properties of Transition Metal Single Atom Catalysts at Valparaiso University partnering with Ivy Tech Community College hopes to accelerate a promising research direction

seeking novel catalytic properties of graphene-supported transition metal atoms. The project initiates a formal partnership between VU and Ivy Tech for collaborative research and student mentoring. The project allows community college students to participate in cutting edge NASA related research while being mentored by a VU undergraduate student, while also producing useful database for scientist trying to synthesize supported transition metal single atom catalysts.

- Precollege projects:

Taylor University's *TWEET K-12 Robotics Research* (Taylor Women Engaging in Engineering and Technology) teaches engineering and programming. Female students in primarily rural areas will learn robotic concepts through collaborative activities and the program will intentionally emphasize female leadership and engagement.

The *UEngineering Experience* at the University of Evansville enables 24 freshman high school students to spend a full day at UE to explore engineering. Multiple small-scale, multidisciplinary projects will be completed in order to provide participants the satisfaction of seeing the results of their efforts and demonstrate what engineering has to offer.

Science Central's *Coding Club 2017* provides children on the Autism spectrum to have hands-on experience with STEM disciplines while participating in NASA activities. Workshops focus on basic principles of coding along with current activities and missions of NASA.

STEAM Academy is a hands on learning environment for 3-5 year old preschool students focusing on Science, Technology, Engineering, Arts and Mathematics. The curriculum uses Indiana preschool and kindergarten readiness standards as a starting point. INSGC funding provided teacher development and inclusion of NASA education materials.

Educator Professional Development by Science Central developed and conducted a series of public workshops via Interactive Video Conferencing for K-6 grade teachers. The workshops directly relate to NASA activities focusing on physical science, earth/space science, the scientific process, and life sciences.

- **Informal Education projects:**

The Eclipse Project at the Children's Museum of Indianapolis provided a perfect place for families and children to view the rare total solar eclipse occurred August 21, 2017.

Science educators explained the phenomenon of the moon moving across the sun, which created a nighttime experience in the middle of the afternoon.

Terre Haute Children's Museum's "*Fiddling With Physics*" Exhibit was a joint effort with the Indiana Space Grant Consortium, the Duke Energy Foundation, and Powered Equipment/Lee and Sally Shipley. The physics-oriented activities are all multi-user experiences with multiple variables and outcomes. Thousands of people have experienced physics in hands-on activities through this effort.

E. PROGRAM CONTRIBUTIONS TO NASA EDUCATION PERFORMANCE GOALS

Include summary data for the bulleted list below:

- **Diversity**: Scholarship awardees for FY 2017 were 65% female, 31% male, and 4% gender not reported. A full 30% of our scholarship applicants chose not to report their ethnicity. Based on the information we have, 17% of scholarship recipients were under-represented. There were also 5 disabled awardees and 2 veterans. Fellowship awardees were 58% female and 42% male. 17% of fellowship awardees did not report ethnicity. Based on available data, 8% of fellowship awardees were URM.

- **Minority Serving Institution Collaborations**: Ivy Tech Community College partnered extensively with Indiana Space Grant Affiliates this year throughout the State. Purdue and Indiana University have strong relationships with minority serving institutions in other states and there has been continued significant partnering with the Minority Engineering Program at Purdue University.

- **Office of Education Annual Performance Indicators**:
  - API 2.4.1: ED-17-1 65% of the 54 scholarship awardees were female, and 58% of the 12 fellowship awardees were female. 17% of scholarship and 8% of fellowship awardees were URM; however, this data is dramatically impacted by the fact that 30% of scholarship and 17% of fellowship students refused to provide ethnicity information. Data on project participants is forthcoming.
  - API 2.4.2: ED-17-2 >100 educators in the State participated in professional development, internships, or research
  - API 2.4.4: ED-17-4 Indiana has 9 museum and science center affiliates
  - API 2.4.5: ED-17-5 >50,000 K-12 student participants

F. IMPROVEMENTS MADE IN THE PAST YEAR

The INSGC office improved our relationship and effectiveness with our affiliates this year in several ways. By improving the agenda of our annual Spring affiliate meeting, affiliate directors were given more voice and initiated several collaborative projects and ideas. Further, we have been able to link our affiliates more with our industry partners and develop new industry relationships by understanding the needs and current goals of the affiliates and industry partners. We have increased efforts in engaging with affiliate institutions as a whole, including providing networking and help with proposals and encouraging affiliate directors to expand their reach at their institutions. INSGC has built stronger connections with students as well, and expanded the available network of NASA and industry internships. INSGC has devoted efforts toward making STEM opportunities available for disabled students. Two examples include programs run by affiliates that were targeted at students on the autism spectrum, and efforts are underway to enhance the availability of materials and learning for the blind, including Space Grant/NASA Blind Education Materials. We also increased the number of scholarship/fellowship awardees that were disabled/veterans over past years.

INSGC experienced phenomenal results in statewide efforts by multiple affiliates related to the 2017 eclipse. We also built strong relationships with huge impact in the underserved southeastern quadrant of the State in which we have historically had difficulty establishing a presence due to the absence of educational and industry partners in the area. These partnerships include education and workforce development in aviation, aerospace, UAV technologies, and more. A completely redesigned website was launched this year, and we have received positive comments from affiliates, students, and fellow consortia. INSGC has continued strengthening our relationships with the local offices of our representatives and senators, and are expanding efforts at collaboration and integration of our affiliates in these relationships.

G. CURRENT AND PROJECTED CHALLENGES

The lead institution of INSGC, Purdue University, is still involved in an overhaul of all business processes to streamline and improve performance. Titled Business Processes Re-engineering, the project is anticipated to reduce the amount of time required for all business

processes, and reduce the layers of involvement and approvals, thereby improving efficiency. Our office continues to work closely with campus personnel and our current business office colleagues to ensure the smoothest transitions possible. We are also under development on a more formal status for INSGC partners (non-affiliate educational institutions and industry partners), including the development of a Memorandum of Understanding to formally define those relationships.

INSGC is concerned about numbers, and demographic identification, of URM applicants for scholarships and fellowships. Unfortunately, INSGC experienced an unprecedented percentage of applicants who did not provide full demographic data (particularly related to race/ethnicity), limiting our ability to provide accurate reporting. We are in the process of researching trends and evaluating current and past data to determine possible hurdles to underrepresented applicants. Female applicants remained high, in fact higher than past years, and many students did provide gender data that did not provide race/ethnicity. INSGC-funded projects are not having the same difficulty; we are recruiting URM participants for project roles at or above previous levels. These numbers will be reflected in the full annual reporting.

H. PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

The INSGC office engages the Affiliates to discuss and contribute to the strategies of the consortium. All Affiliates have voting rights and responsibilities approving strategic directions and Consortium program decisions discussed at Affiliate Meetings.

Academic Affiliates

Purdue University – *Lead Institution*	Purdue University Northwest
Purdue University College of Tech at Columbus	Anderson University
Ball State University	Indiana State University
Taylor University	Indiana University – Bloomington
Indiana University Purdue University Ft, Wayne	University of Evansville
Indiana University Purdue University Indianapolis	University of Southern Indiana
Valparaiso University	Trine University

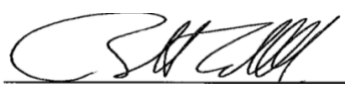
Outreach Affiliates

Children's Museum of Indianapolis	IMAX Theater
Challenger Learning Center of Northwest Indiana	Indiana State Museum
Ethos, Incorporated	Evansville Museum
Science Central	Terre Haute Children's Museum
Conner Prairie	

Corporate Affiliates and Partners

StratoStar Systems	Near Space Launch
ISTEM-Purdue University	Indianapolis Symphony Orchestra

Below is a valid signature from Barrett S. Caldwell indicating submission of this report.



Barrett S. Caldwell, PhD, Director, Indiana Space Grant Consortium