

THE NATIONAL SPACE GRANT COLLEGE & FELLOWSHIP PROGRAM

FISCAL YEAR 2020 ANNUAL PERFORMANCE REPORT (APR)

FUNDING SOURCE:
OFFICE OF STEM ENGAGEMENT
SPACE GRANT

MANAGING ORGANIZATION:
NASA HEADQUARTERS OFFICE OF STEM ENGAGEMENT

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FLORIDA SPACE GRANT CONSORTIUM LEAD
INSTITUTION:
[UNIVERSITY OF CENTRAL FLORIDA]

FLORIDA SPACE GRANT DIRECTOR:
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ACTIVITY DESCRIPTION: (100 – 250 words)

FSGC supported the needs of the 4 NASA Mission Directorates by: (a) training students who wish to pursue space by providing 4 internships, 20 fellowships, and 24 scholarships; and (b) funding 12 university research proposals which also support NASA Kennedy Space Center's needs . 18 students were supported by these research awards.

Additional activities undertaken to specifically support HEOMD included recruiting 15 university/college teams and 150 students to participate in NASA technical competitions, and implementing senior design programs based on NASA KSC topics of interest which involves 8 university / college teams and 32 students. The NASA competitions included the Human Exploration Rover Challenge and NASA S.U.I.T.S. FSGC planned to immerse K12 students in HEOMD by hosting a rover competition for public libraries across Florida. However, due to the pandemic, the funds were used to engaged K-12 students in the Plan the Moon Challenge. 20 teams from Florida are participating in the challenge

FSGC also connected higher education students to the work of STMD by hosting an academy comprised of 15 university students that take part in a high-altitude balloon workshop at NASA KSC. This academy will be held early summer as most students will be vaccinated by that time. It will reach 6000 students by working with the Challenger learning Center to host professional workshops involving 11 middle schools and 11 pre-service teachers. It is also collaborating with the Orlando Science Center to integrate NASA-inspired content into new or existing live shows, workshops, or other public programming offerings. Training will be provided to team members on equipment and for mentorship, and materials costs to such offerings that will incorporate monthly, weekend, or daytime themes.

ACTIVITY GOALS: (Bulleted list)

State the Consortium Goals and Objectives from your base proposal and augmentation proposal.

The objectives should express quantitative targets when appropriate.

1. Networking

1.1. Establish a state-wide network of universities and colleges with interest and capabilities and Space sciences and engineering

a. **S.M.A.R.T Objective** – Convene university and college representatives in collaborating meetings to establish Space Grant network in the State of Florida.

b. **Action Plan** – The FSGC shall convene at least 2 face-to-face meetings with affiliates per year. FSGC shall continue to maintain a network of at least 12 universities/colleges which serve as affiliate members of the FSGC.

2. NASA Internships, Fellowships and Scholarships

2.1 Enable students to pursue careers in the space program – whether through graduate, undergraduate, or Community College technical training.

a. **S.M.A.R.T Objective 1** – Competitively award internships for both graduate and undergraduate students at NASA Centers and industry. These will be students who wish to pursue space/aerospace/aeronautics training.

b. **Action Plan** – The FSGC will promote NASA and industry internships via its website, newsletter, and other correspondence. The FSGC will award at least 5 internships per year. Over the course of this grant it is expected that 50% of the recipients will be underrepresented minority students and 45% will be female students. FSGC will also

ensure that 70% of awardees continue on in a STEM discipline by longitudinally tracking students.

2.2 Enable students to pursue careers in the space program – whether through graduate, undergraduate, or Community College technical training.

a. **S.M.A.R.T Objective 2** – Competitively award graduate fellowships to students who wish to pursue space/aerospace/aeronautics training.

b. **Action Plan** – The FSGC will promote its fellowship programs via its website, newsletter, and other correspondence. The FSGC will award at least 12 graduate fellowships per year. Over the course of this grant it is expected that 50% of the recipients will be underrepresented minority students and 45% will be female students. FSGC will also ensure that 70% of awardees continue on in a STEM discipline by longitudinally tracking students.

2.3 Engage university students, at smaller institutions that have little or no research activities, by awarding them FSGC scholarships.

a. **S.M.A.R.T Objective 1** – Approach minority offices at these institutions to solicit applications from minority undergraduate students.

b. **Action Plan** – The FSGC shall conduct outreach to Minority Serving Institutions, as well as minority offices at other higher education institutions. FSGC shall distribute success story profiles of recent scholarship recipients and ensure that there is strong representation by both minority and female students in these profiles. The FSGC will award at least 8 scholarships per year. Over the course of this grant it is expected that 50% of the recipients will be underrepresented minority students and 45% will be female students. FSGC will also ensure that 70% of awardees continue on in a STEM discipline by longitudinally tracking students.

3. Human Exploration and Operations Mission Directorate (HEOMD) Projects

3.1. Provide opportunities for sophomore, junior and senior university students in research and design that will foster innovative solutions to support NASA's Lunar and Mars Missions.

a. **S.M.A.R.T Objective** – Support university teams taking part in the FSGC Rover Reduction Competition, and increase the number of women and number of minorities participating on such teams.

b. **Action Plan** – The FSGC shall promote the competition to its Florida universities/colleges and encourage participation by providing seed funding to selected teams. FSGC shall seek to recruit 4 teams comprised of at least 4 members per team, on an annual basis. Over the course of this grant it is expected that 30% of the recipients will be underrepresented minority students and 30% will be female students.

3.2 Provide resources and experiences for university students and faculty that supports the Space Launch Systems, and NASA's Lunar and Mars Missions.

a. **S.M.A.R.T Objective** – Support university teams taking part in NASA led student projects like the NASA Student Launch Initiative, NASA Lunabotics Engineering Competition, NASA Human Exploration Rover Challenge, NASA RASC-AL Competition, and Micro-g NExT and increase the number of women and number of minorities participating on such teams.

b. **Action Plan** – The FSGC shall promote the NASA led projects to Florida universities/colleges and encourage participation by providing seed funding to selected teams. FSGC shall seek to recruit 7 teams, competing in the various NASA led student projects, comprised of at least 4 members per team, on an annual basis. Over the course of this grant it is expected that 30% of the recipients will be underrepresented minority students and 30% will be female students.

3.3 Increase both the quantity of aerospace work in Florida as well as the overall quality of advanced technology projects that support NASA Kennedy Space Center's technical needs.

a. **S.M.A.R.T Objective** – Integrate topics from NASA Kennedy Space Center into Senior Design Programs at Florida universities, and facilitate communication and collaboration between the two.

b. **Action Plan** – The FSGC shall contact faculty members at Florida universities/colleges teaching senior design classes and distribute technical topics which have been identified by the Kennedy Space Center. On an annual basis, FSGC shall fund travel expenses for 6 university teams per year to travel to Kennedy Space Center at least 3 times to collaborate with scientists and engineers. It is expected that each team will have at least 5 students. There will be at least 5 projects from KSC. Over the course of this grant it is expected that 30% of the recipients will be underrepresented minority students and 30% will be female students.

3.4 Increase both the quantity of aerospace work in Florida as well as the overall quality of advanced technology projects that support NASA Kennedy Space Center's technical needs.

a. **S.M.A.R.T Objective** – Integrate topics of interest to HEOMD into Senior Design Programs at Florida universities.

b. **Action Plan** – The FSGC shall contact faculty members at Florida universities/colleges teaching senior design classes and distribute technical topics to them which are relevant to HEOMD. The FGSC will work to recruit 4 project teams with at least 4 members per team, per year. Over the course of this grant it is expected that 30% of the recipients will be underrepresented minority students and 30% will be female students.

3.5 Provide STEM engagement experiences related to NASA technologies for middle school students in underserved areas.

a. **S.M.A.R.T Objective** – Recruit and mentor teams from underserved areas to compete remotely in the Public Library Rover Competition held at the Kennedy Space Center Visitor Complex.

b. **Action Plan** – The FSGC will promote this competition by working with the Florida Public Library Association to distribute information to its members. Each year, the FSGC will recruit 3 public libraries in underserved areas and each library will form 3 teams. Each team shall be comprised of at least 4 students. FSGC will send a representative to each library to host a one-day workshop using rovers. Thereafter, students will participate in a competition with other libraries. The competition shall challenge students stationed at their libraries to remotely operate rovers located at the Kennedy Space Center Visitors Center.

4. Space Technology Mission Directorate (STMD) Projects

4.1 Provide resources and experiences for university students and faculty that supports the Space Launch Systems.

a. **S.M.A.R.T Objective** – Engage student teams to design and build a hybrid powered rocket in the Hybrid Rocket Competition, and maximize the number of women and underrepresented minorities.

b. **Action Plan** – The FSGC shall promote the Hybrid Rocket Competition to Florida universities/colleges and encourage participation by providing seed funding to selected teams. FSGC shall seek to recruit 8 teams comprised of at least 5 members per team, on an annual basis. Over the course of this grant it is expected that 30% of the recipients will be underrepresented minority students and 30% will be female students.

4.2 Increase both the quantity of aerospace work in Florida as well as the overall quality of advanced technology projects that support NASA Kennedy Space Center's technical needs.

a. **S.M.A.R.T Objective** – Integrate topics of interest to STMD into Senior Design Programs at Florida universities.

b. **Action Plan** – The FSGC shall contact faculty members at Florida universities/colleges teaching senior design classes and distribute technical topics to them which are relevant to STMD. The FGSC will work to recruit 6 project teams with at least 4 members per team on an annual basis. Over the course of this grant it is expected that 30% of the recipients will be underrepresented minority students and 30% will be female students.

5. Science Mission Directorate (SMD) Projects

5.1 Provide opportunities for university students to engage in scientific research platforms that support a better understanding of our earth, solar system, and universe.

a. **S.M.A.R.T Objective** – Host two academies comprised of university students that take part in a high-altitude balloon workshop at NASA Kennedy Space Center.

b. **Action Plan** – The FSGC will promote the academy by hosting skype sessions in advance and inviting faculty and students to attend these sessions to learn about the project, potential payload experiments, and hardware used. The FSGC will select 15 students through a competitive application process. These students will attend the 4 day academy at the Kennedy Space Center where they will get an opportunity to build a payload, launch the high altitude balloon, and participate in meetings with aerospace professionals. This academy will be conducted on annual basis.

5.2 Provide professional development and training for middle and pre-service school teachers in STEM curriculum related to NASA's Science Mission Directorate Research, specifically the Earth Science Division.

a. **S.M.A.R.T Objective** – Provide professional development workshops at the Challenger Learning Center for middle school and pre-Service teachers, and empower these teachers to train students from their schools to participate in critical thinking activities hosted at the Challenger Learning Center. The workshops will increase teachers' content knowledge regarding space exploration, physical and earth/space science.

b. **Action Plan** – The FSGC will work with the Challenger Learning Center to recruit at least 11 middle school teachers and 10 pre-service teachers from at least 10 schools who will participate in a workshop at the Challenger Center. There will be 1,500 students participating in NASA educational activities at the Challenger Center. These activities shall occur annually.

5.3 Increase awareness of NASA's Human Exploration and Operations Mission and Science Mission Directorates' research priorities, while engaging the public in hands-on, informal science learning.

a. **S.M.A.R.T Objective** – The Orlando Science Center will integrate NASA-inspired content into new or existing live shows, workshops, or other public programming offerings.

b. **Action Plan** – Along with FSGC support, the Orlando Science Center will integrate NASA-inspired content into programming offerings by training team members, over the course of 4 months per year, on equipment and for mentorship, and materials costs to such offerings that will incorporate monthly, weekend, or daytime themes. Each offering will be space-themed and incorporate topics and concepts implemented by HEOMD and SMD, such as robotics, human exploration, and planetary sciences.

6. Competitive Projects

6.1 Facilitate the expansion and diversification of Florida's aerospace industry by supporting student and university research relevant to NASA KSC's technology needs and other NASA priorities.

a. **S.M.A.R.T Objective** – Implement a competitive project that solicits proposals from universities to undertake space research projects that hold the potential for expansion in the areas of: additional outside funding, commercialization, industry leadership, and technological competitiveness for Florida overall.

b. **Action Plan** – The FSGC will work with the Kennedy Space Center to identify technological needs which are of importance to upcoming NASA missions and initiatives. The FSGC shall solicit proposals from Florida universities/colleges under four Mission Directorates. A panel comprised of academic and industry representatives shall review proposals and competitively award at least 7 university proposals, with 1 student per proposal. Over the course of this grant it is expected that 40% of the recipients will be underrepresented minority students and 45% will be female students.

6.2 Advance early stage technologies, patented by NASA KSC, by engaging universities to pursue commercialization of these technologies.

a. **S.M.A.R.T Objective** – Build upon a pilot program launched in 2015, by soliciting and competitively selecting proposals from universities identifying dual use potential of specific KSC patented technologies.

b. **Action Plan** – The FSGC shall work with Kennedy Space Center’s Office of Technology Transfer to identify patents which hold promise for commercialization in the private sector. The FSGC shall distribute a synopsis of available patents to Florida university/colleges, and solicit proposals for advancing these technologies. It is expected that at least 1 award will be made during this grant cycle, with 1 student participating.

6.3 Create opportunities for students to interact with engineers and scientists to collaborate on research relevant to NASA’s technology needs and other NASA priorities.

a. **S.M.A.R.T Objective** – Provide funding for students to travel to conferences and workshops to present the findings from space research conducted at their university.

b. **Action Plan** – FSGC shall distribute applications to students working on an FSGC sponsored space research project. Students will be required to outline their findings and provide an abstract for their presentation. FSGC will select 5-10 students on an annual basis and fund their travel expenses to attend 1-2 day meetings at various conferences and workshops to present their findings.

**ACTIVITY CONTRIBUTIONS TO PERFORMANCE GOALS (PG)
AND SUCCESS CRITERIA**

List appropriate FY 2020 PGs and Success Criteria and write a brief description of the project activity’s contribution to each.

PG 3.3.3: Provide opportunities for students to engage with NASA’s aeronautics, space, and science people, content, and facilities in support of a diverse future NASA and aerospace industry workforce.

PG 3.3.3 Success Criteria: Meet or exceed the national average in two of the four categories of student diversity for NASA STEM enrollees in internships, fellowships, or other student engagement opportunities. Diversity Categories: (1) students across all institutional categories and levels (as defined by the U.S. Department of Education), (2) racially or ethnically underrepresented students (Hispanics and Latinos, African Americans, American Indians, Alaska Native, Native Hawaiians and Pacific Islanders), (3) women, and (4) persons with disabilities at percentages that meet or exceed national averages for science and engineering

enrollees, as determined by the most recent, publicly available data from the U.S. Department of Education's National Center for Education Statistics.

Response to PG 3.3.3 and/or PG 3.3.3 Success Criteria goes here:

I. NIFS

(a) Masters Fellowship Program. The FSGC Masters Fellowship Program provides a prestigious instrument to reward and attract the best and the brightest US citizens to space related careers. Accordingly, each Fellow will receive an Academic Year 2020-2021 fellowship stipend of \$10,000 for being a full-time Masters student. In the Fall of 2020, we selected 7 Masters fellows from 4 universities (Univ. of Central Florida, Univ. of Florida, Florida State University and Univ. of South Florida). The field of study was varied. The students are in the following fields (Planetary Science, Mech. Eng., Chemical Eng., Meteorology, Aerospace ng, Geological Sciences and Aerospace Eng.). The Mission Directorates served by these projects are HEO (2 projects), SMD (3 projects), ARMD (1 project), and ST (1 project). 2 of the 7 awardees are women and 2 are under-represented.

(b) Dissertation Improvement Fellowship: These grants provide partial support (funds cannot be used for salaries and/or tuition) of Master's Thesis and Doctoral Dissertation research for improvement beyond the already existing project. The duration cannot be more than one year and the maximum fellowship amount is \$5000. These awards are intended to provide supplemental funds for items not normally available from the student's university or other sources. They are not intended to provide the total costs of a student's dissertation research. 13 students from 3 universities (Univ. of Central Florida, Florida State Univ, and Univ. of South Florida) were awarded the fellowships. 3 of the projects are aligned with HEOMD, 3 with SMD, 2 with ST, and 5 with ARMD. 4 of the awardees are women and 3 are under-represented

(c) NASA Internships: Florida students are requested to apply for NASA internships through the NASA internship website. Selected students are supported by FSGC taking into account the diversity of the students and their universities. The student list was provided by the different NASA Centers. FSGC supported 4 undergraduates in the Summer and 1 undergraduate in the Fall who is working part-time. 4 of the interns were at the Kennedy Space Center and 1 at Marshall. 1 of the interns was a woman and 1 under-represented minority. Interns came from 3 universities (Florida State Univ., Univ. of Florida and Embry-Riddle Aeronautical Univ.)

(d) Bethune Cookman Scholarships. The B-CU STEM Internship Award will assist twenty (21) students at Bethune-Cookman University by awarding each of them a \$1,000.00 supplemental microgrant. These awards are intended to defray some of the incidental costs associate with college enrollment. The students will meet multiple required criteria: The student must have a declared major in the College of Science, Engineering, and Mathematics (STEM fields), or have an interdisciplinary studies major with the intent of switching to a STEM major before the end of the academic year and be in consultation with an advisor for that intended STEM major. The student must be a US citizen and the student must have at least \$1,000.00 awarded in non-federal scholarship or grant money.

From the students meeting the above required criteria, students were nominated by the department chairs and academic advisors in the College of Science, Engineering, and Mathematics. Twenty-one of the nominated students were selected to receive these awards. Inside Higher Ed in "Small Grants, Big Impact," (February 22, 2016) reports on several studies showing that microgrants, such as the awards provided by this program, greatly

increase student retention and graduation rates. By increasing the retention and graduation rates in the Science, Technology, Engineering, and Mathematics (STEM) fields, the goals of the NASA FSGC are supported, specifically enhancing STEM awareness, literacy, education and excellence in Florida's citizens, public and private educational systems, and workforce

10 female, 11 males. 21 under-represented

(e) Affiliate scholarships: Supported 2 undergraduate and 1 graduate student as scholars. 2 were women and 3 under-represented

Total NIF : 48 awardees (**19 women (40%), 29 under-represented 60%**)

II Competitive Programs - Research: The purpose of Florida Space Research program is to support the expansion and diversification of Florida's aerospace industry by addressing workforce development, including student research experience, and increasing statewide academic involvement in space research, technology development, engineering, education and training programs that are consistent with the state's space industry priorities. In 2020-21, FSGC-SF has funded 12 space research and education grants under the Florida Space Research Program (FSRP) totaling of \$299,966 which includes \$100K from Space Florida (The awards to 4 PI's will be given when we get the funds from Space Florida). Matching funds totaled \$230,435. The program is comprised of 4 categories – Science Mission Directorate, Human Exploration and Operations, Space Technology, and Aeronautics. The State of Florida and Space Florida have been significant contributors to the Florida Space Research Program for five years. The FSRP 2020 awardees include 7 Florida universities. A total of 28 proposals were received. Each submission was independently evaluated by a team of experienced professionals from Kennedy Space Center and other universities and NASA centers.

18 students were supported by faculty from the 12 projects. 7 of the students are undergraduates and 11 are graduate students. 7 of the awardees are women (39%) and 4 were under-represented minorities (22%)

Success Criteria

1. Racially or ethnically underrepresented students (Hispanics and Latinos, African Americans, American Indians, Alaska Native, Native Hawaiians and Pacific Islanders)

We have supported 48 students with fellowships, scholarships or internships. Our goal was to support at least 31 students. 29 of the students were underrepresented students (59%). This has exceeded our goals and the national goals. We have also supported 18 students working on research projects with their faculty mentors. 4 of these students were under-represented minorities. (22%). This was below our goal of 40%. One reason is that faculty find it difficult to recruit under-represented minorities for their research projects. That is not the case for fellowships or scholarships

2. Women

We have supported 48 students with fellowships, scholarships or internships. 19 of the students were women (40%). This was below our goal of 45%.

For our competitive research programs, we supported 18 students. 7 of the awards were to women (39%). We have no control over the selection of the students as they are selected by faculty after receiving their awards. We encourage all faculty to recruit women and under-represented minorities.

PG 3.3.4: Enhance the effectiveness of education investments using performance assessment and evaluation-driven processes.

PG 3.3.4 Success Criteria: Discuss how the Consortium has or plans to implement evaluation-driven processes to assess the overall impact of the Consortium and its activities.

Response to PG 3.3.4 and/or PG 3.3.4 Success Criteria goes here:

As a first cut, we are working with our SMART matrix to see whether we reached our target number for our goals. Based on that we intend to make minor changes to our programs. We are hesitant to make major changes right now since COVID-19 has mildly impacted our goals. In a month or so, we plan to sit down with Dr. Bonnie Swan, a nationally recognized expert in program evaluation, assessment, and applied social research at the lead university, University of Central Florida. he is currently the Director for Program Evaluation and Educational Research Group (PEER), a service center at the University of Central Florida (UCF) where she has been responsible for conducting contract evaluations and research both on campus and with outside agencies and institutions for over a decade. She is very familiar with the Florida Space Grant Program and has helped evaluate a number of student workshops for pre-service teachers. She will be able to guide us with the proper evaluation techniques, specially for Year 2 of our grant.

At present, we have met our target goals for our NIFS program and Research programs. These programs constitutes the bulk of our funding. We have also met our target for most of our higher education programs, except for the Ballooning programs. We have avoided having this program so far because of COVID. However, withing the next 2 months, we will decide whether to have the programs in the summer of have it virtual during the next 2 months.

Finally, in April we plan to go through our goals and objectives. From our experience with the way students managed their studies during the pandemic, we have already decided that we will be targeting students in rural areas with low internet connection. We plan to work with local authorities to help these students with internet connectivity and see to it that they are aware of all our programs and participate in the programs.

PG 3.3.5: Provide opportunities for students to contribute to NASA's aeronautics, space, and science missions and work in exploration and discovery.

PG 3.3.3 Success Criteria: Number of paper presentations and peer-reviewed research publications (and beginning in FY2021 to include student proposed solutions and products) resulting from STEM engagement investments. (Target number is 1,300)

Response to PG 3.3.5 and/or PG 3.3.5 Success Criteria goes here:

III Human Exploration Mission Directorate (HEOMD) Projects

(a) Rover Competition Rover Reduction: FSGC plans a 4-year series of innovative Engineering Senior Design competitions for Small Rover technology development with competitors building upon the NASA Kennedy Mini- RASSOR robot foundation and the open source EZ-RASSOR software environment. EZRASSOR itself is the result of such a Senior Design project. Teams will compete each year to advance a technology area with the winning design(s) serving as the base platform for the subsequent competition(s).3 teams

from 2 universities are taking part in Year 1

(b) NASA Competitions. FSGC, so far, is supporting 2 teams from Univ. of Central Florida and 1 team from Univ. of South Florida to participate in the Spacesuit User Interface Technologies for Students (SUITS). SUITS challenges students to design and create spacesuit information displays within augmented reality (AR) environments. FSGC has provided support to the 3 teams.

(c) Senior Design Projects at KSC: The Plan is for FSGC to integrate with Florida University Senior Design Programs and Partner with the Kennedy Space Center (KSC), to increase both the quantity of aerospace work in Florida as well as the overall quality of advanced technology (STEM / STEAM) projects. 3 teams from Univ. of Central Florida, 4 teams from Univ. of South Florida and 1 team from Embry-Riddle are taking part in the KSC led senior design projects

(d) Senior Design Projects: FSGC is supporting 2 teams from Florida State University, 1 team from Univ. of Miami for senior design projects

(e) Public Library Rover Competition. FSGC had planned to hold a rover competition for middle school children at schools in Florida's underserved areas during the Summer. Unfortunately, due to the COVID crisis, we decided to postpone this competition until Summer of 2021. Instead of this library program and with the permission of Space Grant HQ and NSSC we used the funds to support 20 university and college teams in a new national competition called Plant the Moon Challenge. Participants in the Plant the Moon Challenge will join a global science experiment and research challenge to examine how vegetable crops can grow in lunar soil. Each team will receive real lunar soil simulant from the University of Central Florida's CLASS Exolith Lab! They are designing and conducting a set of experiments using this lunar simulant to grow crops for a future long-duration lunar mission.

In summary, only the Public Library Rover project has been postponed to Summer of 2021

151 students are participating in these projects. 126 are undergraduates and 15 are graduate students. 38 of these students are women (25%) while 42 are under-represented minorities (28%)

IV Space Technology Mission Directorate (STMD) Projects

(a) Hybrid Rocket Competition The objective of this competition is for student teams to design and build a hybrid powered rocket. There are two categories of competition to choose from; the first would be to reach the maximum altitude and the second would be to fly the rocket closest to 2,000 feet in altitude. We are supporting 2 teams to build and launch their own rockets in their respective campuses.

(b) Senior Design Project: We are supporting 1 team from Florida State University for their senior design project

V Science Mission Directorate (SMD) Projects

(a) FSGC Academy We plan to host two, 4-day Academies, in the Spring of 2021, where we select 15 to 16 students from Florida universities to come to the Kennedy Space Center Visitor Complex (KSCVC) to take part in a 4-day workshop. Right now we are waiting for students to be vaccinated before they are grouped together. We may do one virtual academy in April and do the second one mid-summer when we hope that most of the students will be vaccinated.

(b) Challenger Learning Center Teacher Workshops: This project provides a six-hour professional development workshop for eleven (11) middle school teachers and ten (10) pre-service teachers each year; curriculum for classroom instruction; and student engagement challenges for the students of the teachers attending the workshops to demonstrate their new knowledge and excitement for space exploration by conducting a simulated NASA space mission. This has just been awarded to the Challenger Center. The workshops will be held in the Spring of 2021.

(c) Orlando Science Center: Building upon the successful implementation of Florida Space Grant Consortium-supported public programming workshops offered within The Hive: A Makerspace in FY19, Orlando Science will be training team members and purchase materials costs to generate new and upgrade existing public program offerings with NASA-inspired content during FY20 – FY24. The following programs will be upgraded or expanded upon by incorporating new NASA-inspired content and material. (Science on a Sphere Programming, Astronomy Month Programming, KidsTown Programming, The Hive: A Makerspace Programming, and Observatory Programming)

(d) South Florida Surveillance Balloon Competition:

This competition has been postponed to the Spring of 2021. This competition will be open to the undergraduate students who study at the Florida colleges and universities located below the Marion County – Volusia County line. The competition will be designed to give aerial surveillance, additive manufacturing, electronic equipment control, picture taking and system tracking experience to the students. Right now, we do not want to host the competition because the students are not vaccinated. We are expecting most to be vaccinated in a couple of months. We then intend to hold the competition. We plan to finish by the end of May of mid-June.

Success Criteria

All of our programs are directly aligned with NASA's Mission Directorates. Summarized below are the projects.

Human Exploration Mission Directorate

FSGC is supporting 3 teams who were selected to participate in the NASA's Spacesuit UserInterface Technologies for Students (SUITS) Design Challenge. This is directly connected to the Space Technology Mission Directorate and the Human Exploration and Operations Mission Directorate. In addition, one team from Florida State University is participating in the Human Exploration Rover Challenge. In addition, 20 teams from Florida K-12 schools and universities and colleges are participating in a new project called Plant the Moon Challenge which is directly aligned to the Human Exploration and Operations Mission Directorate.

FSGC and Kennedy Space Center are also supporting 8 teams from Florida universities on senior design projects that are aligned to KSC priorities and the HEO Mission Directorate.

Space Technology Mission Directorate:

FSGC is supporting 1 team for a National Rocket Competition and 2 teams in FSGC's Hybrid Rocket Competition.

Science Mission Directorate

The Challenger Center at the Florida State University is conducting a six-hour professional development workshop for eleven (11) middle school teachers and ten (10) pre-service teachers

based on a NASA Mission. This will be completed by the end of April. In addition, FSGC is working with the Orlando Science Center to train team members and upgrading a number of exhibits including Science on a Sphere Programming, Astronomy Month Programming, KidsTown Programming, The Hive: A Makerspace Programming, and Observatory Programming. These are all aligned with the Science Mission Directorates. Final number of participants will be available in May of 2021.

NOTE: For the following categories, complete if applicable to your base award. If not applicable, indicate “Not Applicable”.

BASE AWARD ACCOMPLISHMENTS: (250 – 500 words)

We have met our target goals for our NIFS program and Research programs. These programs constitute the bulk of our funding. We have also met our target for most of our higher education programs, except for the Ballooning programs. We have avoided having this program so far because of COVID. However, withing the next 2 months, we will decide whether to have the programs in the summer of have it virtual during the next 2 months. For k-12 programs, we are working with the Challenger Center at the Florida State University to conduct teacher workshops. This is continuing this semester. For our informal science project, we have teamed up with the Orlando Science Center.

For our NIFS Programs, we have supported:

- 7 Masters Fellows (2 women (W) and 2 under-represented minorities (URM))
- 13 graduate fellowships for thesis improvement (4 W and 3 URM)
- 24 scholarships to undergraduate students (12 W, 24 URM)
- 4 interns at NASA centers (1 W and 1 URM)

The projects conducted by these students were aligned to all four Mission Directorates

For our competitive program, we focused our attention on our flagship program (Florida Space Research Program). All the four Mission Directorates were represented by the 12 projects. 18 students were supported by faculty from the 12 projects. 7 of the students are undergraduates and 11 are graduate students. 7 of the awardees are women (39%) and 4 were under-represented minorities (22%).

151 students are participating in hands-on projects either through NASA competitions or through senior design projects. 126 are undergraduates and 15 are graduate students. 38 of these students are women (25%) while 42 are under-represented minorities (28%)

Since most of our programs began in the Fall semester, it is difficult to provide any highlights. However, one of the NASA interns at KSC, Melissa Ma, and supported by FSGC wrote up the pros and cons of a virtual internship

This summer, I completed a virtual 2020 summer internship at NASA Kennedy Space Center. The entire experience was completely virtual; I received a laptop that could VPN into necessary NASA communication tools and databases for completion of my internship. There were several pros to the virtual experience I did not anticipate: the number of webinars and speakers was one. I heard that an in-person traditional internship would have had a max of five speakers throughout 10 weeks. For my internship, there was at least one speaker every week. This way, I could hear people give presentations and host Q&As from many different centers and time zones across the United States. It was also easy

to schedule meetings with people, because their entire schedule was available to see online through Teams. There was no need to locate them in person. The drawbacks to the virtual experience, besides not being able to see rockets launch or handle hardware in person, is the lack of people readily available around you. In traditional internships, your mentor and coworkers were a desk away and could take a look at your work by pulling up a chair next to you. In a virtual environment, sharing screens is somewhat tedious when you have multiple windows open. While we were all available at our emails, shooting emails back and forth all day does not beat face-to-face conversations or phone calls. Of course, everyone had to overcome these difficulties and I believe my mentor and I did our best to overcome the virtual walls.

NCAS AND SPACE GRANT PILOT ACCOMPLISHMENTS (If applicable): (250 – 500 words)

Not Applicable

BIG Idea FY2020 ACCOMPLISHMENTS (If applicable): (250 – 500 words)

Not Applicable

FIRST NATIONS LAUNCH (If applicable): (250 – 500 words)

Not Applicable

ACTIVITY IMPROVEMENTS MADE IN THE PAST YEAR:

(e.g. activity management, cost efficiencies) (100 – 250 words)

Since the whole Space Grant Team have been working remotely since March of 2020 and all our meetings, including the Fall Advisory Board meeting have been virtual. This means we have not used any of our travel funds. We plan to request Space Grant HW to shift funds from Travel to internships, so that we can support 2 more interns during the summer of 2021. The FSGC staff meets virtually once or twice a week and is in daily touch via email and phone calls.

ACTIVITY PARTNERS AND ROLE OF AFFILIATES IN ACTIVITY EXECUTION:

Bulleted list or table. Should include a brief description of how affiliates were involved in the project activity.

Listed below are all of FSGC's affiliates. Funds are not provided directly to affiliates for implementation of programs. FSGC awards are all competitive and awards are given to the respective PI's in their institution. The affiliate institution is responsible for sending final reports and all other relevant documentation to the FSGC offices. The only roles the affiliates have is to ensure that information from the FSGC office is being sent to all interested faculty and students and to ensure timely technical and financial reports to the FSGC office. In addition, the FSGC advisory Board, comprising of representatives from all 21 affiliates meet twice a year to approve the budget and FSGC programs.

Academic

- **Bethune-Cookman University** (4-year historically black college awarding exclusively baccalaureate degrees): FSGC has a scholarship program with Bethune Cookman.
- **Broward College** (4-year Hispanic college Bachelor of Science degrees in addition to their 2-year degree programs).
- **Embry-Riddle Aeronautical University** (University awarding baccalaureate and master's degrees). Actively takes part in the fellowship, higher education and research programs
- **Eckerd College** (Private, 4-year college awarding exclusively baccalaureate degrees)
- **Florida Atlantic University** (University awarding degrees up through the Ph.D) Actively takes part in the fellowship, higher education and research programs
- **Eastern Florida State College** (community college that is now a 4-year college) Actively takes part in the higher education programs
- **Florida Gulf Coast University** (4-year college awarding baccalaureate and graduate degrees) Actively takes part in the higher education programs ad
- **Florida Institute of Technology** (Private University awarding degrees up through the Ph.D). Actively takes part in the fellowship, higher education and research programs
- **Florida International University** (University awarding baccalaureate and master's degrees, Hispanic Serving Institute) . Actively takes part in the fellowship, higher education and research programs
- **Florida State University** (University awarding degrees up through the Ph.D). Actively takes part in the fellowship, higher education and research programs
- **Florida A&M University** (University awarding degrees up through the Ph.D.; Historically Black College or University) Actively takes part in the research programs
- **Florida Polytechnic University** (Engineering University awarding bachelors and Masters degrees) Actively takes part in the fellowship, and higher education programs
- **University of Central Florida – Lead University:** (University awarding degrees up through the Ph.D) Actively takes part in the fellowship, higher education and research programs
- **University of Florida:** (University awarding degrees up through the Ph.D) Actively takes part in the fellowship, higher education and research programs
- **University of Miami** (Private University awarding degrees up through the Ph.D) Actively takes part in the fellowship, higher education and research programs
- **University of North Florida:** (University awarding baccalaureate and master's degrees) Actively takes part in the fellowship, higher education and research programs
- **University of South Florida:** (University awarding degrees up through the Ph.D) Actively takes part in the fellowship, higher education and research programs
- **University of West Florida:** (University awarding baccalaureate and master's degrees) Actively takes part in the scholar, and higher education programs

State Agency

- **Space Florida** (State/Local Government): Space Florida was created by the Florida Legislature to sustain Florida's position as the global space leader. Space Florida provides \$100K for the FSGC research program

Federal Agency

- **Kennedy Space Center** (Federal Center): KSC is the NASA center of excellence for launch and payload processing systems. KSC is partnering with FSGC on the pilot Technology Development and Commercialization Program by providing potential topics for commercialization. They are also proving us with senior design topics.

Non-Profit

- **Astronauts Memorial Foundation** (Private 501(c)(3) not-for-profit organization): The Astronauts Memorial Foundation honors and memorializes those astronauts who have sacrificed their lives for the nation and the space program by sponsoring the national Space Mirror Memorial, and by implementing innovative educational technology programs. AMF, through its Educator Resource Center, conducts teacher workshops.

Science Centers

- **Orlando Science Center** (Science Museum): Orlando Science Center offers hands-on fun for all ages through engaging interactive exhibits, live programming, giant-screen films, school field trips and school-break camps. The science Center conducts the Informal Science program for FSGC

CURRENT AND PROJECTED CHALLENGES:

Identify any current or projected challenges in the implementation or execution of activities. Explain how the management team is working to address the challenges identified and/or how National Program Staff can assist.

We have been able to start most of our programs, except two. Both are ballooning programs involving a group of students from various universities getting together to build payloads to be launched on a weather balloon. One is targeted for the students in the South Florida area and the other is open to students all across the state and will be conducted at the Kennedy Space Center Visitor Complex. We are reluctant to take the responsibility and risk of these students being infected by the COVID-19 virus. We are hoping that all these students will be vaccinated by the middle of May and then plan to host both the programs by the end of May or early June. In the meantime, we are looking at the possibility of having a part of the programs online and then gather for 1 day to build the payload and launch. This is not a very exciting option. We are hoping to have this program, in person, in June.

REFERENCES (optional – include only if needed):

(APA style reference list)