

California Space Grant Consortium  
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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 California Space Grant Consortium is a Designated Consortium funded at a level of **\$760,000** for fiscal year 2016.

B. PROGRAM GOALS

1. Promote diversity and inclusion in all programs and activities by encouraging participation by underrepresented minority and female students and faculty. *1A:* Each academic year, provide a percentage of awards to underrepresented minority and female students that is consistent with diversity targets established by NASA. The diversity targets for the state of California are currently 42% for awards to minority students and 40% for awards to female students. *1B:* Undertake at least three collaborative programs with a non-member Minority Serving Institution (MSI) each year. *1C:* Each academic year, conduct at least one outreach event in partnership with a non-member MSI to promote programs and opportunities to students and faculty.
2. Conduct quality internship, scholarship and fellowship programs including STEM (Science, Technology, Engineering, and Math) research awards for community college, undergraduate and graduate students to broaden and deepen students' knowledge and prepare them for advanced STEM degrees or STEM employment. *2A:* Each academic year, award undergraduate, graduate, and community college students with internships, scholarships and fellowships. Students will be competitively selected by a review panel. *2B:* Award at least the minimum funding amount required by NASA (currently \$150,000) to at least 50 students each academic year. *2C:* Each academic year, provide a percentage of fellowship/ scholarship

awards to underrepresented minority and female students that is consistent with diversity targets established by NASA. The diversity targets for the state of California are currently 42% for awards to minority students and 40% for awards to female students. *2D*: Longitudinally track 100% of all students receiving significant awards to identify their next step in academia or the workforce. Significant awards are those equal to or greater than \$5,000 or 160 contact hours, cumulatively, or a combination of both. *2E*: At least 90% of students completing their education and receiving significant awards will be employed by NASA, an aerospace contractor, higher education or other educational institutions. *2F*: At least 50% of undergraduate students receiving significant support from CaSGC will move on to advanced education in NASA-related disciplines.

3. Undertake programs that foster research capabilities at our affiliate institutions and serve as a catalyst for linking university researchers to NASA and other opportunities. *3A*: Each academic year, support at least three interdisciplinary student research infrastructure projects in partnership with CaSGC affiliate institutions. *3B*: Each academic year, involve at least 10 students in research infrastructure projects in partnership with CaSGC affiliate institutions. *3C*: Each academic year, provide a percentage of research infrastructure awards to underrepresented minority and female students that is consistent with diversity targets established by NASA. The diversity targets for the state of California are currently 42% for awards to minority students and 40% for awards to female students.
4. Offer quality interdisciplinary hands-on higher education programs in partnership with our affiliate institutions to prepare students for STEM employment. *4A*: Each academic year, provide paid internships for at least five students at California NASA Centers and at least one student at an industry partner. *4B*: Each academic year, conduct at least five hands-on interdisciplinary higher education projects in partnership with CaSGC affiliate institutions. *4C*: Each academic year, involve at least 50 students in hands-on interdisciplinary higher education projects in partnership with CaSGC affiliate institutions. *4D*: Each academic year, involve students from underrepresented backgrounds in hands-on higher education projects at a level consistent with diversity targets established by NASA. The diversity targets for the state of California are currently 42% for awards to minority students and 40% for awards to female students. *4E*: Each academic year, at least 70% of MSI affiliates will be involved in our higher education programs. Currently there are 8 MSI affiliates. *4F*: Each academic year, at least two new or revised courses targeted at the STEM skills needed by NASA will be developed with CaSGC support.
5. Pre-service and in-service educators and student-focused programs for students throughout the precollege pipeline. *5A*: Each year, provide professional development in STEM using NASA resources to at least 30 pre-service and/or in-service teachers. *5B*: Each year, reach over 150 precollege students by conducting student-focused programs and activities promoting participation in STEM and related careers. *5C*: At least 75% of precollege educators participating in two or more days of professional development will use NASA resources in their classroom following the workshop. *5D*: At least 60% of precollege educators receiving NASA resources or participating in CaSGC-led short duration activities will use NASA resources in their classroom. *5E*: At least 50% of all precollege students participating in CaSGC-sponsored programs will express an interest in STEM careers.

6. Conduct Informal Science Education programs in partnership with formal and informal education members and partners. *6A*: Each academic year, utilize material developed in CaSGC's other program elements to inspire and engage the general public in at least 4 science-related events and university open houses. *6B*: Sponsor at least one program each year with the Reuben H. Fleet Science Center, the San Diego Air & Space Museum, and/or the California Science Center. *6C*: Consider other appropriate informal science education opportunities as funding and partnerships permit with the goal of at least one other activity per year.

### C. PROGRAM/PROJECT BENEFITS TO PROGRAM AREAS

1. From California State University, Sacramento (CSUS), CA Space Grant funded mechanical engineering student Felipe Valdez was featured on NASA's web page in the feature article, "Felipe Valdez: Life at a Crossroads," December 2016, <https://www.nasa.gov/feature/felipe-valdez-life-at-a-crossroads>. As an immigrant from Mexico, Felipe moved to Yuba City, an hour outside of Sacramento, CA, where he started high school. Despite the challenge of integrating into a new culture and learning a new language, Felipe excelled in all his courses and graduated with an excellent GPA. After graduating from high school, he went on to attend first Yuba Community College and then at CSUS for his bachelors and is now currently working on his masters there. Throughout his higher academic career, Felipe has received many honors and accolades such as the Mathematics, Engineering, and Science Achievement (MESA) Student of the Year award. As a graduate student funded by Space Grant, Felipe has had the opportunity to work alongside one of his professors and NASA fellow Dr. Jose Granda on NASA research projects. Felipe was involved in designing a control system for the NASA Morpheus Project space vehicle, in collaboration with colleagues at NASA Johnson Space Center. While completing his internship at NASA's Armstrong Flight Research Center the following semester, he and two other CSUS students worked on the next objective, which is the design of a more advanced control system on Morpheus, the very same vehicle he had worked on during his undergraduate research. He aimed to create a system that would allow the vehicle to perform complex maneuvers autonomously. "Felipe is the type of intern most mentors desire," said his NASA mentor, Oscar Murillo. "He is eager to engage in the research, asking questions to figure out the next step, and willing to learn new skills to accomplish the tasks."
2. On April 8th, 2017, UC Santa Barbara's (UCSB) NASA Directed Energy Interstellar program team consisting of a group of students, one professor (Dr. Philip Lubin), and two staff scientists were featured presenters at "Yuri's Night" at the Los Angeles Museum of Science and Industry. The event was attended by around 1400 people, and the UCSB team was one of the most popular tables. The students showcased laser array demos, explained the 'space craft on a chip' microcircuitry, and allowed participants to look through two microscopes at colonies of *C. elegans*, the first interstellar travelers who will fly on board their wafer-scale spacecraft they are testing for the NASA Starlight and Breakthrough Starshot's trip to Alpha Centauri.
3. To be able to maintain a competitive advantage in the global economy, institutions of higher education must look toward untapped populations of the community through which to recruit and retain the best and most qualified individuals for the engineering workforce. California

State Polytechnic University, Pomona (CPP) and California State University, Long Beach (CSULB) with “seed” funding from the CA Space Grant, had developed and maintained their program “Maximizing Engineering Potential (MEP): Preparing the Next Generation of Minority & Women Engineers” with projects such as “My Daughter is an Engineer” and “Engineering Girls – It Takes A Village” which focus on historically under-represented minorities, low-income, first-generation, and women students. The program leverages the efforts of four engineering cultural affinity organizations: American Indian Science and Engineering Society (AISES), National Society of Black Engineers (NSBE), Society of Hispanic Professional Engineers (SHPE), and Society of Women Engineers (SWE). Working closely with AISES, NSBE, SHPE, and SWE, this program enriches existing activities to reach out to support those communities that continue to be under-represented in engineering. These activities included outreach events and workshops for K-12 students and educators (including pre-service teachers) as well as community college transfer students. By introducing fundamental concepts in engineering and at the same time incorporating NASA content through creative activities using low-cost materials, outreach integrates engineering material that conforms to K-12 standards. Materials developed and used during the program serve as contextual vehicles for K-12 lesson planning workshops; resultant materials included exemplars of lessons plans and resources for enhancing enjoyment of NASA content learning. Fieldtrips to engineering industry (Boeing, Northrop Grumman, Lockheed Martin, and Southern California Edison) offered participants a view of real-world engineering in the workplace. An aerospace-related fieldtrip (Columbia Memorial Space Center, Downey, California) strengthened K-12 ties to NASA Centers. The ability to expose pre-college students to the excitement of engineering, NASA’s space program, and cutting-edge research is an indirect outcome of having well-trained K-12 educators teach material in their own classrooms.

#### D. PROGRAM ACCOMPLISHMENTS

- NASA Internships, Fellowships, and Scholarships (NIFS): NASA Internships, Fellowships, and Scholarships (NIFS): Nine awards were provided to eight undergraduate and one graduate students. Students were selected based on academic achievement, letters of recommendation, leadership & personal statements. Six awards were given to one graduate and five undergraduate students for the 2017 NASA Summer Internships, in which 2 students are supported at each California NASA Center (SMART Objective 4A). Also included are three Undergraduate Research Opportunities (SMART Objective 3B).
- Higher Education projects: This year we welcomed ten CA Community Colleges - seven veteran (Butte College from Oroville, CA, Cerritos College from Norwalk, CA, College of the Desert in Palm Desert, CA, Irvine Valley College from Irvine, CA, Los Angeles City College from Los Angeles, CA, Rio Hondo College in Whittier, CA, and Victor Valley College from Victorville, CA), and three new ones (Miramar College from San Diego, CA, Mendocino College from Ukiah, CA, and Woodland College, from Woodland, CA). Although we are only funding approximately 100 students (ten from each of the 10 colleges) with scholarships and individual Arduino kits, we’ve been impressed by the overwhelming support from these college campuses who have been able to fund over 50 additional students to participate in the program, one campus as high as 20 additional students. This demonstrates how the “seed”

support of Space Grant has helped developed and grow programs within the CA Community College System where there were very little or no such type of program in existence or support from STEM department administration. Out of the total 159 direct participants this year, 60% are underrepresented minorities and 23% are females.

Our HE projects from our UC affiliates include UC Davis (UCD) Mapping Club, UC Los Angeles (UCLA) Space Physics Exercises, UC Santa Barbara (UCSB) Directed Energy for Space Applications Program, UC Santa Cruz (UCSC) Lamat Program and Undergraduate High-Performance Supercomputer Training, and UC San Diego's Summer Internship Academy.

Other HE projects in the form of Workforce Development programs include Azusa Pacific University (APU) faculty-mentored projects in Biology and Computer Science, Cal Poly Pomona's (CPP) Aerospace Vehicle Laboratory Operations & Field Testing, CSU Fresno (CSUF) Unmanned Aerial Systems program, Sonoma State University (SSU) Cubesat and rocketry projects, CSU Sacramento (CSUS) faculty-mentored projects in space exploration, aeronautics and vehicle dynamics, and University of Southern California (USC) Satellite Tracking Station Operations Training.

These Higher Education projects at the 4-year universities have funded 119 students - 107 undergraduate students and 12 graduate students. Out of these students, 32% were females and 36% were underrepresented minorities.

- Research Infrastructure projects: Two major research was conducted by UC Davis (UCD) regarding meteorological controls on foginess along coastal California and UC Santa Barbara (UCSB) on directed energy for interstellar exploration and planetary defense. Seven students were directly funded, however, there were hundreds of participant who were reached via these research activities.
- Precollege projects: The CaSGC conducted six (6) activities in a progression of educational opportunities involving precollege students, pre-service teachers, and in-service teachers to engage and educate in the STEM disciplines. At Cal Poly Pomona (CPP), a CaSGC sponsored project titled, "Maximizing Engineering Potential: Preparing the Next Generation of Minority and Women Engineers" has created STEM-based teaching tools which introduce fundamental concepts in engineering and, at the same time, incorporate NASA content through creative activities using low-cost materials. These same teaching tools will be used for outreach which will integrate engineering material that conforms to K-12 standards.

In preparation for the total solar eclipse on August 21, 2017, the Astronomical Society of the Pacific (ASP) designed three professional development workshops in San Francisco, CA, Fresno, CA, and Stockton, CA, to engage teachers with high percentages of underrepresented students and to help them focus on a Next Generation Science Standards (NGSS) approach for classroom instruction on solar and lunar eclipses.

At the UC System, UC Riverside (UCR) held their annual Regional Engineering Education Learning (REEL) conference which provides training for math and science teachers through

teacher workshops and a vibrant and interactive platform that will help teachers build their STEM expertise and provide tools and techniques for making STEM topics come alive in the classroom. At UC Santa Barbara (UCSB), in the form of outreach talks, professional educator talks, and invited talks at NASA and military centers, over 50 educational professional development events were given dealing with directed energy for interstellar travel and planetary defense as well as providing high school educators to work on NASA-sponsored lab projects. To meet the challenge of visualization to the scientific knowledge discovery process, at UC Santa Cruz (UCSC), scientists have developed education materials and teacher-awareness sessions to engage students in research, develop high school curriculum materials, connect communities as disparate as space sciences and the visual arts, and disseminate the scientific messages.

Other CaSGC sponsored precollege activities include International Space Station (ISS) projects at two CA middle schools, McCaffrey Middle School in Galt, CA, and Elk Grove Unified School District. At McCaffrey Middle School, disadvantaged Hispanic students collaborate with Dr. Norman Lewis at Washington University to understand the effects of the microgravity environment of ISS on plant growth/development for future long duration space exploration and colonization of other extra-terrestrial land types. At the Elk Grove Unified School District, a local Flight Experiment Design Competition is conducted for the Student Spaceflight Experiments Program (SSEP) Mission 11 to the ISS in late Spring 2017 where their student teams vie to fly an experiment in low Earth orbit in a real research mini-laboratory reserved just for their community (SMART Objective 5E). Students design experiments in diverse fields, including: seed germination, crystal growth, physiology and life cycles of microorganisms (e.g. bacteria), cell biology and growth, food studies, and studies of micro-aquatic life (SMART Objective 5B).

- Informal Education projects: The CaSGC has been very active in outreach and informal education activities throughout the year, participating in eight (8) science and space related events (SMART Objective 6A). CaSGC Affiliates, UC Davis (UCD) and UC Los Angeles (UCLA), held on-campus events to reach out to the general public and attract students to science (SMART Objective 5D). UCD's Picnic Day/Open House reached out to over 50,000 attendees annually to educate the future workforce on remote sensing and its various applications. UCLA's Explore Your Universe (EYU) event hosted by the combined science departments engaged in Space, Astronomical, and Astrophysical investigations drew up to 7,000 attendees to provide them a much deeper understanding of engineering and research programs in planetary, astronomical, astrophysical, solar, and earth sciences.

Besides on-campus events, CaSGC Affiliates also participated in outside, organized, outreach events that have drawn thousands of families, K-12 students, pre-college educators and the public at large. In September 2016 and April 2017, respectively, UC Santa Barbara's (UCSB) NASA Directed Energy Interstellar program team manned a booth at the inaugural Dent:Space in San Francisco, CA, a World's Fair-like set of interactive demos illustrating the future of space exploration and its many possibilities, and Yuri's Night, a globally celebrated annual event commemorating Yuri Gagarin becoming the first human to venture into Space, held in Los Angeles, CA, at the California Science Center. At, UC San Diego (UCSD), Higher Education students from the UCSD Near Space Balloon/CubeSat Club conducted informal

education activities related to the project in four venues: San Diego Maker Faire (October 2016), San Diego STEAM Maker Fest (December 2016), San Diego Science Festival EXPO Day (March 2017) and Space Day at the San Diego Air & Space Museum (May 2017). In each activity they had a booth with hands-on exhibits related to conducting a high altitude balloon launch: video, balloon pressure and elasticity display, atmospheric layers display, Arduino microcontrollers, and GoPro camera experiments (SMART Objective 6B).

#### E. PROGRAM CONTRIBUTIONS TO NASA EDUCATION PERFORMANCE GOALS

- **Diversity:** Of the 296 directly funded participants: 126 (43%) are minority students underrepresented in STEM, 89 (30%) are female, 85 (29%) are the first in their family to graduate from college, 81 (27%) were qualified for a subsidized school lunch (low income), 5 (1.7%) are US Veterans, and 12 (4%) have a disability.
- **Minority Serving Institution Collaborations:** Our major collaboration with MSIs is through our Community College Partnership Program where most of the colleges are MSI or HSI categorized. This program competitively awarded ten (10) Community Colleges designed to enhance the college's STEM preparation and improve a bridge opportunity for students to either the UC or CSU system. The program involved student-team projects centered on the use of low-cost programmable microcomputers. These student teams would then work on these projects during the summer and present their projects at a poster symposium at one of the three CA NASA Centers (Ames, Armstrong, or JPL) where they would also receive a unique walking tour highlighting the current Center research challenges followed by a research seminar, and finally, meeting with NASA scientists to discuss their research and get inspirational career counselling advice. To enhance the program, NASA webinars were broadcast from each of the CA NASA Center to the ten community colleges on research topics that highlight the unique work of each center and are of interest to the community college faculty and students. At the successful completion of their projects, the participating students also received a CA Space Grant scholarship.
- **Office of Education Annual Performance Indicators:**
  - API 2.4.1: ED-16-1      232
  - API 2.4.2: ED-16-2      152
  - API 2.4.4: ED-16-4        8
  - API 2.4.5: ED-16-5    50,000+ (Countless participants of informal education events CaSGC participate in)

#### F. IMPROVEMENTS MADE IN THE PAST YEAR

- **Greater Community College Involvement:** One of the challenges listed last year was building Space Grant's relationship with the California Community College System. With the culmination of our successful 2-year Space Grant Community College Program which reached 150 new students per year at 12 CA Community Colleges, we were able to carry this program via the Augmentation funding to our existing Space Grant budget as well as reach out to other community colleges. This year we welcomed ten CA Community Colleges where three new campuses were rotated into the program. Although we are only funding 100 students (ten from each of the 10 colleges), we've been impressed of the overwhelming support from these college campuses who have been able to fund additional students to participate in the program.

#### G. CURRENT AND PROJECTED CHALLENGES

- **Need for Process Improvement:** One of the biggest challenges we've had has been communication with our UC Affiliates. We ascertained that a bottleneck exists between the CaSGC campus directors and their Offices of Contracts & Grants (OCG). Although the UC campuses (campus directors) are expending the funds, the funds are not being invoiced in a timely manner to the leading institution, UC San Diego (UCSD), where CaSGC is headquartered. The current protocol is the UC system is considered one academic institution and awards given to the affiliate UCs are considered intra multi-campus awards, or MCAs. These MCAs generate funding accounts retained at UCSD for the UC affiliates to invoice their expenditures. Upon receipt of the invoice, UCSD can then release the award monies to them. To mitigate this challenge, are currently seeking the cooperation of the UC affiliates to resolve the bottleneck issues by making all FY15 (Year 1) and FY16 (Year 2) funds available to them as MCAs and working closely with both the campus directors and their OCGs to facilitate abating their balances. We have generated MCAs for Years 1 and 2 and have assertively contacted our UC campus directors as well as their respective OCG officers, notifying them of the September 30, 2017 (end of FY17) to invoice all of Year 1 and Year 2 MCAs by this deadline. We will monitor their progress biweekly by emailing and calling them requesting progress and enforcing milestones until their invoices appear on our ledgers.
- **Increasing Female Student Involvement:** Nationwide, female student enrollment in all majors is (>50%), but within the STEM field female enrollment is closer to 10-15%. In a recent published study, three California universities ranked in the top five nationally for female STEM enrollment (UC San Diego 33%, UC Davis 24%, UC Berkeley 24%). Our greatest on-going challenge is meeting the 40% award target for high-quality female students. We are partnering with faculty mentors and student chapters of the Society of Women Engineers and other women resources groups to develop new programs at universities and community colleges.
- **Increasing Industry Involvement:** One of the challenges is increasing the collaboration and partnership with industries and companies, the beneficiaries of the many Space Grant Workforce Development programs. We have found that although larger companies have established student recruitment offices, many of the small to mid-sized companies who are often sub-contractors or even startups do not have a channel or resources in tapping into the talent pool of highly capable and technical students from Space Grant, either as internships,



cooperatives, or even employment. To assist these companies and build relationships with local, global, small and larger companies and organizations, we have been actively attending and investing in events such as the UCSD Women in STEM Networking event and the larger Space Tech Expo event to make those industry connections and maintain the STEM Pipeline from academia to industry employment for our students.

#### H. PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

- Four-Year Public Institutions within the University of California System: *UC San Diego* (Lead Institution for CaSGC; fellowships/scholarships in Engineering, Near Space Balloon Team), *UC Berkeley* (fellowship/scholarship programs in Space Sciences), *UC Davis* (higher education and precollege programs in Environmental Sciences), *UC Irvine* (fellowships/scholarships in Earth System Science), *UC Los Angeles* (fellowships/scholarships in Geophysics, Space Sciences, and Aerospace Engineering), *UC Riverside*<sup>1</sup> (fellowships/scholarships in Engineering; precollege program with MESA), *UC Santa Barbara* (various experimental cosmology space-related instrumentation projects; works closely with Santa Barbara City College), *UC Santa Cruz*<sup>1</sup> (astrophysics programs with Hartnell and Cabrillo Colleges to develop students for careers in STEM research; serves on a CaSGC advisory board).
- Four-Year Public Institutions within the California State University System: *Cal Poly Pomona*<sup>1</sup> (UAV and CubeSat projects and K-12 outreach along with partnership with Citrus College), *Cal Poly San Luis Obispo* (CubeSats and rocket projects), *CSU Sacramento* (Mechanical Engineering projects in conjunction with NASA Johnson Space Center), *CSU San Bernardino*<sup>1</sup> (Astronomy projects with Mt. San Antonio College), *CSU Long Beach*<sup>1</sup> (rocket projects; serves on a CaSGC advisory board), *CSU Los Angeles*<sup>1</sup>, *CSU Fresno*<sup>1</sup> (precollege program for middle and high school students and workforce development in UAVs), *San Diego State University*<sup>1</sup> (runs the San Diego MESA Alliance Research Academy for community college students in hands-on university research as well as graduate student Aerospace Research), *San Jose State University*, *Sonoma State University* (Cubesat research experiences including Napa Valley College & Santa Rosa Junior College).
- Four-Year Private Institutions: *Azusa Pacific University* (STEM outreach programs), *California Institute of Technology* (in a state of transition with CaSGC), *Pomona College*, *Santa Clara University* (robotics, CubeSats, and satellite operations in conjunction with NASA Ames Research Center), *Stanford University* (in a state of transition with CaSGC), *University of San Diego*, *University of Southern California* (Astronautical research).
- Other Educational Institutions: Astronomical Society of the Pacific

#### PARTNERS:

- California Community College District: Butte College, Cerritos College, College of the Desert, Irvine Valley College, Los Angeles City College, Rio Hondo College, Victor Valley College,

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<sup>1</sup> Minority Serving Institution (MSI)

Miramar College, Mendocino College, Woodland College, Citrus College, College of San Mateo, Hartnell College, Santa Monica City College, Mt. San Antonio College, Napa Valley College, Contra Costa College, Evergreen Valley College, Southwestern College, San Diego City College, Santa Barbara City College, Santa Rosa Junior College

- Education: Center for Excellence in Education, Lincoln Middle School, Mathematics, Engineering, Science Achievement Program (MESA), National Center for Earth and Space Science Education, San Diego MESA Alliance, UCSD Jacobs School of Engineering, Texas Space Grant Consortium, Washington State University, McCaffrey Middle School
- Government: NASA Ames Research Center, NASA Armstrong Flight Research Center, NASA Dawn Project, NASA Goddard Space Flight Center, NASA Jet Propulsion Laboratory, NASA Johnson Space Center, NASA Marshall Space Flight Center, NASA Office of Education, National Renewable Energy Laboratory, National Science Foundation, and United States Geological Survey.
- Industry: ATK Aerospace Systems, Boeing, FLIR Systems, Inc., General Atomics, Intel Corporation, Lockheed-Martin, Microcosm, Inc., NanoRacks, Northrop Grumman, Pixar, Raytheon, SpaceX, Thermo Scientific, Blue Origin, Zero Gravity Solutions, Woodruff Scientific
- Informal Education: Exploratorium, Reuben H. Fleet Science Center, San Diego Air & Space Museum, San Diego Science Festival, The Tech Museum of Innovation, San Diego Maker Faire, San Diego STEAM Maker Festival.
- Societies & Organizations: American Institute of Aeronautics and Astronautics, AmericaView, Center for the Advancement of Science and Space, Keck Institute for Space Studies, National Council for Science and the Environment, Packard Foundation, American Indian Science and Engineering Society, National Society of Black Engineers, Society of Hispanic Professional Engineers, Society of Women Engineers