OPORTUNIDADES DE ESTÁGIO NA NASA

Código 1 - Biosensor Development

Project Title	Biosensor Development
Participating Center	Ames Research Center
Research Area/Field	Nanotechnology
Project Description	Development of biosensors is an active field due to a wide range of applications in lab-on-a-chip, diagnostics of infectious diseases, cancer diagnostics, environment monitoring, biodetection and others. One of the strategies used for selective identification of a target is to /preselect/a probe that has a unique affinity for the target or can uniquely interact or hybridize with the target: sort of a "lock and key" approach. In this approach, one then needs a platform to support the probe and a recognizing element that can recognize the said interaction between the probe and the target. The interaction result can manifest optically (by using dyes, quantum dots for example) or electrically. The platform design and configuration may vary depending on whether optical or electrical readout is used and what environment the sensor will be utilized. Electrical readout biosensors have gained much attention because, in principle, they can be made more compact than optical technologies. Advances in microfabrication and related technologies have been aiding the electrical readout based biosensor development to the forefront. A previous NASA Ames innovation involves a nanoeletrode array consisting of an array of carbon nanofibers as individual nanoeletrodes. Each nanofiber, which is a solid nanocylinder, has a probe attached to it. The array size, chip size and wafer size can be controlled. In order to maintain that this device is stable over a wide range of testing conditions, the sensor will placed in various chemical and electrical environments. The project involves pursuing the above or closely related avenues to demonstrate the sensor functionality in a variety of testing conditions. Intended NASA applications include water quality monitoring for ISS and lab-on-a-chip for point of care diagnostics for astronaut health monitoring.
Requirements	MICROSOFT Word, Excel and Powerpoint

Código 2 - CubeSat Cluster Test-Bed

Project Title	CubeSat Cluster Test-Bed
Participating Center	Ames Research Center
Research Area/Field	Small Sats
Project Description	Team members will use available off-the-shelf or spare laboratory hardware to develop laboratory test bed of at least two "Cubesats" and one ground station that will be used for on-going software and communications architecture development. The "Cubesats" may be complete units with all subsystems, flat-sats, or development units consisting of just a processor and RF subsystem. The team will develop ground software as necessary to demonstrate operation of the units including simulated intersatellite communications and simulated downlink.
Requirements	Students should have an Aerospace Engineering, Mechanical Engineering or Mechatronics, Electrical Engineering, Systems Engineering or other related engineering major.

Código 3 - Data Mining and Analysis for Sustainability Base

Project Title	Data Mining and Analysis for Sustainability Base
Participating Center	Ames Research Center
Research Area/Field	Data Mining
Project Description	The Intelligent Systems Division at NASA Ames Research Center will be integrating advanced technologies into a new "Green" building known as "Sustainability Base" at the Ames campus. Sustainability Base is high –performance, LEED Platinum certified building that will incorporate NASA innovations and technologies to improve energy efficiency, reduce carbon footprint, and lower operating and maintenance expenses compared to traditional buildings. It will function as a living experimental platform, integrating the latest technologies as they evolve. This internship opportunity will assist in defining and implementing demonstrations of NASA technology in Sustainability Base. In particular, the intern will employ advanced data mining algorithms on data acquired from Sustainability Base to learn how the building operates and then monitor how it is performing over time. This could include measurements of energy use, mechanical system performance, environmental parameters, and other key performance indicators. For example, correlations between

	environmental control system settings and temperature ranges in workspaces can be established and then monitored to give early indication of performance degradation or unexpected changes to the building configuration. However, basic data analysis and gaining an intuitive understanding of data from various building systems (BACnet data, lighting, shade, photovoltaic sensor data, etc) will also be as important precursor to any application of the advanced data mining algorithms. In addition to global building performance, the algorithms can be also used to detect changes in individual energy use as well. In either case, the algorithms will provide early indications of off-nominal performance to building operators or occupants, enabling corrective actions to maximize building performance and efficiency. Additional information on Sustainability Base can be found at http://www.nasa.gov/sustainability -base/. Additional information on data mining algorithms can be found at http://ti.arc.nasa.gov/tech/dash/intelligent-data-understanding/
Requirements	The focus of this effort may relate more to automated tracking and consolidation of energy data and plug load management and analysis, so the ideal candidate will have experience in scripting or application development to extract real-time data from APIs and websites for logging into a PostgreSQL database. Experience with MAQTLAB; Familiarity with Linux OS is preferred; Strong analytical and organizational skills; Interest in sustainability; Interest in data mining algorithms for health management: Senior undergraduate at junior/senior level or higher preferred.

Código 4 – Explore Impact of Network Delays on Distributed Spacecraft Testing

Project Title	Explore Impact of Network Delays on Distributed Spacecraft Testing
Participating Center	Ames Research Center
Research Area/Field	Small Sats
Project Description	Team members will use available off-the-self or space laboratory hardware to explore the possibility of using standard network systems and protocols to run mission simulation and closed-loop hardware-in-the-loop hardware tests remotely where significant parts of the system are connected over the internet. For example, a spacecraft bus could be at one location, a payload at a second location and a dynamic simulation environment could be at a third location, all connected over the internet. The team would identify the problems associated with such an arrangement (e.g. latency) and suggest approaches to mitigate them.
Requirements	Students should have an Aerospace Engineering, Mechanical Engineering or Mechatronics, Electrical Engineering, Systems Engineering or other related engineering major.

Código 5 – Lunar Topographic Products from Orbital Images

Project Title	Lunar Topographic Products from Orbital Images
Participating Center	Ames Research Center
Research Area/Field	Computer Science
Project Description	Digital terrain models are essential for cartography, science analysis, mission planning and operations. The NASA Ames Intelligent Robotics (IRG) has developed software to automatically generate high-quality topographic and albedo models from satellite images. Our software, the Ames Stereo Pipeline 8ASP), uses stereo vision and photoclinometric techniques to produce 3D models of the Earth, Moon, and Mars with very high accuracy and resolution. The intern will assist IRG to improve the quality of topographic products from lunar orbital images. In particular, the intern will help develop multi-stage stereogrammetric methods to exploit the full potential of multiple, overlapping views of a planetary surface. The intern will work closely with NASA researchers and engineers throughout the internship. Very strong emphasis is placed on incorporating and integrating the intern's research into IRG's on-going projects. Research results may be published in one (or more) technical forums: as a NASA technical report, a conference paper, or journal article.
Requirements	The interns must have a background in Computer Science or Mathematics. Practical experience with computer programming, Linux-based software development and open-source tools (gcc, git, etc) is required. Experience with C++ is strongly encouraged.

Código 6 – Monitoring Changes in ASRS Reports using Python and Text Mining

Project Title	Monitoring Changes in ASRS Reports using Python and Text Mining
Participating Center	Ames Research Center
Research Area/Field	Computer Science
Project Description	Students applying for fellowship opportunities will be required to submit a proposal to the mentor. Prior to submitting a proposal, students will create a proposal summary with a description of their idea, and they will submit it to the mentor for their approval. The mentor has 10 business days to respond to each proposal summary. It is anticipated that mentors will only approve a couple proposal summaries, and they will work with those students to create their proposals and to make sure the topic is mutually beneficial to both the mentor and student.
Requirements	We aim to develop tools than can be used to monitor the changes in the aviations safety reports submitted to NASA Aviation Safety Reporting System (ASRS) program. ASRS collects and analysis the voluntarily submitted aviation safety incidents reports in order to reduce the ikelihood of aviation accidents. We need tools that can help ASRS to monitor changes in the narratives of the reports over time and can summarize these reports.

Código 7 – Prognostics and Health Management

Project Title	Prognostics and Health Management
Participating Center	Ames Research Center
Project Description	Explore Prognostic and forecasting concepts in the context of aeronautics vehicles and airspace operations. The task involves literature review, algorithm development (likely in matlab) and realization of some of the concepts in relevant aeronautics simulations. It may also involve some lab experiments during which the candidate would age components relevant in an aeronautics context.
Requirements	The outcome would be one or more of: • Algorithms • Experimental data • Report or publication • Poster presentation Matlab required, labview desired.

Código 8 – Studies of the aqueous history of Mars

Project Title	Studies of the aqueous history of Mars
Participating Center	Ames Research Center
Research Area/Field	Computer Science
Project Description	Student will analyze data from a variety of spacecraft to understand the geologic history of sites of interest, in order to better understand the role of water in the history of Mars. This opportunity may include computer modeling, data analysis and laboratory work. If times allows, preparation of a manuscript. Potentially, the sites will be proposed as landing sites for the 2020 Mars Rover. Student will also develop software for the analysis of CRISM data.
Requirements	Experience in Unix or equivalent fluency in IDL preferred.

Código 9 – The Influence of Mechanical Unloading on Biological Function

Project Title	The Influence of Mechanical Unloading on Biological Function
Participating Center	Ames Research Center
Research Area/Field	Life sciences, biology
Project Description	The spaceflight environment, including microgravity and space radiation, is known to negatively impact mammalian physiology, including somatic stem cell-based tissue regeneration. The degenerative effects of spaceflight that we understand best include rapid microgravity-adaptive bone and muscle loss, loss of cardiovascular capacity, defects in wound and bone fracture healing and impaired immune function. These implications pose a significant risk for long-term human space exploration. Our work focuses on

	the influence of mechanical unloading on stem cell proliferation, differentiation and regeneration and how alterations in stem cell function may be the cause of widespread tissue. In this opportunity, the selected student will work with research scientists to analyze the response of mouse bone and bone marrow stem cells to mechanical unloading using both spaceflight samples and mouse hindlimb unloading experiments. The student will investigate stem cell responses to microgravity and mechanical unloading using gene expression and protein analysis and furthermore, will investigate the influence of stem cell function on whole bone tissue properties – including structural and molecular analysis. Furthermore, the student will also work with scientists on optimizing conditions for an upcoming spaceflight experiment where we aim to identify key molecular mechanisms that cause degenerative effects in bone tissue through impaired differentiation of mesenchymal stem cells. The student will conduct cell culture and gene expression/protein assays to characterize wildtype stem cells compared to the transgenic model. The student will then work with research scientists to determine the optimal cell culture parameters to conduct the experiment in spaceflight hardware.
Requirements	Laboratory experience is preferred

Código 10 – Upgrading a Space Debris Simulation Software for planetary defense assessments

Project Title	Upgrading a Space Debris Simulation Software for planetary defense assessments
Participating Center	Ames Research Center
Research Area/Field	Space Debris Mitigation/Planetary Defense
Project Description	NASA Ames Research Center has developed a simulation software that models the space debris environment in Low Earth Orbit (LEO). The goal of the current software is to assess the efficiency of a concept for collision avoidance between debris and active satellites. The investigated system would use photon pressure from ground based lasers to slightly change orbits to avoid collisions on warning. For the internship, the main task will be to upgrade the simulation software to include the near earth object (NEO) environment (asteroids) and enable the assessment of cubesat based asteroid detection systems. You will change the main body of the previous simulation from the sun to the earth, introduce a population of asteroids into the model and investigate the utility of cubesats to detect those asteroids as they come close to Earth. In addition, you also will help to maintain the original software for space debris modeling.
Requirements	The intern should have a background in the sciences or engineering, and ideally Aerospace Engineering or Physics. The project requires programming skills in C and Matlab and an understanding of orbital dynamics.

Código 11 – Engineering Student Intern, Experimental Aero-Physics Branch

Project Title	Engineering Student Intern, Experimental Aero-Physics Branch
Participating Center	Ames Research Center
Research Area/Field	Mathemactics, Physics, Engineering
Project Description	The student will help with a variety of experimental projects which investigate the fluid mechanic, aerodynamic, and/or aero-acoustic characteristics of manned and unmanned spacecraft, aircraft, rotorcraft, ground vehicles, ships, structures, sports balls, and other objects. The experimental projects will be conducted in conjunction with on-site research mentors, using NASA Ames wind tunnel, water channel, lab, and/or computer facilities. The student will assist with many different phases of one or more test programs; these phases may include prior data review and test planning, test logistics, experimental design and setup, model construction and installation, instrumentation calibration, installation, and operation, test video/photo documentation, post-test data plotting and analysis and report development. The student may also assist with the development and execution of various computer programs used to analyze or simulate the results of experimental test programs. The main outcome of this internship will be experience with a variety of disciplines related to fluid mechanics, aerodynamics, and/or aeroacoustics.
Requirements	Physics, Science, Math, Engineering backgrounds preferred

Código 12 – Rotorcraft Aeromechanics

Project Title	Rotorcraft Aeromechanics
Participating Center	Ames Research Center
Research Area/Field	Aeromechanics
Project Description	The Aeromechanics Branch is responsible for aeromechanics research activities that directly support the civil competitiveness of the U.S. helicopter industry and the Department of Defense. Branch programs address all aspects of the rotorcraft which directly influence the vehicle's performance, structural, and dynamic response, external acoustics, vibration, and aeroelastic stability. The span of research also includes unmanned aerial vehicle (UAV) platforms, including quadcopters and other advanced, small remotely piloted vertical takeoff and landing (VTOL) aircraft. The programs are both theoretical and experimental in nature. Advanced computational methodology research using computational fluid dynamics and multidisciplinary comprehensive analyses seeks to understand the complete rotorcraft's operating environment and to develop analytical models to predict rotorcraft aerodynamic, aeroacoustic, and dynamic behavior. Experimental research seeks to obtain accurate data to validate these analyses, investigate phenomena currently beyond predictive capability, and to achieve rapid solutions to flight vehicle problems. Databases from the flight and wind tunnel experimental programs are validated, documented and maintained for the benefit of the U.S. rotorcraft technology base.
Requirements	Broad background in science and math classes typical of an upper division undergraduate in mechanical, aeronautical or aerospace engineering. Knowledge of MatLab, Simulink, CREO ProE/SolidWorks/AutoCAd, VSP, Rhino, C++, python, or other programming/software languages is desired, but not mandatory.