National Aeronautics and Space Administration

2009

NASA Glenn Academy

for Space Exploration

A Message From the Center Director

Woodrow Whitlow Jr.
Director, NASA Glenn Research Center

New Horizons:

The Glenn Research Center drives the engine of innovation. The Center's expertise continues to be critical to NASA's future missions in air and space. As private and commercial aviation expands, NASA Glenn will propel aircraft to new standards of performance and efficiency. With a new vision for exploring our solar system, NASA Glenn engineers and scientists are ready to pursue breakthrough technologies in advanced power, propulsion and communications to enable human and robotic missions to the Moon and beyond.

(From "The Glenn Research Center: Expanding Horizons and Opening Frontiers", NASA Fact Sheet FS-2004-08-009-GRC.)

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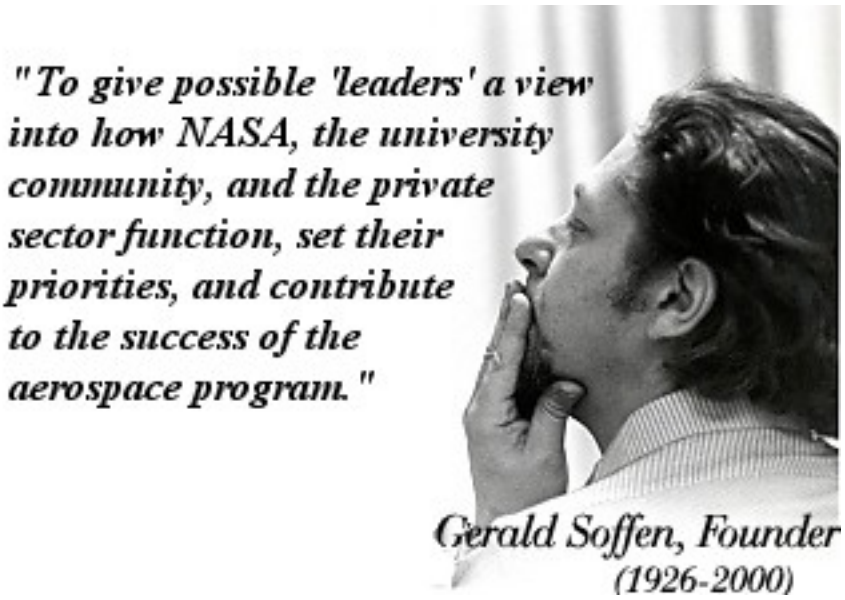
A Brief History of the NASA Academy Program



The NASA Academy was founded in 1993 as the "NASA Space Academy" at Goddard Space Flight Center by Gerald (Jerry) Soffen, former Mars Viking project scientist, architect of the NASA Astrobiology program, and first Director of the Goddard Office of University Programs. Jerry was an accomplished scientist and a dedicated educator. He took advantage of the unusual opportunities presented to him during his career and realized the importance of mentoring in the life of young professionals. In his vision, the Academy was intended to exceed in purpose and content all the other regular internships by familiarizing its participants with as many facets of NASA as possible. With his dynamic personality and unique leadership, he opened many gateways and defined a new standard of excellence.

NASA Academy programs were established later at the Marshall Space Flight Center (1994), the Ames Research Center (1997), the Dryden Flight Research Center (1997), and the Glenn Research Center (2005). In 2009, Ames, Glenn, Goddard, and Marshall will host Academies.

Jerry Soffen died on November 22, 2000. We honor his legacy by continuing the Academy program that he loved so well.

In 2009, the NASA Academy celebrates seventeen years of operation. So far, more than 650 participants have graduated from the program.

The NASA Academy for Space Exploration is an intensive resident summer insitute of higher learning designed to guide the future leaders of the United States space programs by exposing them to many facets of NASA and other sectors of the aerospace industry. This unique and prestigious internship program is designed for talented college upper-level undergraduate students and graduate students interested in pursuing professional and leadership careers in space-related fields.

The NASA Academy program is designed to present a broad picture of the organization of the NASA agency, and some of its most important current and planned science, engineering, education, and technology enterprises. Additionally, it presents a number of non-technical areas of critical significance, such as management, budgeting, safety, personnel and career development, leadership, space law, and international cooperation Students conduct supervised research in GRC laboratories, attend lectures and workshops, and participate in visits to other NASA Centers and space-related laboratories and industries.

NASA Academy provides immersive and integrated multidisciplinary exposure and training for students with various backgrounds and career aspirations. The academic curriculum balances opportunities for direct contact with advanced science and engineering research and development and an awareness of the complex managerial, political, financial, social, and human issues faced by the past, present, and future aerospace programs.

By participating in the NASA Academy program, the students join the NASA Academy Alumni Association (NAAA). The NAAA works to serve both present and past members of the Academy program by promoting communications, fellowship, camaraderie, and an *esprit de corps* among and between all Alumni. Additionally, the NAAA seeks to provide a mechanism to facilitate Alumni participation in programs and projects, both internal and external to the NAAA, that promote NASA and space education, and that communicate the excitement of space exploration and development to the general populace.

Alumni of the program have gone on to become the following (as of 2001):

- Rhodes and Truman Scholars.
- International Space University (ISU) Graduates.
- Test Pilots (Air Force / Navy).
- 70+ pursuing PhD/Masters (many at institutions such as Harvard, MIT, Cal-Tech, Stanford, and Princeton).
- 30+ returned for positions at NASA Installations (JSC, KSC, GSFC, ARC, MSFC)
- Many others work in Industry: Lockheed Martin, Northrop Grumman, Raytheon, Boeing, Space-X, Orbital Sciences…and the list goes on.
- Coming soon: Astronaut (one alumnus is currently in the top levels of the astronaut selection process).

Program Objectives

- To support and enhance the general objectives and mission of NASA.

- To give to the selected students guided access to the extensive and varied resources at the participating NASA Research and Space Flight Centers, and to expose students to the centers' infrastructure, science, technology, and organizational and managerial expertise.

- To provide a unique, intensive, and rigorous educational and training curriculum related to the organization of NASA, its in-house science and technology projects, its collaboration with other National centers, industry, and academia, and its extensive technology transfer programs.

- To facilitate access to, and dissemination of, valuable information on career development paths, financial support, technical writing standards, intellectual property, etc.

- To create an environment that fosters creativity, personal initiative, and leadership qualities, together with group mentality, teamwork, and professional ethics.

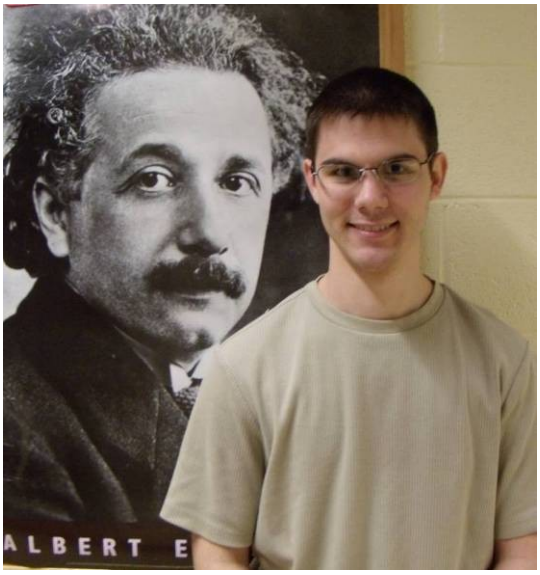
The eight Research Associates in the 2009 NASA Glenn Academy for Space Exploration have been selected from a very competitive pool of applicants from institutions of higher education both within and outside of the United States. Selection was based following criteria:

- Academic rank (Rising Junior undergraduate through rising second-year graduate student).
- Academic performance (Minimum GPA of 3.0 or equivalent).
- Demonstrated interest in the space program.
- Demonstrated leadership qualities.
- Research and/or project interest and experience.
- Letters of recommendation.
- Citizenship is required for US applicants; non-US citizens must apply through their country's space agency.

The selection process and placement of the Academy participants within Glenn's research groups were assisted by recommendations from Academy Alumni, faculty, administrators, academic supervisors, and the applicants' self-profiling essays.

Lehigh University
Bethlehem, PA
Ph.D. in Physics, 2014

Moravian College
Bethlehem, PA
B.S. in Physics, May 2009
B.A. in Economics, May 2009



NASA Academy Research Project:
Device Development for NASA Space Communications Applications/Novel Power Combiner for Solid State Power Amplifiers

Principal Investigator:
Edwin G. Wintucky

Home Address:
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Bath, PA 18014
484-764-5856
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Philosophy

If you ask my friends and family what my favorite topic of discussion is, they would all tell you that it has to be "physics." I have been drawn to the sciences and mathematics since I was a child, and have always demonstrated and aptitude for them. In high school I was exposed to the study of physics for the first time. I became quite fond of physics' ability to describe nature in the most fundamental ways possible. The appeal of such an intimate and fundamental understanding of nature spurred me on to further study in college.

As my knowledge of physics increased, I would often think about ways in which I could apply the concepts learned in the lab to real world situations. I found that it is often better to "guide nature" when accomplishing your goals rather than fighting against it. This is where a deep understanding of the laws of physics becomes very important. If you want to truly accomplish your goals, however, it is not merely enough to have an understanding of the laws of nature; one must also understand the tendencies of man.

I realized that any truly successful technology not only worked in a technical sense, but that it also must work in an economic sense. Any technology, no matter how elegant or awe inspiring, cannot be sustained without solid economic incentives. With this perspective in mind, I seek ways to develop technologies which are viable both technologically and economically. If you really want to get a job done, the technology must both work well and be practical.

Work Experience, Research, and Hobbies

My first research experience occurred a few years ago when I began an internship with Specialty Minerals Inc. My main area of research concerned the study of paper physics. Believe it or not, paper itself can be quite complex if studied at a fundamental level. Specifically, the interactions between the paper fibers and the calcium carbonate (paper whitener) can cause the properties of paper to vary significantly. Learning to control the bonding of various ingredients proved to be very critical in engineering quality paper products at a competitive price.

Recently, I completed a Research Experience for Undergraduates (REU) experience at Lehigh University where I studied topics concerning statistical and thermal physics. I was particularly interested in the microstructure of various metal alloys and how that structure was influenced by heat. Of particular importance to my research was the modeling of small crystallites (metallurgists call them 'grains') which are semi-randomly distributed throughout the amorphous portion of an alloy. It is believed that the exact size and size distribution of these crystallites can influence the thermophysical properties of metallic alloys.

For the past few years I have been working for the physics department at Moravian College. My job varies from fixing lab equipment, to assisting students, to grading weekly quizzes. I have also had some experience in the IT department at my college where I would assist in the administration of computer networks. In the distant past, some of my non-technical work experiences rangea from being a maintenance man on a local golf course to cashiering at a small gas station.

In my free time I like to engage in various outdoor activities which range from hunting and fishing, to camping and backpacking. I often like to play around with electronics projects as well as teach myself new computer languages. I also am very active in my local church as I often volunteer my services as an audio-visual technician.

Educational and Professional Objectives

In the early fall I plan on heading back to PA to continue my education at Lehigh University where I will pursue a Ph.D. in physics. Upon the completion of this degree I would like to work in the aerospace industry developing new technologies that are in high demand. I have a particular interest in developing the emerging private space industry into a fully matured market. This would include both manned and unmanned spaceflight technologies.

University of Michigan
Ann Arbor, MI
M.S. in Aerospace Engineering, May 2011
B.S. in Aerospace Engineering, May 2010
Minors in Physics and Mathematics, May 2010

NASA Academy Research Project:

Exploration of Life Support/Particulate Matter Removal

Principle Investigator:

Dr. Juan H. Agui

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Rochester Hills, MI 48306
248-808-0176

EMAIL: BarrJon@umich.edu

Philosophy

On December 17, 1903, two brothers took flight in Kitty Hawk, North Carolina at 10:35 AM. On July 20, 1969 at 10:56 PM, a United States Navy test pilot touched foot on the dusty surface of the Moon. It took 65 years, 7 months, 3 days, 12 hours, and 21 minutes for powered flight to go from the back room of the Wright brother's bicycle shop to the lunar surface. I am still amazed those early pioneers of aviation could advance aerospace science and technology that quickly. I hope to continue the tradition of my predecessors, helping to advance and push forward the man's understanding of flight.

Engineering was a passion of mine from an early age. I grew up in Metro-Detroit, an area defined by the engineering profession. Every child on my street was raised on LEGOs and erector sets; every parent was working for the big three auto companies or suppliers. There was no tougher area for a fifth grader to compete in a science fair or pinewood derby. In this community math and science were not thought of as the dull, dry subjects of study, but as tools used to solve the technical problems confronting society. The history of Detroit instilled in me the unfaltering belief that there is a way to engineer a solution for the problems we face, and the goals we seek.

This is a fantastic time to be in the aerospace field. We are seeing the birth of the next generation of manned space vehicle, privatization of the space industry, and the development of fundamentally different aviation propulsion and structural systems. I hope to join this rapidly advancing field to push the limits of human understanding.

Research Experience

As a high school student, I participated in a physics Research Experience for Undergraduates (REU) at Oakland University. Throughout the summer of 2006, I studied carbon nanotubes in high-pressure situations with Raman spectroscopy. My project studied fundamental materials properties of carbon nanotubes, using Diamond Anvil Cells (DACs) and studying their scattered Raman spectrums. It was incredible that I could produce pressures in the DAC comparable to the center of the Earth and observe the response of electrons to individual photons. The project inspired me to pursue a career in research and gave me a foundation in math, physics, and research fundamentals.

In the summer of 2007, I worked in a REU in Computer Science at Oakland University on virtual reality training systems. My project worked on the development of a virtual hospital environment for nurse training using game theory techniques and I gained a broader understanding of product development. One other student and I had to conduct every facet of software development: design, storyboarding, graphics, coding, beta testing, and revision iterations. The project gave me a greater understanding of computer science and the engineering design process.

During the summer of 2008, I participated in a third REU project with the Space Physics Research Laboratory (SPRL) at the University of Michigan. I worked on designing and testing atmospheric measurement hardware for NASA Marshall's and the University of Michigan's Hurricane Imaging Radiometer (HIRad) project. I helped with some of the component testing, including a full frequency response analysis of HIRad's analog to digital converter. I also built up the circuit boards and installed the components of the DetMit radiometer, designed to detect and mitigate radio frequency interference. The SPRL labs gave me experience in the "hands on" portion of engineering research. The HIRad and DetMit projects helped to advance my understanding in the application of science and mathematics to engineer devices to study the world around us.

Leadership

My leadership is perhaps best exemplified with my experience in Scouting, and I earned my Eagle award in February 2006. For my Eagle project, I designed and funded map boxes along a nine-mile trail running through Oakland County, MI Leading the project was an eye-opening experience, as I was at the helm of almost every phase of the undertaking. Astronaut and Eagle Scout Jim Lovell once said that scouting, "…working together, being honest with each other, being close knit ... and depending on one another, …all these things build [one's] character … and makes him a much better citizen." The skills and ideals I learned in scouting have provided me with a great foundation upon which I have built and can build my academic and professional careers.

Professional Objectives

I am interested in pursuing a career in aerospace research, which was inspired in part by personal interactions with the faculties of the University of Michigan and Oakland University. In pursuit of this goal, I am majoring in aerospace engineering with minors in mathematics and physics, grounding me with knowledge in both engineering and science and giving me a strong foundation for graduate school and beyond. I hope to dedicate myself to the discovery and implementation of practical and timely solutions to many of today's unintuitive problems in the field of aviation and aeronautics.

North Carolina State University
Raleigh, NC
B.S. Business Administration, May 2010
B.S. Environmental Technology May 2010

NASA Academy Research Project:
New Business Process Development for
NASA Glenn Research Center

Principal Investigator:
Dr. Robert "Joe" Shaw

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10101 Thomas Payne Circle
Raleigh Charlotte, NC 28277
704-575-1752

EMAIL: afengine@gmail.com

Personal Statement

I, like most people who work at NASA, seem to have been drawn to it at an early age. The great mission that has been given to this organization transcends many boundaries and inspires individuals around the world. In my mind, NASA as an institution embodies the wonder of human imagination, the apex of scientific achievement, and what it means to work for a cause that is truly larger than life. These are all things that I want to incorporate into the rest of my life and help extend to the future generations of people who are motivated by the timeless concepts that NASA and the aerospace industry as a whole stands for.

Education and Influences

There are a handful of highly significant events and people that have fundamentally changed the way I think about and the way I want to live my life. In effect, these turning-points have positively altered how I will allocate the short amount of time that I have been given here on the Earth. I will share one of them with you here. I can recall a few courses that truly stand out in the time I have spent in college. The first of these was a marketing course taught by Dr. Darryl Banks. In his brief time at NCSU, Dr. Banks taught a total of two marketing course sections, one of which I unknowingly signed up for sophomore year at NC State. From the first class, I noticed that there was something different about him and his teaching style. He had a kind of intellect and enthusiasm that I had never seen before. His charisma and bold character were traits that I was immediately attracted to and in the time I spent in Dr. Banks's course, I matured and

grew as a person at a faster rate than I had ever before. Before I took Dr. Banks's course, I did not know what I wanted to do with my future and I did not think too much about it either. From participating in his lectures and conversing with him after class, a fire was lit inside me that brought vision, motivation, and focus into my life. Acquiring these fundamental character traits has helped me form a foundation on which I can achieve. Dr. Banks heavily shaped my career goals, taught me to love learning and to strive for excellence. He instilled in me a thirst to make an impact in the world around me. I sometimes think about what I would be doing if I had never walked into Dr. Banks class. As he only taught a total of two courses at NCSU before moving, it could have easily never happened. It makes me realize how lucky I am to have been in the right place at the right time. Today, I carry this thought with me in my pursuits and now in what could be considered a form of repayment; I seek to pass off the great and elusive teachings that have done so much for me onto others.

Experience

During the school year I spend time working for the student government of my university. I have enjoyed managing and taking part in many projects around the campus including creating and installing an energy feedback system in residence halls and establishing a farmers market on the university grounds. Working on behalf of the students of my university has been a positive experience. My colleagues and I truly believe in the importance of our work to make the university a better place for the students yet to come. This goal has created a close bond between us and a culture of working hard to achieve a common goal.

In addition to student government activities, I worked for Dell as their NC State University representative during the summer and fall of 2008. Here I implemented ground level marketing activities and leveraged many of the university connections that I had made to increase the presence of Dell around the NC State campus.

In the summer of 2008 I worked for the North Carolina Geological Survey as a surveyor. I had decided that I wanted to spend one of my summers as a student doing hard science and fieldwork as I knew that it would provide a unique and valuable experience for the career in business that I am pursuing. In this internship I spent my time surveying and categorizing geology along the rivers in central North Carolina.

During the summer of 2007, fall of 2007, and spring of 2009 I toured as a co-op student at the NASA Glenn Research Center. There are two projects that I am currently focusing on. The first is working with a group to develop an advanced energy strategic plan for the center. I have done research on many advanced energy topics and worked to make links between the NASA Glenn's capabilities and the needs of the market. In the second project, I am researching and developing new business development practices that can be implemented at the center.

Lastly, I have been involved in creating a start-up company focusing on clean technologies and products. With my partners, I have written business plans, developed proposals, and engaged in market and financial analysis. I have combined this venture with my classroom experience by doing undergraduate marketing research under an advisor of mine on topics relevant to the startups' industry.

Watching classic crime/drama and film noir movies, riding bicycles, playing racquet sports, and grilling food are some of the things I enjoy doing in my free time.

Baylor University
Waco, TX
B.S. in Biochemistry and Minor in Anthropology, May 2009

NASA Academy Research Project:
Biofuels as an Alternative Fuel Source

Principal Investigator:
Dr. Blial Bomani

Home Address:
1207 Johnson Rd
Keller, TX 76248
817-715-2899

EMAIL: jmfrasure@gmail.com

Philosophy

NASA's chief medical officer, Dr. Richard Williams, said that the goals of physicians in NASA are to "maximize the demonstrated synergy between space exploration and advances in patient care as we undertake exploration class space missions." I want to aid NASA because of their direct influence in patient care as it relates to the people of Africa. Simple improvements in their quality of life (such as better column chromatography for pure water consumption) make a significant difference in the lives of those less fortunate. Research with NASA produces first the advancement of technology relating to space, but the secondary by-product is the betterment of human life.

After seeing three shuttle launches in person as a young girl, I knew that I wanted to be a part of the space industry. Feeling the wave of heat and awe envelop the crowd sparked an interest in me that has yet to be put out. Simple discoveries have come from NASA that have directly influence the health of the human population. Specifically, the vertical treadmill and NEEMO 12 devices have helped scientists to learn more about the human body. By my participation with these and other apparatuses in the Human Research Program, I feel that I could help to drive medicine forward. Especially in a time where fuel is a valuable commodity, I look forward to finding viable alternatives to natural resources through marine life. One of my strengths is ideation. I approach all tasks wholeheartedly and apply innovation in uncommon ways, which I will apply to the biofuel research conducted at Glenn.

Work Experience, Research, and Hobbies

My passion in life is for people's lives to be improved through the betterment of their health. I love medicine and everything involved in its process, so the majority of my undergraduate career was spent in that pursuit. I have over sixty hours shadowing experience in many diverse disciplines of medicine, ranging from anesthesia, OB/GYN, eating disorders, and orthopedic surgery, which I have assisted the physician in several surgeries in minor tasks.

I earned my Private Pilot's License on my 17th birthday, the earliest allowed in the state of Texas. As a young girl I knew I loved aviation along with the space program, and started flying as soon as I could. My hours logged and time spent studying for flight has been invaluable in all pursuits of my life, teaching me patience, determination, and to follow my dreams without fear. I hope to use my license one day along with my research in medicine in Africa one day.

In the Texas Aerospace Scholars Program (founded for high-school students before their senior year to learn more about NASA), I was chosen the leader of my team and the only student speaker at the luncheon that week. That experience fueled my interest in NASA as a real possibility for work in the space industry.

I implemented an equestrian team at my high school while winning many competitions, including being offered a scholarship and spot on the Baylor University Equestrian Team. Working with horses taught me much about patience and that hard work pays off. I also was a working actor all through high school, which has allowed me to pay for my equestrian experiences and flying lessons, not to mention my first car. These lessons in self-reliance cemented my drive for accomplishment.

Educational and Professional Objectives

I am a person of deep convictions. My heart is drawn to the people of Africa, and a life goal of mine is to spend time every year working directly with them. I spent a month in Zambia working with AIDS orphans. I speak Swahili as a second language, and although research is vital to the advancement of medical studies, the direct interaction with patients keeps me focused on the goal of advances in patient care.

West Virginia University
Morgantown, WV
Dual Bachelor of Science in Mechanical and Aerospace Engineering – December 2009

NASA Academy Research Project:
Cryogenic Propellant Thermal Control Analysis

Principal Investigator:
Dr. David W. Plachta

Home Address:
17 Painter's Crossing
Williamstown, WV 26187
304-615-6182

EMAIL: charner4@gmail.com

Philosophy

As someone who loves to reminisce about the past and look forward to the future, it has taken a long time for me to realize that the most important time in one's life is the present. I have had many great experiences in life so far, and often set goals for the future, yet I know that this is my only chance to live this current moment it time. Time is linear, it has no loops, so each moment must be memorable and without regret. Time should never be wasted, but either enjoyed or invested working toward an ultimate goal where dreams become reality.

Academics and Research

During my freshman year at WVU, I was not completely convinced a career in engineering was for me. Growing up, I was told by many I was meant to be an engineer so I took the advice of my elders not knowing exactly what was in store. I had always excelled in problem solving and math so it was a natural fit. In addition to that, I always tried to explore, whether it be the wooded area behind my house as a child or the forces that govern our physical world. I also enjoyed optimizing things and was very interested in aerodynamic designs of all types of vehicles. Soon after my first exposure to Mechanical and especially Aerospace Engineering, I found out those who knew me were on to something. I knew that it both fit my strengths and fulfilled my interests.

As I progressed in my college career, my interests were drawn more to the Aerospace degree, especially the space travel aspect, while still continuing my pursuit of

both degrees. In my Junior year, I joined the Microgravity Research Team at WVU. This team was formed to conduct research through a NASA program called the Reduced Gravity Student Flight Opportunities Program (RGSFOP). The team submitted a proposal entitled "Investigation of Viscous and Capillary Fingering Through a Hele-Shaw Cell in Microgravity" to the program for review and our experiment was one of those accepted. We researched our topic, then designed and constructed an experiment apparatus to test the phenomena in question. We took the experiment to Johnson Space Center where it was tested in Microgravity conditions aboard the Weightless Wonder Aircraft. The data collected was analyzed and a report was submitted. This experience greatly enhanced all aspects of my research skills. It also honed my teamwork and leadership skills. What intrigued me most about this project was the space applications and working with NASA.

In the summer of 2008 I worked as an intern for Pratt and Whitney Engine Services in Bridgeport, WV. The company performed repairs and overhauls to a wide array of small to medium aircraft engines made by Pratt and Whitney. As an engineering intern my job consisted of designing and aiding in the construction of various engine part testing apparatuses. I also assisted engineers in writing repair instructions and gathering data to make decisions on limits for reparability for certain damages.

I have always excelled in academics and because of this taken great pride in my education. School is number one in my life but it is far from my entire life. I participate in many extracurricular activities many of which are through the engineering college. I am a member of the WVU Student chapter of the American Institute of Aeronautical Engineers and the WVU Flying Club. Also, I was this past semester's Corresponding Secretary for the WVU chapter of Tau Beta Pi, the Engineering Honor Society. In this post, I helped organize a district conference for other local chapters held at our school. I also served as our social coordinator organizing intramural activities, meetings, and cookouts. I also love sports and participate in a basketball intramural team (2009 University-wide Champs!) and the WVU Ultimate Frisbee Club Team. I also love to meet new people and challenge myself to new things. Currently, I am focusing on Spanish and piano.

Educational and Professional Objectives

I have many goals I would like to accomplish in my lifetime, many of which are far-fetched, but would be very fulfilling. I plan to enter graduate school in the fall of 2010 where I can get involved in space related research. After schooling, I wish to help send humans safely into space especially uncharted territories, whether that be with NASA or some other endeavor. Further, I want to help make our society aware of why space exploration is important and why we need to invest in it. Mostly, I want to be successful, but success is too often measured in the possessions one accumulates. To me, the lives one touches, the attitude one spreads, the changes they make to their world, and the experiences they have greatly outweigh their collections.

University of Cincinnati
Cincinnati, OH
B.S. in Aerospace Engineering, June 2011
M.S. in Aerospace Engineering, June 2011

NASA Academy Research Project:
Mars Data Analysis: Dust Deposition on Rovers

Principal Investigator:
Dr. Geoffrey A. Landis

Home Address:
1203 Harrison Pond Dr
New Albany, OH, 43054
614-530-0036

EMAIL: milas@email.uc.edu

Philosophy

Just as the cliché typically goes, I'm the nerdy kid with his head filled with numbers, who stares out at the stars and becomes short of breath at the grand scope of all of it. I want to explore it. I want to understand it. These are the things that have led me to study aerospace. I find that this area, above all others, is the perfect avenue to both conquer this fascinating unknown and play to my strengths of physics and math.

Education/Work Experience

As a 3rd year student at the University of Cincinnati, I'm pursuing both a bachelor's and master's degree through the ACCEND program. So far, my schooling has exposed me to the basics of fluid flow, aerodynamics, programming, and system modeling. Additionally, through the three quarters of Co-Op work I've completed, I have had experience with practical programming, hands-on work, and teamwork. During my first Co-Op quarter at the University of Cincinnati, I worked with Dr. San-Mou Jeng as a research assistant in his lab. Responsible for setting up rigs and recording combustor acoustics, temperature, and composition, I was involved in the hands-on building and testing aspect of aerospace research. This was a sharp contrast from my next Co-Op at Wright Patterson AFB, where I worked in the Turbine Engine Research and Analysis group. My work at Wright Patterson required much more computer modeling and research than my previous Co-Op. I worked at this Co-Op for two quarters where I used programs such as TERMAP and NASA's CEA (Chemical Equilibrium with

Applications). While I enjoyed both experiences and received excellent exposure to both worlds of aeronautical analysis/modeling and testing, I have yet to explore the subject in which I'm most interested in, that drew me to the aero program in the first place: space.

Unfortunately, as of yet, I have not been heavily exposed to the spacecraft side of aerospace, and I believe this is where my true passion lies. One of the main reasons I entered an aerospace engineering program was because of a class I took in high school, "Space Tech". That one class captured my imagination and interest unlike anything I had experienced before. Our class project, a Mars rover simulation, kept me riveted and put to good use the math and analytical skills that seem to come easily to me and put my leadership skills to the test. So while I have enjoyed my course work so far, I am anxious to get to classes that involve more space related topics.

Hobbies

During my free time, aside from the typical time-wasters of video games and movies, I like to read, often a good sci-fi book. However, my greatest passion lies in fencing. I've been fencing for more than seven years and I am currently the coach and president of the University of Cincinnati Fencing Club, The physical activity is a must for me but, more than that is the mental and competitive challenge fencing provides. I am a member of the United States Fencing Association (USFA) and even though I am rated in both epee and foil fencing, I constantly strive to improve my rating. I try to fence at least twice a week and someday I hope to achieve an "A" rating (the best available) in foil.

Career Objectives

My current, short-term objectives consist of gaining more exposure to rocket propulsion, spacecraft design, and space systems, through both my time as a Research Associate during the NASA Academy and my next year at the University of Cincinnati. Quite simply, I haven't seen enough to know what exactly I want to commit to as a career. I figure my education in this field in still incredibly young, and there are plenty of fields that I have virtually no experience with. There are few who have the raw curiosity and complete commitment that I bring to the table. I am ready to start the "space" phase of my aerospace education and excited learning from and working with NASA.

Not surprisingly, my current long-term goals are somewhat open-ended. I hope to have a key role with space exploration projects, not unlike those of the Mars rovers or the Kepler telescope. In fact, given my fascination with space and rockets, determination to succeed, ability to learn quickly, and the leadership skills I continue to learn, eventually I hope to head-up a major project in the space exploration field.

University of Washington
Seattle, WA
M.S. in Applied Mathematics, Dec 2009
B.S. in Applied and Computational and Mathematical Sciences, and B.S. in Molecular and Cellular Biology, Dec 2008

NASA Academy Research Project:
Systematic Analysis of the Effects of Spaceflight on Human Physiology

Principal Investigator:
Beth Lewandowski

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1403 191st St SE
Bothell, WA 98012
206-427-9410

EMAIL: sohih@u.washington.edu

Philosophy

"Twenty years from now you will be more disappointed by the things that you didn't do than by the ones you did do. So throw off the bowlines. Sail away from the safe harbor. Catch the trade winds in your sails. Explore. Dream. Discover." –Mark Twain

The above quote embodies my view towards life. I wake up each morning, in anticipation of doing something I have never done before, exploring something new and living every day to its fullest. I think every "today" should be lived so that it becomes a hope for "tomorrow" and can be remembered as a memorable "yesterday." And in three words, that is what life is all about: "yesterday", "today" and "tomorrow." Yesterday becomes our reason for looking forward to today and we live today in hopes of a promising tomorrow. And no tomorrow will be like today, which is why I believe in taking from every day all I can. It is to "Explore. Dream. Discover" that I look forward to challenging myself to new, demanding and "out of the box" situations so that I can continue to learn something new and grow as a person, both intellectually and socially.

When I think of NASA, I think of my dreams, my passion to explore and a hope of leaving my mark in science, no matter how small it may be. In a speech in 1962, John F. Kennedy said, "We choose to go the moon in this decade and do the other things, not because they are easy, but because they are hard. . ." I believe that one's true potential comes out in entirety when he/she is challenged to the next level. By attending the NASA Academy, I may not actually be going to the moon (who knows I might?) but I hope to accomplish something as exciting as that.

Although my studies so far have been focused on the math and sciences and my career will be as well, my scope has not been limited to just math and science. To me, it is very important to balance my work load with extra-curricular activities and culturally enlightening experiences. I have led an Indian dance group on my college campus and organized a series of Bollywood movie nights on campus. I am also involved with Seattle Women's Field Hockey and volunteering at local K-2 classrooms. I love to travel, meet people from diverse backgrounds, learn about their cultures and share mine with them.

Academics/Research Experience/Goals

I got involved with research at the University of Washington through a summer program (UW GenOM) during the summer (June 2004) before my freshman year. My research project was to evolve proteins called homing endonucleases so that they could cleave the DNA that is responsible for making tuberculosis resistant to antibiotics. I continued working on this project during my freshman year.

During my sophomore year, I began volunteering at the University of Washington (UW) Autism Center. I also participated in the UW Pre-Major in Astronomy Program (Pre-MAP) and worked in an Astronomy lab, where I analyzed RR Lyrae stars data from the Sloan Digital Sky Survey (SDSS) using Supermongo, a plotting and analysis package.

By the end of my sophomore year, I started working in the Department of Psychiatry & Behavioral Sciences, Division of Medical Genetics at UW where my project was to utilize bacterial homologous recombination to create deletions in the human MAPT gene and in the human PKCγ gene for identification of its regulatory elements. At the end of my junior year, I left to study abroad in Australia for a semester at the University of Western Australia, where I also got the wonderful opportunity to get involved with research. My project at the University of Western Australia was to use a Random Amplified Polymorphic DNA (RAPD) PCR test to identify hairy marrons (Cherax ternuimanus) from the Margaret River in southwestern Australia.

I must say the semester I spent abroad in Australia was definitely the highlight of my undergraduate education. After returning from Australia, I worked in an Applied Mathematics lab where I programmed in MATLAB to develop and optimize novel methods for approximating the surface area and volume of gliomas, a type of brain tumor. Then came perhaps the most exciting news: I had been accepted into the NASA Undergraduate Student Research Program (USRP) for Fall 2008. My project focused on optimizing growth parameters for salt-tolerant plants in order to obtain aviation fuel from them. It was a crucial experience that introduced me to the research environment at NASA. After the completion of the NASA USRP internship, I graduated in Fall 2008 with dual degrees in Applied & Computational Mathematical Sciences (ACMS) and Biology. In Jan 2009, I began my Masters degree in Applied Mathematics at the University of Washington.

My goal has been to work at NASA towards a research project that would allow me to use my skills in Applied Mathematics and Biology, in anticipation of doing more extensive work on the project after the end of the internship and finding a dissertation project either for my Masters or PhD in Applied Mathematics. I hope the NASA Academy will only bolster my goals and make them even more exciting and adventurous. Whether I do a research project for my Masters or PhD or get a job after graduation or who knows even become an astronaut, I know I would love to work for NASA!

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Philosophy

There are two things which most shape my thoughts and actions. The first is a love of learning and mental challenge. This is reflected not only in my studies and research, but also in the activities I enjoy. I am continually fascinated by the complexity and interconnectedness of the world. As a result I try to be as well rounded as I can, not only learning about aeronautics, but other subjects such as politics, economics, history and foreign language. The second thing which motivates me is other people. I do not begin to pretend to know the meaning of life, but most of the meaning in my life comes from my interaction with others. In the future, my ideal job would be one that not only provides me a challenge to overcome, but one which also benefits the lives of others.

Education

Ever since I can remember, I have been interested in flight and space exploration. More recently, I have become very interested in renewable energy technologies and sustainability. After graduating from South Kingstown High School in 2004, I decided to attend the University of Rochester. I graduated Summa Cum Laude in 2008 with a Bachelor's degree in Mechanical Engineering with minors in French and Mathematics. Currently I am a Master's student at Stanford University, and I plan on continuing on for a PhD. My academic interests are currently aerodynamics, computational fluid

dynamics, and optimization with applications to renewable energy technologies and aircraft design.

Experience

In the spring of my junior year at the University of Rochester, I worked on the characterization of magnetorheological fluids. Magnetorheological fluids are fluids whose properties change in the presence of a magnetic field. We examined the properties of the fluid under the presence of a continually changing magnetic field.

The following summer, I worked at King Mongkut's University of Technology Thonburi in Bangkok, Thailand as part of the Research Experience for Undergraduates program through the National Science Foundation. I was a research assistant to Teeranoot Chanthasopeephan. There, I worked on developing a refreshable Braille display using shape memory alloys as actuators. Shape memory alloys are materials who can be heat treated to "remember" a shape. The alloy can be deformed, and later reheated to go back to the remembered shape. The idea is to use this memory process to move Braille dots up and down on a reader. While refreshable Braille displays do currently exist, shape memory alloys look to make the systems much cheaper. During my senior year, I again worked on shape memory alloys, this time examining the transient force they exert while heating up.

At Stanford, I am currently researching the optimization of wind farms by examining the choice of turbine type and turbine location in the farm. Additionally, I am in a course this quarter where we are building autonomous aircraft, and we will attempt to set the world record for altitude reached by an aircraft of this weight and control.

Extracurricular Activities

I am an active Juggler, and am currently a member of the Stanford Court Jugglers. As an undergraduate I was a member of the UR Strong Jugglers, and in my senior year I was the vice president of the group. Each year in the spring, the Strong Jugglers put on an hour long show. Some of my fondest memories from Rochester come from preparing for this show.

I have played the oboe since I was in Junior High School, and was in the University of Rochester Symphony Orchestra all four years as an undergraduate. For two of those years, I was also in choral groups at the university. The two biggest performances I was in were singing the Verdi Requiem with several area colleges and the Rochester Philharmonic, and playing Beethoven's ninth symphony as part of the 50th anniversary of the orchestra.

I am a lover of strategy board games, and one day I hope to get a game of my own published. I have played ice hockey most of my life, and I have also sailed competitively. I enjoy pickup sports of any kind, and in the California weather soccer and volleyball have been the most frequent recently.

Outlook

This summer I hope to gain valuable experience as part of the academy. I am looking forward to learning more about NASA and the work being done by NASA researchers. I am hoping to better evaluate my research interests, and I hope to leave with a better idea of my future research path.

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Philosophy

Michael Griffin gave a speech in 2007 in which he talked about how people justify expenditures for projects with practical "Acceptable Reasons." Yet, he said what really drives people to accomplish these feats are "Real Reasons," those intangibles that are more important. Many things that I have done at MIT and in internships reflect my Acceptable Reasons. My inspirations, though, are the Real Reasons: to be part of exploration, to develop new things that have never existed, to know that I have advanced the knowledge of the world with my work.

I have always been fascinated with spaceflight. My grandparents lived in Florida, so I visited Kennedy Space Center several times. If we visited them when there was a shuttle launch, we would stand outside, and look through the leaves of the orange trees for the trail of smoke streaking through the sky. My brother and I procured a cardboard refrigerator box, cut windows and added some wings. We painted it black and white and our lowly box had become an orbiter, ready to blast off into the abyss. When I was in high school, I participated in a program called Presidential Classroom, and we visited Goddard. On our tour, I saw engineers putting Mylar on a satellite, and I immediately thought, *That is the kind of job that I want*.

During the summer of 2008, I participated in the NASA Academy at Glenn as a Research Assistant. I saw how the program was to train the future leaders of the aerospace industry, so that someday we will do great things together. Everyone at Glenn was inspired by Apollo landing on the moon when they were young. Well, it is my generation's turn: to go beyond. My Real Reasons: I want to stand on the shoulders of the giants before us, and figure out how we'll continue to explore.

Work Experience, Research, and Hobbies

During my freshman year at MIT, I was involved with a learning community for freshmen at MIT called Terrascope. This program presents students with a big, unsolvable world problem that they must come up with solutions for, then tasks the students to build a museum exhibit and the class visits a related site during spring break. For me, our year's problem was the threat of tsunamis on costal regions and islands. I learned a lot about early detection methods using satellites and buoys, and we traveled to Valdivia, Chile, where a major tsunami occurred in 1960. I stayed involved as an advisor to the program and was able to travel to New Orleans and Iceland in subsequent years.

Following my freshman year at MIT, I worked as an intern at Northrop Grumman Norden Systems in Norwalk, CT, which builds and designs radar products. During that time, I created a simulation of radar behavior over water, which was used to predict performance for government proposals. I had a quite different experience the following summer, when I worked for Vehicle Design Summit, a student group trying to design, build, and distribute extremely efficient cars through developing a consortium of students around the world. Even though everyone wanted to build a car, there were many different varying opinions and worldviews about how exactly that should be done and what was most important in that process. Figuring out even how to move planning or designs forward could be a challenge, but was very rewarding when accomplished.

In the summer of 2008, I was a Research Assistant to Dr. Greg Zimmerli at Glenn, working on a project to figure out what the fuel level of a tank is using radio waves, matching the resonant mode frequencies to the correct fill level. I enjoyed my academy experience so much that I am returning this year as the Operations and Logistics Manager.

For my senior design project at MIT, I worked in a group of thirty to forty undergraduate students to design and begin building a small satellite that we are hoping to launch within two to three years. The satellite has an electric propulsion system and will have a high amount of maneuverability for a ~50kg satellite. I worked on the wiring harness, as well as the design for the sensors and actuators of the attitude control system.

I began diving when I was eight or nine years old and have continued since then. I was the captain of the team this past year. The sport is as much a mental exercise as a physical one, as diving from high and higher platforms and executing more advanced dives requires no small amount of courage, but the feeling of soaring into the air and cleanly entering the water is exhilarating. I enjoy skiing, sailing, being outside, and writing.

Educational and Professional Objectives

My experience with the NASA Academy in 2008 made me realize that I want to be one of the leaders in the aerospace industry. To start on this path, I currently want to learn more about systems engineering. Beyond graduation and managing the 2009 Academy, I will begin work at Raytheon in Sudbury, Massachusetts, working on systems architecture for radar systems. After gaining some experience working in industry, I plan to return to school and get a graduate degree. I hope to be able to positively impact the aerospace industry and make my own mark on the world.

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Dr. Kankam joined the NASA Glenn Research Center (GRC) in March '90, as a Senior Research Engineer in the 'Power and On-Board Propulsion Technology Division'. He currently serves as the GRC University Affairs Officer at GRC. He has oversight responsibility for GRC research community collaboration with academia, in support of the Center research programs. He also currently serves on the Research Advisory Boards of Cleveland State University, Miami University in Ohio, and the Puerto Rico Space Grant Advisory Board in Puerto Rico.

Dr. Kankam earned his Diploma in Business Admin. (Mgt. Studies), and Ph.D., M.A.Sc. and B.A.Sc. (Applied Science & Engineering) degrees in Electrical Engineering from the U. of Toronto, Canada. He is a member of the Canadian Society of Professional Engineers, and a Life Senior Member of the IEEE and its Industry Application Society (IAS). He served as the 2005 and 2006 chairman of the Industrial Automation and Control Committee of the IEEE/IAS, and is now the Vice-Chair of the Manufacturing Systems Development and Applications Department of the IEEE/IAS, for Magazine publications.

Dr. Kankam was a Research Officer in the R/D Division-Ontario Ministry of Transportation & Communications (MTC), Toronto/Canada, from Dec.'73 to Aug.'77. He was then employed as an Engineer at Ontario Hydro, Toronto/Canada, from Sept.'77 to Feb.'79, and an Application Engineer at General Electric Company in Schenectady, NY, from March '79 to March '90.

He served on the GRC's Fellowship Selection Committee for several years, Technical Review Teams, Panel of Evaluators for NASA Research and Internship Programs, and as GRC's Technical Representative of NASA 'Faculty Awards for

Research' Program from '92 to '97. He has proctored and mentored summer Faculty Fellows and Student Interns, respectively, to complement in-house research programs. He was selected as a NASA Administrator Fellow from '97 to '99. During the '97-'98 academic year he was a Visiting Professor in the Dept. of Electrical Engineering, Howard Univ., in Washington D.C., where he taught "Energy Conversion", and co-developed the "Automation and Control Laboratory." Subsequently, he was a Study Director at the National Research Council's Aeronautics and Space Engineering Board, and later as a Visiting Research Engineer at the Royal Military College of Science in Shrivenham, England.

He was appointed Acting Chief of the 'Electro-Mechanical Systems Branch' from November 2000 to March 2001. Later, he served as a Strategic Planning Manager in the Aeropropulsion Research Program Office, in support of Aerospace Propulsion and Power Programs. As a former senior research engineer, he planned and performed research, and managed, identified and consulted on the development of power and power electronics-based systems for aerospace and terrestrial applications. He has authored/co-authored over fifty technical reports, and more than sixty refereed publications on the dynamics and control of power and power electronics-based systems, in IEEE Transactions, Conference Proceedings and affiliated Journals.

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