

National Aeronautics and Space Administration



NASA ROBOTICS ACADEMY AT MARSHALL SPACE FLIGHT CENTER



PROFILE BOOK 2007



Michael Griffin, NASA Administrator

NASA's Strategic Goals

- Fly the Space Shuttle as safely as possible until its retirement, not later than 2010
- Complete the International Space Station, accommodating international partner commitments and human exploration
- Develop a balanced overall program of science, exploration, and aeronautics consistent with the new focus on human exploration
- Bring a new Crew Exploration Vehicle into service after Shuttle retirement
- Encourage partnerships with the emerging commercial space sector
- Return to the moon and make it a base for later missions to Mars and beyond

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Program Description

The NASA Robotics Academy is an intensive resident summer program of higher learning for college undergraduate and graduate students interested in pursuing professional and leadership careers in robotics-related fields.

The NASA Robotics Academy program is designed to present a comprehensive package of information and experiences about the organization of the NASA Agency, some of its most important current and planned science, engineering, education, and technology enterprises, as well as a number of non-technical areas of critical significance. Besides attending lectures and workshops with experts in their field, the Robotics Academy students are involved in supervised research in a MSFC laboratory, and will participate in visits to other NASA Centers and a number of robotics-related academic laboratories and industries.



Eligibility, Selection Criteria, and Placement

The participants in the Marshall NASA Robotics Academy have been selected based on the following criteria:

- US citizenship or permanent residency
- Research Associates: Rising college freshman
- and sophomores
- Team Leads: Junior/senior undergraduates or
- graduate students
- High academic standing (GPA 3.0 or higher)
- Demonstrated prior involvement in robotics
- Propensity for teamwork

Both the selection process and placement of the Academy participants in Marshall's research groups were assisted by recommendations from faculty, administrators, academic supervisors, and co-workers, and the applicants' self-profiling essays.



A Brief History of the NASA Robotics Academy

The NASA Robotics Academy was founded in 2005 at the Goddard Space Flight Center (GSFC) with a vision to expand to other NASA centers. The Ames Chapter opened in 2006 and in 2007 Marshall Space Flight Center also began their preliminary year of the Robotics Academy.

The Robotics Academy began with the insight that robotics plays a critical role in NASA's Space Exploration Vision. The NASA Robotics Academy provides a pathway for students interested in careers in this exciting field. It can provide a bridge from high school programs such as FIRST, Botball and BEST to continued involvement in robotics research through undergraduate and graduate levels.



Automatic Rendezvous and Docking

The pilot group for the MSFC Robotics Academy will be performing research on a project supervised by the Automated Rendezvous and Capture group at the Marshall Space Flight Center. Specifically, the group will be working on modifying the existing architecture for a Small Air Sled (SAS) and creating a wireless control station to operate the vehicle manually.

Currently the vehicle operates on an 84' by 44' epoxy "Flat Floor" housed in one of the laboratories at the MSFC facility. Using compressed air, the SAS floats on a small cushion of air and uses its eighteen thrusters to translate and rotate. The SAS is equipped with gyros, accelerometers, and a space tested VGS in addition to laser range finders to obtain position, acceleration and velocity measurements on the floor relative to its environment. Using the Advanced Visual Guidance System and corner-cubes, the SAS can determine its position relative to a docking station on the edge of the floor. This information is recorded and analyzed using one on-board laptop computer. A second computer, also on-board, is then sent this data and then using a second program automatically docks with the docking station in real-time.

This group will take the existing hardware and software associated with the SAS, adapt it and wirelessly transmit telemetry to a wireless control station (WiCS). At the WiCS, a user will be able to view the appropriate telemetry and provide manual control for the SAS in near real-time with joystick input with software the group will develop.

The goal of the project is to provide a working control station that will allow for manual to automatic comparison of timing and efficiency for the SAS.

Principal Investigator: *Linda Brewster*

Team Lead: *Kyle Unfus*

Research Associates: *Kyrie Jig
Kristie Llera
Jonny Minder*



Kyle Unfus

Worcester Polytechnic Institute

Worcester, MA
Mechanical Engineering,
Concentration: Thermo-Fluids
Master of Science 2008
Email: kunfus@wpi.edu



Research and Work Experience

- **Thesis: Numerical Modeling of a Mili-Newton Hydrazine Thruster for Scaling Study**
- **Major Qualifying Project: Numerical Modeling of a Hydrazine Thruster**
- **Interactive Qualifying Project: Review of International Space Market**
- **Design Manager:** 2004 Team 42 FIRST Competition
- **Lead Design Engineer:** Base Sub-Group 2004 Team 42 FIRST Competition
- **Design Engineer:** Arm Sub-Group 2003 Team 42 FIRST Competition
- **Maintenance, various:** Westford Racquet and Fitness, Westford, MA; September 2006- June 2007
- **Head Coach:** Greenwood Memorial Swim Club, Worcester Extension Age-Group Developmental Swim Team; March 2007 – June 2007
- **Assistant Coach:** Greenwood Memorial Swim Club, Worcester Extension Age-Group Developmental Swim Team; October 2006 – February 2007
- **Aquatics Director:** Rotary Scout Reservation, Postenkil, NY; 2005, 2006 (summer seasonal)
- **Loader:** United Parcel Service, Shrewsbury, MA; October 2005- September 2006
- **Assistant Aquatics Director:** Rotary Scout Reservation, Postenkil, NY; 2004, 2003, 2002 (summer seasonal)
- **Lifeguard, Swimming Instructor,** Nashua YMCA, Nashua, NH; October 2001 – June 2004



Membership and Activities

- WPI Men's Swimming and Diving Team, 2005, 2006, 2007; *Co-Captain 2007*
- AIAA; 2006 – present
- Phi Beta Upsilon; Fraternity, 2004 - present
- Daniel Webster College's Theatre Guild; Founding Member; Stage Manager 2002, 2003; Set Designer 2002, 2003, 2004
- Acting: Arsenic and Old Lace; Officer O'Hara. DWC Theatre Guild; 2003
- Daniel Webster College Activities Board; Band Director 2002-2004
- Who's Who Among America's High School Students
- National Honor Society

Honors and Awards

- David Orlap Outstanding Staff Award; Rotary Scout Resarvation, 2006
- Most Inspirational Swimmer; WPI Swimming and Diving, 2006
- Hero of the Week; United Parcel Service, March 2006
- Kiwanis Science Scholarship Award; Columbia High School, 2001
- Eagle Scout: 2001

Special Skills

- Software Tools
 - ANSYS
 - Autodesk AutoCAD
 - Autodesk Inventor
 - COMSOL Multiphysics (FEMLab)
 - FLUENT
 - LabVIEW
 - Matlab
 - MSC Nastran
 - Pro Engineer
 - Solidworks
 - Waterloo Maple
 - Windows Office Professional
- Programming Languages
 - C ++
 - Visual Basic



- Shop Experience and Machining
 - 2 and 3 axis manual milling machines
 - 3 axis Computer Numeric Control milling machine
 - 2 axis manual metal lathe
 - Stick welding
 - Other various shop tools: drills, saws, ect.

Hobbies

Swimming, flying, SCUBA diving, playing guitar, teaching, listening to music, spending time with friends, brewing beer, reading, rock climbing, watching movies, cooking, sailing, building and designing things, drawing, learning, traveling, R/C vehicles

Personal Statement

I was born south of Buffalo New York, but grew up in a suburb of Albany, NY. After graduating from Columbia High School in 2001 with honors, I spent three years at Daniel Webster College in Nashua New Hampshire. Originally at DWC for a degree in Professional Flight Operations, I soon found that I had a greater affinity for designing planes than flying them. Despite changing the degree I was pursuing, I continued to fly for all three years I was in NH earning my Private Pilots License and many hours towards advanced certifications. After graduating with my Associates of Science in Aeronautical Engineering, I continued my education by transferring to Worcester Polytechnic Institute in Worcester Massachusetts. In 2006, I received my Bachelor of Science degree in Aerospace Engineering. Despite the wealth of knowledge obtained, I decided to continue my education and pursue an advanced degree. I decided to stay at WPI and seek a MS in Mechanical Engineering with a concentration in thermo-fluids. It is to this end that I am currently studying and working for academically.

I believe I am a headstrong person who is dedicated and knows what he wants. I am willing to work hard for what I want as I see this work as part of the reward for diligence. These strengths are also my weaknesses. I do tend to be a little stubborn and take the lead when I should follow. Being told that something is impossible, or cannot be done, simply drives me to prove them wrong. It is through this stubbornness that I truly believe that I think “outside the box” and seek ideas and creativity not always tapped into in the engineering world.



Kyrie Jig



Catholic University of America

Washington, District of Columbia
Mechanical Engineering
Bachelor of Science 2010
Email: 28jig@cua.edu

Research and Work Experience

- 2006 NASA GSFC Robotics Academy;
 - Worked on designing and building a robotic lunar crane that would be able to extend 15 feet and lift at least 200 pounds
- Collection Management Assistant: Catholic University of America; Summer 2002-2005
 - Repaired books (spines, corners, endsheets, etc.)
 - Labeled books
 - Charged and Discharged books
 - Took books up to circulation
 - Sorted books
- Engineering Research Practicum
 - Tested the maneuverability and traction of a VEX Robot
 - Wrote a 40 page research paper pertaining to the project

Membership and Activities

- American Society of Mechanical Engineers, 2006 – present
- Society of Women Engineers, 2006 – present
- Steel Bridge Competition, 2006 - present
- Thespian Honors Society, 2006
- National Honors Society, 2005 – 2006
- Asian Student Association, 2005 - 2006
- FIRST Robotics Team 53, 2004 – 2006
- Junior Civitan, 2004 – 2006
- Spanish Club, 2004 - 2005
- Women's Choir, 2003 – 2005
- Tech, 2003 – present
- Girl Scouts, 1996 – 2004



Honors and Awards

- Honor Roll 9th – 12th grade
- Induction into National Honor Society, 11th grade
- Who's Who Among America's High School Students, 2005, 2006
- Maryland Distinguished Scholar, Certificate of Mention, 2006
- Honorable Mention, High School Science Fair, 2002
- Graduated from Science and Tech Program in Row of Distinction, Overall GPA 3.8 and above

Special Skills

- Software Tools
 - AutoCAD
 - IDEAS
 - LabVIEW
 - ProDesktop
 - Microsoft Office
- Shop Experience and Machining
 - Lathe
 - Band Saw
 - 3 axis manual milling machine
 - 2 axis CNC milling machine
 - Drill Press
 - Hack Saw
 - Jigsaw

Hobbies

Ultimate frisbee, soccer, bicycling, tech, building objects, singing, listening to music, reading, drawing

Personal Statement

From an early age I was fascinated with how things worked and loved finding new approaches for old ideas. When I went to high school, I was a part of the Science and Technology magnet program, which enhanced my interest in engineering and robotics. In 11th grade, I participated in FIRST Robotics and knew that this was the field I wanted to go into. My last year of high school I worked on an engineering research practicum involving VEX robots and wrote a paper on my findings.



This past year I was a member of the Society of Women Engineers (SWE) at my university and continued working with robotics. Currently I am going into my second year at The Catholic University of America in Washington, DC. I am currently majoring in mechanical engineering and hope to attain a Masters degree in this field after finishing my Bachelors degree.

My drive to get things accomplished has helped me to be where I am today. I am strong-willed, so once I set my mind to something I will not stop until I succeed. I love to learn new things and use this knowledge in my daily life. Technology today is getting more and more advanced and I would like to be one of the people that helps contribute to its advancement.



Kristie Llera



Florida Institute of Technology

Melbourne, Florida
Physics, Space Science
Minor in Chemistry
Bachelor of Science (2) 2010
Email: kllera@fit.edu

Research and Work Experience

- Research Assistant: Magnetic Storms, Florida Institute of Technology
- Ramtech 59: Designing and fabricating parts for USFIRST robots, Miami Coral Park Sr.

Membership and Activities

- Alpha Phi Omega: Service Fraternity, Spring 2007 - present
- Florida Space Academy: Fall 2006
- Student Astronomical Society (SAS): Florida Tech Chapter
Fall 2006- present
- Society of Physics Students (SPS): Florida Tech Chapter
Fall 2006- present
- FUNSAT member: Systems Integration, Fall 2006 – present
- 4-H: Cuniculus member (community service) 2005 – 2006
- Multicultural Club: 2005 – 2006
- National Honor Society: 2004 - 2006
- Junior Engineering Technical Society: 2004 – 2006
- Women's Rugby: FIU, 2004 - 2005
- Math Honor Society: 2003 – 2006
- Science Honor Society: 2003 – 2006
- BETA Honor Society: 2003 – 2006
 - President: 2005 - 2006
- FIRST Team Ramtech59: 2001 - 2006
 - Team Treasurer: 2004 - 2005
 - Team President: 2005 - 2006
- Chess Club: 2000 – 2004
 - Club President: 2003 – 2004
- Future Business Leaders of America: 2000 - 2004



Honors and Awards

- Bright-Futures Scholarship: 2006
- FIRST Scholarship: 2006
- Venture Scholars: 2005
- Inducted to BETA Honor Society: 2004
- Inducted to National Honor Society: 2004
- Inducted to Math Honor Society: 2003
- Inducted to Science Honor Society: 2003

Special Skills

- Software Tools
 - Autodesk AutoCAD
 - General PC skills
 - MasterCAM
 - Rhino
- Computer Languages
 - IDL
- Shop Experience and Machining
 - Various multi-axis CNC machines
 - Milling machines
 - Manual Lathes
 - Band Saw
 - Drill Press
 - Other various heavy machinery

Hobbies

Puzzles, Sudoku problems, brain teasers, problem solving, building equipment and robots, playing sports, reading, watching movies, listening to music of all types, brainstorming, learning of new applications and material for future developments.

Personal Statement

I am the youngest of two, born on February first, 1988 to parents who immigrated to the US from Cuba at a young age. I have lived in Miami my whole life and was the first of my generation to actually leave home for college. I have been very involved, hyper actually, and feel I do my best when I keep both my mind and body very active.

I enjoy doing various activities, from dancing ballet since the age of three to playing rugby at 16. I have also played and



participated in tennis, soccer and Cross Country for many years. In my spare time during the summers, I managed to teach myself to play the piano and was finally able to take violin lessons before starting college. During the school year, I have been a member and held officer positions in all kinds of honors and service clubs such as Future Business Leaders of America, National Honors, Math & Science Honors, BETA, and FIRST. Aside from the meetings and projects, I was involved in tutoring fellow students in Math and Science and serving as a mentor to those interested in Engineering and Robotics education.

I first became interested in a career in space sciences when I saw a series on the Discovery Channel on planetary research. I was captivated by the findings made by scientists using their own research tools they developed. I could imagine myself using these tools or creating my own in the future someday and I decided that's what I wanted to do. Since then my goal is to be involved in new discoveries, space exploration, researching new technologies and just learning new things. I am a highly motivated person and enjoy learning, to continually challenge myself and challenge what is known versus what we have yet to try.

I have a passion for knowledge and each experience I come across feeds my drive and refuels my imagination to keep asking questions and learning how to make my ideas into reality. I hope to use what I learn now for the future. This will enhance my abilities and contribute to the human understanding of the tangible world and everything just outside our physical reach.



Hawaii Pacific University

Honolulu, Hawaii

Washington University

St. Louis, Missouri

Mathematics, Engineering

Bachelor of Science (2) 2009

Email: jminder@campus.hpu.edu

Jonathan Minder



Research and Work Experience

- BT Prime Mover – Muscatine, IA
 - Summer 2006 – Receive and distribute hardware
- Lifeguard/Swim Instructor
 - Geneva Golf & Country Club 2003-2005 – Muscatine, IA
 - Head Guard 2005
 - Employee of the month September 2005
 - Organized and taught swim lessons for members
 - Overall pool maintenance
 - YMCA Honolulu – 2005-2006 – Honolulu, HI
- Sales Rep – 2004-2005 - Honolulu, HI
 - Abercrombie & Fitch
- Waiter – 2003-2004 – Muscatine, IA
 - Diamond Dave's Restaurant and Bar

Membership and Activities

- Honor Society: Hawaii Pacific University, 2004 – 2007
- Founding Member: Kappa Mu Epsilon Honor Society
 - HPU Chapter - 2007

Honors and Awards

- Dean's List: 2004-2007
- Makana 20% Scholarship

Special Skills

- Computer Languages
 - C++
 - Visual Basic
 - LabVIEW
 - Microsoft Office



- Forklift Operators License

Hobbies

Golf, racquetball, skiing/snowboarding, surfing, swimming, volleyball, reading, and traveling

Personal Statement

I spent the first 18 years of my life in a small town in Iowa, graduating from Muscatine High School in 2004. After graduation, I immediately packed my things and headed out to Hawaii to start college at Hawaii Pacific University. I enrolled in a 3-2 Engineering program there, allowing me to spend the first three years of college in Hawaii earning a BS in Applied Mathematics, and then spending the final two years of college at Washington University in St. Louis, pursuing a BS in Mechanical Engineering.

I have always known what I wanted in life, to see everything there is to see in this world, and then move on to everything outside it. I've spent my whole life trying to accomplish these goals and so far am doing an okay job of it. My ambitions to succeed in everything I do and my desire to continually challenge myself in every aspect have been key factors in getting where I am today.

My interest in NASA was forged early in my life and I've never lost that sense of awe and wonder with space exploration that I had as a young child. Virtually every school project I've ever done has had something to do with space exploration or a related field. Working for NASA this summer has fulfilled the start of a lifelong dream.



Staff

NASA Robotics Academy Program Director

Dr. Alan S. Chow

Dr. Chow was an aerospace technologist at NASA's Marshall Space Flight Center in Huntsville, Ala. He is a 2001 recipient of a NASA Administrator's Fellowship, an annual award intended to enhance academic partnerships with NASA by sending top researchers to study and teach at minority-serving institutions. Currently he works in the Education Office with Dr. Six.

Program Manager

Dr. Gerald R. Karr

Dr. Karr is a Professor of Mechanical and Aerospace Engineering at UAH. Since 1992, Dr. Karr has also served as the UAH Campus Director of the ASGC. Dr. Karr also served as the Chair of the Mechanical and Aerospace Engineering Department at UAH from 1986 through 1999. Dr. Karr has, since 1978, been the University Director of the highly successful NASA Summer Faculty Research Opportunity (NSFRO) program. Dr. Karr has also been an active researcher in the areas of satellite drag, high-energy lasers, cryogenics, spacecraft thermal design and computational fluid mechanics. Dr. Karr earned his BS (1964), MS (1966), and PhD (1969) in Aeronautical and Astronautical Engineering at the University of Illinois at Champaign-Urbana. For recreation, Dr. Karr enjoys golf, running, sailing and visiting with his children and grandsons.

Operations Manager

Andrew Herron

Andrew is an alumnus of the 2006 NASA Academy at MSFC. He graduated in May 2007 from Florida Institute of Technology with a Bachelor of Science in Astronomy/Astrophysics and a Minor in Education. In August 2007 he will begin graduate studies at the Georgia Institute of Technology in Aerospace Engineering. His research background includes SEM studies and computational molecular modeling for the Olson Research Group in the Chemistry Department at FloridaTech and also gamma-ray burst study and classification for the NSSTC Gamma-Ray Astrophysics Team at the 2006 NASA Academy. In the future, Andrew hopes to pursue a



career as rocket scientist and astronaut. Space activities aside, the greatest influences on Andrew are his faith, scouting, and music. Andrew enjoys playing clarinet, tenor saxophone, ukulele, and harmonica, running, canoeing, climbing, biking, swimming, hiking, backpacking, camping, skydiving, whitewater rafting, amateur astronomy, photography, history, and spending time with family and friends.



Links

- ***NASA Robotics Academy:***
<http://university.gsfc.nasa.gov/programs/robotics.jsp>
- ***NASA Robotics Alliance Project***
<http://robotics.nasa.gov/>
- ***NASA Academy Alumni Association:***
<http://www.nasa-academy.org/>
- ***NASA Agency:***
<http://www.nasa.gov>
- ***NASA Marshall Space Flight Center:***
<http://www.msfc.nasa.gov/>
- ***Botball Robot Competition:***
<http://www.botball.org/>
- ***For Inspiration and Recognition in Science and Technology:***
<http://www.usfirst.org/>
- ***International Space University:***
<http://www.isunet.edu>
- ***The Soffen Memorial Fund:***
<http://www.nasa-academy.org/soffen/donors.html>