Costa, Fernando: **University of Tennessee / Mechanical Engineering / B.S. 2012**
Dowling, Jennifer: **Georgia Institute of Technology / Aerospace Engineering / B.S. 2012**
Holquist, Jordan: **University of Illinois at Urbana–Champaign / Aerospace Engineering / B.S. 2012**
Jones, Daniel: **University of Alabama / Aerospace Engineering / B.S. 2012**

NASA MSFC Mentor: Philip Franklin
Org Code: ER-52 Solid Rocket Propulsion

Fernando Costa:

Research and Experience

- ***NASA USRP Internship,Moffett*** **Field, CA, January 2011-April 2011**
  - Worked in the aeromechanics branch of the flight vehicle research and technology division
  - Responsible for tilt rotor research activities that directly supported the U.S. helicopter industry and the Department of Defense
  - Helped with rotor testing in the largest wind tunnel facility in the world
- ***Bekaert Corporation, Rogers, AR,*** **January 2010 – August 2010**
  - Identified and solved problems in the production of steel cord using statistical process control procedures
  - Collaborated and maintained open lines of communication with the production and maintenance personnel to solve problems and maintain all aspects of statistical process control
  - Developed and coordinated trials and tests including customer samples to expand and improve production

Membership and Activities

- Pi Tau Sigma
- UT Soccer Club
- UT Intramurals

Honors and Awards

- National Scholars Honor Society
- UT Volunteer Scholarship
- National Science & Math Talent Grant

Jennifer Dowling:

Research and Experience

- ***Co-Op, NASA Kennedy Space Center, FL***

- May 2010 – July 2010

  - Worked in Launch Services Program Fluids and Propulsion for Expendable Launch Vehicles
  - Created a 1-dimensional tool for shock wave phenomena in explosives.
    - Created using Cheetah software for thermochemical calculations and utilizing the three dimensional graphing capabilities of Mathematica

- August 2009 – December 2009

  - Worked in Shuttle Fluids on the Environmental Control and Life Support System
  - Shadowed engineers during testing of the ECLSS system in the Orbiter
  - Created a cost analysis for the ECLSS system including personnel and hardware

- January 2009 – May 2009

  - Worked in Launch Services Program Fluids and Propulsion for Expendable Launch Vehicles
    - Created a propulsion analysis tool used for the Delta II first stage engine used to predict the performance of the engine and for post flight analysis of the vehicle by combining previous databases

- ***Georgia Institute of Technology, Atlanta, GA***

- Combustion Lab Undergraduate Researcher

  - Worked with graduate student on jet engine research
  - Aided in repairs to rig, including adding pressure valves in the fuel and air lines and designing structural supports for the rig, and literary research

Membership and Activities

- American Institution of Aeronautics and Astronautics (AIAA)
  - Vice President 2010 – 2011, 2011-2012
  - In charge of setting up speakers for bimonthly meeting
- Georgia Tech Dance Association
  - Treasurer 2011-2012
  - Swing dancing club that puts on monthly dances and workshops
- Women in Engineering Mentors and Mentees
  - Mentor to a lowerclassmen aerospace engineer

Honors and Awards

- Performance Award at NASA Kennedy Space Center for work during 2009 – 2010
- Women in Engineering “Mentor of the Year Award”

- Boeing Company Scholarship Program
- AIAA Outstanding Service Award
- Women in Engineering Alcoa Scholarship
- Sigma Gamma Tau Aerospace Engineering Honor Society

Jordan Holquist:

Research and Experience

- ***University of Illinois, Champaign, IL***
  - **Aerodynamics Research Laboratory, May 2010 – Present**
    - Set up Schlieren imaging optics and equipment and assist with image and data acquisition and analysis of high speed active flow control
    - Prepare lab rooms, experiments, and testing equipment to investigate the properties of high voltage DC electric arc discharges and their effects in air flow
  - **Aerodynamics and Propulsion Lab, Fall 2010**
    - Worked with a team to design an experiment train model to reduce base pressure drag
    - Utilized measurement techniques of hot-wire anemometry, load cells, and pitot-static probes to analyze vortex shedding of models in a subsonic wind tunnel
- ***Illinois Robotics in Space,* May 2009 – Present**
  - Project manager and systems engineer for club's effort to compete in NASA's Lunabotics Mining Competition
  - Working to broaden the focus of the organization to increase competency in applied engineering skills such as soldering, tools, CAD, and programming
  - Leading the club by organizing and conducting general meetings, skills workshops, and small-scale robotics projects with an emphasis on peer-to-peer education
- ***College Works Painting,* February 2010 – August 2010**
  - Secured, coordinated, and finalized 20 contracts with revenues exceeding $60,000 dollars, achieving a 20% profit margin within 5 months of the start of business
  - Recruited, trained, and supervised 2 crews and 14 employees in marketing, painting, and job site management
  - Organized and planned detailed bi-weekly production projections, working closely with employees to ensure goals, budgets, and quality levels were all achieved

Membership and Activities

- Illinois Robotics in Space – President 2010-2012, Founding Member, 2009
- American Institute of Aeronautics and Astronautics (AIAA)
- Students for the Exploration and Development of Space (SEDS)
- Floor Lovers Illinois (Break Dancing)
- UIUC Climbing Club

Honors and Awards

- Plato and Flora S. McCourtney Foundation Scholarship – 2008, 2009, 2010

- Dean's List, 2 semesters
- National Honor Society
- Louis Armstrong Award for Jazz, 2008

Daniel Jones:

Research and Experience

- **Assurance Quality Group, Inc. , Cottondale, AL, May-August 2008, 2009**
  - **Field Representative**
    - Inspected automobile components for damages and defects and reported issues to plant management and quality control
    - Repaired any non-cosmetic flaws in defective hardware
- **Lenny's Sub Shop, Tuscaloosa, AL, August 2006-August 2007**
  - **Manager**
    - Oversaw every aspect of daily functions in the deli, inventory, order, and delivery of food, and reported operational statistics to owner
    - Worked with fellow employees to maximize efficiency and quality of service, handled any dissatisfaction among employees or customers

Membership and Activities

- American Institution of Aeronautics and Astronautics (AIAA)

Honors and Awards

- President's List (2 semesters)
- Dean's List (8 semesters)
- NASA Space Grant Scholar
- Capstone Scholars Scholarship
- Mary Ellen Sullivan Banks Scholarship
- AT&T Foundation Scholarship
- John M. Gallalee Scholarship

Title: Solid Rocket Motors Thrust Oscillations Due To Vortex Shedding Across Inhibitors

Abstract:

Solid Rocket Motor thrust oscillations are a major concern within the aerospace industry for a number of reasons. In some cases the frequencies of these oscillations are nearing the resonant frequency of the motor's structure, certain payloads, and the internal organs of the human body. Should these resonant modes be excited within a motor, damage, injury, and/or death are all possible consequences. A major cause of these oscillations is believed to be vortex shedding in the combustion chamber over the combustion inhibitors stationed at motor segment interfaces. A subscale quasi-1D cold flow test chamber was designed and modeled to have fluid and acoustic properties similar to the combustion chamber of the Space Shuttle Solid Rocket Boosters. Lateral inhibitor test articles and a test matrix were developed to test various inhibitor geometries, spacing, and longitudinal locations in the test chamber. In addition, an experimental test bed and the procedures for set up and testing were developed to acquire pressure and acoustic data as well as Schlieren images of the flow characteristics. With this cold flow test facility, future work can be accomplished in correlating inhibitor configurations with vortex shedding frequencies, acoustic frequencies, and pressure oscillation amplitudes in an environment similar to one found within typical full scale Solid Rocket Motors. This research will allow future motor designers to avoid inhibitor configurations that can create dangerous oscillatory conditions, resulting in safer and more reliable Solid Rocket Motors.