

Names: 1) Barile, Kristina
2) Chander, Meera
3) Navarro, Christopher
4) Saindon, Luke



Educational Institutions: 1) Harvard University
2) Massachusetts Institute of Technology
3) University of Texas at El Paso
4) University of Maine

Majors/Degrees/Grad Year: 1) Mechanical Engineering, BS 2012
2) Aerospace Engineering, BS 2014
3) Mechanical Engineering, MS 2011
Mechanical Engineering, BS 2008
4) Mechanical Engineering, BS 2012

NASA MSFC Mentor: Kevin Pedersen

Org Code/Division: ER23 - Spacecraft and Auxiliary Propulsion Systems Branch

Research and Experience

- 1) Calspan (Summer 20090 – Speed Trap Design for Car Crash Testing) and Moog (Spring 2008 – Analysis of Airplane Actuator Systems)
- 2) Glenn Research Center Summer Internships (Summers 2009 and 2010 – Ceramic Matrix Composites Research) and Astronomy Research (Fall 2010 – Investigating Globular Clusters)
- 3) Center for Space Exploration Technology and Research (January 2010-Present); General Motors (July 2008- May 2009)
- 4) UMaine Research Assistant (2008-2009, Design and Fabrication of Tidal Turbines), Applied Thermal Sciences (Summer 2009- Design of Ramjet Propulsion Systems and Design of Toroidal Internal Combustion Engine Concepts)

Membership and Activities

- 1) American Institute for Aeronautics and Astronautics, Harvard College Engineering Society, Harvard Yearbook Publications Photo Editor, Expressions Dance Company
- 2) American Institute for Aeronautics and Astronautics, MIT Flying Club, MIT Bhangra Indian Dance Team
- 3) American Institute for Aeronautics and Astronautics
- 4) American Society of Mechanical Engineers, UMaine Coaster Car Club, UMaine FSAE, Black Bear Robotics Club

Honors and Awards

- 1) Buffalo Seminary Valedictorian , Harvard Book Award, Rensselaer Polytechnic Institute Medal, Buffalo NY Ray of Light Award
- 2) Arthur J. Samberg Scholar (MIT), Student Contribution to Hubble “Top Stars” Teacher Award, AP Scholar with Distinction, National Merit Commendation

3) UTEP College of Engineering Deans List

4) UMaine Presidential Scholar, UMaine Honors College Student

Title of Poster: Optical Mass Gauging Using Modified Michelson Interferometer

Abstract: In a microgravity environment, it can be challenging to determine the mass/volume of liquid in a tank due to unpredictable fluid behavior. Although other methods exist to accomplish this task, compensations must be made due to unfavorable balances between weight, cost, and uncertainty of these systems. This thus exemplifies a technology gap for in-space cryogenic depot applications. We have constructed a proof-of-concept experiment for a different approach consisting of a propellant tank with a certain percentage of ullage, a modified Michelson interferometer, and a piston/bellows system - a piston stroke will provide a change in pressure to a test cell of gas, thus changing the gas's density. This will be detected as a change in gas's index of refraction, which manifests as movement of fringes in the interferometer's interference pattern. By measuring the number of fringes that pass our detector, we can calculate the volume of the ullage and thus the volume of propellant. The primary objectives of this testing include establishing repeatability of this method and quantifying the uncertainty, which can then be compared with alternatives to this method and further improved.