

Summer/Fall 2020 Recognition of Graduates

December 3, 2020



Pictured are the Propulsion Research Center students, staff, and faculty. This mosaic picture will remind us in the future that we are all “sheltering in place” this semester because of the COVID-19 epidemic. Our traditional picture of everyone gathered outside the JRC in new PRC shirts is not possible this fall. This year we assembled online to celebrate our students achieving four PhDs, six master’s degrees, and three bachelor’s degrees supported by research at the UAH Propulsion Research Center. We also recognize some other significant contributors.

New graduates, as you continue your studies or enter the new (online) workforce, take pride in all the people who have made UAH and the PRC an outstanding place for you to build relationships, gain an exceptional education, and participate in cutting-edge research projects.

Now with COVID-19 isolating us for a season we need to be intentional and to find new ways to “Keep our relationships more important than tasks or problems.” We wish all the graduates a successful and enjoyable future. Call on us in the future. We look forward to hearing from you.

Dr. Robert A. Frederick, Jr.
PRC Director
Professor of Mechanical and Aerospace Engineering
From Home, December 3, 2020



Summer/Fall 2020

PRC Graduate Recognition Program

Welcome

Dr. Robert Frederick, PRC Director

Recognition of Graduates

Ph.D. Students

Master's Students

Undergraduate Students

Virtual Reception

Introduction of Special Friends and Family Members



November 2019 Recognition Event

2020 PRC Graduate Recognition

Recognition of Doctoral Graduates



Dr. Ryan Gott
Bowling Green, KY

Ryan Gott is receiving a Doctor of Philosophy degree in Aerospace Engineering. Ryan completed his dissertation on "*Analysis of Atmospheric Pressure Plasma Generated Oxidative Species for Water Purification*", with his **advisor Dr. Gabe Xu**. Ryan said, "My work focused on developing and studying plasma sources for water purification. We were able to successfully develop some new plasma device designs that improved upon basic plasma jets and removed contaminants from water. Seven and a half years ago, I was on a plane coming back to Huntsville and happened to be sitting next to the president of the UAH alumni association. I asked her how to get involved in research as an undergraduate, and she told me to email the department head. Dr. Hollingsworth directed me to Dr. Xu, and he introduced me to plasma and the PRC! I always loved the family environment of the PRC. Over the years we played together on volleyball, kickball, and softball teams, cheered each other on throughout our research, and celebrated our successes together at luncheons (pre-COVID). I'll miss you all!"

Dr. Gabe Xu said, "Ryan has been an invaluable colleague and member of the lab. It's not far-fetched to say that he could run everything and knows where everything is. I will miss our research collaboration road trips and the long discussions about life, science, culture, politics and everything in between. I know he will do great things in his career and advance plasma science and technology for the betterment of everyone. We'll all miss his friendly demeanor, willingness to help other students, and uncanny ability to make a broken experiment work." **In January, Ryan will be starting a postdoctoral position at NASA's Kennedy Space Center to study plasma treatment of plants for human space exploration!**



Dr. Dakota Haring
Huntsville, AL

Dakota Haring is receiving a Doctor of Philosophy degree in Mechanical Engineering. Dakota completed his dissertation on "*Ablation Heat Transfer Characteristics of a Polymer Coolant Medium for Warm Gas Generator Applications*," with **Dr. Robert Frederick as his advisor**. He explained, "As a GRA, I conducted experimental and numerical research on ablative polymer coolant beds at the PRC. I was responsible for the experimental design, fabrication, and operation of cryogenic flow systems, combustion bombs, solid propellant systems, real-time radiography systems, data acquisition systems, and edge detection algorithms to experimentally determine ablation heat flux rates and heat transfer coefficients of ablative polymer coolant beds used for warm gas generator applications. I took multiple propulsion classes with Dr. Frederick and asked Dr. Frederick if I could get involved with the PRC. The one person I appreciate the most is Dr. Robert A. Frederick, Jr. Without his guidance I would not have completed my journey. Dr. Frederick put forth countless hours meeting with me every week, reading and editing my drafts, sometimes even meeting on the weekend or late at night just to assist me. I am forever grateful for the knowledge, friendship, and patience I found in Dr. Frederick. I recommend to anyone looking for the best advisor, go to him."

Dr. Robert Frederick offered, "Dakota worked very quickly and diligently to complete his dissertation work. He got oriented into the laboratory very quickly and developed his ideas on the modeling and analysis of the results with success. He is a very talented and creative person, and I look forward to seeing his future professional achievements." **Dakota plans to take time off and travel while looking for a job in the propulsion field.**



Dr. Amit Patel
Florence, AL

Amit Patel is receiving a Doctor of Philosophy degree in Aerospace Engineering. Amit completed his dissertation on “*Experimental Investigation of PMMA Cooling Beds for Warm Gas Generator Applications*,” with **Dr. Robert Frederick as his advisor**. He said, “I worked on laboratory experimentation with solid propellants and cooling materials to reduce hot gas temperatures for warm gas generator systems. It involved in-depth data and uncertainty analysis, design of experiments processes and a heat transfer study. I started at the PRC in 2012 as a student specialist and was also enrolled in the rocket design class with Dr. Lineberry. The best part about my experience at the PRC is getting to interact with the people. The people really make the PRC a great place to work. Having the ability to do hands-on laboratory research was a unique technical experience.”

Dr. Robert Frederick remarked that, “Amit has been an enthusiastic and high-level contributor to the PRC. He has put together a formidable package of four degrees from UAH: a B.S., Master’s, PhD, and an MBA, and I know that his parents are also very proud of his academic achievements. Through all this he has accumulated outstanding technical, business, speaking, safety, and analysis experience. He will be fantastic at any job that involves enthusiasm, effective communication, and technical expertise.” **Amit started a new position with Jacobs Space Exploration Group in October as a Solid Rocket Motor Design Engineer.**






Dr. Sneha Reddy Vanga
Hyderabad, India




Sneha Reddy Vanga is receiving a Doctor of Philosophy degree in Aerospace Engineering. Sneha completed a dissertation titled “*Effects of Double Wall Cooling Configurations and Conditions on a Full Coverage Effusion Plate*,” with **Dr. Phillip Ligrani as her advisor**. Sneha’s objective was to “obtain new experimental data to understand the flow characteristics for new effusion/impingement design models. A double wall cooling facility is used to model similar configurations of combustor liners employed in gas turbine engines.” She said, “Most of my coursework at UAH was related to propulsion. I started working at PRC as a graduate research assistant for Dr. Ligrani in 2015. I am very grateful for the learning experience and everyone who supported and helped me in the laboratory. I would like to thank my advisor Professor Dr. Phillip Ligrani for his valuable guidance and continuous support towards the completion of my doctoral dissertation and related research.”

Dr. Ligrani noted that, “Sneha obtained extensive, excellent research results because of her meticulous attention to detail, carefully conducted procedures, and continued hard work. Within her investigations, Sneha studied advanced gas turbine component cooling schemes, consisting of double wall cooling configurations, using a variety of different experimental procedures. Because of her work, new insight is provided into a variety of different thermal-fluid physical phenomena, appearing over a wide range of flow conditions, within a complex device, whose performance is affected by a large collection of different physical effects. Sneha has already published 3 journal papers based on her laboratory research, with several additional papers submitted, or under development for submission in the near future.



Sneha plans to pursue a job as a test engineer or as a post-doctoral researcher.

Recognition of Master's Degree Graduates

 <p>Hallie Collopy New Orleans, LA (Noxon, Montana)</p>	<p>Hallie Collopy is receiving a Master of Science degree in Mechanical Engineering. She completed her thesis titled, <i>"Surface Heat Transfer Characteristics of a Transonic Turbine Blade with Pressure Side Film Cooling and Different Tip Gaps"</i> with Dr. Phillip Ligrani as her academic advisor. When reflecting on her time at the PRC Hallie said, "I enjoyed working with so many wonderful people at the PRC. Dr. Ligrani has been an excellent mentor and I am thankful to have had the opportunity to work with him." Hallie's research involved measurements and analysis for an extremely complex flow arrangement, involving complex and intricate thermal transport and surface heat transfer phenomena. Her high quality results provide new levels of resolution of surface heat transfer variations for a complex squealer blade tip geometry, with a unique cooling arrangement. As part of this research, Hallie developed new measurement techniques, with new levels of understanding of a key cooling performance parameter, called the adiabatic film cooling effectiveness. The associated results are already employed for advanced gas turbine thermal design by Solar Turbines Incorporated, the sponsor of the research. One book chapter, one journal paper, and two conference papers have already been published, which are based upon Hallie's research results. Additional journal papers are expected, with two additional journal papers already submitted.</p>
 <p>Avery Fairbanks Section, AL</p>	<p>Avery Fairbanks is receiving a Master of Science degree in Mechanical Engineering. He worked previously with Dr. Phillip Ligrani as an undergraduate. He has been a full time graduate student while also working full time as an aerospace engineer at Torch Technologies. His immediate plans are to continue at Torch on advanced optical problems and systems.</p>
 <p>Swarnalatha Kathalagiri Vasantha Kumar Banglore, India</p>	<p>Swarnalatha is receiving a Master of Science degree in Aerospace Engineering. Swarnalatha completed her thesis on, <i>"Experimental Investigation of Spray Characteristics for Different Geometrical Misalignment Cases of Like Doublet Impinging Injectors,"</i> with Dr. Robert Frederick as her advisor. She explained, "This was the study of spray sheet characteristics for different geometrical conditions like doublet impinging injector. It was a cold flow experiment conducted at the spray facility of the PRC." Swarnalatha said she got involved in the PRC by "following Dr. Frederick everywhere (STALKED HIM ;))." When elaborating on her experience she said, "Very helpful folks (Special thanks to Mr. Tony, Evan, James and Dr. Lineberry)." Dr. Frederick remarked that, "Swarna is a very persistent and hardworking student. She completed a very detailed experimental study of liquid rocket injectors. Also, on the way she learned a lot about working in the laboratory, analyzing data, and presentation at professional conferences. Her achievements are also noteworthy as she completed them while being a full-time Teaching Assistant, grading hundreds of papers a week." Swarnalatha plans to pursue a Ph.D. in engineering.</p>

 <p>Isheeta Sunil Ranade Mumbai, India</p>	<p>Isheeta Sunil Ranade received a Master of Science degree in Aerospace Engineering this Summer. Isheeta completed her thesis on “<i>Experimental Investigation of a Liquid-Gas Dual-Swirl Coaxial Injector under Self-Pulsation</i>,” with Dr. Robert Frederick as her advisor. Isheeta worked in the Spray Facility at the PRC and explained, “As part of my thesis work I performed cold flow experiments to map the stable and unstable (self-pulsation) operating zones for a liquid-gas dual swirl coaxial injector. I was enrolled in a rocket propulsion class with Dr. Frederick during which I requested him to be my thesis advisor, as I was interested in doing experimental work related to injectors. I appreciate Dr. Frederick for being my advisor and for giving me the opportunity to do research at PRC. I also want to thank the staff, and students at PRC for making my research experience a memorable one.”</p> <p>Dr. Frederick remarked that, “Isheeta was a delight to advise. There is a lot of drive inside of her to perform well. She completed important experiments in liquid rocket injectors, learned to work in the lab, presented papers in professional conferences, and volunteered to help us often at PRC social events. She finished up her writing remotely from India during the pandemic while working many hours at a new full time job. I am very proud of her and wish her the best for her future. “Isheeta is currently working as a Propulsion Engineer at Agnikul, a space startup based in India, working towards launching India’s first private rocket.”</p>
 <p>Nathan Schilling Rockville, MD</p>	<p>Nathan Schilling received a Master of Science degree in Aerospace Engineering this Summer. Nathan completed a master’s thesis titled “<i>Augmenting a fission/fusion hybrid propulsion system with a pulsed magnetic nozzle</i>,” with Dr. Jason Cassibry as advisor. He explained, “I have spent the past couple years working on a mathematical model of the circuit used to charge the capacitor banks for the NASA PuFF vehicle. I hope to spend the next year or two (hopefully) working on a mathematical model of the magnetic nozzle on the PuFF vehicle, using a software package my advisor developed called SPFMax. I got involved at the PRC after sending an email to my advisor back in undergrad, about working as a grad student at UAH, and he accepted me. I’ve appreciated the willingness of the faculty (especially my advisor) to help and accommodate me, especially during these COVID times. Also, the food at the monthly luncheons.”</p> <p>Dr. Jason Cassibry said, “Nathan Schilling is continuing on his Ph.D. with me working on pulsed magnetic nozzles. He has done an excellent job developing and testing a model for flux compression recharging of a pulsed fission/fusion reactor.”</p>
 <p>Aalap Chirag Vyas</p>	<p>Dr. Jason Cassibry said, “Aalap Vyas has been an excellent student and colleague. He will continue to work with us past his Master’s supporting numerical modeling of plasma liner driven magneto-inertial fusion. I look forward to the continued collaboration!”</p>

Recognition of Bachelor's Degree Graduates

<p>Trenton Colbert</p>	<p>Dr. Kavan Hazeli said, "Trent's friendly and caring character is quite remarkable. I enjoyed working with him a lot and I wish him a bright future."</p>
 <p>David Long Scottsboro, AL</p>	<p>David Long is receiving a Bachelor of Science degree in Mechanical Engineering. Dr. David Lineberry said, "It was easy to see, immediately after he started working with us, how valuable a resource David would be to our projects at the JRC. He works very well independently or as part of a team. He came to us with a lot of practical hands-on skills and quickly learned the additional skills needed to support a number of projects, from designing, building, and balancing the air bearing for cold gas DACS evaluation to hot-fire testing in the test cell." David is actively applying for an engineering position.</p>
 <p>James Venters Huntsville, AL</p>	<p>James Venters is receiving a Bachelor of Science degree in Mechanical Engineering. James said, "since I am an undergrad, I do not have an advisor. However, Dr. Lineberry or Dr. Frederick are my supervisors depending on the project I am working on. During my time at the PRC, I have assisted with: cold flow injector characterization, testing of solid, liquid, and hybrid rocket engines, fluid system design and fabrication, and instrumentation set up. I assist on our contracted research work in the cold flow spray facility and on the hot fire test stand. I generally assist on whatever the most pressing issue is at any given time. Dr. Dan Jones introduced me to the PRC. I initially applied to work as an intern for Earth to Sky I but then transitioned to working at the JRC. I am grateful for Dr. David Lineberry, Mr. Tony Hall, Dr. Dan Jones, Mr. Evan Unruh, and Mr. Joseph Agnew for all the help they have given me over the years and guiding me to being a better engineer." Dr. David Lineberry said, "James has really been the linchpin for almost all projects in the hot-fire test cell and spray facility projects over the last few years. He has always been a pleasure to work with, and I look forward to continuing to work with him as a GRA in the Spring." James plans to pursue a masters degree in Mechanical Engineering through a GRA position at the PRC.</p>

UAH PRC Graduate, Dr. Shery Welsh accepts position as Director, Air Force Office of Scientific Research

Excerpts from an article by Jim Steele (full article by J. Steele at <https://www.uah.edu/prc>)



Dr. Shery Welsh, UAH PhD in Materials Sciences

University of Alabama in Huntsville (UAH) and PRC alumna, Dr. Shery Welsh, who earned her PhD in Materials Sciences, has been tapped as Director, Air Force Office of Scientific Research (AFOSR) in Arlington, Virginia. The goal of this organization is to locate and transition cutting-edge basic research to the Air Force Research Laboratory and other Department of Defense (DoD) elements moving from her current position at the Missile Defense Agency.

"I started out taking courses to be an architect, because I loved to draw, and then about a year in I decided that I wanted to be the engineer that built the stuff the architect was drawing," she says. "Materials Science and Engineering just sounded fun...and it was! I have a true love and passion for materials science, and it only grew with time. Everything is made of or is reliant on materials!" Dr. Welsh did her coursework for her PhD at UAH. When her colleague and mentor, Dr. Jeffrey Evans, passed away in 2014, she found herself serving as a part-time professor as well. Congratulations Shery on your new position! We are very proud of your accomplishments.

Thoughts for the Future

The UAH PRC stands poised to build upon a rich legacy of research advances in propulsion. One of our original strategies was to pursue funding support for projects that would support students. The faculty associated with the PRC have followed that vision and could produce 300 graduates with advanced degrees on propulsion topics in the first 30 years (projecting to next year). If we also project 30 years of total expenditures at \$50 million, that averages to about \$170,000 of external support per degree. The strategy forward will focus on continuing a legacy of excellence in traditional student production in the propulsion arena, equipping the future workforce for success in their careers.

Upcoming Events

- Spring 2021 Commencement: May 5, 2021
- Hypersonic Aerodynamics Continuing Education Web Course January 2021 - Dr. Cassibry
- PRC Webinars in Spring - PI's giving updates on current research initiatives and can include panel discussions with the national experts from around the world.



PROPULSION RESEARCH CENTER
THE UNIVERSITY OF ALABAMA IN HUNTSVILLE

- **Opportunity:** "I have an Opportunity for You."
- **Courage:** "Aerospace is not for the Faint of Heart."
- **Relationships:** "Keep your relationships more important than tasks or problems."