

Spring 2019 Recognition of Graduates

April 24, 2019






Propulsion Research Center Spring-Summer 2019 Graduate Recognition. *Pictured above are students, staff, faculty, and stakeholders of the UAH Propulsion Research Center at the reception for the spring-summer 2019 graduate recognition. Photo by Michael Mercier | UAH*



This spring we celebrate our students achieving four PhD.s., nine master's degrees, and six bachelor's degrees supported in part by research and active mentoring at the UAH Propulsion Research Center. We also honor those who support our students and faculty. New graduates, as you continue your studies or enter the 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 in propulsion and engineering, and participate in cutting-edge research projects. Always remember, as we face new challenges each day, to *"Keep relationships more important than tasks or problems."* We wish all the graduates and those starting new endeavors a successful and enjoyable future. Call on us in the future. We look forward to hearing from you.

Dr. Robert Frederick, PRC Director, April 24, 2019

PRC Mission Support Recognitions

	<p>Gabriele Cromartie is recognized for five years of service at the University of Alabama in Huntsville. Gaby started her UAH career at the College of Business and then served as a Staff Assistant at the Civil and Environmental Engineering Department. She joined the Propulsion Research Center in May 2018 as the Program Coordinator. Gaby says, "I enjoy working with a variety of people and take pride in mentoring students. I feel 'at home' in the PRC." Gaby currently continues her education in the College of Professional Studies at UAH. Dr. Frederick said, "We are extremely pleased to have Gaby with us. She is a breath of fresh air and excels in all of her projects. She is organized, thoughtful, and has excellent rapport with others."</p>
	<p>Anthony Edmondson is recognized for 10 years of Service at the University of Alabama in Huntsville. Anthony joined the PRC as a Research Coordinator after moving from the University of Texas at Austin. In 2015, he completed his MBA at UAH while working full-time at the PRC. He was then promoted to PRC Program Administrator. Anthony said, "There is never a dull moment at the PRC. I also like how we value our relationships with each other at the PRC." Dr. Frederick said, "Anthony is very diligent in all of his work and keeps all of our financial world in good order. I have absolute confidence in his work and trust in his good judgement for all our financial operations."</p>
	<p>Anthony Hall is recognized for 15 years of service at the University of Alabama in Huntsville. Tony received his BSME in Mechanical Engineering in 2003. Tony has been a key contributor in establishing our test capabilities including: the construction of the Rocket Test Facility and various propellant feed systems. Tony said, "I have enjoyed interacting with the students over the years and hope to continue advancing the PRC as a world-class research center." Dr. Frederick said, "Tony is a key player in keeping all of our facilities and equipment in order. Most importantly, he watches over the students and keeps them in a safe environment as they learn the ins and outs of propulsion testing."</p>

New Orbit Recognition

	<p>Jacqueline Crews joined the PRC front office in November 2018 as the new Student Specialist supporting the Propulsion Research Center and its events. She is a sophomore at the College of Nursing with a compassion for people. Her previous position at the Chipotle marketing department served as a good foundation for the job requirements at the PRC. Jackie said, "I enjoy working with the staff and students of the PRC. It has been a great opportunity to learn and utilize my strengths." "Jackie" is kind, hard-working, and very dependable. Her outgoing, friendly personality is appreciated by all. She enjoys spending time with her friends and volunteering at the local senior assisted living center.</p>
	<p>Bill Knuth joined the PRC in April of 2019 as an on-call Principal Research Scientist. Mr. Knuth's career has spanned a variety of endeavors from designing turbopumps on the Saturn V to being Chief Engineer for an aerospace company. Bill says, "I am honored to be part of the PRC Team, and I look forward to generating new ideas that can be developed in conjunction with the research teams at UAH." Dr. Frederick said, "Mr. Knuth helped me with my first senior design class at UAH"</p>

28 years ago. From the day I met him, he has always been a kind, creative, and positive influence on me and the students he interacts with. He is a perfect addition to our team. We are privileged to have him join the UAH PRC Team.”

Doctoral Graduate Recognition



Dr. Annette Fisher
Huntsville, AL

Annette Fisher completed her dissertation entitled, “Development of Absorption-Coefficient-Based Narrow-Band Model and Its Application to the Calculation of Radiative Heat Transfer in One- and Two-Dimensional Enclosures,” with **Dr. Sarma L. Rani as her advisor**. Annette’s thesis involved the development of the first ever narrow-band model based on the absorption coefficient rather than the absorptivity, with all existing models considered. Annette said, “UAH continuously pushes the envelope in innovation and novel research. I am thankful to have the opportunity to work with a world-class advisor, Dr. Rani, to solve some of the DoD’s most challenging problems.” Dr. Rani said, “Annette performed painstaking research on the development and validation of a novel narrow-band model for non-gray radiative heat transfer. She demonstrated exemplary patience, persistence, and hard work in undertaking an extremely rigorous and detailed analysis of the narrow-band model developed.” Dr. Fisher received her Bachelors (Cum Laude), Master of Science, and Ph.D. in Mechanical Engineering from the University of Alabama in Huntsville. **Annette is a DIA/DI/MSIC Group Leader for the Distributed Simulation and Model Development Team.**



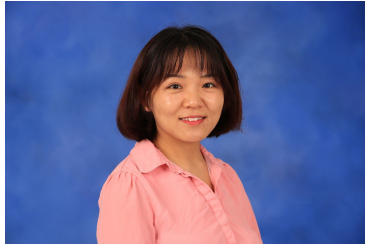
Dr. Deepa Kodali
Hyderabad, India

Deepa Kodali is completing a dissertation titled “Analytical Aeroelastic Models for Chordwise and Spanwise Flexible Flapping Wings in Forward Flight” with **Dr. Chang-kwon Kang as her advisor**. Deepa said, “I have enjoyed working with the amazing group of people and I have learned a lot as a student at UAH. Thank you, Dr. Kang, for your excellent support and guidance throughout this journey.” Dr. Kang remarked, “Deepa has made very nice contributions to aeroelasticity by deriving analytical models of flapping wing flyers with flexible wings. This was a very challenging problem, but I am very glad that Deepa was able to solve it.” **Deepa plans to pursue postdoctoral studies and would like to become a professor.**



Dr. Kevin Schillo
Tampa, FL

Kevin completed his dissertation entitled, “Three-Dimensional Modeling of Fusion Yield in Plasma Jet-Driven Magneto-Inertial Fusion,” with **Dr. Jason Cassibry as his advisor**. Kevin said, “I appreciate the numerous opportunities I’ve had during my time at UAH and with the PRC. From my days a GRA researching fusion propulsion to my ongoing involvement with fission-fusion hybrid research, I have been privileged with working with some of the most brilliant minds in the industry. I cannot thank Dr. Cassibry enough for his ceaseless support and guidance throughout my graduate studies. Thank you to my committee members and everyone at the PRC and MAE for making my time at UAH among the best years of my life.” Dr. Cassibry said, “Kevin is an outstanding engineer. He has pushed the limits of our 3D modeling capability, showing that there is a design space for high gain magneto-inertial fusion targets. Additionally, he volunteers time to support PUFF, an advanced propulsion concept being developed at NASA MSFC. He has also developed tools to assist other graduate students. Kevin has been a wonderful citizen in our research group, and I look forward to watching his career grow.” **Kevin is a Post Doc with us continuing his work on Magneto-Inertial Fusion and MCNP modeling for PUFF target design.**



Dr. Mengying Su
Dongying, China

Mengying Su is completing her Ph.D. degree dissertation which is titled, "Investigations of Elastic Instabilities and Elastic Turbulence Within Internal Flows," with **Dr. Phil Ligrani as her advisor**. Within her research efforts, Mengying has advanced our understanding of elastic instabilities and elastic turbulence within millimeter-scale flows and micro-scale flows. Included is a significant new understanding of associated transitional and thermal transport phenomena. As part of these efforts, Mengying has become an expert in the use and understanding of viscoelastic fluid rheological properties, as measured using our Anton-Parr Rheometer. According to Dr. Ligrani, "Mengying has worked very hard on her research, and accomplished very much, with rich dividends in new understanding for the non-Newtonian fluid mechanics community." **After completion of her Ph.D. degree, Mengying is planning to return to the P. R. China, to work as an Editor for an International Journal.**

Master's Graduate Recognition



Adam Bower, MSASE
Ashville, NC



Adam Bower has completed a thesis titled, "The Effects of Structural Margin in the Test-Fail-Fix Cycle for Rocket Engines" with **Dr. Dale Thomas as his adviser**. On his time at UAH, Adam said, "I enjoyed getting to know many great professors and colleagues as well as gaining real work experience through the Space Hardware Club and internships." According to Dr. Thomas, "I had the privilege of working with many of the Saturn and Shuttle veterans during my early years at NASA. I see many of their traits in Adam -- mainly, the ability to lose oneself in working on the solution to a challenging technical problem. They saw hard problems as something to be chased, not something to run away from." Adam plans to prepare and submit an article to the *AIAA Journal of Spacecraft and Rockets* based on this thesis research, and will also be presenting a paper entitled "A Methodology for Modelling the Effects of Margin in the Test-Fail-Fix Cycle for Rocket Engines" at the AIAA Propulsion and Energy Conference this summer. **Adam will be working at Raytheon after graduation.**





Justin Conner, MSASE
Clinton, TN

Justin Conner completed his thesis titled, "A Model Based Systems Engineering Approach to Cryogenic Fluid Management for Achieving Zero Boil-off on Nuclear Thermal Propulsion Spacecraft," with **Dr. Dale Thomas as his thesis advisor**. Justin is looking to utilize sun shields as a possible cooling method for storing liquid hydrogen in space for years without having to vent off any boil-off, which wastes precious propellant. Jason states, "I went to several schools and was ultimately drawn to UAH for their exciting research capabilities and student engaging professors. Dr. Thomas has been an outstanding mentor and professor to me, and I look forward to continuing our relationship after graduation as I can now call him a friend." According to Dr. Thomas, "Justin's easy-going nature masks a very talented and gifted engineer. Justin's work will help enable the use of nuclear thermal propulsion for deep space exploration missions." **Justin will be presenting his work in the Cryogenic Engineering Conference in the summer and has accepted a Systems Engineering position at Boeing Phantom Works.**

 <p>Joshua Logan Grumbach, Athens, AL</p>	<p>Logan Grumbach completed MSASE degree with Dr. Dale Thomas as his advisor. Logan said, "Working with the Propulsion Research Center has not only provided the opportunity to get a well-rounded academic education from world-class faculty, but also exposure to real industry problems and industry partners. The experiences and contacts I have made at UAH continue to enhance my career growth provide exciting opportunities for my future." Dr. Frederick remarked that "Logan is a high-energy professional with a broad range of talents and practical skills." Logan is currently a Senior Systems Engineer at Boeing in Huntsville, Alabama supporting the Missile Defense Agency and the Army Future's Command. Logan plans to continue with Dr. Thomas in pursuit of a doctoral degree.</p>
 <p>Robert Dalton Hicks, MSME Bradenton, FL</p>	<p>Dalton Hicks is completing a thesis titled "Manufacturing Effects on Water Cavitation in Sharp Edged Orifices," with Dr. Robert Frederick as his advisor. For the 2017-2018 academic year, Dalton was supported by the Alabama Space Grant Consortium as a Space Grant Fellow and performed research using high pressure water flow facilities to determine effects of manufacturing on cavitation. Dalton has said that he "values the office environment and the proximity to other researcher we as students get to have in our work. The problems are real and pertinent, the solutions are hands-on". Dr. Frederick remarked that, "Dalton is a high-energy contributor and very capable in making things happen in the laboratory. He is also very interested and insightful into the scientific principles of the processes he is investigating." Dalton is currently employed in industry in Cape Canaveral, Florida.</p>
 <p>Garrick Jennings, MSASE Murfreesboro, TN</p>	<p>Garrick Jennings completed his thesis on "A SysML Based X in the Loop System Modeling Strategy" with Dr. Dale Thomas as his advisor. Garrick was also named the UAH/Jacobs Systems Engineering Fellow and supported work at the Advanced Concepts Office on the Marshall Space Flight Center. According to Dr. Thomas, "I think that Garrick is somewhat of a reluctant researcher, and he got frustrated at times with the slow incremental nature of a research project -- although I think that he was enjoying it toward the end. It told me a lot about his character and discipline that he successfully completed a significant thesis on schedule, and those traits will serve him well during his career." Garrick plans to continue working with the NASA MSFC Advanced Concepts Office following graduation.</p>
 <p>Andrew Minor, MSME Jasper, AL</p>	<p>Andre Minor has completed a thesis titled, "Quantification of Porosity and its Effects on the Quasi-Static and Dynamic Behavior of the Additively Manufactured Nickel-Based Superalloy Inconel 718" with Dr. Hazeli as his advisor. Dr. Hazeli states that, "Andrew is the first alumni in my group. His dedication to learning and his constant progress in conducting original research enabled me to enjoy my first academic advisory role endeavor." He currently works at Defence Intelligence Agency.</p>
 <p>Victor Emmanuel Pierre Lopez, MSASE Mexico City, Mexico</p>	<p>Victor Lopez has completed a thesis titled "Complexity Assessment Using SysML" with Dr. Dale Thomas as his advisor. His research has led him to investigate the reasons behind failures of complex systems. On his time at UAH, Victor said, "I have learned a lot, made lifelong friendships and cannot wait for the next chapter". Dr. Thomas said, "His masters' research represents a noteworthy first step in realizing aerospace system designs that are no more complex than necessary, with the attendant benefits of increased robustness and resilience." Victor presented a paper entitled "Complexity Assessment Using SysML Models" and is submitting a paper based on his thesis research for publication in the <i>IEEE Systems Journal</i>. Victor plans to pursue a doctoral degree at UAH, also under the direction of Dr. Thomas.</p>

	<p>David completed his M.S. degree thesis titled, "Supply Channel Heat Transfer with Simultaneous Impingement Jet Array Cooling and Crossflow Cooling," with Dr. Phil Ligrani as his advisor. With this investigation, David developed a new understanding of internal cooling arrangements, for combustor liner components, which include simultaneous use of combinations of cross flow and impingement jet array cooling. As such, David has been undertaking exemplary work on double wall cooling configurations, which are unique, with arrangements and conditions which are different from anything which has been previously investigated. He added that "David's efforts are consistently exacting and meticulous, and it has always been a pleasure to work with him." David is planning to continue Ph.D. studies, also under the direction of Dr. Ligrani.</p>
	<p>Rachael completed a Master of Science in Aerospace Systems Engineering with Dr. Jason Cassibry as advisor. Rachael said, "I appreciate UAH's ties within the local industry that gave me the opportunity for experience through class projects. I also appreciate the professors who took the time to help with coursework or to just listen to my concerns. I felt that the professors cared about my career path and success. Dr. Cassibry said, "Rachael has supported diagnostic development with our collaborators at NASA MSFC and in our Charger Lab. As just one of many examples, she successfully built a photomultiplier tube, which is a delicate, high voltage instrument used to measure radiation output. This required her to develop and apply multiple skill sets, which showcases her versatile engineering abilities. She has integrated and worked well with numerous and diverse teams. I know she will continue to be very successful in her career." Rachael is applying for positions within the aerospace industry.</p>

Bachelors' Graduate Recognition

	<p>Prathmesh has completed the coursework required for a Bachelor of Science in Mechanical Engineering. He has performed research as an undergraduate research assistant under the supervision of Dr. Kavan Hazeli. Prathmesh worked on lattice structures composed of additively manufactured Nickel-Based Super Alloy Inconel 718. Dr. Hazeli statement about Prathmesh: "Prathmesh's transition from an undergraduate researcher to a high-quality independent and responsible researcher has set a remarkable example." Prathmesh plans to pursue a Masters Degree at UAH under the guidance of Dr. Kavan Hazeli.</p>
	<p>Gabrielle Andrew has completed the coursework required for a Bachelor of Science in Chemical Engineering. She has worked as an undergraduate research assistant with Dr. Nelson since Summer 2017. In Dr. Nelson's group Gabby has contributed to thermodynamic analysis of environmental control and life support systems for the International Space Station and synthesis and testing of lithium ion battery materials. Gabby credits her faith as instrumental in her achievements. "Always believe in the strength of God more than your own," she notes. Dr. Nelson said, "Gabby has been a pleasure to work with. Her strong work ethic, determination, and desire to learn have enabled her to contribute to two very different projects as an undergraduate researcher." Gabrielle is planning to work for Earth to Sky, where she currently interns.</p>



Daniel Corey, BSME
Reston, VA

Daniel Corey has completed the coursework required for a Bachelor of Science in Mechanical Engineering. He worked as an **undergraduate research assistant with Dr. Ligrani and Dr. Lineberry since the Spring of 2016**. Daniel supported initial construction, instrumentation and data collection of the supersonic wind tunnel. He also supported hot-fire testing of Kerosene-Gox rocket engine and developed the automation software for X-Ray CT scanning in the high pressure laboratory. "Working in the PRC has been one of the best parts of my undergraduate experience," he noted. Dr. Lineberry said, "Daniel has been an incredibly valuable member of the PRC staff. He can do just about anything." **Daniel plans to start work at Blue Origin in West Texas as a Test Engineer at the BE3 test stand.**



William Hankins
BSAE
Lexington, AL

William Hankins has completed the coursework required for a Bachelor of Science in Aerospace Engineering. He has worked as an **undergraduate research assistant with Dr. Lineberry since Fall of 2018**. William has worked in the PRC Spray facility supporting cold flow liquid rocket engine injectors and developing a pressure readout display for test stand sensors as part of an honors project. Will notes, "My experience at UAH and the Propulsion Research Center has proved invaluable as I move into graduate school and my career. I have made many connections and friends that I will carry with me throughout my career." Dr. Lineberry said, "Will has been a great addition to the PRC Team. I look forward to continued work in the Fall" William will be taking an **internship this summer with Corvid Technologies and starting graduate school at UAH in the Fall.**



Erik Korzon, BSAE
Anchorage, AK

Erik Korzon has completed the coursework required for a Bachelor of Science in Aerospace Engineering. He worked in the PRC Spray Facility through an RCEU in the Summer of 2018 and as an **undergraduate research assistant with Dr. Frederick since the Fall of 2018**. Erik supported upgrade of the Spray Facility for high flow rate benchtop testing including development of a test section for studying flow cavitation. Through the PRC, he also has worked with a local company supporting development of a liquid rocket engine hot-fire test stand. Erik said about his experience with UAH and the PRC, "Getting real research and engineering experience as an undergraduate student has helped illuminate my path as I look towards graduate school and my career." Dr. Frederick remarked, "Erik is an excellent student and has supported the development of a new test stand for one of our newest PRC customers." **Erik will work at the PRC this summer and start graduate school at UAH in the Fall.**



Abhee Singh, BSME
Kathmandu, Nepal

Abhee Singh has completed the coursework required for a Bachelor of Science in Mechanical Engineering. He has been involved in supporting investigations of thermal transport and heat transfer within double wall cooling configurations, **under the direction of Dr. Ligrani**. The double wall configurations considered are unique, with arrangements and conditions which are different from anything which has been previously investigated. His accomplishments include development of a two-dimensional traversing system and obtaining flow visualization data over a range of experimental conditions. Dr. Ligrani indicates that "it has always been a pleasure to interact with Abhee." **Abhee is planning to continue graduate-level studies, at an institution other than UAH.**

UAH University Student Launch Team Recognition



UAH USLI Team Photo April 6, 2019

Students: Hope Cash, Benjamin Channell, Joshua Claytor, Colton Connor, Daniel Corey, Darnisha Crane, Kyle DeGreen, Connor Gisburne, William Hankins, Hunter Hood, Matthew Jones, Brooklyn Kirkwood, Erik Korzon, Sakurako Kuba, Elena Pradhan, Zachary Ruta, Tanner Schmitt, Marcus Shelton, Andrew Smelser, Reid Wernig

Instructor: Dr. David Lineberry, UAH PRC

Mentor: Jason Winningham, UAH ECE

GTAs: Vivian Braswell, Bao Chi Ha, UAH MAE

The UAH Team was tasked with designing and building a high-powered rocket capable of reaching a specified altitude as well as retaining and deploying a payload. Unlike previous years, the team had to select an altitude – in the past, the target altitude was a mile. The team had to also design and build a payload capable of completing a task assigned by NASA – the team chose to build an unmanned air vehicle (UAV) and was given the task of delivering a beacon to a NASA specified location. The competition took place on April 6 – the team had issues with recovery which prevented the completion of the UAV's task. Overall, the rocket did not suffer major damages and few repairs need to be made to both rocket and UAV.

At the end of competition day, the team attended the awards ceremony where recognized with an **award for outstanding safety practices**. The final rankings for the competition will be released in the next few weeks after the submission of the Post-Launch Assessment Review (PLAR) by all of the teams.

Thank you to our 2018-19 Customers

Aerojet Rocketdyne, Alabama Department of Commerce, Boeing, C3 Propulsion, Combustion Research & FlowTech, Inc., CSRA/ECDC, Earth to Sky, Inc., Georgia Tech. (DARPA), Gloyer-Taylor Laboratories (GTL), IHI Corporation, Jacobs, Hyper V Technologies, Manufacturing Technical Solutions (MTS), McConnell Jones Lanier & Murphy LLP, The Missile Defense Agency (MDA), NASA Alabama Space Grant Consortium, NASA Goddard Spaceflight Center, NASA Headquarters, NASA Marshall Spaceflight Center (MSFC), San Diego Composites, Inc., Solar Turbines, Inc., State of Alabama, Space and Missile Defense Command, TGV Rockets, Inc., U.S. Air Force, Varian Medical Systems, Incorporated, and Vector (formally known as Garvey Spacecraft Corp).

Grateful acknowledgments to all those potential customers who collaborated with us to write proposals last year.

Upcoming Events

Apr 26 - Melvin's BBQ, "Musical Madness at Melvins III"

11:30 - 1:00, \$25 cash at door, Register online or call
256-503-4909, 2315 Hall Ave NW, Huntsville, AL

May 2 - UAH Commencement 10:00 AM

Von Braun Center in the Propst Arena



Courage • Opportunity • People