

# Spring 2022 Recognition of Graduates



April 29, 2022



PRC alumni and faculty at our 30th Anniversary celebrating our Alumni Banquet on April 14th. The left photo is of alumni who have received a bachelor's degree and the photo on the right are alumni with advanced degrees.

Our PRC 30th anniversary festivities included a Banquet, a Propulsion Research Symposium, and a Cookout at the Lab on April 14 and 15, 2022. In all, over 75 of our alumni participated traveling from as far away as California, Washington, Florida, and other parts of the United States. This spring we also celebrate our newest alumni achieving one PhD, two master's degrees, and fifteen bachelor's degrees supported by research at the UAH Propulsion Research Center.

New graduates, as you continue your studies or enter the workforce, take pride in all of our current alumni who have gone before you to establish an excellent reputation for the PRC and also express you appreciation to 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. Remember 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 April 29, 2022





# Spring 2022 PRC Graduate Recognition Program

#### Welcome

Dr. Robert Frederick, PRC Director

### **Recognition of Alumni at 30th Anniversary**

Celebrating our Alumni Banquet

Propulsion Research Symposium

Cookout at the Lab

#### **Recognition of Graduates**

Ph.D. Student

Master's Students

Undergraduate Students



#### Recognition of UAH Alumni Speakers at our 30th Anniversary Banquet



Dayna Ise, BSME 1999 NASA MSFC



Michelle Christensen, BS MAE 2006, Blue Origin



Dr. Chris Brophy, PhD 1997, Naval Postgraduate School



Tryshanda Moton, MS AE 2001 NASA GSFC



Dr. Kent Chojnacki, PhD 1993 NASA MSFC



Diakonos Research



#### **Recognition of Doctoral Graduates**

	Dr. Behzad Bahrami Babamiri is receiving a Doctor of Philosophy degree in		
	Mechanical Engineering. Behzad completed his dissertation on "Synchronous		
	involvement of topology and microstructure to design additively manufactured lattice		
	structures." He explained, "I started my PhD in fall 2017 working on the additively		
	manufactured lattice structure made of Inconel718 under the supervision of Dr. Kavan		
	Hazeli. I remember in the first year, when my office was still in Tech Hall, I joined PRC		
Dr. Behzad Bahrami Bahamiri	and I met several amazing people there. Then I moved to the Optics Building and stayed		
	there for almost 3.5 years, and I enjoyed my time there a lot by learning, thinking,		
Bookan. Iran	analyzing, publishing papers, and meeting great and knowledgeable people."		
Dookan, ir an	Dr. Jason Mayeur, his committee chair, said "Behzad did an outstanding job in his		
	research working on additive manufacturing of metallic lattice structures, accounting		
	for the interplay of both material microstructure and structural topology to achiev		
	optimized structural performance. I had the pleasure to work very closely with him		
	over the last year of his PhD and couldn't be more proud of his growth during that		
	period."		
	Dr. Behzad is working for Beyond Gravity (RUAG) company as a Stress Engineer		
	currently. He said, "Since I have passion for space I will continue my work in this		
	area as a Structural Analysis Engineer for space structures."		

#### **Recognition of Master's Degree Graduates**

	Nagarajan Nageshwar is receiving a Master's degree in Aerospace Systems
	Engineering. He completed his thesis titled "Effect of The Width and Number of Rings
	in A Concentric Split Ring Resonator on Plasma Generation for Miniature Ion
	Thruster" with his advisor Dr. Gabe Xu.
	Nagarajan explained, "My research focused on the design study of a potential
	low-power plasma source for Ion thruster." He continued, "I approached Dr. Xu for
	research opportunities, and he took me into his PERL research group. And that's how I
Nagarajan Nageshwar	had a chance to work in PRC. I thank Dr. Xu for being patient with me and guiding me
Tamil Nadu, India	with my research."
	Dr. Gabe Xu said, "Nageshwar has done great work with the SRR devices and
	designing them and running a long series of experiments to study their properties and
	the performance in a miniature ion engine."
	Nageshwar is planning to continue into a Ph.D.





Isabeta Rountree Louisville, KY Isabeta Rountree is receiving a Master's degree in Systems Engineering. Isabetha explained, "she works on implementing Model-Based Systems Engineering (MBSE) for customers at NASA MSFC. As the Mars Ascent Vehicle MBSE Lead, she researches potential MBSE applications, evaluates the immediate and delayed potential benefit of a given application, selects applications for use, and implements the systems engineering modeling. These MBSE applications also answer any direct customer needs for lifecycle systems engineering deliverables. She also trains systems engineering teammates and has developed and delivered formal MBSE trainings at the center. In this role, she serves as an MBSE resource at the center and has also directly supported MMPACT and HLS systems engineering model development. She remembers how she came to join the PRC, I directly contacted Dr. Thomas after my first year of undergrad and asked to get involved with the MBSE research being done in the CSIL. After reading a textbook on MBSE foundations, Dr. Thomas welcomed me into the research lab the summer following my second year." She stated, "I appreciate the academic opportunity the PRC offers students at UAH. Getting involved with research at the PRC was an irreplaceable experience. I'm very thankful to Dr. Thomas and the students at the CSIL for their guidance and community."

**Dr. Dale Thomas said,** Isabeta is presently working with Sev1Tech in support of the Mars Ascent Vehicle project at Marshall Space Flight Center. When we get the first geological samples back from Mars in a few years – thank Isabeta!

Isabeta is planning to continue her work as the Mars Ascent Vehicle MBSE lead while helping with implementation of MBSE at MSFC.

#### **Recognition of Bachelor's Degree Graduates**

Callahan Diercks Loves Park, IL	Callahan Diercks is receiving his Bachelor of Science degree in Mechanical			
	Engineering. He stated, "As an Undergraduate Research Assistant, I have done a lot of			
	different work around the PRC helping out with whatever is needed. A lot of my time			
	has been spent assisting Solid Fuel Ramjet tests whether that be setting up the test			
	stand or operating tests from the control room." Callahan remembered, "I reached			
	out to Dr. Lineberry the summer before my senior year after a friend recommended			
	the PRC as a great place for hands-on testing experience." He expressed, "Dr.			
	Lineberry and Tony Hall have been great to work with at the PRC. They have always			
	been happy to explain concepts that were new to me and really got me up to speed			
	with conducting tests."			
	<b>Dr. Dave Lineberry,</b> his mentor said, "Callahan has been a valuable team mer			
	on numerous projects since his first day at the PRC. He quickly got up to speed with			
	the facilities and testing practices of the PRC. He has been a pleasure to work with."			
	Callahan is planning to stay in Huntsville seeking a career in Mechanical			
	Engineering.			



A

Caleb Knox Trussville, AL



Morgan Aldridge Bloomington, IL workforce." Caleb is planning to work as a Test Engineer in the Huntsville area. Morgan Aldridge is receiving a Bachelor of Science degree in Aerospace Engineering. Morgan explained, "I assisted with SFRJ, including creating grains to test and helping run test fires. I started out working with the Py-GCMS to test propellant formulations. Then I shifted over to helping cast wax grains for SFRJ testing, as well as helping with test operations." She remembered, "Dr. Frederick reached out to me and asked if I would be interested in assisting with propulsion research at the PRC." Morgan continued, "I appreciate Paige Berg for her guidance and patience to explain everything to me. I learned a lot about what goes into propulsion research that I wouldn't have known without this experience. It has

**Caleb Knox** is receiving his Bachelor of Science degree in Mechanical Engineering. Caleb stated, "I assisted in the testing and processing of data on a double wall

Dr. Ligrani helped me understand more about heat transfer throughout the process. I was able to assist both of them in preparing our paper to be published in the International Journal of Heat and Mass Transfer. Working at the PRC has given me a clear understanding of the work I would like to pursue as I graduate and go into the

effusion plate using a subsonic wind tunnel. Sneha Vanga, Austin Click, and

**Dr. Robert Frederick** said, "Mogan is an outstanding student and a diligent helper in the laboratory. She quickly contributed to all the tasks she was assigned in the laboratory and worked well with all the members of her team. We are also proud of the many academic awards she has received and her participation in UAH sports."

definitely been a great way to complete my education at UAH."

Morgan accepted a job as an Associate Design Engineer with Aerojet Rocketdyne at their Huntsville office.



Manvith Amara *Charlotte, NC*  **Manvith Amara** is receiving his Bachelor of Science degree in Aerospace Engineering. Manvith said, "I initially got involved with the PRC my freshman year through Dr. Gabe Xu, working on developing CAD models for an atmospheric pressure plasma jet. In my senior year, I had taken the MAE 490/491 course for Senior Design in Rocketery under the guidance of Dr. Lineberry and helped develop a rocket that took part in the NASA Student Launch Initiative 2022 competition as the Propulsion Team Lead. I appreciate Dr. Lineberry the most for his dedication and supporting nature towards students. He had repeatedly stayed after his normal working hours to assist in my capstone project, Performance Variability in Solid Rocket Motors, and I would have never been able to complete it without him. I appreciate the PRC's nature to encourage students across all levels to take part in ongoing research, no matter the experience level, and the openness of all of the faculty and staff that are willing to teach to those that listen."

**Dr. Dave Lineberry** said, "It has been a pleasure working with Manvith in the MAE 490/491 project and on his honors project. He is a dedicated and focused student and a supportive teammate to his peers.

**Dr. Gabe Xu** said, "Manvith was a great research assistant and helped to advance our research in atmospheric pressure plasma jets."



	Manvith is planning to work as an Aerospace Engineer in the Huntsville
Declan Brick Fayetteville, AR	<ul> <li>Declan Brick is receiving his Bachelor of Science degree in Aerospace Engineering.</li> <li>He is the recipient of the Goldwater Scholarship and the NSF Graduate Research</li> <li>Fellowship. Declan said, "I grew up in Fayetteville, Arkansas. I've loved being a part</li> <li>of the PRC and PERL as it's been the springboard for my scholarship, fellowship, and</li> <li>entry into graduate school."</li> <li>Dr. Gabe Xu said, "Declan is one of the brightest students I've worked with, and he</li> <li>was willing to tackle plasma modeling in an all experimental group. In the course of</li> <li>his undergraduate research, he has learned three computational tools: Ansys,</li> <li>Comsol, and SPFMax."</li> <li>Declan will be attending University of Michigan to do a PhD in computational</li> <li>modeling of electric propulsion.</li> </ul>
Logan Curtis Versailles, KY	<ul> <li>James William Logan Curtis is receiving his Bachelor of Science degree in Aerospace Engineering.</li> <li>Dr. Jason Cassibry said, "Logan has been a highly productive student in our laboratory as we have moved twice! In particular he's gotten very good at programming controls for some of our systems, and he has helped contribute to fulfilling milestones on a contract with Lunar Resources."</li> <li>Logan is looking for a permanent job preferably in the Huntsville area, and he's also considering graduate school.</li> </ul>
Final StateBennett HasnerLouisville, KY	<b>Bennett Hasner</b> is receiving his Bachelor of Science degree in Aerospace Engineering. He explained, "I conduct research on Pulse Power Propulsion systems and Nuclear Fusion solutions with Dr. Cassibry. The goal of my work over the past three years was to aid in the study and creation of future multi-purpose propulsion systems using a machine known as "Sparky". I aided in the design of the voltage supply system, created a new Cubesat platform for the testing of small thrusters of the same design as Sparky and aided in the creation of the firing mechanism for the system." He stated, "I got involved in the PRC through a good friend of mine, Shelby Westrich, who introduced me to Dr. Cassibry who I came to admire extremely quickly as his passion for the field is what helped me fully realize my love for the propulsion field. My experience with Dr. Cassibry's lab has allowed me to make some of my best college friends and gave me invaluable insight into the field. The day-to-day work was everything I wanted from student research, it was fun and complex and allowed for me to freely test theories and solutions to any issues we encountered. It was the passion for the work that I felt every day that continued to reinforce that I chose the right mentor and the right field I want to work in for the rest of my career." His advisor <b>Dr. Jason Cassibry</b> said, "Logan has been a highly productive student in our laboratory as we have moved twice! In particular he's gotten very good at programming controls for some of our systems and he has helped contribute to fulfilling milestones on a contract with Lunar Resources. He is now looking for a



	permanent job preferably in the Huntsville area and he's also considering graduate school "
	Bennett is planning to work in the propulsion field in the Huntsville area and will continue to do work with Dr. Cassibry even in his full-time career.
Neil Laya Rensselaer, NY	<ul> <li>Neil Laya is receiving his Bachelor of Science degree in Aerospace Engineering. He has been awarded the Alabama Space Grant Graduate Research Fellowship to pursue a graduate degree.</li> <li>Dr. Gabe Xu said, "Neil started research with me his freshman year and continued throughout his undergraduate time. In that time he has done both experimental and numerical work focused on ion engines. He developed the wet etching method to fabricate SRRs that we still use today. I look forward to continuing to work with him in graduate school."</li> <li>Neil is planning to continue to graduate school at UAH working with Dr. Xu and studying magnetic reconnection space propulsion.</li> </ul>
Jacob Lee Huntsville, AL	Jacob Lee is receiving his Bachelor of Science degree in Aerospace Engineering. He explained, "Our research effort involved the development of small form-factor power generation systems to be used in missile systems. We worked to develop systems that utilized triboelectric and piezoelectric phenomena to generate electricity by harvesting the motion of the platform that the generator is installed on." Jacob added, "I got involved with the PRC after taking Dr. Wang's MAE 371 Aerospace Structures Course and was so interested in his work that I emailed him several times to see if he had any lab openings. One person in the PRC that I appreciate the most is <b>Dr. Gang Wang.</b> His passion for his research and for his students carries over both in the class and in the lab." Jacob will be starting a job at Space and Missile Defense Command after graduation.
Shivani Patel Lebanon, TN	<ul> <li>Shivani Patel is receiving her Bachelor of Science degree in Aerospace Engineering.</li> <li>She completed a "Honors Capstone Title: "Evaluating Rocket Performance with Different 3D-Printed Nozzle Extensions." Shivani noted, I am designing and 3D printing various nozzle extensions for hobby rocketry motors to increase motor performance and evaluate the viability of printed nozzle extensions for future USLI teams. I became involved with the PRC when I joined the USLI team this past year. She pointed out, I appreciate how helpful every person at the PRC is, from the faculty, staff, and other students. Everyone here is so willing to answer any question and help out in any way they can. I especially appreciate my capstone advisor, Dr. Lineberry, who has stayed at the PRC for incredibly long hours to ensure that the testing for my capstone gets completed.</li> <li>Dr. Dale Thomas said, Shivani promised to continue her graduate studies after taking a break from school. I'm going to hold her to that!</li> <li>Shivani will be working at Dynetics within their Systems Engineering department.</li> </ul>



Alay Shah South Riding, VA Alay Shah is receiving his Bachelor of Science degree in Aerospace Engineering. He completed an Honors Capstone entitled "Space Communications and Navigation (SCaN) Tool Capabilities Updates for Antenna Pattern and Jitter." He has worked within the Complex Systems Integration Lab under the guidance of Dr. Thomas since freshman year. His most recent work is developing an ontology for Marshall Space Flight Center; the object of the research is to advance the state of practice for Model-Based Systems Engineering by moving towards semantic interoperability between models and past data. Alay stated, "I'm so grateful to Dr. Thomas and my colleagues at the CSIL. I have learned so much from them and am grateful for their mentorship and help with my projects. Also, Dr. Thomas has the best stories and has made me a better engineer."

**Dr. Thomas** said, "Alay worked on a range of projects in the CSIL, making significant contributions to our model based engineering research for the MSFC Advanced Concepts Office. He was a great research team member, and I look forward to our paths crossing again down the road."

Alay will be working with Blue Origin beginning in the fall. In true Alay style, he's taking the summer off to enjoy life a bit before getting to work.



Brandon Staton Russell, KY **Brandon Staton** is receiving his Bachelor of Science degree in Aerospace Engineering. Brandon said, "He contributed to the "Analysis of Time-Resolved Plasma Jet Emissions that Drive Methylene Blue Dye Decomposition" under Dr. Xu and lead-author Ryan Gott. He helped image and analyze the interaction of plasma bullets when contacting a sheet of water under Dr. Xu. Designed and built a variable high voltage breakdown switch capable of withstanding at least 20 kV under

Dr. Cassibry." Brandon explained, "Before coming to UAH, I looked at the research being done in electric propulsion and got in touch with Dr. Xu about Hall-effect thrusters my freshman year. When the project ended, one of my current coworkers let me know about the high voltage research being conducted in the CAPP lab and was able to get me in touch with Dr. Cassibry." Giving credit to both of his advisors

**Dr. Gabe Xu (2018-2020) and Dr. Jason Cassibry (2021-current),** Brandon stated, "I was impressed with the friendliness of everybody within the respective labs. I was also amazed at everyone's willingness to go out of their way to help me understand all aspects of their research being conducted, even if I had no previous knowledge in the subject."

**Dr. Jason Cassibry stated,** "Brandon came into our laboratory at the Executive Plaza and then helped us with the move over to the Hexagon location near the airport. He has been an excellent undergraduate research assistant working well with other undergraduates and graduate students."

Brandon accepted a job at Corvid doing missile defense analysis.



Shelby Westrich Crab Orchard, IL	<ul> <li>Shelby Westrich is receiving her Bachelor of Science degree in Aerospace Engineering. She stated, "I worked as an undergraduate research assistant at the Charger Atomic Propulsion and Power Laboratory. I initially met Dr. Cassibry when he gave me a tour of the PRC while I was in high school. Getting to see all of the exciting projects taking place at the PRC solidified my decision to go to UAH. I began working for Dr. Cassibry my freshman year, and we shortly discovered our shared nerdiness over Star Trek. During the Research and Creative Experience for Undergraduates (RCEU) program, my work focused on developing magnetic field probes to characterize the output of pulsed power machines. Shelby expressed, "I am incredibly thankful for Dr. Cassibry and our entire lab team for being such influential mentors in my life. Many of my favorite memories during my undergraduate career came from this group, they have truly helped me grow as an engineer and a person!"</li> <li>Dr. Jason Cassibry said, "Shelby worked with us in the laboratory both at the aerophysics research center and on campus and executive plaza. She was the first student to come back into the laboratory after we reset and switched from charger to smaller pulse power machines. Her initial involvement directly resulted in us getting our first conference paper with a new pulse power machine which also led to additional funding. She played an absolutely invaluable role in getting us started again on our current path."</li> <li>Shelby accepted an offer to work for Jacobs Space Exploration Group as a Solid Rocket Motor Test Engineer at NASA Marshall Space Flight Center. She plans to pursue a graduate degree part-time in Aerospace Systems Engineering at UAH</li> </ul>
Jordan Willoughby Fort Payne, AL	Jordan Willoughby is receiving his Bachelor of Science degree in Aerospace Engineering. He stated, one of his research activities was "The use of resonant frequencies in concealed object detection." He continued, "I have helped develop a test procedure to prove the validity of the technology. I have also started implementing normal mode analysis to predict the resonance of more complex objects." He explained, "I worked with Dr. Frederick and Dr. Blackmon to help on a volunteer basis before converting to part-time employment. I have really appreciated Dr. Blackmon's help, through educational and career advice. The opportunity he provided has opened up a lot of opportunities for me." Dr. James Blackmon, his advisor, said, "Jordan assisted me with the development of the RF Locator. A system we've been working on for years to detect terrorist weapons. He very quickly learned the principles, the operation, and the test set-up and testing procedures. He was always available when weather permitted testing. He was very helpful. He operated the system independently and conducted various analyses while maintaining a 4.0 GPA." Jordan is planning to pursue an aerospace engineering career in the Huntsville area and continue his education through a graduate school program.





Charles Wilson Jasper, AL

#### **SLI Launch Team**

Manvith Amara, Madelynne Bell, Declan Brick, Adam Garret, Tyler Gas, Brennan Haralson, Alex Herbst, Leela Hyatt, Tanner Jackson, Neil Laya, Allison Lentz, Sophia Matthews, Joshua Newton, Shivani Patel, Justin Philips, Jaden Reid, Jason Riebe, Spencer Rubottom, Hunter Silverstrim, Dalton Sloan, Shelby Westrich, Jordan Willoughby **Charles Wilson** is receiving his Bachelor of Science degree in Aerospace Engineering. He stated, "I first met Dr. Ligrani as one of his students where he invited me to join his team as a student specialist my sophomore year. There I was able to assist in the testing of film tip cooling in transonic flow. Testing has been one of the most fulfilling experiences in my undergraduate experience, providing an insight into what my future career interests will be."

**Dr. Phillip Ligrani** stated, "Charles worked with us in the laboratory on a project involving transonic turbine blade heat transfer with film cooling. His support and excellent laboratory activities led to many successful project outcomes."

Charles has accepted an offer from Boeing with the BCA engineering team.





# Evan Unruh gets Director's "Hard Charger" Award.



Evan Unruh gets PRC Director's "Hard Charger" Award from PRC Director, Dr. Robert Frederick Dr. Clark Hawk, our founding Director, used to give at his discretion something called the Hard Charger Award. It was a special recognition for a job well done. Tonight I am pleased to reinstate that practice by recognizing Evan Unruh with a PRC Director's Hard Charger Award. Evan completed a Bachelor's at UAH and a Master's Degree in 2021. During the pandemic he designed, built, and tested UAH's first rotating detonation engine. This demonstration was a key element enabling Dr. Gabe Xu and his team to win a 1.5 Million research award from Texas A&M supporting RDE's for hypersonics.

Evan was also a utility infielder in the PRC labs with Dr. Lineberry and Tony on rocket engine testing, torpedo combustor testing, and student projects. Also during the pandemic, he was my grader for Rocket Propulsion where he helped me roll out a new online version of this class, with a new book, and new homework problems for 100 students, 100% online. He worked out and typed out dozens of homework and test solutions. He also was a Teaching Assistant in our rocket design class. Dr. Frederick said, "I am not sure I would have made it through the pandemic without his assistance. And I must say that Aerojet Rocketdyne has made a wonderful catch to bring him onboard."

## **PRC 30 Years and Beyond**

#### PRC 30<sup>th</sup> Anniversary Metrics

- 300 Students Receiving Advanced Degrees
- \$60 Million In External Funding
- 438 Refereed Journal Article
- 1,400 Students Through Propulsion Class
- (10 per year)(2 million/year, \$200K/graduate)(15 per year)(47 per year)

#### PRC 30<sup>th</sup> Anniversary Vision Forward

- Continuing a legacy of excellence in traditional student production in the propulsion arena
- $\hfill\square$  Equipping the future workforce for success in their professional careers
- □ Networking with alumni to develop partnerships on research projects and workforce development

