

# Fall 2017

## Recognition of Graduates



Fall 2017 PRC Community

## Relationships at the UAH Propulsion Research Center

At the UAH Propulsion Research Center, we *strive to keep relationships more important than tasks or problems*. The pictures above show each of us posed individually for the PRC website. As we combine our individual efforts to learn, grow, and support each other, we become so much more than just individuals or even teams achieving great tasks. I admire the way our students, staff, faculty, and alumni develop and keep good relationships with each other. As our relationships develop, we become a community. Coming together now to celebrate our achievements and recognize our graduates and staff is an important part of showing our appreciation to the people in our community. This booklet summarizes some recent achievements of our faculty, staff, and students and highlights those receiving degrees in the fall of 2017.

*Dr. Robert Frederick, Director of the UAH Propulsion Research Center and Professor of Mechanical and Aerospace Engineering*

# Fall 2017

## PRC Graduate Recognition Program

### Welcome

*PRC Director Dr. Robert Frederick*

### Recognition of Graduates

*Drs. Phillip Ligrani, Sarma Rani, and Gabe Xu*

### Address

*“Gluten Free Rocket Science” by Dr. Ashley Ramirez*

### Recognition of Students, Staff, and Faculty

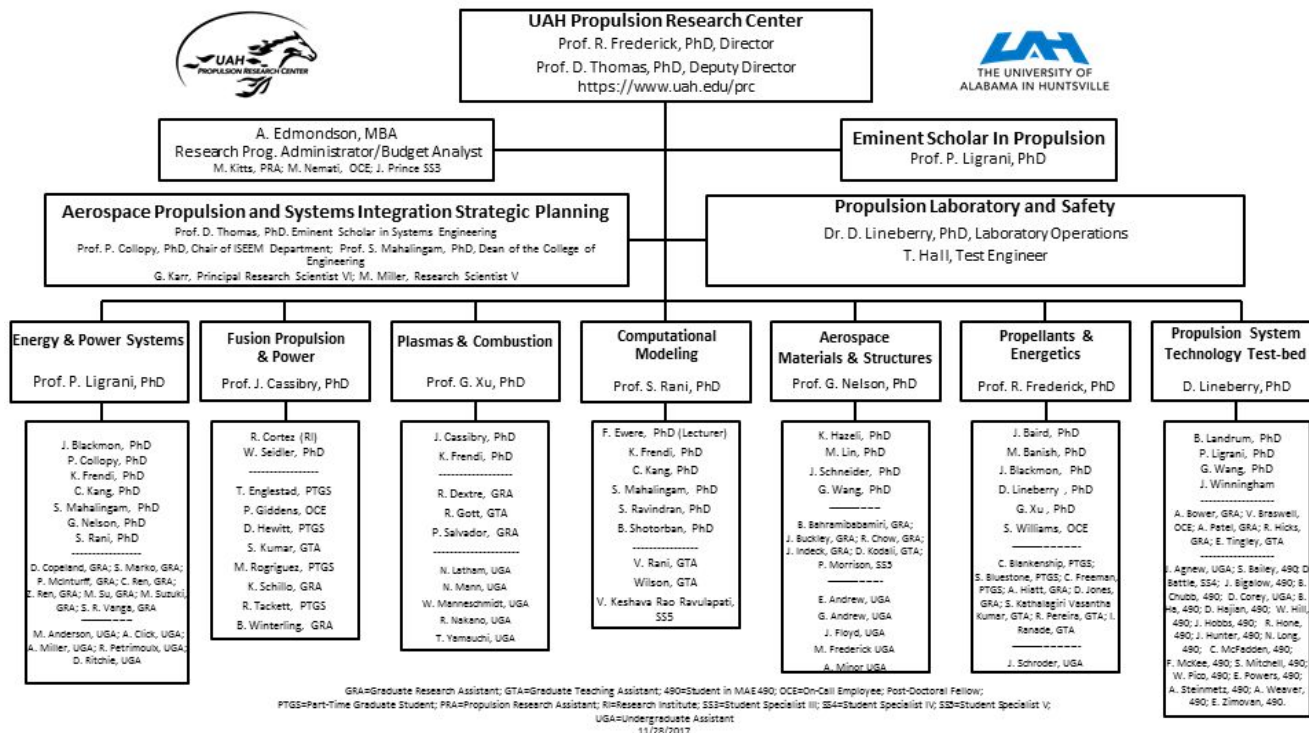
*Drs. Robert Frederick and David Lineberry*

### Special Music

*Margaret Allen, Michael Falwell, Kyra Henderson, Kayla Moyers, and William Stutts*

*UAH Department of Music*

### Adjourn to Reception



## UAH Propulsion Research Center

The UAH Propulsion Research Center (PRC) is beginning its 26<sup>th</sup> year at the University of Alabama in Huntsville (UAH). The mission of the Propulsion Research Center is to provide an environment that connects the academic research community with the needs and concerns of the propulsion community while promoting an interdisciplinary approach to solving propulsion problems. Academic highlights from last year include the offering of new graduate courses in liquid rocket engineering and solid rocket combustion instability. Research highlights include a new supersonic wind tunnel capability, upgrades to our rocket test facility, and new research programs in nuclear thermal propulsion, advanced structures, advanced heat transfer, additive manufacturing, and the first UAH rapid-prototyped hall thruster. In the 2017 fiscal year, total research expenditures rose 20% to \$1.884 million. Four PhD, eleven master's, and numerous undergraduate students obtained degrees in conjunction with the center. The Propulsion Research Center continues to be a resource for both fundamental and applied research as well as a significant contributor to workforce development in the propulsion and energy field.

## Guest Speaker Dr. Ashley Ramirez

Mason Dixon Bakery & Bistro was founded by Dr. Ashley and her husband, Taylor. Dr. Ramirez graduated with a PhD in Chemistry from Duke University and, after receiving her degree, she and her husband moved to Huntsville, AL for Dr. Ramirez to accept a position at Redstone Arsenal. When the Ramirezes arrived in Huntsville, however, Dr. Ramirez's position was postponed due to sequestration. During this "serendipitous delay," the Ramirezes pursued their dream of opening a gluten-free bakery.

The bakery, founded in April 2013, expanded to include a bistro in January 2015. Both sides of the Mason Dixon business have received numerous accolades over the past four years and this past October the Ramirezes opened a Mason Dixon Bakery & Bistro in Homewood, AL.





## Doctoral Student



**“Dr.” Vijaya Rani**  
PhD  
Vijayawada, India

Vijaya completed a dissertation titled “Analytical Investigation of Thermoacoustic Instabilities in Premixed Combustion Systems” with Dr. Sarma Rani as his advisor and Dr. Kader Frendi as his Committee Chair. “Vijaya Krishna has made seminal fundamental contributions to the development of theoretical models for the prediction of combustion instabilities,” Dr. Sarma Rani said, “[Vijaya] has also developed novel solution methodologies for the generalized acoustic wave equation.” On his time at UAH, Vijaya said “I have made some enriching and long-lasting friendships that I will forever cherish,” Vijaya also said that he had “learned a lot as a student here at UAH and [I] am better equipped to face the challenges in the real world.” **Vijaya plans to pursue postdoctoral studies.** Ultimately he would like to become a professor.

## Master’s Students



**Mr. Ethan Hopping**  
MSAE  
Clinton, TN

Ethan completed a thesis titled “Design and Testing of a Hall Effect Thruster with Additively Manufactured Components.” “What I enjoyed the most about UAH/PRC were the people,” Ethan said, “I came to UAH from a small, quiet community that didn’t have access to the wealth of technical experience, cultural backgrounds, and knowledge that is available in Huntsville [...]. UAH is where I first had the opportunity to figure out what I wanted to do professionally.” Ethan’s advisor, Dr. Xu, said that “Ethan was very dedicated to the work and went from no experience in Hall thrusters to a fully functioning thruster that was tested at NASA Glenn Research Center in the span of just 18 months.” **Ethan has moved to Kent, WA and is working as a propulsion development engineer at Blue Origin.** He says that he is having lots of fun.



**Mr. Patrick McInturff**  
MSAE  
Southside, AL

Patrick completed a thesis titled “Influences of Impingement Hole Shape and Small Roughness on Impingement Jet Array Heat Transfer” with Dr. Phil Ligrani as his advisor. For the fall semester, Patrick was also named as the **Von Braun Propulsion Fellow** and performed research using x-ray systems to measure the deflagration of polymers under high heat loads. Dr. Ligrani said that “Patrick addresses each and every research challenge with hard work and persistence, but also with quiet determination and incisive intelligence.” On his time at UAH, Patrick said that he “learned that engineering is a fun, challenging, yet rewarding subject.” **Patrick is seeking industry work in the Huntsville area.**



**Mr. Masaaki Suzuki**  
MSAE  
Tokyo, Japan

Masaaki completed a thesis titled “Influences of Impingement Hole Shape and Small Plus Large Roughness on Impingement Jet Array Heat Transfer” with Dr. Phil Ligrani as his advisor. On Masaaki’s work improving jet array impingement cooling, as applied to a variety of engineering devices, Dr. Ligrani said that “everyone involved in the project has enjoyed working with Masaaki, including the project sponsor, which is located in Tokyo, Japan.” Reflecting on his time at UAH, Masaaki said that he has “enjoyed working with people at PRC and eating the free food from luncheons. **After graduation, Masaaki will return to Japan to work for Bosch.**

## Undergraduate Student



Mr. David Ritchie  
BSAE  
Vestavia Hills, AL

David Ritchie has completed the coursework required for a Bachelor of Science in Aerospace Engineering with Dr. Phil Ligrani as his advisor. When asked about his experience as an undergraduate, David said: "I have had the pleasure to work with an amazing group of people, and I have learned that such a good team makes a world of difference in producing quality results." **David added that he plans to continue his studies at UAH in the hopes of completing a PhD.** Dr. Ligrani said that David had been involved in experimental research on a double wall cooling configuration and website development. He added that "David's efforts are consistently exacting and meticulous, and it has always been a pleasure to work with him."

## Propulsion Excellence Awards



Ms. Mirael Parker-Davis  
Contract Admin I

Mirael Parker-Davis is a Contract Administrator in the UAH Office of Sponsored Programs. Last year, Mirael supported the PRC in the preparation and submission of 41 proposals and the administration of 32 active awards. "The PRC depends on submitting timely proposals and well-managed awards," PRC Director Dr. Frederick explained, "Mirael supports the PRC with excellent work with a cheerful outlook which encourages everyone to perform with excellence." PRC Program Administrator & Budget Analyst Anthony Edmondson said "Mirael truly emulates the PRC's aspiration of putting relationships over problems. Her approach to work always keeps lines of communication open with continued positive results for the PRC and UAH." **Today, the PRC recognizes Mirael with a Propulsion Excellence Award for her consistent, high-quality support and her outstanding relational skills.**



Mr. Jason Winningham  
Charger Rocket Works Mentor

Jason Winningham is a Computer Systems Engineer in the UAH Electrical and Computer Engineering Department. For the past five years, Jason has supported Dr. David Lineberry and the students working on the UAH Student Launch Initiative in conjunction with the Alabama Space Grant Consortium. Jason mentors students on integrating the complex systems involved in launching, operating, and tracking high-powered rockets. Dr. David Lineberry noted that "Jason has invested numerous weekends and evenings to assist students with design, manufacturing, and testing which helps ensure that our students have the resources available to be successful." Jason's skill and easy manner make him an excellent student mentor. **For volunteering hundreds of hours of his time to UAH students, promoting student success, and his outstanding relational skills, Jason is recognized with a Propulsion Excellence Award.**

## Recent Achievements



**Mr. Anthony Edmondson**  
PRC Research Program  
Administrator/Budget Analyst

The PRC's Research Program Administrator & Budget Analyst, **Anthony Edmondson** ('15 MBA), was awarded the highly competitive **Society of Research Administrators International (SRAI) 2017 Annual Meeting Scholarship**. "The PRC is pleased to support Anthony's participation in this professional society to grow his skills and network with other professionals," PRC Director Dr. Robert Frederick said "It is my honor to recognize Anthony Edmondson for his hard work, dedication and support to PRC faculty, staff, and students," said Gloria Greene, Director of the Office of Sponsored Programs, "I am extra excited that Anthony is becoming engaged and active in SRAI and I congratulate him on winning the SRAI 2017 Travel Award[...]. Great Job, Anthony, thank you for personally investing in the profession."



**Mr. Robert Dalton Hicks**  
Alabama Space Grant Fellow

PRC graduate research assistant **Robert Dalton Hicks** was named as a **Graduate Fellow in the NASA Space Grant Consortium** this past **November**. Dalton's research explores higher-performance self-pressurized oxidizers for space propulsion applications. The renewable fellowship provides \$37,000, including a student stipend and expenses for an internship at a NASA Center. Dalton said that "Being an ASGC Fellow has allowed me to become acquainted with a multitude of other individuals in the area and has helped advance my research goals for my Master's Degree." Dalton added that "I stayed with UAH and the PRC [after completing an undergraduate degree] because I knew the institution was the right fit for what I wanted to do as a grad student. I had already had a great experience with UAH and the PRC as an undergraduate and wanted to continue that experience." PRC Director Dr. Robert Frederick is Dalton's advisor.



**Mr. Saroj Kumar**  
PRCSA President

PRC graduate teaching assistant **Saroj Kumar** is recognized as the **two-term President of the Propulsion Research Center Student Association (PRCSA)**. The PRCSA aims to further the professional development of the students affiliated with the PRC as well as promote propulsion education to the community at large. Saroj has led successful activities this past year including NASA in the Park and UAH Girls Science and Engineering Day. On Saroj's dedication to the PRCSA, PRCSA Faculty Advisor Dr. Frederick said that "Saroj is an enthusiastic and exemplary role model to hundreds of young students as he and the PRCSA team introduce them to engineering and rocketry with fun, hands-on activities."



**Mr. Julian Schröder**  
PRC Intern

**Julian Schröder** is completing an **Internship at the PRC** for his studies at the **City University of Applied Sciences in Bremen, Germany**. Julian's internship has involved upgrading the PRC's Spray Research Facility with a new data acquisition system and a new pressure system. "During my internship with the PRC," Julian said, "I have gained a lot of technical know-how and I have made some lasting connections. I'm certain my experiences in this program will help me in my future studies and with any other challenges I may face." Dr. Lineberry added that "Julian has been a great asset to the PRC this semester. He has picked up technical aspects of the project quickly, and has an outstanding work ethic."



## New Orbits



**Mr. Daniel Corey**  
Undergraduate Research  
Assistant

PRC undergraduate research assistant, **Daniel Corey**, has accepted an **internship with Blue Origin for the 2017 Spring Semester**. Daniel will be working at Blue Origin's West Texas facility supporting liquid rocket engine testing. Daniel has worked in the PRC as an undergraduate research assistant since the spring of 2016. He supported both the Wind Tunnel Facility and the Rocket Test Facility. "Propulsion is something I've grown more interested in the more I've learned about it," says Daniel, "and I'm grateful to the many, many people at the PRC who have taught and encouraged me over the past two years." Daniel will return to UAH in the fall of 2018 to continue his Bachelor's Degree in Mechanical Engineering.

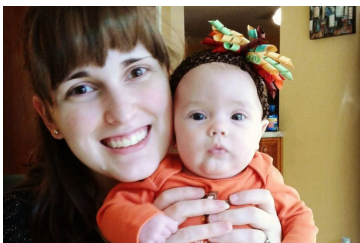
## New Arrivals



**Benjamin David Bennewitz**

**Benjamin David Bennewitz was born to PRC alumnus John Bennewitz ('15 PhD) and his wife Tara ('14 SEC) on Wednesday, November 22.** Both Ben and Tara are doing well.

John has completed a Postdoctoral Research Scholar at the UCLA Energy and Propulsion Research Laboratory/Air Force Research Laboratory. He currently a Research Scientist (Senior Engineer) for ERC, Inc. and part of the technical staff of the Air Force Research Laboratory's Combustion Device Branch.



**Olivia and Esther Marie Hitt**

**Esther Marie Hitt was born to PRC alumnus Matthew Hitt ('16 PhD) and his wife Olivia ('17 BA) on Thursday, September 7.** Esther has already attended her first UAH hockey game and has recently sat on Dr. Frederick's desk.

Matthew is currently employed at the US Army Space and Missile Defense Command (SMDC). Matthew and Olivia met at a PRC Student Luncheon in the fall of 2015 that featured joint presentations by students and faculty from the departments of music and engineering on "How is Music Like Rocket Science." Olivia and Matthew hit it off right away winning the "Best Student Presentation" award for their presentation, "Bad Vibes in Music and Propulsion."

## PRC Hosts Rocket Test Group at UAH



The PRC hosted the Rocket Test Group (RTG) for their 49th biannual meeting this past October on the UAH campus. RTG is a national organization of rocket test facility operators. The meeting, beginning Tuesday, October 17 and ending Wednesday, October 18, was the first RTG meeting to be held at UAH.

RTG members from around the country meet twice a year to network, share technical discussions, and tour local facilities. Approximately forty RTG members and guests, including eight UAH students and four UAH faculty, attended the meeting at UAH.

PRC Director Robert Frederick was pleased with the outcome of the meeting. “The RTG meeting was a tremendous success,” he said. “Our team learned a great deal from our interactions with these highly-experienced rocket test engineers and we look forward to future RTG meetings.”

The RTG meeting consisted of technical presentations on the latest advancements and best practices in propulsion technology. Attendees also toured UAH laboratories, including propulsion facilities at the UAH Johnson Research Center and the Mechanics of Materials under Extreme Environments lab in the UAH Optics Building.

## Upcoming Events

### ***UAH Commencement.***

December 10, 2:00-4:00 pm at the Von Braun Center in the Propst Arena.

### ***“A Merry Little Melvin’s Christmas.”***

Featuring the PRC Tuba Trio under Maestro Khari Battle.

December 12, 12:15-2:00 pm at Melvin’s Place of BBQ. Reservations required. \$20 cash at the door.

### ***PRC Student Luncheon--Industry/Faculty Mentorship.***

60th Anniversary of Explorer 1--the First U.S. Satellite Launch.

January 19, 12:00-1:30 pm at the Johnson Research Center.

### ***Process Hazards Analysis Short Course.***

Date, location, and fee to be announced soon. We anticipate the course will be scheduled in February.