

Spring 2020 Recognition of Graduates

April 22, 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 spring because of the COVID-19 epidemic. Our traditional picture of everyone gathered outside the JRC in new PRC shirts is not possible this spring. This year we assembled online to celebrate our students achieving two PhDs., four master’s degrees, and eleven 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, April 22, 2020



Spring 2020

PRC Graduate Recognition Program

Welcome

Dr. Robert Frederick, PRC Director

PRC Community Service Recognition

Looking 25 Years into the Future

Dr. Robert Frederick, PRC Director

Recognition of Graduates

Ph.D. Students

Master's Students

Undergraduate Students

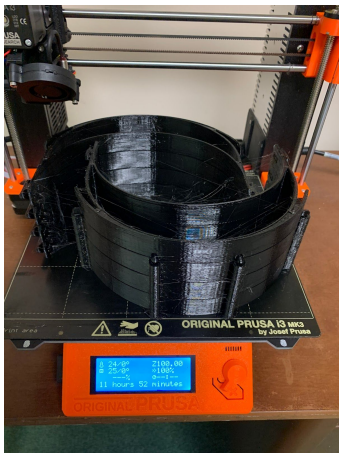
Virtual Reception

Introduction of Special Friends and Family Members

PRC Community Service Recognition



James Venters
Huntsville, AL



**Rapid Prototyping
Machine**

James Venters, a PRC undergraduate student specialist, was one of the last people to leave our JRC Laboratories as we shut down suddenly on March 19 for the COVID-19 lockdown. A busy undergraduate who also supports our research test programs, James was not just thinking about his own problems, classes, and life disruptions, he also was thinking about helping others. He called Dr. Frederick and described how we could use some of our research equipment to make critically needed parts for face masks to support medical workers and first responders who were on the front lines. **Destin Sandlin** (MSE 2011), another UAH PRC graduate who was on the front lines of these activities had inspired James. We set James up at his home with the supplies and equipment. He then volunteered to produce these parts.

James is a hard working and significant contributor to the PRC. But today he is recognized for his initiative to help others in a very important and creative way. He did this at a time when it would have been easy to just worry about himself. We also recognize the many others throughout UAH and the community who are contributing their skills and resources to help front-line workers. Finally, we appreciate James' parents for raising such a fine young man, and who like us, are very proud of him.

For his initiative, skill, and service to the community in support of COVID-19 front line workers, James Venters is given the PRC Community Service Recognition.

Looking 25 Years into the Future

By Looking 25 years into the Past
Dr. Robert Frederick, PRC Director



This is the PRC 25 years ago this month. In order to look 25 years into the future for our current graduates, I peered 25 years back to see what had happened to those in the photo. The list below is an initial summary. Some have retired. Sadly, some of our teachers and mentors, and even one graduate have passed away during this time as well. Many have risen in industry to senior technical positions with companies like Raytheon, Lockheed Martin, Parson, and Textron. One owns his own technical company. One became a professor and runs a propulsion lab of his own. Many have risen to senior levels in government including NASA SLS Chief Engineer, Chief Engineer with Missile Defense Agency, and Sr. Discipline Expert with NASA. In the next 25 years you could make similar achievements in academia, business, or industry. You are well-equipped and have the passion to do even more in this constantly changing world. Use your time wisely as 25 years will go very fast. Take time to build your relationships over the next 25 years as well. They are the best memories.

Pictured above left to right:

- Mr. Derek Budisalich, Now Sr. Principal Systems Engineer, Raytheon
- Dr. Noah Rhys, (MSE '95, Ph.D. '99); Now President, at Yetispace, Inc.
- Timothy Tucker, (MS '96)
- The Late (1946 - 2018) Dr. Hugh Coleman, First UAH Eminent Scholar of Propulsion and Professor of MAE
- Ramonal Hallut, ('93 BSE Chemical Engineering, '95 MSE chemical engineering); Consultant
- The late Mr. Jim Sanders, PRC Volunteer and Mentor, NASA MSFC Retired
- The Late (1963 - 2015) Dr. Kendal Brown, (UAH PhD '96); Last Position NASA MSFC
- Mr. Pete Markopoulos, (MS MAE '96); Now at Lockheed Martin in Huntsville
- Dr. David Elrod, Now TBD
- Dr. Brian Landrum, Now Associate Professor of MAE, Associate Department Chair of MAE
- Dr. Brian Greiner (MSME, '93, PhD/MAE '98) Currently Chief Engineer for ITASE at Parsons, Inc.
- Dr. Chris Brophy (UAH PhD '97), Associate Professor, Naval Postgraduate School (MAE Dept) and Director of the NPS Rocket Propulsion Lab
- Dr. Robert Frederick; Now UAH PRC Center Director, Professor of MAE
- Dr. John Blevins (PhD '97, MS '93), NASA Space Launch System (SLS), Chief Engineer
- Dr. Kent Chojnacki, (MS in '93 Ph.D. in '97); Currently NASA MSFC Systems Engineering and Integration Manager for the Human Landing Systems Program
- Mrs. Linda Marion, Retired, First PRC Staff Assistant
- Dr. Douglas Feikema, Currently NASA Glenn, Aerospace Engineer
- Paul Schallhorn (Ph.D. Dec 1998, Dr. Elrod); Now Thermal/Fluids Sr. Discipline Expert, NASA
- Dr. Joseph Bonometti, (PhD 1997, Dr. Hawk), Now Sensor & Laser Chief Engineer with the Missile Defense Agency
- Mr. John Dempsey, Now Director Program Management, Textron Aviation
- The Late (1937 - 2008) Dr. Clark Hawk, Founding Director of PRC, and Professor of MAE

Recognition of Doctoral Graduates



**Dr. Daniel Jones
Ballwin, MO**

Daniel Jones is receiving a Doctor of Philosophy degree in Aerospace Systems Engineering. Dan completed a dissertation entitled, *“Effect of Sulfur and a Perfluoropolyether on the Ignition and Decomposition of Solid Fuels for Ramjets”*, with his advisor Dr. Frederick, who also serves as the Director of the Propulsion Center. Dan said, “I studied how to decrease the lower flammability limit of solid ramjet fuel while maintaining other key thermal and mechanical characteristics. My assistantship work involved building and testing a proof of concept solid fuel ramjet combustor here at the JRC. When I finished at Purdue, Dr. Heister highly recommended UAH and Dr. Frederick. I appreciate Dr. Frederick’s understanding, wisdom, patience, support and encouragement.” **Dr. Robert Frederick** said, “Dan Jones is a hard-working and extremely capable researcher who has honed his skills in research, propulsion testing, polymer chemistry, instrumentation, and explosives safety while at UAH. I will never forget his helpfulness and loyalty when he quietly said, ‘I will teach your class,’ when I realized I was going to have heart surgery (and he did it). **Dan will be in Huntsville supporting the US Army Aviation and Missile Center as a contractor.**



**Seth Thompson
Keene, NH**

Seth Thompson is receiving a Doctor of Philosophy degree in Mechanical Engineering. Seth completed his dissertation on *“Two Dimensional Magnetohydrodynamic Modeling of Cylindrical Plasma Jets Confined Magneto-Inertial Fusion Targets.”* He explained, “Numerical modeling of a plasma target that is imploded by high-velocity jets. These jets merge and form a cylindrical liner to compress a magnetized target to fusion conditions and provide containment of the reaction space. I came to UAH to work on advanced spacecraft propulsion, where I met Dr. Cassibry and was invited to work with him and his team. He has been a true friend and mentor, without his guidance, I would not be graduating.” **Dr. Jason Cassibry** said, “Seth is extremely hard working and he required very little input. I have relied on him for years for helping to develop new ideas and algorithms.” **In the future, Seth plans to work towards in-space propulsion and trajectory modeling and guide future mission analysis.**

Recognition of Master’s Graduates









**Austin Click
Clayton, NC**

Austin Click is receiving a Master of Science degree in Mechanical Engineering. Austin completed his thesis on “Double Wall Heat Transfer With Full-Coverage Effusion With and Without Louver Slot Cooling.” He said, “I worked on combustor liner cooling for utility gas turbine engines. I got involved with the PRC through Dr. Ligrani’s Thermo I class my sophomore year. I really appreciate how helpful everyone involved with the PRC is and the outside companies that come to support the PRC whenever they can.” **Dr. Phillip Ligrani** said, “Austin was involved in an effort to experimentally investigate both the hot and cold sides of an effusion double-wall test plate. Austin’s excellent efforts, including meticulous attention to each and every experimental detail, led to high quality archival data, which are now contained within multiple archival journal publications.” **Austin plans on moving to a job within industry in Phoenix, AZ, hopefully at some point very soon.**

 <p>Stacy Godshall Lansdale, PA</p>	<p>Stacy is receiving a Master of Science in Aerospace Systems Engineering. Stacy said, "My dissertation will be related to DoD Space Operations and will most likely incorporate a Model Based Systems Engineering (MBSE) analysis. I was fortunate enough to be able to take Dr. Fredericks's Advanced Readings in Propulsion and Energy class. I appreciate the collaboration between the MAE and ISEEM Departments within the PRC which has enabled me to work with, and learn from, both Dr. Thomas and Dr. Frederick." Dr. Dale Thomas said, "Stacy was not only an exemplary student, but he also helped me mentor the younger students. He combines military discipline with a creative intellect, and I look forward to working with him on his dissertation research. Stacy will pursue a PhD at UAH as well as move to his next DoD assignment in 2021; possibly teaching at the Naval Postgraduate School in Monterey, CA starting in August of 2021.</p>
 <p>David Hewitt Denver, CO</p>	<p>David Hewitt is receiving a Master of Science degree in Mechanical Engineering. David completed his thesis on "<i>MCNP Design of Radiation Shielding for Pulsed Fusion Propulsion.</i>" He explained, "I conducted Monte Carlo analysis for the transport of ionizing radiation particles through shielding materials used in the Charger-1 laboratory facility and applied these techniques to develop design practices for spacecraft radiation shielding. I was originally hired by Dr. Hawk as a in the 1997-1998 school year, and again in 2004. Dr. Cassibry in 2013 connected me with Charger-1. I very much appreciate watching the PRC grow over the last 23 years and working with several exemplary graduates of the PRC. I am proud to join the ranks of those who have obtained advanced degrees. Thanks to Dr. Hawk wherever he may be now for believing in me when I had a hard time believing in myself, and thanks to Dr. Frederick and Dr. Cassibry for putting up with my quixotic journey towards this thesis while working full time." Dr. Jason Cassibry said, "David has been a pleasure to work with. Results from his Master's thesis gave us quantitative answers to radiation shielding requirements for both laboratory and spacecraft design for fusion propulsion. His literature review was basically a textbook on radiation safety, measurements, and standards. He also introduced me to the Toy Box Bistro which is now one of my favorite restaurants in Huntsville." David "plans to return the portion of my brain that has been devoted to this effort to being a more effective engineer at my employer Dynetics, which I know they will appreciate having back after putting up with my thesis for so long."</p>
 <p>Michael Sampson Memphis, TN</p>	<p>Michael Sampson is receiving a Master of Science degree in Mechanical Engineering. Michael completed a master's thesis titled "Aerodynamic and Heat Transfer Characteristics of a Transonic Turbine Blade Tip with Pressure-Side Film Cooling." He designed, assembled, and tested a transonic turbine blade cascade experiment. Michael explained, "I emailed Dr. Frederick after searching for graduate schools that perform propulsion research. I appreciate the extremely knowledgeable staff and students, the high quality research, and the burgers." Dr. Phillip Ligrani said, "Michael was involved in an effort to investigate the aerodynamic characteristics and surface heat transfer distributions along a transonic turbine blade tip. His work and efforts were consistently excellent as many technical challenges and problems were overcome and solved. The net result was high quality archival experimental data for blade tip configurations for experimental conditions which have never before been investigated." Michael has been given a contingent job offer from Dynetics to work on the propulsion system for NASA's Human Landing System (HLS), if they get the contract.</p>

Recognition Undergraduate Graduates

 <p>Joseph Agnew New Market, AL</p>	<p>Joseph Agnew is receiving a Bachelor of Science degree in Mechanical Engineering. Joseph said, he “worked as an Undergraduate Research Assistant supporting research work at the PRC, including testing of solid, liquid, and hybrid rocket engines, and the setup of DAQ hardware.. During my first semester as a Freshman, I was looking for research opportunities on campus, and Dr. Cassibry was kind enough to put me in touch with Dr. Frederick for an interview. The PRC has been really wonderful for me, particularly from the standpoint of mentorship and passing-on of knowledge and research techniques. I’m particularly grateful to those involved with Test Cell operations for their invaluable friendship and guidance: Dr. David Lineberry, Mr. Tony Hall, Mr. Evan Unruh, and Mr. James Venters.” Dr. Dave Lineberry said, “Joseph has been a pleasure to work with. He has always been a helpful, hard-working, and responsible student. It’s been enjoyable watching his progression in the PRC from supporting the office staff, to assisting with and running tests in the JRC, to allegedly leading a secret Warp Drive research program at the UAH which has brought him international renown. I look forward to working with him as a GRA.” Tony Hall says, ”working in the lab with Joseph has been a pleasure. His abilities and thirst for knowledge will serve him well as he continues forward with his education.” Joseph plans to continue studying at UAH for a Masters in Mechanical Engineering, and to work as a GRA on test programs.</p>
 <p>Brady Burnsid Huntsville, AL</p>	<p>Brady Burnsid is receiving a Bachelor of Science degree in Aerospace Engineering. Brady remarked, “I wanted to thank you for setting me up with the PRC and giving me the opportunity to work with Earth to Sky. I’ve learned a lot about the development and testing process and have had a great time with Chris Barker and his team.” Dr. Robert Frederick said, “We enjoyed having Brady on board for his internship and wish him well in his future endeavors.” Brady is pursuing a full-time position in the Huntsville area.</p>
 <p>Margarita Hockensmith Lexington, KY</p>	<p>Margarita Hockensmith is receiving a Bachelor of Science degree in Aerospace Engineering. Maggie’s completed her Honors Capstone Thesis on “<i>Cold-Side Heat Transfer Characteristics of a Double Wall Plate with a Louver Slot and Impingement Jet Array Cooling.</i>” She “conducted work within the double wall cooling facility, where I studied the effects of different effusion cooling arrangements, including an upstream louver slot, and different cooling supply arrangements on the heat transfer performance of a double wall cooling effusion plate.” Maggie explained how she got involved with the PRC, “I was contacted via email by my advisor, Dr. Ligrani. The aspect that I appreciate most about the PRC is how welcoming everyone was when I first started last November. They were all really helpful and understanding, and continue to be!” Dr. Phillip Ligrani said, “Maggie was involved in an experimental heat transfer effort to investigate the cold and hot sides of an effusion double-wall test plate. Her efforts led to high quality experimental data, which are now being used for the design and development of advanced combustor liner cooling configurations.” Maggie is pursuing her Master’s Degree in Aerospace Systems Engineering at UAH.</p>

 <p>Aaron Hunt Terryville, CT</p>	<p>Aaron Hunt is receiving a Bachelor of Science degree in Aerospace Engineering. Aaron did an internship at Earth-to-Sky, Inc. and also supported our research programs working at the UAH student machine shop. Dr. Robert Frederick said, “Aaron is a bright engineer with many practical skills. We enjoyed having him with us at the PRC.”</p>
 <p>Ward Manneschmidt Knoxville, TN</p>	<p>Ward Manneschmidt is receiving a Bachelor of Science degree in Aerospace Engineering. Ward said, “he designed/modeled test equipment. Dr. Ligrani contacted me last semester asking about my grad school plans. He appreciates “the opportunity the PRC gives to undergraduates to get hands-on experience outside the classroom.” Dr. Phillip Ligrani said, “Ward was involved in an effort to develop an experimental facility and the associated experimental techniques for investigation of supersonic inlets of high performance aero-propulsion engines. Ward’s efforts and accomplishments were consistently excellent, as he designed and oversaw the construction of different components for the investigation, ranging from a supersonic nozzle to a complex two-dimensional, multi-pressure-probe traversing system.” Ward plans to continue at UAH to get his Masters in Aerospace Systems Engineering.</p>
 <p>Erin McNabb Huntsville, AL</p>	<p>Erin McNabb is receiving a Bachelor of Science degree in Mechanical Engineering - Honors Capstone. Erin completed her undergraduate honors thesis on: “<i>Recent Investigations of Shock Wave Effects and Interactions.</i>” She said, “I worked in the supersonic wind tunnel lab on and off, but I played a larger part in processing the data obtained from the wind tunnel testing in the lab. I wrote up MATLAB functions and Excel codes to speed up the data analysis and generate consistent results. I got involved with the PRC after applying for the job when Dr. Ligrani announced it to my Thermodynamics II class. One person from the PRC that I would like to thank is the graduate student I worked with, Hallie Collopy. Hallie never showed any negativity, so I could never tell if she was having a bad day. She was always patient, kind, and hard-working, and she has been a joy and a blessing to get to work with.” Dr. Phillip Ligrani said, “Erin was involved in an effort to investigate the aerodynamic characteristics and surface heat transfer distributions along a transonic turbine blade tip. Her efforts to develop methods to analyze our experimental data were very important to the overall success of the project. Overall, Erin’s work was outstanding, as she first determined how to analyze experimental results, and then, used the resulting techniques to analyze significant collections of experimental data.” Erin plans to remain in Huntsville and pursue a career at a missions focused engineering company upon graduation.</p>

	<p>Jacob Moseley is receiving a Bachelor of Science degree in Aerospace Engineering - Honors Capstone. Jacob said, "I worked on Dr. Ligrani's Transonic Wind Tunnel Experiment. My work included design, manufacturing, and procurement of components for the experiment. Dr. Ligrani visited my Thermo 1 class offering jobs working on a supersonic wind tunnel. I appreciate the collaborative effort from various researchers and staff within the PRC."</p>
<p>Jacob Moseley Gaylesville, AL</p>	<p>Dr. Phillip Ligrani said, "Jake was involved in an effort to investigate the aerodynamic characteristics and surface heat transfer distributions along a transonic turbine blade tip. His work and efforts were very important to the overall success of the project, and involved the development, design, and construction of different transonic turbine cascade components." Jacob will be starting a job in May for Dynamic Concepts Inc. working on dynamic loads on ISS docking adapters or the integrated SLS vehicle.</p>
	<p>Isabeta Rountree is receiving her Bachelor of Science degree in Industrial & Systems Engineering. She "worked as an undergraduate research assistant studying applications of model-based systems engineering in the Complex Systems Integration Lab (CSIL). She said, "after my sophomore year I was interested in doing research so I explored the research being done in the ISEEM department and asked to be a part of the CSIL. I really appreciate how the PRC supports hands-on student involvement at every level in a quality research environment. Thanks for taking a chance on a sophomore undergraduate student with no experience. Dr. Dale Thomas said, "Isabeta will be a great systems engineer. First, she is fearless; she knows that what she does not know how to do, she can figure out. Second, she is energetic; he excels not only in the classroom, but is very active outside the classroom as well. Lastly, she is fun; she enjoys all that life has to offer, and that excitement is more infectious than COVID-19 to anyone she works with." Isabeta said she "plans to join industry after graduation, doing systems engineering on aerospace system development. As a current JUMP student, I plan on returning in the Fall to continue my Masters in Systems Engineering."</p>
<p>Isabeta Rountree Louisville, KY</p>	<p>Thomas Salverson is receiving his Bachelor of Science degree in Mechanical Engineering. Thomas said, "Dr. Frederick introduced me to Dr. Blackmon when he expressed his interest in propulsion research. I worked with Dr. Blackmon on improving the Reciprocating Feed System (RFS) trade study analysis code. He also took part in the Rocket Design Senior design project." Salverson worked with Dr. Blackmon to incorporate thermochemical analysis into the RFS trade study code. For the Rocket Design project, he worked on the design and development of the payload electronics. Thomas added, "I really appreciated Dr. Blackmon's guidance and mentorship throughout my time working with him. He helped teach me the basics of propulsion as well as further my understanding of spacecraft and propulsion systems. Dr. Blackmon also always has a good story or an interesting life antidote to share – both of which I greatly enjoyed and appreciated." Dr. James Blackmon said: "Thomas was a joy to work with. He always took initiative and performed a thorough analysis. As a result of his research, we were able to submit a well-documented AIAA paper." Thomas plans to return to UAH in the Fall to pursue a Masters Degree in Electrical Engineering, concentrating in Control Theory.</p>
	<p>Thomas Salverson Gretna, Nebraska</p>
<p>Andrew Colbert Decatur, AL</p>	<p>Andrew Colbert is receiving a Bachelor of Science degree in Mechanical Engineering. He supported research with Dr. Kavan Hazeli.</p>

PRC team's NASA Student Launch rocket and rover effort is successful (full article at <https://www.uah.edu/prc>)



The UAH NASA Student Launch student team with its Baedor Rocket

A student team at The University of Alabama in Huntsville (UAH) successfully launched a rocket with a rover as its payload in a national NASA Student Launch that was shortened by the COVID-19 virus. Named Baedor, the rocket that launched on March 14 in Woodville, Ala., used a Level 2 Aerotech L2200G solid fuel motor. It is 136 inches long and 6.17 inches in diameter. It weighs 61.5 pounds with a loaded motor and payload.

"This year our rocket reached an apogee of 4,454 feet above ground level," says Nicholas Roman, the project manager and a senior in aerospace engineering from Cullman. The team's goal was 4,500 feet. Originally set as a payload demonstration launch before the viral outbreak changed the SLI schedule, instead the flight demonstrated the full mission of the UAH team's rocket and payload. The SLI final launch had previously been set for April 4 at Bragg Farms in Toney, Ala., was scrubbed. The SLI program typically has a very tight schedule, but this year because of the COVID-19 outbreak, in addition to new design and programmatic challenges, the team had to deal with a schedule reduced by an additional month. Completing the design, manufacturing, and testing of both the payload and rocket, and demonstrating the full mission prior to the shutdown was a monumental accomplishment.

- Nicholas Roman, project manager; senior, aerospace engineering, Cullman, Ala.
- Joshua Jordan, chief engineer; senior, mechanical engineering, Mount Vernon, Wash.
- Peter Martin, vehicle team lead; senior, mechanical engineering, Coopersburg, Penn.
- James Venters, payload team lead; senior, mechanical engineering, Huntsville, Ala.
- Jessy McIntosh, safety officer; senior, mechanical engineering, Beaufort, N.C.
- Maggie Hockensmith, technical writing coordinator and vehicle safety deputy; senior, aerospace engineering, Lexington, Ky.
- Claudia Hyder, payload safety deputy; senior, mechanical engineering, Knoxville, Tenn.
- Patrick Day, project management team; senior, aerospace engineering, Johnson City, Tenn.
- Will Snyder, project management team; senior, aerospace engineering, Cleveland, Ohio
- Rodney L Luke, vehicle team; senior, aerospace engineering, Pleasant Grove, Ala.
- Roman Benetti, vehicle team; senior, aerospace engineering, Woodbury, Minn.
- Rachel O'Kraski, vehicle team; senior, aerospace engineering, Huntsville, Ala.
- Ben Lucke, vehicle team; senior, aerospace engineering, Saint Petersburg, Fla.
- Jeremy Hart, vehicle team; senior, aerospace engineering, Gainesville, Ga.
- Jacob Zilke, vehicle team; senior, aerospace engineering, Wilmington, N.C.
- Joseph Agnew, payload team; senior, mechanical engineering, New Market, Ala.
- Johnathon Jacobs, payload team; senior, aerospace engineering, Valley Head, Ala.
- Thomas Salverson, payload team; senior, mechanical engineering, Gretna, Neb.
- Kevin Caruso, payload team; senior, mechanical engineering, Lawrenceburg, Tenn.
- Jacob Moseley, payload team; senior, aerospace engineering, Gaylesville, Ala.

The UAH team is advised by Dr. David Lineberry, a Research Engineer at the UAH Propulsion Research Center, and mentored by Jason Winningham, who has assisted rocket launches and advised throughout the project.

Thank you to our 2019-20 Customers

Thanks also go to our recent sponsors: Aerojet Rocketdyne, Alabama Space Grant (NASA), Barber-Nichols, Inc., Boeing, C3 Propulsion, Combustion Research & Flow Tech., Inc., Earth to Sky LLC, Department of the Air Force (USAF), ERC/MSI, Gloyer-Taylor Laboratories (GTL), Hyperion Technology, Hyper V Technologies, Jacobs, IHI Corporation, Manufacturing Technical Solutions (MTS), NASA Headquarters, NASA Goddard Space Flight Center, NASA Marshall Space Flight Center (MSFC), McConnell Jones Lanier & Murphy LLP, Northrop Grumman, Science and Technology Applications, LLC, Solar Turbines, Inc., TGV Rockets, Inc., The Missile Defense Agency (MDA), Torch Technologies, State of Alabama, Varian Medical Systems, Incorporated, and Vector (formerly known as Garvey Spacecraft Corp). Grateful acknowledgements to all those potential new collaborators who teamed with us to write proposals last year.

The Way We Were in December 2020



Upcoming Events

- Spring 2020 Commencement Suspended
- Summer 2020 UAH Classes, Online
- Fall 2020 ????????
- **Dan Jones** and **James Venters** are hereby assigned to give the April 2045 Status Report on the Graduates from this Brochure in 25 years. *Dr. Robert Frederick*
- Looking forward to the next 25 years



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.”*