

DEPARTMENT OF
**INDUSTRIAL & SYSTEMS
 ENGINEERING AND
 ENGINEERING
 MANAGEMENT**



FALL 2019



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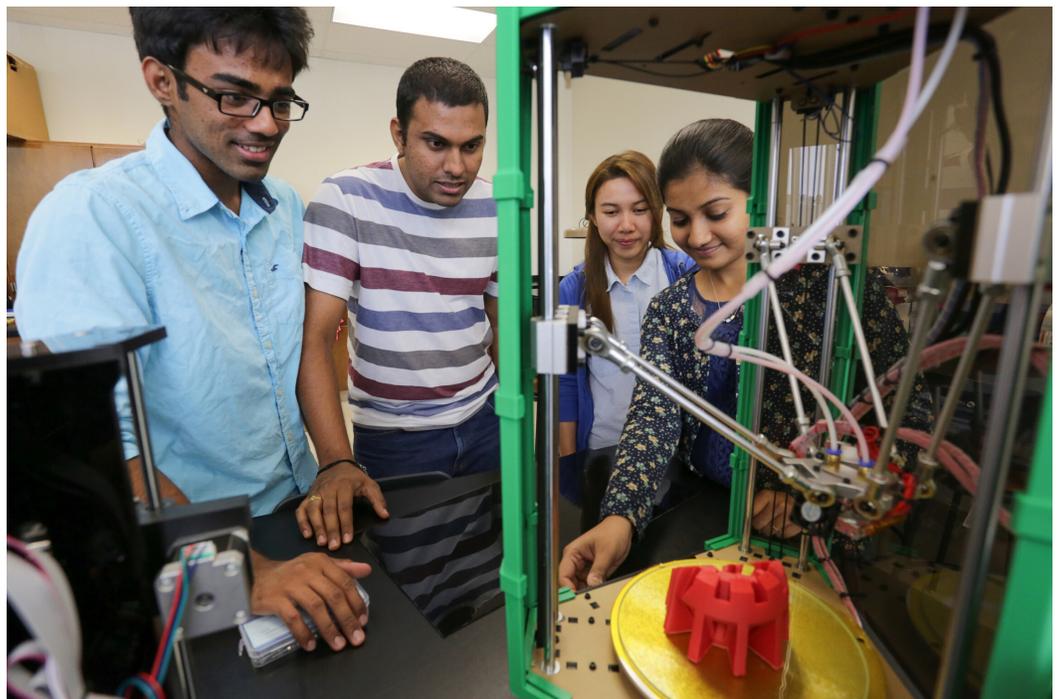
ABOUT THE ISEEM PROGRAM

Industrial and systems engineers resolve problems or improve processes where outcomes are influenced by complicated and uncertain interactions between people, machines, information, materials and energy. In short, industrial and systems engineers endeavor to find ways to do things better.

Their concepts may dramatically influence how efficiently, safely, sustainably, and profitably a company achieve its objectives.

The University of Alabama in Huntsville's Industrial & Systems Engineering and Engineering Management (ISEEM) program is ABET-accredited, producing world-class ISE professionals, equipped with engineering science tools that make them effective contributors in a wide array of industries.

Our graduates leave UAH prepared to devise efficient integrated organizational or production systems honed through in-depth instruction incorporating analytical, computational, or experimental practices.



BACHELOR OF SCIENCE IN INDUSTRIAL AND SYSTEMS ENGINEERING

Our undergraduate program begins by exposing students to the fundamentals of engineering, as well as the humanities that characterize a university education. The curriculum then shifts to the specialized knowledge of industrial and systems engineering needed for a successful career in industry, the government, or academia. In addition to lab-intensive coursework and team-based projects, students have ample opportunity to see innovations firsthand through local facility tours and internship opportunities.

After graduating, ISE graduates will be prepared to use their educational experiences, ethical judgement, systems thinking and core competencies in engineering fundamentals and more, to impact the community in a positive way.

MASTER OF SCIENCE IN ENGINEERING

The ISEEM department offers this program with specializations in industrial engineering, systems engineering and engineering management. It also offers the opportunity for students without an engineering background to obtain quantitative tools in operations research through the Masters of Science in Operations Research.

INDUSTRIAL ENGINEERING

Broadens engineering problem-solving skills: This application-oriented program expands students' understanding of traditional and contemporary problem-solving skills in the area of operations research, quality control, computer-integrated manufacturing, and simulation

SYSTEMS ENGINEERING

Expands on systems-oriented aspects of engineering: With a curriculum focused on needs identification, cost-benefit analysis, the system life-cycle concept, quality control, logistics planning and control, and forecasting, this program provides students with the analysis and design tools to supplement those learned in their undergraduate engineering program.

ENGINEERING MANAGEMENT

For engineers who find themselves performing engineering management functions without the benefit of a formal management education: This program is designed to build upon the mathematical and analytical expertise gained from both a formal engineering education and professional experience. Its curriculum emphasizes the application of the management function in a technological setting while recognizing the basic and applied sciences in engineering systems.

ENGINEERING MANAGEMENT PROGRAM

What is it? The UAH Engineering Management (EM) Masters Program is a joint program through a partnership between the College of Engineering and the College of Business. It was developed for practicing engineers and other STEM professionals performing technical management who desire formal education in engineering management. An EM concentration of three courses is also available as part of the MBA program through the College of Business.

The program is designed with the working professional in mind. Courses are almost exclusively blended and online.

MASTER OF SCIENCE IN OPERATIONS RESEARCH

Broadens comprehension of the operations research aspects of engineering: Courses in the curriculum for this program include methods of problem identification, linear programming, optimization, queueing, Markov processes, and systems modeling.

PH.D. IN INDUSTRIAL ENGINEERING

The ISEEM Department offers a Ph.D. in Industrial Engineering with concentrations in Industrial Engineering, Systems Engineering, and Engineering Management. Graduates are well equipped for roles in academia, government, and industry.

RESEARCH AREAS:

- Additive Manufacturing
- Model Based Systems Engineering
- Cyber-Physical Systems Integration
- Simulation Modeling and Analysis
- Complex Engineered Systems
- Systems Science
- Engineering Material System Design
- Supply Chain Management
- Lean Manufacturing
- Quality Systems Design and Engineering
- Large-Scale Complex Systems Design
- Gamification and Game Theory
- Technology Management

INDUSTRY PARTNERSHIPS:

- NASA
- U.S. Army
- Northrop Grumman
- Alabama Department of Transportation
- Steelcase
- Lockheed Martin
- BOEING
- Jacobs
- Sanmina/SCI
- Adtran
- Dyneticws
- Aerojet Rocketdyne
- Davidson Technologies
- MITRE



CHAIR'S MESSAGE

Welcome to another year of scholarship and growth from UAH's Industrial and Systems Engineering & Engineering Management Department. We have several developments to report for the department. Last year I was pleased to report that we were able to restart our Engineering Management (EM) master's degree program as a joint endeavor between our department and the College of Business. In the interim, we held a successful search and hired Dr. Nicholas (Nic) Loyd to supervise the program and teach some of the core courses. Nic will also maintain his position as Director of the Center for Management and Economic Research (CMER). Dr. Loyd brings a wealth of experience to the program. He has been teaching for us or several years at the undergraduate level in work design (lean manufacturing) and will now be teaching graduate courses in the EM program as well. The EM program is available for engineering and technology graduates in the region. We are excited to have this opportunity to offer to employees of local government and commercial organizations. This program will complement our existing programs in systems engineering, as well as in industrial engineering and operations research. We are in the process of offering a systems engineering related track in the senior year of our undergraduate program. In place of the manufacturing courses, the students in this track will have an introductory systems engineering, a systems engineering modeling, and design of experiments courses. Elective courses in designated concentration areas will also be identified. The demand for graduates who have a background in systems engineering has been increasing and this concentration should provide graduates who have had a first introduction to systems engineering concepts and methods. Our undergraduate program combines an emphasis on both engineering fundamentals and industrial engineering specialization. Our seniors apply these skills in a variety of senior design projects in multidisciplinary systems design or in local industry and healthcare settings. Many of our students intern in local technology companies such as Blue Origin, Boeing, Jacobs Engineering as well as UAH's Rotorcraft Systems Engineering and Simulation Center. Our best students are also taking advantage of the JUMP program in which they are admitted to the graduate program prior to graduation and are able to begin taking graduate courses (for dual credit) while completing requirements for their degree. The JUMP program makes it possible to start early on "lifelong learning" that is so critical in modern professional careers. ISEEM faculty operate on-campus labs researching a diverse array of emerging issues in the industry. The Complex Systems Integration Lab (CSIL) works hand-in-hand with aerospace and defense agencies to conduct model-based systems engineering (MBSE) research. The Imagining Engineering Systems (ImagEnS) lab examines systems engineering preferences and theories underlying stakeholder-focused engineering. Created by Dr. Bryan Mesmer, his research team explores a variety of non-traditional disciplines, including gamification in training, using storytelling to impart complex systems preferences, and the investigation of performance measures of large-scale engineered systems. All of our labs and research operations employ students within UAH's College of Engineering.

UAH Engineering Forum & the Southeast Symposium on Contemporary Engineering Topics

Aug 22, 2018 | **Summer Cruz**

The College of Engineering at The University of Alabama in Huntsville (UAH) held their first Engineering Forum (UAH-EF) in conjunction to the 2018 Southeast Symposium on Contemporary Engineering Topics (SSCET). The partnership event took place on Friday, Aug. 3rd at the Charger Union Theatre and the Shelby Center for Science & Technology.

Faculty and technical experts from across the Southeast and the UAH College of Engineering presented "state-of-the-art engineering solutions to modern engineering problems." Industrial and Systems Engineering & Engineering Management Department (ISEEM) professor, Dr. Paul Collopy, chaired the ISE track. "It was great to share research experiences with our counterparts across the Southeast. Our Systems Engineering students met researchers from Mississippi State and from the Army Corps of Engineers' laboratory in Vicksburg, Mississippi. Many of the research questions that we are investigating overlap." says Dr. Paul Collopy.



2018 Southeast Symposium on Contemporary Engineering Topics (SSCET)

The UAH-EF featured eleven engineering tracks, including industrial and systems engineering. UAH ISEEM delivered seven of the 11 presentations:

- Dr. L. Dale Thomas, "Systems Engineering Implications of the Digital Twin"
- Dr. Bryan Mesmer, "A Reimagining of Systems Engineering through Adoption of Art Method"
- Garima Bhatia, "Preliminary Analysis of Value Contributed by Systems Engineers to Organizations"
- Giulia Palma, "Content Analysis of NASA's NextStep 2 Project to Elicit Preferences"
- Victor Lopez, "Complexity estimation using SysML"
- Christopher White, "Examining Engineered System Through Holistic Value vs. Performance Metric Lenses: An Application to Launch Vehicle Design"
- Joseph Clerkin, "A Comprehensive NASA Projects Value Model: Describing Value Contributions from Knowledge"

The SSCET is organized by the Institute of Electrical and Electronic Engineers (IEEE) and first held at the University of New Orleans in 2009. It has grown in size and scope since then, now serving as an event where students, alumni, and the local engineering community are able to meet and share engineering ideas and solutions to modern engineering problems.

ASGC gears up to build first collaborative CubeSat to measure gamma-ray bursts

Nov 01, 2018 | **Jim Steele**



To the best of my knowledge, there has never been a student-developed CubeSat to fly outside LEO," says ASGC Director Dale Thomas.
"And it will be exceptionally challenging."

An effort by Alabama Space Grant Consortium (ASGC) members to design the first in a planned series of statewide collaborative cube satellites (CubeSat) will be the focus of a workshop Nov. 9 from 9 a.m. to 4 p.m. at the Educator Training Facility at the U.S. Space and Rocket Center. Based at The University of Alabama in Huntsville (UAH), ASGC member universities are Alabama A&M University, Auburn University, Tuskegee University, The University of Alabama, The University of Alabama at Birmingham, UAH and University of South Alabama. ASGC members have individually launched two previous CubeSats, and five CubeSat projects are underway independent of the collaborative effort.

The first collaborative ASGC CubeSat project will carry gamma-ray burst (GRB) detector to be placed in the vicinity of the moon to detect short gamma-ray bursts. Proposed by Dr. Michael Briggs, assistant director of UAH's Center for Space Plasma and Aeronomic Research (CSPAR) and a principal research scientist, the project was selected from four ASGC member submissions by Dr. David Beale, ASGC campus director for Auburn University and the principal investigator for the Alabama CubeSat Initiative.

Short GRBs result from the mergers of binary neutron stars, forming black holes, and are associated with detectable gravitational wave emission. Detecting and localizing short GRBs are of high scientific interest. Multi-messenger observations, in the electromagnetic spectrum and by a non-electromagnetic signal, can provide fundamentally new physics and astrophysics results that align with the first broad scientific question for NASA astrophysics: How does the universe work?

Flying a CubeSat outside low Earth orbit (LEO) involves entering a space environment that is more hostile outside the Earth's van Allen belts. It also becomes progressively harder to communicate over the longer distances.

"There have been many student-developed CubeSats previously; to the best of my knowledge, there has never been a student-developed CubeSat to fly outside LEO," says Dr. Dale Thomas, ASGC director UAH professor and the eminent scholar in systems engineering. "I think that's a pretty big deal. And it will be exceptionally challenging." On Oct. 16, the Alabama Space Authority passed a resolution supporting the Alabama CubeSat Initiative. The intent of the initiative is to ramp up a system by which ASGC members will eventually fly one collaborative CubeSat per year. "This initiative is one element of the ASGC strategy to enable the Alabama economy to grow as the space economy grows", Dr. Thomas says. "The space economy was at \$385 billion in 2017, is growing at an annual rate of 7 percent and is forecast to reach \$1.5 trillion by 2040, according to the U.S. Chamber of Commerce. Alabama can benefit greatly from this new opportunity if we prepare."

Startup funds of \$1,000 have been provided to each Alabama CubeSat Initiative subsystem team, and faculty advisors are integrating design efforts into university curricula as senior design projects. The collaborative effort is expected to involve over 100 students from all seven universities during academic year 2018-2019.

NASA's Marshall Space Flight Center (MSFC) is providing subject matter experts to coach the student teams via an effort coordinated by Dr. Frank Six, MSFC university affairs officer. ASGC is currently soliciting corporate and individual sponsors for the initiative. Interested sponsors can contact Dr. Thomas at dale.thomas@uah.edu. Over 100 students and faculty from all seven ASGC members are expected for the Huntsville workshop. "The workshop is necessary to get the teams from the various universities working together - everyone on the same page, if you will," says Dr. Thomas. "As such, it is a critically important first step."

Workshop topics will cover the main payload and science, systems engineering, thermal protection and control, power systems, attitude determination and control, communication systems, and structures and deployment mechanisms. Academic and industry mentors will speak and coach those involved in the project. "One objective of this initiative is to help students learn to work in geographically dispersed teams. Such an arrangement is rapidly becoming the norm rather than the exception," Dr. Thomas says. "Very few complex system developments today are undertaken within a single organization or at a single location. This initiative will equip participating students with skills to cope with the challenges that such a project entails."

Another objective is to familiarize students with the challenges unique to spacecraft design and development, he says. "This project will let students see the progression of a system from concept through design through integration and testing and ultimately operations," Dr. Thomas says. "As such, they will benefit from an academic experience that is typically acquired during their early years on the job."

Dr. Schroer an inaugural member of AAMA Hall of Fame

Dec 05, 2018 | Jim Steele

The Alabama Automotive Manufacturers Association (AAMA) has inducted its founder, Dr. Bernard Schroer, a retired University of Alabama in Huntsville (UAH) associate vice president of research and industrial and systems engineering professor, into its inaugural Hall of Fame. The AAMA Hall of Fame recognizes individuals in Alabama who have made a significant impact on the establishment and growth of the automotive manufacturing industry in the state.

One of three inaugural inductees, Dr. Schroer was also a principal research engineer at UAH's Center for Management and Economic Research (CMER). The other two inductees were Ed Castile, deputy secretary of commerce, Workforce Development Division and director of Alabama Industrial Development Training (AIDT), and Bill Taylor, former president of the Economic Development Partnership of Alabama (EDPA) and past president and CEO of Mercedes-Benz U.S. International.

"I was surprised that I was considered on the level of these two industry leaders", says Dr. Schroer. "It is truly a great honor to be inducted in the AAMA Hall of Fame with these two individuals." The induction ceremony was part of the Annual AAMA Awards Banquet at the Wynfrey Hotel in Birmingham on Nov. 1.

Dr. Schroer formed AAMA in 2001 and advocated for the growth of the automotive manufacturing industry in Alabama before his retirement in 2011. He retired from UAH with over 30 years of service and remains active in the university. He served as AAMA's first executive director from 2001-2011. AAMA's headquarters was located at UAH for many years and currently UAH assists AAMA with administrative support. Dr. Schroer says AAMA's arrival on the scene was well-timed.

"Mercedes-Benz was already operational in Vance. Shortly thereafter, Honda announced coming to Alabama," Dr. Schroer says. "Then the Toyota engine plant announced for Huntsville, following by Hyundai in Montgomery and the Navistar engine plant in Huntsville. You can see that you could not have asked for better timing in establishing AAMA."

The second statewide automotive manufacturing association organized in the South, AAMA used Tennessee's AMA as its model. "At that time, in 2001, UAH was one of the original 10 regional Alabama Technology Network centers and was working closely with the automotive industry in the state, providing continuous improvement training and actual continuous improvement implementations," Dr. Schroer says. "There was an obvious need for the new supplier base in the state to know each other and to get together on a regular basis to network and to share best practices."

At AAMA's founding, the new original equipment manufacturer (OEM) assembly plants were looking for suppliers that would locate near plants for just-in-time delivery. "Annually AAMA would host a supplier matchmaking meeting where OEM suppliers would bring in their buyers to meet with potential suppliers," Dr. Schroer says. "Many companies became suppliers through these meetings."

AAMA led the effort to start the Southern Automotive Conference (SAC) and partners with the Tennessee, Georgia and Mississippi automobile manufacturers associations to produce the SAC each year, rotating the location annually to a different state.

Today, the organization is seen as a key component of support for the automotive manufacturing industry and its needs. AAMA promotes the growth and continuous improvement of automotive manufacturing in Alabama by supporting the automobile OEM plants and their suppliers.

In Alabama, the organization provides strategic direction to workforce development by strengthening the business and education alliance, improves automotive manufacturing processes and systems and conducts programs to share knowledge on issues impacting the automotive industry in the state.



**Dr. Bernard Schroer was one of three
inaugural AAMA Hall of Fame inductees.
Courtesy AAMA**

Marsbee mission gets a little more real, thanks to systems engineering

Jan 08, 2019 | Diana LaChance



Assistant professor Dr. Bryan Mesmer (left), one of the original collaborators on the Marsbee proposal, enlisted the help of ISEEM graduate students Giulia Palma (center) and Shahrom Doneshwar (right) to develop and use value modeling and design structure matrices for the project.

When Shahrom Doneshwar first learned about the NASA-funded plan to explore the surface of Mars using robotic bees, he says he "didn't even know that it was possible!" Now, however, the masters' candidate in the Department of Industrial & Systems Engineering and Engineering Management (ISEEM) at The University of Alabama in Huntsville (UAH) is an award-winning member of the Marsbee team.

Doneshwar's presentations of his research, entitled "Systems Approach for the NASA Marsbee Mission," was named one of the most outstanding at the RAM XI Training Summit, hosted by the Huntsville chapter of the Society of Reliability Engineers; fellow ISEEM students, Christopher White and Victor Lopez, also won awards for their presentations, entitled "Exergy-Efficiency Optimization of a Rocket Launch Vehicle" and "Using SysML Models as a Complexity Assessment Tool," respectively.

The one-on-one interactions with the professors here was a good match. - Shahrom Doneshwar

Doneshwar applied to UAH after earning his undergraduate degree in mechanical engineering from the M.H Saboo Siddik College of Engineering in India. "I had two or three classes related to systems engineering, and I really liked them, so when I looked into graduate schools that provided systems engineering degrees, I was interested in the research being done by Dr. Sampson Gholston," he says. "I'm also the kind of person who will get lost in a crowd, so the one-on-one interactions with the professors here was a good match."

It was through Dr. Gholston that Doneshwar was introduced to Dr. Bryan Mesmer, an assistant professor in systems engineering and one of the original collaborators on the Marsbee proposal. "I was waiting for an opportunity to explore the systems engineering perspective, and since I'm also a mechanical engineer, I knew what he was talking about when he told me that they were working on - it just clicked," he says.

So I did it for a month unofficially, and then he hired me as a graduate research assistant to deal with the Marsbees' subsystem interactions." Along with fellow ISEEM graduate student Giulia Palma, Doneshwar was tasked with the following: creating design structure matrices to identify system couplings, analyzing couplings strengths to inform of important subsystem relationships, eliciting stakeholder desires using surveys and interviews, identifying key attributes and preferences of stakeholders, and developing a value model to enable an optimized system.

"The design structure matrices will be used to identify subsystem interactions that have a large impact on the value, thereby enabling proper resource allocation," he explains. "And the value model is a mathematical representation of stakeholder preferences, instead of requirements, to enable consistent subsystem design decisions." With the project only in Phase I of NASA's Innovative Advanced Concepts program, however, Doneshwar clarifies that their work is in the preliminary stages. "We are not applying global sensitivity equations," he says, "we are visualizing the interactions."

In addition to presenting his research on using a systems approach for the mission at the RAM XI event, Doneshwar and Palma also presented their poster, "Using Value Modeling and Design Structure Matrices for the NASA Marsbee Project," at the American Astronautical Society's 11th annual Wernher von Braun Memorial Symposium held in late October on the UAH campus. And going forward, Doneshwar is hoping to co-write a paper about the systems perspective of the Marsbee project with Dr. Mesmer. "I haven't seen many papers on using a design structure matrix approach with value modeling for an unmanned aerial vehicle before," he says.

And should the Marsbee project receive funding for Phase II, Doneshwar's systems engineering expertise will be of even more value. "We can use the value model to compare different missions and systems that perform similar functions as the Marsbee," he says, "and then compare that to a broader NASA value model to study overall impact of the mission." After that, who knows? Maybe one day, the Marsbees he didn't even know were possible will be making their maiden flight on the Red Planet.



Doneshwar (center), along with fellow ISEEM students Christopher White (left) and Victor Lopez (right), received an award for his research at the 2018 RAM XI Training Summit.

ISEEM Assistant Professor Wins Award

Oct 30, 2018 | **Summer Cruz**

ISEEM assistant professor, Dr. Bryan Mesmer, has been selected to receive the 2018 American Society for Engineering Management (ASEM) Meritorious Service Award for non-board members. The award is given annually to an active ASEM member who has contributed outstanding accomplishments and particularly recognizes efforts towards local sections of ASEM.

Dr. Bryan Mesmer's helping hand during the 2017 ASEM conference, hosted by The University of Alabama in Huntsville (UAH), was recognized by the ASEM Board of Directors. Dr. Mesmer says, "I organized the keynote speakers, industry panels, meetings, and the social outreach elements of the event." The four-day event concentrated on, "Reimagining Systems Engineering and Management," and Dr. Mesmer's help steering the conference resulted in him earning the 2018 ASEM Meritorious Service Award for non-board members. He says it was rewarding because he wanted to do a good job.

Being a member of ASEM can be beneficial to students because, "it gives you a platform to promote your research and strengthen your network, which could lead to opportunities in the future," says Dr. Mesmer. Dr. Mesmer will receive the award on Oct. 19, 2018, in conjunction with the ASEM International Annual Conference (IAC), at the Coeur d'Alene Resort, Coeur d'Alene, Idaho.



Dr. Bryan Mesmer receiving the 2018 American Society for Engineering Management (ASEM) Meritorious Service Award for non-board member.

A New Addition to the ISEEM Department, Nicholas Loyd, Ph.D.

AUG 21 , 2019 | Nadia Wright



Nicholas Loyd, Ph.D., Clinical Assistant Professor, ISEEM Department and Director of CMER and ATN

Dr. Nicholas Loyd feels the ISE industry has “changed a lot”, “the roots of ISE based on time study” has changed especially in the area of “the evolution of engineering management” since he first got started in the industry. He says, “There has been a shift in focus from the technical aspects to focus on the people doing the job, the motivational theory”.

He explains the industry focuses on the skills and abilities of the people working with the systems which in return improved the quality of the final output of products and services. He says that by teaching engineers basic people skills, to communicate with others in a way that is teaching others to use the systems instead of telling them how to do it.

He also believes the next phase in the Industrial and Systems Engineering field, is the digital connection phase, the introduction of Artificial Intelligence and the new Industry 4.0, the fourth Industrial Revolution so to speak.

When it comes to the necessary skills and abilities needed for a successful career in Industrial and Systems Engineering field, Dr. Loyd answered, “You need to have a problem-solving mindset, if you have it, you don’t have to memorize the process, and you can just solve the problem. When you learn to do that, everything else you have learned can be used as tools.” He advocates the steps of problem-solving, “Plan, Do, Check, Act”, and if the solution is not favorable, to start over from scratch. He thinks if you have good people skills and the ability to develop other people’s problem-solving skills, will help you be successful in a career in ISE.

Dr. Loyd’s goal for the Engineering Management effort in the ISEEM department is “To grow it into a program to where it will serve the need of the community of Huntsville, by making it better than it was and creating exciting options for students in ISEEM”. He would like others to know that Engineering Management is a manual or toolbox that gives engineers management skills to make transitions from the technical aspects to the management and skills of people in the workplace.

At the end of every semester, Dr. Nicholas Loyd gives his students a little piece of advice, he tells them two things, “Go through the process, watch the process, and do things that matter. Do the job you love and that makes a difference, do something that matters”.

We look forward to seeing the changes and difference Dr. Loyd will be contributing to the ISEEM department. Welcome to the ISEEM department, Dr. Nicholas Loyd.

We are pleased to announce the appointment of Dr. Nicholas Loyd, a UAH Alumnus, as Clinical Assistant Professor to lead our Engineering Management effort. He obtained a bachelor’s degree in Industrial and Systems Engineering as well as a master’s degree in Engineering Management from The University of Alabama in Huntsville (UAH), and a Doctoral degree.

Dr. Loyd has vast experience working in the industry, including over 15 years of experience implementing lean production systems, as well as 19 years as a Research Director in production systems and 10 years of experience teaching ISE 324. He is also a certified trainer for the National Institute of Standards and Technology’s (NIST) Manufacturing Extension Partnership (MEP) and MIT’s Lean Advancement Initiative. He has trained thousands of professionals in various industries in the principles of Lean Enterprise and aided in Lean implementation events. Dr. Loyd has been involved at UAH as an instructor for both the College of Business and the Industrial and Systems Engineering department.

Even with all of his past accomplishments, Dr. Loyd is most proud of being part and contributing to the establishment of the Toyota Mazda FAME program. He is eminently involved in the ISEEM industry, he has been involved in several research projects locally and worldwide, in countries such as Switzerland and Canada.

When asked what inspired him to have a career in the ISEEM industry, he says, even though he always wanted to be veterinarian, to see an animal in pain and suffering was not what he would like to encounter every day. He changed gears and got inspired for a life in the ISE field, after attending a family picnic at his father’s work in his junior and senior year of high school. His father worked in factory manufacturing and Dr. Loyd got to experience through his father, the involvement of ISEEM in the manufacturing world.

Marc Gethers Presentation

Oct 02, 2018 | Diana LaChance



Marc Gethers, ISEEM Undergraduate Alum and current Master's degree candidate

Marc Gethers, an undergraduate alumnus of the Department of Industrial & Systems Engineering and Engineering Management (ISEEM) at The University of Alabama in Huntsville (UAH), is currently pursuing his master's degree in the same field under the guidance of Dr. L. Dale Thomas, eminent scholar and ISEEM professor. In addition to conducting research for his master's thesis, entitled "Goal Function Tree (GFT) for an Unmanned Aerial Vehicle in a Systems-Modeling Language Environment," Gethers also serves as a research assistant in UAH's Complex Systems Integration Lab, where he performs model-based systems engineering for a Boeing Defense, Space & Security program and supports a NASA X-ray telescope program called Lynx.

Marc is researching how to adapt an abort-management technique - known as goal function trees - used on NASA's Space Launch System to develop more robust systems in general," says Dr. Thomas. "As systems become ever more complex, particularly owing to the growing use of embedded software and the Internet of Things, system robustness has become ever more critical to the successful development and operation of future systems."

According to Gethers, the traditional requirement development process often focuses on how the system operates in the nominal environment, but it lacks rigor for off-nominal system definition. "Defining the off-nominal state is critical," he says, "because all failures of a system represent the transition to the off-nominal state that are defined by a failure effect." That transition is the failure, fault, or error of a system, which causes a failure effect of less than optimum operational capability. "Such degradation in performance can cause loss of mission, or worse, loss of life," he says. "Without the realization of the off-nominal space, mission risk is increased due to unaccounted-for conditions that send the system outside of the nominal bounds."

Gethers, who presented this past summer in Washington, D.C., and later at the Huntsville chapter meeting of the International Council on Systems Engineering, says that he is hopeful that his research improves system engineers' ability to define system failures and effects earlier in the system-development process so that requirements can be developed to handle such cases. "The systems-modeling language environment will facilitate a more collaborative effort between the traditional failure modes and effects analysis teams and the integrated product teams to develop solutions earlier in the system lifecycle."

UAH alumnus, Army veteran Drew Wallburg director of Cummings Aerospace 3D Lab

Nov 20, 2018 | Joyce Anderson - Maples

Andrew "Drew" Wallburg ('13, BS, MAE) is a decorated veteran of the U.S. Army, he graduated Cum Laude with a bachelor's degree in Mechanical and Aerospace Engineering from The University of Alabama in Huntsville (UAH). Wallburg has received many military, academic, civic honors and awards. He is a husband and proud father of two amazing young children.

What a difference a decade makes. Wallburg didn't enroll in the UAH College of Engineering in 2003 expecting to drop out, but as the saying goes "stuff happens." And, a lot of *stuff* happened during Wallburg's first attempt at graduating from UAH.

"I had two very different experiences at UAH. When I first attended from 2003-2006, I had the opportunity to have a great time in the student atmosphere. I had such a great time that my studies suffered heavily," Wallburg said. "This was not fault of the university. The taste of true independence was initially difficult for me to reign in. Every time I tried to get it together, the effort was short lived and my directionless wandering would take over again. I tried taking different courses to see if an academic change would give me better direction, but I ended up leaving the university with a cumulative 2.2 grade point average (GPA) to work manual labor jobs. I came back to UAH Mechanical and Aerospace Engineering department in 2010 after a deployment to Iraq."

Several years later, his second college experience was vastly different. "I poured myself into being much more studious and found a dramatically different result. My grades were fantastic, I understood the material, and I found that teachers that I had taken classes from the first time were willing to give me a fair opportunity to prove that I had changed," he said. "The professors were compassionate and helpful. It is a very serious attribute to my success. I ended up pulling that 2.2 GPA up to a 3.4, and I graduated cum laude."

He said leaving the university before graduating left him "wandering" without any real purpose, and destined for a dead end. "One day while sitting on the couch with my wife I looked at her and said 'I think I'm going to join the Army tomorrow'. It was the best decision I ever made."

A carpentry/masonry specialist, Wallburg's squad built housing (MWR's), Morale, Welfare and Recreation Services, Education Centers, and a few horizontal construction projects for the infantry, tankers, and scouts, and an air field.

Wallburg served in the Army eight years, and finished as a Staff Sergeant and squad leader. He left the military with structure, discipline, and self-worth. "The Army is not great for everyone... you have to be willing to accept and embrace the rigor of the lifestyle. It is a great home for the wayward, as it is for the selfless. The comradery is unparalleled. You'll find that you have a much larger extended family than you could have hoped for. But there is a tremendous amount of pride knowing that you are a part of a bigger function than just yourself."



UAH alumnus Drew Wallburg on duty in Iraq

Wallburg was hired as a systems engineer at the Boeing Company within months after graduating from UAH in 2013. A "tinkerer by nature," Wallburg, with Boeing, invented a cyclic flexing salt-spray chamber and methods for determining operational performance of material systems.

"I worked on the Fast Lean Environmental Cell team in the Boeing Research and Technology Chemical Technologies group," Wallburg said. "Sean Pennell, Kris Williams, and Dr. Erik Sapper were the chemistry and experiment design side of the project, and I was the sole designer for a cyclic flexing apparatus that could handle up to 14 substrate panels per experiment. We submitted our patent application in 2015, and were awarded the patent in 2018."

Today, Wallburg is employed as director of the Cummings Aerospace Additive Manufacturing Laboratory. "AM is a fascinating technology area. The ability to make a solid geometry starting from a powder or a filament is an absolute marvel. Use with topology optimization and conformal cooling is a complete game changer."

"We have produced products for Raytheon, MDA, and ASRC Federal Astronautics, and we have more work on the horizon. The most interesting thing about additive manufacturing is in the application of the different technology types. AM is not the cure-all for every manufacturing need, but it provides a solution for the previously unmanufacturable."

When Wallburg reflects about his career success he believes UAH is directly responsible for his professional acceleration. "My favorite professors were Dr. Christina Carmen, Dr. Sarma Rani, and Seth Thompson. Statics was definitely my favorite class, and I had gone from being one of Dr. Carmen's lowest grades to one of her highest. Dr. Rani was an excellent teacher for system dynamics, and Seth Thompson was one of the best professors that I had the opportunity to learn from. These three professors made a distinct impact in the type of engineer that I wanted to become. They exuded excellence, and made me want to do the same."

Wallburg said UAH prepared him for a career as an engineer by providing the fundamentals to survive entering the workforce. "Fortunately, I had taken some courses in the university's Industrial Systems Engineering and Engineering Management department, which I believe provided me a leg up for my first engineering position. The biggest benefit is that I had all of the fundamentals I needed for all of the job positions. My technical writing skills were developed by the high standards of the labs and projects that I worked on at the university," he added. "When I switched from systems engineering to mechanical design, I was equipped to work in a CAD environment, perform hand calculations, and prepare and understand finite elements analysis runs and results. UAH is a difficult school, and that is important for entering the workplace," Wallburg said.

"When I think of Drew, I think of a self-made success story whereby he achieved his present status by working harder than most any student I have encountered," said Dr. Christina L. Carmen, Clinical Associate Professor, UAH Department of Mechanical and Aerospace Engineering.

"Drew was a student in my statics class over 10 years ago. I remember him very well, even though he hardly ever attended class! On the first day of his return to class I saw him sitting in the front row - which he did for the remainder of the semester. He achieved one of the highest final averages - if not the highest - in all of my statics classes. At that point I was sold on this young man who had turned his life around, was achieving academic success, and was a military hero," she added.

Carmen noted too, that Wallburg served as lead on a U.S. Department of Defense Special Operations Command project. The UAH team designed and built a Humanitarian aid and Disaster Recovery Kit. "Wallburg's team performed with such exceptionalism that they were invited by the Special Ops Command to present their design efforts to U.S. Navy personnel in Washington D.C.," Carmen added.

Wallburg, a firm believer in volunteerism has devoted hundreds of hours to the UAH chapter of the North Alabama American Society of Mechanical Engineers (ASME), UAH's Veteran's Network and the United Cerebral Palsy (UCP) Association of Huntsville and Tennessee Valley.

The late Al Reisz, a fellow veteran employed by Boeing, introduces Wallburg to ASME. Reisz was the lead contractor on the development and testing of the Saturn V rocket. He also worked with the Skylab program.

"Al passed away a few years ago, but his enthusiasm for getting professionals together was impacting," said Wallburg. "I've worked to bring better awareness to our organization, and our goal is to contribute back to the student and professional community through outreach. As a member of the ASME leadership team, I've attended the better part of 100 senior design reviews at UAH to assist students in bettering their projects and honing their engineering skillsets."

And, Wallburg is extremely happy to serve as a UCP board member. "My proudest work supporting UCP was in the university's senior design reviews that I helped shape. The students on these teams get full credit for the outstanding altruistic work they've performed for UCP and the UAH RISE School. I am very proud to have helped guide their product development into something that will positively impact a family with a special need.

INTUITIVE executive discovers co-op education plays key role in business success.

Feb 26, 2019 | Joyce Anderson - Maples



UAH alumna Vergenia Shelton is president of INTUITIVE in Huntsville

It's hard to imagine now, but there was a time when Vergenia Shelton ('13, MS, ISE) dreamed of going into the medical profession. After entering college, however her career choice shifted slightly to engineering. But it was a phenomenal, cooperative education experience that left no doubt for Shelton that engineering would be the career of her dreams. "I was able to gain real-world experience and hands-on learning. Applying what I learned in class to real work brought to life my passion and love for engineering," she said.

That passion can be seen through her outstanding leadership, according to Rey Almodóvar, Intuitive Research and Technology Corporation (INTUITIVE), Co-founder and CEO. "Vergenia is a proven leader and the ultimate professional who exemplifies INTUITIVE's standing reputation as the innovative partner our customers trust," he said. "This is an exciting time for the INTUITIVE family and I am honored to be working alongside Vergenia as we continue to grow our business," Almodóvar added.

"INTUITIVE transformed the engineering services and government contracting industry 20 years ago by creating a superior alternative to the traditional support contractor-offering services that are technically competent, strategically sound, competitively priced, and the overall best value to our customers. Vergenia's dedication to the company, our employees, and our customers is immeasurable and it epitomizes our founding principles. She is doing remarkable things for INTUITIVE, and I look forward to the impact her leadership will have in the future of the company over the next 20 years and beyond.

"Today, The University of Alabama in Huntsville (UAH) alumna is president of INTUITIVE in Huntsville. "I am a huge advocate of cooperative education (co-op) programs, and I am proud that INTUITIVE has such a robust co-op/internship program," Shelton said. "Our co-ops have the opportunity to work with cutting-edge technologies and software, which enhance their skill set and resume. Students in our co-op program work alongside our professionals through all phases of a project. Our goal is to provide our co-ops with insight into a day in the life of an engineer, in hopes that we can impact students in the way I was impacted," she added.

INTUITIVE is an award-winning aerospace engineering and analysis firm; the company provides sound technical solutions and program management, assisting customers throughout all phases of a product's life cycle. Shelton received her undergraduate degree in industrial and systems engineering from Auburn University. After working several years in Atlanta, she returned home to Scottsboro, beginning to work full time at INTUITIVE and growing her family. It was at this time she decided to earn a graduate degree in engineering at UAH."

I needed an option that would work with my busy schedule. I was very familiar with UAH and its reputation as a leader in education — particularly the engineering program," she said. "UAH's proximity to my work location and its flexible programs allowed me to take classes in the evenings or online. UAH was the perfect fit for me."

Shelton wrote her UAH Capstone on the benefits of Communities of Practice (CoPs).

A CoP is a group of people who share a profession or craft. "The idea is that learning can occur in a social context and people can evolve when they share a common goal or interest," Shelton explained. "I was able to take my work and research and implement CoPs at INTUITIVE. We now have several different CoP groups within our organization, and we have seen great success in these groups. It is exciting to see my work in school come to life in the workplace."

Shelton said her educational experience at UAH was relevant to the engineering and management industry. "With Redstone Arsenal and Cummings Research Park as its neighbor, UAH does an excellent job at catering to the professional needs of the community and surrounding industry. I was able to learn from others, whether it was professors or classmates, about engineering disciplines and how they pertain to the defense industry."

As president of INTUITIVE, Shelton is responsible for the daily operation and improvement of all areas within the company. She leads the company's efforts in formulating and implementing the strategic plan. "It is my role as president to lead the organization by creating, communicating, and implementing the company's vision, mission, and overall direction. This includes working closely with executives to new hires and everyone in-between." Last year, Shelton led efforts for expansion into Florida. The company recently opened a new facility near Eglin Air Force Base in Fort Walton Beach, FL.

Under Shelton's leadership, INTUITIVE has gained international recognition as the number one Best Medium Workplace in the nation by Great Place to Work® and FORTUNE magazine. "We are so honored to be named the number one Best Medium Workplace in the nation," said Shelton. "This marks our third time to be named number one and it's our ninth consecutive year as a national top 10 Great Place to Work."

Shelton said the ranking considers more than 112,000 employee surveys from small and medium-sized companies across the U.S. The surveys include employees' daily experiences of innovation, the company's values, and the effectiveness of their leaders.

"This recognition is significant to me because it is based on the satisfaction of our employees. It takes into account how our employees feel about the company," Shelton said. "At INTUITIVE, we believe in the total well-being of our employees, which is why we strive to improve our workplace and to build an even stronger corporate culture every day. We are always looking for ways to create an atmosphere where employees are truly happy and excited about where they work and what they do. Being named the Best Workplace in the nation reinforces that our commitment and hard work in building and maintaining a positive work environment and strong culture doesn't go unnoticed," Shelton added.

She offers invaluable advice for incoming freshmen looking to establish successful careers in engineering and business. "My advice would be to first find the right school. Attend a university with a reputable, challenging program. Second, apply for an internship or co-op position to experience the field first hand. I would also advise students to find a mentor in their respective fields and start building a network of people with similar career interests."

When it comes to women in management positions at the workplace, Shelton openly embraces her leadership role, as well as personal and professional successes. "If you look across our organization, you will find that women make up a large majority of our management staff," Shelton said. "At INTUITIVE, positions held by women include president, senior vice president, vice president, director, program manager, area leads, senior technical analysts and engineers, and subject matter experts as well as many others. Here, women are recognized for the expertise and skills they bring to the position they hold," she added.

Shelton offers key strategies for women in leadership roles:

- Listen to role models that you admire – Find a mentor to help guide you throughout your journey towards leadership.
- Make sure it's someone you believe in and who shares your same values and ethics.
- Raise your hand – It is important to take risks and step outside of your comfort zone. Don't be afraid to raise your hand and ask for new opportunities.
- Surround yourself with people who will push you – Becoming a leader means continuously growing, learning, and evolving. Surround yourself with people who push you to be the best you can, who challenge you, and who support your goals.
- Believe in Yourself – In order for others to believe in you, you must first believe in yourself. Don't let doubt get the best of you.

"I am lucky to work for a company that supports women in their careers. However, I would like to point out that INTUITIVE operates in a way that sends the message that all employees, regardless of gender, are encouraged to grow in their careers."

UAH ISEEM Alum, Dr. Lisa Watson-Morgan, to lead NASA back to the Moon.

AUG 30 , 2019 | Nadia Wright

NASA's newest program manager for the Human Landing System, which will safely take the first woman and next man to the Moon in 2024, has been announced and it is non-other than Dr. Lisa Watson-Morgan. She is an aerospace engineer and manager at NASA's Marshall Space Flight Center in Huntsville, Alabama as well as a UAH Industrial and Systems Engineering and Engineering Management Alum. She graduated with a bachelor's degree in Industrial Engineering from The University of Alabama in 1991 and received both a master's degree in Industrial and System's Engineering in 1994 and a doctorate in Engineering Management in 2008 from The University of Alabama in Huntsville.

She has over 30 years' experience as a NASA veteran engineer and manager. She also served as deputy director of the Engineering Directorate at the NASA Marshall Space Flight Center in Huntsville, AL. Her career with NASA started in 1989, and in 2013 she was appointed to the Senior Executive Service, She started her career with NASA in 1989, and advanced her positions throughout the years.

In 2013 Dr.Watson-Morgan was appointed to Senior Executive Service, where she served in many positions. She started as the manager of the Marshall's Chief Engineer's office, then became the director of the Spacecraft and Vehicle Systems Department. She advanced to the position of associate director of operations for the Engineering Directorate, and she most recently served as the deputy director of the Senior Executive Service. Dr. Lisa Watson-Morgan has also received copious honors and NASA awards, including the Exceptional Service Medal in 2001, the Exceptional Achievement Medal in 2010 and the Meritorious Presidential Rank Award in 2018.

The voyage of NASA's Human Landing System, is an important milestone in NASA's new Artemis Program, and is the building blocks for long-term human activity on the Moon by 2028. This will light the fire again for crewed exploration of our solar system as well as taking a great step towards humans exploring Mars. Watson-Morgan, as program manager, will take leadership of testing the landing systems while developing, integrating and conducting crewed demonstrations with the collaborations of U.S. industry. She will also manage the 'lunar landing system integration with the Orion deep space crew vehicle', which was launched by the Space Launch System, this will carry the Artemis crew to and from the Gateway lunar orbital platform. From there, the crew will then board the lunar landing system for their mission to the surface of the Moon.

She will be leading a formal team of 360 members. The team will be testing new technologies including automated landing and navigation lidar (laser distance measuring).

Watson-Morgan is excited and confident with her new role and the mission, she said, "We're landing in a totally different place, and that's really crucial. The sun angles are totally different, so the landing is going to be totally different." When faced with the argument, "been there done that", she replied with logic and wit, "That's like saying I've been to the Plains, so I don't need to go to the Grand Canyon."

She has plenty of support and received many recognition after being named program manager. U.S. Rep. Mo Brooks, R-Huntsville, praised her appointment, he said, "It's poetic that the birthplace of America's space program is also the birthplace of the project manager who is going to lead this effort. She is fully capable of taking on this project."

NASA Administrator Jim Bridenstine agreed with Brooks and said Watson-Morgan has "risen through the ranks" and "has a lot of credibility with the highest people at NASA," he said. "We're very proud of her and the great work she does."

"Lisa's appointment to this key role not only reflects NASA's confidence in her visionary leadership, but confidence in the proven expertise and world class capability that define Marshall's contributions to safely landing humans on the Moon and launching complex spacecraft to the Moon and Mars," said Jody Singer, Marshall Director.

'The goal is to deliver a landing system to sustainably ferry astronauts and technology demonstrators to and from the surface, yielding new science and material resources – and leveraging the Moon as a proving ground for future Mars missions.'



Lisa Watson-Morgan, Ph.D., Aerospace Engineer and Manager at NASA's Marshall Space Flight Center in Huntsville

Commencement Ceremony Fall 2018 & Spring 2019

FALL 2018



SPRING 2018

