Continuing the

Legacy of Excellence

THE FY '18 ANNUAL REPORT

Georgia Tech | Daniel Guggenheim School of Aerospace Engineering

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Final Thoughts

"Continuing the Legacy of Excellence" is the title of this, the final annual report to be issued under my tenure as chair of the Daniel Guggenheim School of Aerospace Engineering. It describes our unqualified confidence in the incoming chair, Mark F. Costello, a leader who embodies innovation, intellectual rigor, and vision. But, for me, it is also reminiscent of the implicit charge I was given nine-and-a-half years ago, when I joined this iconic institution: "Continue the legacy of excellence," I was told.

It was and is a sobering mandate, but I think we are on track.

Over the last nine years, we have taken a well-respected academic program and made it world-class, revered by industry partners and peer institutions alike. And we did this while also meeting all requirements as a land-grant institution – a meaningful but often exacting mandate. We have upgraded many classrooms and labs, created a multi-site prototyping lab –the Aero Maker Space - and established the Loewy Library, a collaboration space for students. We totally re-cast the undergraduate curriculum – simplifying it so that our students could take advantage of co-ops, internships, and research opportunities and still graduate in four years. More than a third of our undergrads now leave us having completed a co-op, a research project, or both.

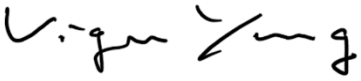
We substantially invested in our future, recruiting 14 tenure-track faculty, all of them the top prospects from our peer institutions.

More than anything else, we demanded a lot of our faculty, and they delivered –actively improving the quality and impact of their scholarship, while also driving the larger conversations about the future of the discipline. Examples are everywhere – from Prof. Robert Braun's two-year term as NASA's chief technologist to Prof. Massimo Ruzzene's service as a program manager for the National Science Foundation. If the demands placed on our faculty sometimes seemed austere, they were always intended to elevate the school's stature. If for that reason alone, the faculty always met – *and exceeded* – them.

At the end of the day, all of these efforts have improved the AE School's reputation, as an academic institution, a research powerhouse, and a source of thought leadership. Our rankings have risen higher than at any other time in our history, and our applicant pool has never been richer.

When they said 'Continue the legacy of excellence', I, in fact*, heard* "Don't stop at excellence. Push past it."

Thanks to the support of peerless faculty, hard-working staff, ambitious students, and a vast network of wildly successful friends and alumni*, that's* exactly where the AE School is going.



Vigor Yang
William R. T. Oakes Professor and Chair

CONTINUING THE LEGACY

Prof. Mark F. Costello Selected as Next Chair of the AE School

Prof. Mark F. Costello

The Daniel Guggenheim School of Aerospace Engineering this year selected Dr. **Mark F. Costello** to serve as its next William R. T. Oakes Chair, an appointment that went into effect August 15, 2018.

Costello is no stranger to the AE School – he earned his master's and doctoral degrees here under the mentorship of Prof. **Daniel Schrage.** He went on to teach at AE for 10 years, most recently as the Davis S. Lewis Professor of Autonomy. And his AE research lab – the Center for Advanced Machine Mobility (CAMM) - quickly became a hub for creating new mobile platform technologies and configurations. Costello even helped launch the AE School's dynamic new learning environment, the Aero Maker Space, before taking leave to serve as a program manager for DARPA in 2017.

Outside academia, an entrepreneurial spirit shaped his ambitions. In 2000, he launched Earthly Dynamics, a company that creates new technologies for autonomous airdrop systems, and, in 2017, he co-founded Persimia, a company that employs physics-based modeling and simulation to facilitate wind turbine siting, permitting, and environmental impact analyses.

But in his latest incarnation - that of school chair candidate - Costello articulated a vision and a strategy for leading AE that invigorated and impressed his CoE colleagues anew. In discussions both public and private, he quickly put his own unique stamp on a role that will define AE's future.

"In this position - all of the positions I've held - I aspire to be a servant leader – someone who will make it possible for others to excel," he said. "I will begin my tenure by working with, and listening to, the AE faculty, staff, and students for ideas, and I will be pushing us to be more risk-tolerant in our approach to new research. We're in a good position to redefine the future of aerospace engineering and we should not shy away from doing it."

Costello is confident about change, he says, because he is committed to advocating for the faculty, staff, and students who will make that change happen.

"I look forward to hiring faculty in emerging areas to expand our capacity. I think we can then incentivize faculty to carve out a portion of their research portfolios for high-risk and high-payoff projects that may lead to the establishment of entirely new lines of inquiry, new algorithms, and new technologies. Along these same lines, the AE School should reach out to faculty in very different technical areas to co-advise students with the goal of establishing new research areas at unexplored seams."

Prof. Tim Lieuwen Elected to the National Academy of Engineering

Prof. Tim Lieuwen

In February, professor and David S. Lewis Jr. Chair **Timothy Charles Lieuwen** became the third AE faculty member in four years to be elected to the National Academy of Engineering. He and 82 other 2018 inductees will be formally admitted to the Academy in September of 2018.

Comprised of the most accomplished academics, researchers, industry leaders, and technical professionals, the NAE is at once considered a career-capping goal and an ambitious launching pad for innovation.

"It's not a recognition of Tim Lieuwen. It's a recognition of all the people and resources that we've been able to bring together at Georgia Tech and at the School of Aerospace Engineering. I, myself, have been mentored incredibly by some very smart colleagues," he said.

"Any time I've walked into Vigor Yang's office or sought perspective from Ben Zinn or Jeff Jagoda or Suresh Menon or Jerry Seitzman or Lakshmi Sankar or even Bob Loewy [all current or former AE faculty], I've been greeted with enthusiasm and I have learned so much."

Lieuwen joins Yang and Dr. Robert Braun, who were inducted into the NAE in 2015 and 2014, respectively. Other NAE members from the Daniel Guggenheim School include Dr. **Ben T. Zinn,** Dr. **Edward Price,** and former chairs Dr. **Robert Loewy** and Dr. **Don Giddens.**

In its announcement, the Academy singled out Lieuwen for "for contributions to research and development in low-emissions gas turbine combustion systems and U.S. energy policy."

The executive director of Georgia Tech's Strategic Energy Institute, Lieuwen earned his undergraduate degree in mechanical engineering at Michigan's Calvin College and completed his master's and doctoral work in aerospace engineering under the mentorship of Dr. **Ben T. Zinn** before joining the AE faculty in 1999. In addition to authoring more than 200 papers, four books, and 110 journal articles, Lieuwen has received three patents. His research spans the areas of acoustics, fluid mechanics, and combustion. Lieuwen works closely with industry and government, particularly focusing on fundamental problems that arise out of development of clean combustion systems or utilization of alternative fuels.

AE RESEARCH HIGHLIGHTS

Brian German: Urban Air Mobility

Urban air mobility (UAM) is a relatively new term in aerospace engineering, but it is by no means a new concept for Prof. **Brian German**. His longstanding interest in the implications of new technologies such as electric propulsion and autonomy on the design of aircraft and on aviation markets dovetails perfectly with UAM, which seeks to meet the growing demand for flexible, dependable, and non-congesting forms of intra-city transportation with electric vertical takeoff and landing (eVTOL) aircraft.

In a recently completed NASA-funded study, “Concept of Operations for ODM VTOL Aircraft Package Delivery,” German and colleagues from Virginia Tech and Analytical Mechanics Associates, Inc. explored the potential for using eVTOL passenger aircraft to carry cargo within in a 17-county region that included the San Francisco Bay Area. Another project has German modeling the feasibility of offering eVTOL as an option for commuters who regularly travel in and out of cities.

“It’s really just a matter of time before we will see vertiports -- bus stops, of sorts, for autonomous eVTOL vehicles – in our cities," said German. “To enable UAM, we need to know what value proposition is needed for consumers to make it an economically viable transportation option. Is it time saved? Money saved? Convenience? There’s a potential for using passenger-class eVTOL to carry commuters during rush hour, and cargo after rush hour. By sharing vehicle capacity this way, we can spread out the costs and reduce ticket prices for passengers.”

Prof. Brian German

German’s research team investigated the practicality of eVTOL transportation concepts through several research themes: (1) assessing business/market viability, (2) optimizing the geographic placement of vertiports,(3) estimating aircraft performance and energy usage, (4) and understanding the impact of time-speed-distance tradeoffs on passenger and cargo throughput in UAM operations. This research was supported by a simulation approach developed by German and his research team that is capable of tracking trip demand, aircraft location and energy state, and vertiport usage throughout a typical “day in the life” of a UAM network.

Graeme Kennedy: FUNtoFEM

The first phase of FUNtoFEM, a NASA-sponsored project to develop a new design optimization tool, was completed by AE professor **Graeme Kennedy** this year. Thus far, his three-year collaboration with Prof. **Marilyn J. Smith** has focused on developing a simulation tool that will allow air vehicle designers to better utilize the new generation of lightweight composite materials to create thinner, longer wings that are not susceptible to flutter.

“We’ve been getting all of these tools to work together on simple design cases,” he said. “Now, we’re ready to apply this to some more difficult design problems in the real world, and to expand the types of design and analysis questions we can ask before a vehicle is designed.”

Kennedy pointed out that traditional vehicle design typically involves iterative and time-consuming collaborations between loads, aerodynamic, and structural dynamics groups. This process frequently means that dynamic aeroealsticity problems - like flutter - do not emerge until late into the process. The FUNtoFEM framework could avert this costly oversight by enabling these complex aeroelastic design considerations to be taken into account earlier.

Prof. Graeme Kennedy

"This is really an efficient design tool, because it tells us how fuel burn function changes as you change different design variables across the design space," says Kennedy.

"Ultimately, the FUNtoFEM tool should be applicable to a broad range of aeroelastic design optimization problems, improving the design of anything that flies."

AE RESEARCH HIGHLIGHTS

Brian Gunter: Opening the Flow Between Satellites and Earth

Prof. **Brian Gunter** is heading up a $1.2 million collaboration between Georgia Tech, NASA's Jet Propulsion Lab, and Xenesis, a satellite communications provider, that could improve the flow of data from Earth-orbiting satellites to ground stations.

"We expect to significantly add to the total bandwidth of information that we can get down from space, and the more bandwidth we have, the more information we can exchange and the more value we can get from satellite networks," said Gunter.

The project will miniaturize, space qualify, and test a laser communications transceiver that could dramatically expand the bandwidth available for downlinking information from the growing number of satellites – and future constellations of space vehicles – in low Earth orbit. Xenesis has licensed JPL's technology and will work with Georgia Tech and JPL to mature it for use as a primary communication system for satellites as small as CubeSats.

Gunter's lab will help to minitiarize the original JPL technology, update the control software, space qualify all the hardware and test the improved system from space – likely from the International Space Station.

Prof. Brian Gunter

The laser system can produce a narrow beam that can travel farther than comparable radio-frequency transmissions at the same power level. In addition to boosting bandwidth, optical systems can use smaller antennas, use power more efficiently, and provide better data security.

The laser communications transceiver developed by JPL consists of two components: (1) an optics module that includes a five-centimeter telescope, two-axis gimbal, monitoring sensors and thermal control system, and (2) an electronics module with a transmitter, processor, controllers and power conditioning systems.

The initial focus will be space-to-ground communication, though the system could also be used for cross-linking communication between satellites. The small antenna size is also more suitable to the small-form satellites envisioned for future constellations that may include thousands of spacecraft.

"Once we can show that this works from space to ground, that will demonstrate that the technology can survive the harsh environment of space, and allow us to continue the development of the transceiver for commercial use," Gunter said.

Rotorcraft Simulation Lab Launches New Options

A new rotorcraft simulation lab developed under the guidance of AE professor **J. V. R. Prasad** is quietly revolutionizing the investigative capabilities of multiple researchers in the AE School. Funded by grants from the Department of Defense University Research Instrumentation Program (DURIP) and the Office of Naval Research (ONR), the lab is outfitted with a Bell Helicopter OH58 cab, a wrap-around movie screen, and specially programmed simulation software that can mimic multiple flying conditions – choppy winds, dense fog, starless darkness, or bright sunlight. Computer models provided by Advanced Rotorcraft Technology, Inc., provide researchers with a picture of how the vehicle responds to those conditions.

Researchers from throughout the Institute and the military have already found their way to the lab. Prasad has been collaborating with professors **Karen Feigh** and **Evangelos Theodorou** on research to improve the safety and efficiency of shipboard landings. The team is using a Model Predictive Path Integral (MPPI) approach to fine-tune software that will, ultimately, give pilots real-time feedback on the best flying strategy to pursue under different conditions.

Behavioral research, conducted by Feigh and Dr. **Dev Minotra** seeks to determine the most effective method for delivering guidance cueing - visual, audio, tactile or a combination - to the pilot while in flight.

Prasad and professors **Massimo Ruzzene** and **Julian Rimoli,** are using the lab to research methods for extending rotorcraft component life while another cohort of researchers [Prasad, Lakshmi Sankar and Dave Peters] is using it to explore multi-rotor inflow models.The application of this research to military projects is clear, but, in the end, Prasad's team has built a lab, fine-tuned a software package, and developed practical technical support that promise to improve rotorcraft safety, efficiency, and durability.

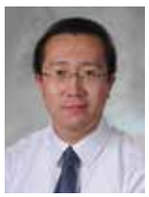
AE FACULTY HIGHLIGHTS


Prof. Dewey H. Hodges

Professor **Dewey H. Hodges** formally received the American Institute of Aeronautics and Astronautics' (AIAA) Structural Dynamics and Materials (SDM) award in recognition of 45 years of research, instruction, and mentorship in the field. Hodges, the author of more than 200 journal papers, five textbooks, and numerous named lectureships, received the award during AIAA's Sci Tech Forum where several of his former students and longtime colleagues hosted Dewey70, a two-day symposium and festschrift to mark his 70th birthday.... Decades of contributions and service to the rotorcraft community continue for Prof. **Marilyn J. Smith** who was appointed deputy technical director of aeromechanics for Vertical Flight Society (formerly the Amercian Helicopter Society) ...Prof. **Wenting Sun**'s investigation of new techniques for controlling the propulsion of ypersonic vehicles was recognized by the Eastern States Section of the Combustion Institute (ESSCI) which selected him to give the 2018 Irvin Glassman Young Investigator Lecture. Sun's research was again recognized by ESSCI with the 2018 Markstein Best Paper Award for his co-authorship of "Measurements of Methane Autoignition Delays in a Shock Tube under Supercritical Carbon Dioxide Conditions"....


Prof. Marilyn J. Smith

Prof. **Mitchell L. R. Walker**'s wide-ranging expertise was very notably recognized by his peers with his election to the board of the Electric Rocket Propulsion Society, his election to chair AIAA's Electric Propulsion Technical Committee, and his appointment to the United States Department of Energy's Fusion Energy Sciences Advisory Committee. Walker was also invited to serve as a U.S. Aerospace Industries Delegate for the 2018 George C. Marshall visit to Austria where he reviewed that country's aerospace and aviation programs and networked with university educators...Regents Professor **Lakshmi Sankar** was named to the Sikorsky Professorhip, an honor that will enable him to offer fellowship opportunities to deserving students.... Prof. **Tim C. Lieuwen** was selected by the American Society of Mechanical Engineers to receive the 2018 George Westinghouse Gold Medal, a much-venerated honor within the field of power and energy generation. Lieuwen's textbook, "Unsteady Combustor Physics" was translated into Chinese and re-issued... Prof. **Massimo Ruzzene** brought more than 60 academics, researchers, and thought leaders to Atlanta from across the U.S. for “Meta-structures: Dynamics, Topology and Related Dynamics” a three-day, Army Research Office-sponsored conference to map out the future of the field. Attendees explored the numerous ways that meta-structures research can help spawn a new generation of more adaptable and effective structures for an unlimited number of purposes...Prof. **Joseph H. Saleh** was named Faculty of the Year by the Georgia Tech chapter of Sigma Gamma Tau, the aerospace engineering honor society... Prof. **Julian J. Rimoli** has been selected to serve as one of Georgia Tech's Provost Teaching and Learning Fellows - a cohort of high-achieving faculty who demonstrate a desire to be change agents in education and to be pioneers in evidenced-based teaching methodologies...."Development and Testing of 3D-Printed Cold Gas Thruster for an Interplanetary CubeSat," a paper co-authored by Prof. **E. Glenn Lightsey** was featured in the *Proceedings of the IEEE,* the flagship publication of the Institute of Electrical and Electronics Engineers. The paper describes the design, development, and test campaign for the cold gas attitude control thruster, which will be used by the BioSentinel spacecraft. The majority of the thruster - the propellant tanks, feed pipes, and nozzles - is composed from a single piece of 3D-printed additive material This allows for more efficient use of available volume and reduces the potential for leaks...Research being performed by AE professor **P. K. Yeung** was recognized as having high potential for accelerated discovery by the U. S. Department of Energy INCITE program. As the PI for "Differential Diffusion and Double Diffusive Phenomena in Turbulence" Yeung was given something more precious than funding: 85 million processor hours on the powerful Cray XK7 computer at the Oakridge National Lab. His team will use this resource to explore turbulent flow phenomena problems that require numerical simulations at resolutions up to half-a-trillion grid points. The research will allow them to gain insight on the turbulent mixing of two passive scalers with different molecular diffusivities in a regime of low diffusivity - a common condition in the ocean, where temperature and salinity diffusivities differ by a factor of 100...The ASDL, under the direction of Prof. **Dimitri Mavris**, coordinated Georgia Tech's Smart Campus initiative, a project that helps the Institute Facilities Management use vast amounts of utilities and infrastructure data to develop cost-avoidance opportunities and model scenarios. Ths year, the initiative layered new data sets from other parts of Institute operations, including safety and transportation. The ultimate research goal is the development of a “Digital Twin” framework and testbed for Georgia Tech: an integrated, virtual counterpart to campus that can be used for benchmarking, scenario building, and pioneering of cyber-physical systems.


Prof.Wenting Sun


Prof. Mitchell L. R. Walker


Prof. Massimo Ruzzene


Prof. Julian J. Rimoli


Prof. E. Glenn Lightsey


Prof. P. K. Yeung

The Guggenheim School Recognized as a Vertical Flight Heritage Site


Prof. Daniel Schrage
VLRCOE Director

The American Helicopter Society (AHS) this year selected the Daniel Guggenheim School of Aerospace Engineering for inclusion in its Vertical Flight Heritage Sites, a distinction earned by just 10 sites world-wide. The Heritage Sites Program recognizes and helps preserve locations that have made noteworthy and significant contributions in both the theory and practice of VTOL aircraft technology. The honor recognizes the Guggenheim School's 35-year stewardship of the Vertical Lift Research Center of Excellence (VLRCOE), a collaborative center funded by the U.S. Army, Navy, and NASA that conducts basic research to support current and future vertical lift capabilities. The Georgia Tech-based Center a long history of promoting innovative research as a means of furthering the discipline. For example, one of its members, AE professor **Dewey H. Hodges**, developed VABS, a software program that is now the standard tool for rotor blade design/layout across industry, government, and academic users. The Center is headed up by three renowned rotorcraft experts: Prof. **Daniel Schrage,** Prof. **Marilyn J. Smith,** and Prof. **J.V.R. Prasad.**

TOGETHER, WE SOAR.

Design. Compete. Win.

For the fourth year in a row, ASDL-led teams (above) took home trophys for the "Best Overall" in the Micro and Advanced categories in the 2018 Society of Automotive Engineer's Design Build Fly Aero East competition. The team's Advanced Class entry also scored #2 for its written report, and a #1 ranking in the Humanitarian On-Target category. In AIAA's 2017 Undergraduate Team Aircraft Design competition, two AE-led teams, Coronis and HAMMER, came in first and second, respectively. Team Coronis donated its $500 prize to the Georgia Tech Yellow Jacket Flying Club, to fund a scholarship for a student pursuing a private pilot's license. In the 2017 and 2018 RoboNation RoboBoat competitions ASDL-led design teams placed third and second, respectively. And in the rotorcraft area, Hummingbuzz, a Georgia Tech design team dominated by aerospace engineering students, was one of just 10 design teams worldwide to receive a $20K prize as a finalist in the 2018 Boeing GoFly Competition. They will go on to compete for a $2 million prize in 2019.

Shining Stars

Nicholas Branch, B.S. AE '17 was named to *Aviation Week's* 20/Twenties list of outstanding young aerospace researchers and students for 2018. He is now a doctoral student working in the High-Powered Electric Propulsion Lab...**Kenneth W. Smith,** M.S. AE '18 was named to Forbes Magazine's 30-Under-30 list for outstanding young scientists...doctoral student **Aarohi Shah** was recognized by the American Helicopter Society's (AHS) with its Robert Lichten Award for "*Closed Loop Approach to Structural Health Monitoring for Critical Rotorcraft Components,*" a paper she co-authored on extending the life of the collective and cyclic pitch links in Blackhawk helicopters... Doctoral student **Byron T. Davis** was selected for the NASA Earth and Space Science Fellowship (NESSF) which will fund his graduate research, "*Expanding the Use of Small-Satellite Constellations for Remote Sensing through Improved Orbit Determination*"...**David B. Gomez's** research "*The High-powered Electric Propulsion Lab's Motivation for Mass Flow Calibration* " was selected by the Institute to receive the 2018 Best AE Undergraduate Research Project Award...While working on his graduate degree through Georgia Tech's Distance Learning program, **Michael Staab** M.S. AE '15, also worked as a flight controller for the Saturn-bound Cassini Spacecraft. Staab was one of just three people authorized to direct the historic spacecraft in its final orbits around Saturn in September 2017... The scholarship of AE graduate student **Giuseppe Trainiti** and AE professors **Massimo Ruzzene** and **Julian J. Rimoli** landed on the front page of the **Journal of Applied Physics**. Their article, "*Optical Evaluation of the Wave Filtering Properties of Graded Undulated Lattices,*" focused on the mitigation of impacts from explosions...Doctoral student **Debolina Dasgupta** was selected by AIAA for its 2018 Martin Summerfield Graduate Award in Propellant and Combustion. The fourth-year doctoral student has worked extensively on turbulent chemistry interactions in lean premixed flames.... Georgia Tech's Women in Engineering recognized eight outstanding AE undergraduates with sponsored scholarships totaling in excess of $12,000: **Adrienne Dorr, Erica Hulette, Alexandra Matlack, Jaqueline Tu, Emily Hale, Elizabeth Halloran, Dawn Andrews,** and **JiaYi Zhang...**Doctoral students **Alex Moushegian** and **Harleen Brar** each had their graduate educations completely underwritten by SMART Scholarships from the U.S. Department of Defense. Brar will continue to work with AE professor **Evangelos Theodorou.** Moushegian will intern at NAVAIR and continue his research with Prof. **Marilyn J. Smith** on numerical physics modeling of fluidic actuation for aerodynamic flow control - eventually to be integrated with the hybrid solvers and a DoD framework...Graduate student **Jean Luis Suazo Betancourt** received a fellowship from the Consortium for Graduate Degrees for Minority Engineers (GEM) that will support both his internships at the Aerospace Corporation and his doctoral research on performance modeling and analysis... AE graduate students Bob Walters and Aaron Wilks each received $2,500 scholarships to continue their rotorcraft research through the first-ever Bell Flight Fellowship program.

Aarohi Shah

Byron T. Davis

David B. Gomez

Debolina Dasgupta

Alex Moushegian

Jean Luis Suazo Betancourt

NEXTGEN AEROSPACE FACULTY

The Guggenheim School's search for innovative researchers and faculty is as relentless as the pace of change itself. Over the past year, the School has recruited five faculty to lead us forward. We are proud to briefly introduce you to:

Prof. Joseph Oefelein

Joseph Oefelein earned his master's and doctoral degrees at Penn State before diving into a career that included research at Stanford University and a 17-year stint as a distinguished member of the technical staff at Sandia National Laboratories, Combustion Research Facility. Oefelein is actively engaged in research on a broad range of topics in simulation and modeling of advanced propulsion, power, and related systems. His expertise is interdisciplinary, with focus on the theory and analysis of complex fluid flows where turbulence interacts with a multitude of strongly coupled fluid dynamic, thermodynamic, transport, chemical, multiphase, and/or heat transfer processes.

"Considering the move to academia, I wanted to work with people whose research I respected. That's a given here. My skills are a good technical fit with my colleagues at Tech. This is a group whose expertise will complement and challenge my own."

Prof. Adam Steinberg

Adam Steinberg received his master's and Ph.D. in aerospace engineering from the University of Michigan. Prior to coming to Tech, he was on the faculty at the University of Toronto Institute for Aerospace Studies and served as a research scientist at the German Aerospace Center. His research focuses on the application of laser-based measurement techniques to solve problems in fundamental and applied thermo-fluids. A primary aim of this work is creating novel engines for reduced pollution emissions, increased efficiency, hypersonic flight, improved space launch, and better reliability. "Georgia Tech is among the best universities worldwide in my field. The prospect of working with such excellent students, faculty, and research engineers – and to access Tech's amazing facilities – was impossible to resist. My research is highly complementary to current activities in the combustion and propulsion area, providing numerous opportunities for exciting collaborations."

Prof. Kyriakos G. Vamvoudakis

Kyriakos G. Vamvoudakis earned his diploma in electronic and computer engineering from Technical University of Crete and his master's and doctoral degrees in electrical engineering at the University of Texas. He was a project research scientist at the Center for Control Dynamical Systems and Computation at the University of California, and was most recently on the faculty at Virginia Tech. Vamvoudakis's research is multi-disciplinary, drawing from the areas of control theory, game theory, renewable energy (smart grid), and computational intelligence. Interactions between self-interested agents along with nature-inspired approaches, are used to design and develop control system algorithms with guaranteed performance and stability where traditional techniques are unable to provide any solutions. His current research focus is game theory based network security and multi-agent optimization with applications to cyber-physical systems.

"I am really excited to join the faculty at Georgia Tech. The opportunity to collaborate with my AE colleagues and those from other Georgia Tech schools is going to provide me with the tools I need to have a larger impact on my research and on society at large."

Prof. Jonathan Rogers

Jonathan Rogers earned his master's and doctoral degrees at the Guggenheim School, and taught at Texas A&M, and, most recently, at Georgia Tech's Mechanical Engineering School, before returning to his alma mater. His research interests encompass robotics, nonlinear dynamics, and control system engineering toward the overall goal of developing and improving actively-controlled autonomous vehicles.

"Currently, there is great interest across the Institute in growing our research efforts in unmanned aerial vehicles (UAVs). Critical stakeholders in industry and government are also looking to Georgia Tech to develop enabling technologies. The natural home for this expanded UAV research presence is the Georgia Tech School of Aerospace Engineering. As I move my research program to the AE School, I hope to provide AE students with world-class research opportunities in the area of autonomy and grow my collaborations with AE faculty members."

Prof. Yongxin Chen

A native of China, **Yongxin Chen**, earned his doctorate in mechanical engineering from the University of Minnesota, and was a post-doctoral researcher at Memorial Sloan Kettering Cancer Center before joining the faculty of Iowa State University in 2017. He is interested in the applications of mathematics in engineering, physics, data science, and biology. His current research focuses on optimal mass transport theory with applications in stochastic control, machine learning and biology networks.

"It's really cool to be a rocket scientist, especially at a top aerospace engineering school. Everyone knows that the students at Georgia Tech have a really strong background in research. I was convinced that this is true after having just a few discussions with the students here. I am also excited about working with the many faculty at Georgia Tech who share - and can expand on - my research interests. Collaboration is a key to solving important problems."

Find out more and meet all of our faculty at ae.gatech.edu/people

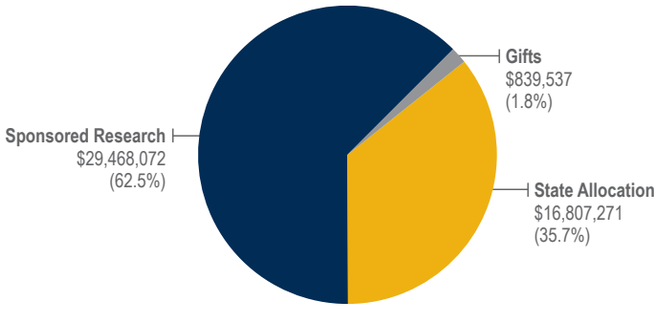
FINANCES

In FY'18, the Daniel Guggenheim School of Aerospace Engineering had expenditures of $47,114,880 which were funded by a combination of the School's state allocation from the Institute, sponsored research contracts, and gifts.

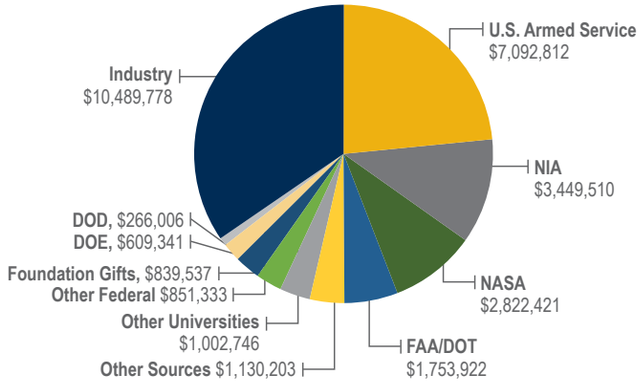
Research funding from outside sources in FY18 totaled $30,307,609: $17,848,091 from the federal government*; $10,489,778 from industry; $839,537 from foundation gifts; and $1,130,203 from other sources (e.g. local, state, and other governments). AE's state allocations were $16,807,271.

**Federal funds included $1,002,746 from other universities as federal flow-through.*

FY18 Expenditures



FY18 Research Funding



THANK YOU

The enduring legacy of Georgia Tech's aerospace engineering program is the story of the more than 6,000 men and women who earned degrees here. In saluting the following three alumni, we celebrate them all.


Dennis Williams

In April of 2018, **Dennis Williams,** A.E. '68, was inducted into the College of Engineering Hall of Fame. Inductees into the Hall of Fame include alumni with an engineering degree from Georgia Tech that have made meritorious engineering or managerial contributions during their careers. Following graduation from Tech, Williams began a 28-year career with GE, which started in the aircraft engine business. He is now on the boards of Owen-Illinois, AMETEK, and Actuant.


Bobby Noble

The Council of Outstanding Young Engineering Alumni recognized **Bobby Noble**, M.S. AE '06) for his advancement in the field of engineering and his early achievements since graduating. He is currently a senior technical leader in the combined-cycle turbomachinery program at the Electric Power Research Institute (EPRI) and is focused on advancing and shaping the future of electricity.


Jan Davis

Former astronaut, **Jan Davis**, BS Applied Biology '75, was awarded the Distinguished Engineering Alumni award. The award is given to alumni who have provided distinguished contributions to the Institute, profession, field or society at large. Jan had a successful career with National Aeronautics and Space Administration (NASA) at the Marshall Space Flight Center (MSFC). She currently works for Bastion Technologies, Inc. as the program manager for Safety and Mission Assurance for the NASA MSFC contract.

Find out how you can support the Guggenheim School of Aerospace Engineering.
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Contact Us

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FY18 AT A GLANCE

#2

2017 ranking for undergraduate program, *U.S. News & World Report*

#4

2018 ranking for graduate program, *U.S. News & World Report*

#1

aerospace engineering school in the world. (Fall 2017) The Shanghai Ranking of World Universities

For more than a decade GT-AE's undergraduate and graduate programs have been ranked in the top 5, nationally.

~37% of eligible GT-AE undergrads involved in research

1,390 students enrolled in Fall 2017 (902 undergraduate, 488 graduate students)