

## Greetings from the Plains!

More than 100 years have passed since the Wright Brothers' historic flight and we are celebrating that achievement. Airplanes were the reason the Department of Aeronautical Engineering was established in 1942 in the School of Engineering of Alabama Polytechnic Institute (API), with Robert G. Pitts as head professor. Actually, a program in aeronautics thrived at API more than a decade prior, in 1930, with three professors and 108 students. In 1960, when API became Auburn University, "Aeronautical" was changed to "Aerospace." Read more about the department's history in a paper entitled "Aerospace Education and Research at Auburn University—From the Wright Brothers' Flight School to the Space Station" by visiting [www.eng.auburn.edu/ae](http://www.eng.auburn.edu/ae) and clicking on "History of Auburn Aerospace Engineering."

Many positive things are happening in the Samuel Ginn College of Engineering and the Department of Aerospace Engineering. The university has embarked on its largest capital campaign. The College of Engineering goal, which will allow us to compete for national top 10 ranking, is \$190 million. Our department hopes to use some of these funds for professorships and scholarships.

We have more students than a year ago, a new faculty member, a former astronaut teaching spacecraft design, a new water tunnel and a state-of-the-art multi-media class/conference room. Just a few areas our faculty are engaged in are cutting edge research in missile design using genetic algorithms; design and prototyping of micro unmanned aerial vehicles that utilize adaptive aerostructures; and modeling and simulation of aerospace vehicles and terrestrial transportation systems. Student enrollment has been increasing steadily since the mid '90s. Fall 2003 saw an enrollment of 109 sophomores, juniors and seniors in our undergraduate program—an increase of 12.5 percent over fall 2002.

I think that our students, faculty, and staff are among the best in the nation. This newsletter contains some compelling evidence. You will read about:

- James Voss '72, veteran astronaut, who has retired from the U.S. Army and NASA to return to the Plains
- Christopher Roy, CFD expert and latest faculty addition
- Forthcoming retirements of John Burkhalter '64 and Rhonald Jenkins
- Our Center for Advanced Simulation and Technology Laboratory, which Sen. Richard C. Shelby helped establish
- Activities of the Aerospace Engineering Advisory Council



John Cochran

- Aerospace students winning AIAA technical paper awards
- Flow visualization using a water tunnel
- Students conducting experiments in microgravity
- Research projects
- Alumni notes
- Student and faculty awards

To all alumni, let us know what you are doing; you can play a major role in our future. War Eagle!

John Cochran Jr. '66, department head

## Astronaut alumnus helps college achieve its vision

One of Auburn University's most famous alums, veteran astronaut Col. James Voss, has returned home. His mission: raise funds as associate dean for external affairs and, as a teacher of spacecraft design, inspire the next generation of explorers. Voss wants to give back to the university that gave him so much. His experience as both astronaut and engineer has shown him the need to continue creating world-class engineers with the foresight to support our future technological



needs. As associate dean, Voss supervises the Samuel Ginn College of Engineering development team in its effort to position the college to move into the arena of America's top 20 engineering programs. The prime feat in accomplishing that goal is funding. Engineering Dean Larry Benefield has set the bar at \$190 million dollars, and with Voss's leadership, the development team's mission is to reach that number in five years via fund-raising events and alumni contributions such as the \$25 million gift of alumnus Samuel Ginn. It will be a challenge, but as a retired U.S. Army colonel and former astronaut accustomed to conducting missions in space, Voss is no stranger to meeting challenges. With such funding, the College of Engineering can provide the scholarships, fellowships, professorships, and facilities necessary to be counted among the elite engineering programs in the nation.

But Voss's mission does not end there. One of NASA's goals is to inspire the next generation of explorers; words that Voss took to heart, reaching that next generation on a daily basis in his classroom as he draws upon a wealth of training and experience. He served as an engineer for both the Army and NASA, logged five space flights, 201 days in space, four spacewalks, and lived and worked aboard the International Space Station. At the U.S. Military Academy, he taught for three years in the Department of Mechanics and discovered his love of teaching. This semester, his course focuses on student design of a spacecraft for human interplanetary exploration. His goals are to instill in his students the desire to

design a spacecraft system, to share lessons learned in spacecraft experiences, and to inspire students to accomplish great things in our space program. Voss wants his students to realize how essential it is to work as part of a design team and collaborate with other design teams. To that end, the class works in separate groups and with remote teams from other universities such as the University of Colorado, where Voss received his master's and honorary doctoral degrees. The class also features guest lecturers from the aerospace industry and NASA.

As both associate dean and educator, Voss is thrilled to assist in acquiring the resources necessary to achieve the vision of the College of Engineering and to continue Auburn's tradition of providing future engineers with an excellent education.



Auburn alumnus and veteran astronaut Jim Voss aboard the International Space Station.

## Department welcomes new faculty member

From Sandia National Laboratories in Albuquerque, N.M., Christopher Roy is the newest member of the aerospace engineering faculty. He earned his bachelor's degree from Duke University, his master's degree from Texas A&M, and his doctorate from North Carolina State University. His specialty is computational fluid dynamics, in which he teaches an introductory course to undergraduate and graduate students, as well as a boundary layer theory course. Roy is also involved in a computational fluid dynamics research program sponsored by Sandia National Laboratories that includes four undergraduates and one graduate student. Along with research findings, he is hoping that the program will generate student papers for the AIAA and help students compete for summer internships.

Roy is also the coordinator of modeling and simulation for the Transportation Peak of Excellence. He contributes to all modeling and simulation aspects of the project, currently focusing on improving the aerodynamic drag for tractor-trailers in an effort to reduce fuel consumption and pollution. If the project's funding receives a five-year renewal, the Transportation Peak team will have the opportunity to complete its work, which may provide benefits to the environment and, perhaps, the economy. In his leisure time, Roy enjoys swimming for the Auburn Masters Swim Team and spending time with his wife and their four horses at their home in southern Lee County.



Chris Roy of the aerospace engineering faculty (right) and Chad Brown, a senior and undergraduate research associate from Seneca, S.C., discuss computational fluid dynamics to analyze and improve the aerodynamics of tractor-trailers.

## Forthcoming retirements

### John Burkhalter

John Burkhalter BAE '63, MSAE '64, whose connection to Auburn University spans more than four decades, intends to retire at the end of November. After earning his master's degree, the Verbena, Ala. native remained at Auburn for three years as an instructor and assistant professor, then in 1972 earned a doctorate from the University of Texas. During his early career he was co-inventor of an aerial seeding device, worked with a team at the University of Texas to implant an artificial heart in a calf, obtained his private pilot's license, and he and his wife Verlyn became parents of Selena, Kimberly and Scott.

In the '70s Burkhalter's research included the use of aerodynamic finite elements such as sources, sinks, vortices, and lifting surfaces to model flight vehicles. In the early '80s he worked on modeling the interference effects between airplane stores and the host airplane, including wind tunnel experiments.

He worked several summers at the U.S. Army Missile Command (now Aviation and Missile Command) where his research included modeling of missiles and missile control surfaces; determination of aerodynamic characteristics of "grid fins" in subsonic and supersonic flow; unsteady aerodynamics of wing-canard configurations; development of a graphical interface for Missile DATCOM and other large aero prediction codes; complete aerodynamic design of a maneuverable towed target; and development of a three-dimensional paneling algorithm for airplanes and missiles.

Recently, Burkhalter made substantial contributions to the state of the art in tactical missile design through development and application of missile design codes based on sophisticated simulation models and powered by genetic algorithms. He served for several years as the AIAA student chapter advisor and member and chair of the AIAA Applied Aerodynamics Technical Committee. He has been associate head of the aerospace department since 1996 and a member of the engineering faculty council



John Burkhalter (right) and Rhonald Jenkins

as well as several university committees.

His teaching honors include a Birdsong Merit Teaching Award and an AIAA Student Chapter Outstanding Faculty Award. His leadership in the department and contribution to our research program will be sorely missed. We hope that as Professor Emeritus, he will teach a course now and then and continue to spend time in our department.

## Rhonald Jenkins

Congratulations to Rhonald Jenkins on his pending retirement. His Auburn career began in 1985—his 19 years of outstanding service to this department are marked by 14 teaching awards. He began teaching mechanical engineering at Tuskegee University in 1977 and became acting head of its aerospace engineering department in 1983. Research opportunities brought him to Auburn where he teaches propulsion, aerodynamics, thermodynamics, and basic engineering courses to undergraduate and graduate students.

Throughout his professional career Jenkins has been involved in many groundbreaking projects, including technical missile designs using genetic algorithms, a thermal protection system for the Hubble Space Telescope, and solid rocket motors for the Space Transportation System.

“I love the interaction with students both in and out of class, as well as seeing a student inspired by my instruction,” he says. “I consider myself fortunate to have been able to teach such great students, and I appreciate a department in which an open-door policy is maintained.”

An amateur astronomer, he owns a telescope and has been president of the Auburn Astronomical Society, which has about 30 members and is open to anyone, since its inception in 1981. He and his wife have taught ballroom dancing for 10 years and enjoy cruising in their Z06 Corvette. Jenkins looks forward to traveling, continuing research, and serving as an engineering consultant for clients such as the U.S. Army. We wish him health, happiness and the very best well-deserved retirement.

## CAST laboratory

Thanks in large part to Sen. Richard Shelby, the Center for Advanced Simulation and Technology (CAST) laboratory has been established in our department over the past four years. The latest addition to this lab is a state-of-the-art multimedia class/conference room. This facility allows us to display simulation results graphically, teach using multimedia, and hold Internet conferences. Over the past four years the CAST project has supported research by eight graduate students and seven faculty members from this department, the Department of Industrial and Systems Engineering, and the Department of Aviation Management and Logistics in the College of Business.

## Advisory Council addresses department issues, sets goals

The Aerospace Engineering Advisory Council consists of 14 members:

Lawrence Burger '80, *director*, U.S. Army Space and Missile Defense Command's Space and Missile Battle Lab

Pete Cerny '69, *technical director*, National Missile Defense Joint Program Office, Missile Defense Agency

Louis Connor '66, *director*, Space & Missile Defense Technologies

Charles “Gene” Fuller '65, *CEO*, REMTECH, Inc.

Ronald Harris '59, *senior executive*, NASA and Boeing

Ralph Hoodless '59, *senior executive (retired)*, NASA

Robert Jones '66, *business development manager*, Missile Defense Programs, Northrop-Grumman

George Landingham '70, *chief*, Aerodynamics Technology; Systems Simulation & Development Directorate; Aviation and Missile Research, Development & Engineering Center (AMRDEC); U.S. Army Aviation and Missile Command (AMCOM)

Mark Miller, '84, '85, *manager*, Missile Systems Department, Dynetics, Inc.

Morris Penny '59, *senior engineer (retired)*, Lockheed Martin

Rex Powell '49, *director (retired)*, Applied Sensors, Guidance, and Electronics Directorate, AMRDEC, AMCOM

Axel Roth '59, *associate director*, Marshall Space Flight Center

Norman Speakman '72, *program manager*, AMTEC, Inc.

James Voss '72, *colonel (retired)*, U.S. Army; *veteran astronaut*, NASA; *associate dean for external affairs*, Auburn University

John Cochran '66, *department head*, Department of Aerospace Engineering, Auburn University

As indicated, all members are Auburn University (or API) alumni and all are aerospace engineering alumni except Larry Burger who qualified by spending his career in aerospace endeavors after receiving his BChE in 1980.

The council's primary purposes are to provide advice to the department head on industry and government activities in the aerospace arena and provide assistance to the department head and faculty in areas including feedback on instructional programs, research funding, and graduate employment.

At the latest council meeting, Cochran addressed the major concerns of the department. Undergraduate enrollment is expected to continue increasing, but class sizes will be approximately 50 and faculty members will have less time for research. Despite this semester's addition of a new professor, the faculty size is too small—even with no one on sabbatical—to teach all required undergraduate and graduate classes and have sufficient time for research. With Jenkins and Burkhalter retiring this year, top faculty members must be recruited. Enter the capital campaign. The department needs more endowments for professorships in order to hire the necessary faculty.

Equally important is increasing graduate student enrollment by acquiring more endowments for graduate scholarships. Since departmental ratings are currently based on research funding and number of graduate students, a strategic goal is to recruit top graduate students using research opportunities, print media, and the Internet. But the most effective way to land top recruits is financial incentives, i.e., scholarships and fellowships. Tuition waivers are available, but state funding for graduate teaching assistants (GTAs) is severely limited. In fact, because the allocation of GTA funds within the college is based on the number of weighted semester credit hours generated in each department, our department's share has been decreasing. Enrollment increases may stop this trend but will not reverse it. Research funding has increased but is not at the level needed to fund many graduate research assistant (GRA) positions. With both in-state and out-of-state competition for graduate students increasing, the need for funding of the department's graduate program is rapidly becoming urgent.

The department needs larger and lengthier projects in order to compete nationally. Program support funds gained from such projects will help the department fulfill many goals, such as making wind tunnel improvements and building a propulsion lab. A way to bring in the necessary projects and funding would be to establish the Center for Missile, Aviation and Rocket Technology (CMART) that a large number of alumni and businesses in the Huntsville area support.

In addition to continuing promotion of CMART, this year the department intends to obtain re-accreditation by ABET, increase research funding, increase its number of graduate students, and achieve success in the capital campaign.

Specific five-year goals:

- Add three faculty members
- Produce 30 to 40 graduates per year from the undergraduate program
- Generate \$200,000 per faculty member in extramural research funding per year
- Obtain \$2 million in endowments for professorships
- Produce 10 to 15 MAE, MS, and PhD graduates per year

Fulfillment of these goals will help place the department in a position to be a top 20 aerospace engineering department.

## Aerospace students receive **AIAA awards**

Last year, Auburn's aerospace students went three for three in the AIAA Paper Contest. After taking first place in the AIAA Southeastern Regional Student Conference in January, David Padgett presented his paper at the 2003 AIAA Aerospace Sciences Meeting in Reno, earning a fourth place finish in the national competition. His first place finish in the regional competition marked the second consecutive year that an Auburn paper topped all others in the undergraduate category.

Jeremy Corpening and Chris Reasonover won the 2001 Southeastern Regional Competition. Freshman Mike Brennon took third place in the undergraduate category in the 2003 regional competition with his paper entitled "An Experimental Investigation of Friction Reduction in Hydraulic Tubing with an Advanced Oligomeric Silane Coating." Zafar Bangash and Robin Sanchez took second place in the graduate category with their paper, "An Experimental Investigation of Formation Flight." More than two dozen papers were submitted from 15 universities throughout the Southeast, with Auburn as the only university placing in both categories. Congratulations to these students on their impressive showing.

## Student and faculty **research projects**

### Aerospace faculty develop breakthrough in missile design

Technology developed by a team of aerospace engineering faculty led by John Burkhalter promises to reduce the time and expense of creating new missile designs.

In the design of a typical missile, the usual procedure is for engineers to first establish the missile's requirements and mission. This is usually done through a government agency in which a specific need arises. Another group of engineers then defines the geometry and details of the system. This team includes aerodynamics, propulsion, and structures personnel; guidance and navigational experts; and warhead, electronics and environmental personnel who deal with the systems engineering aspect of the

design and the packaging of internal components. The design process usually requires 12 to 15 engineers over a span of three years.

In the past few years, the Department of Aerospace Engineering has developed a suite of codes that are typically used in the design process and has coupled these codes with an optimization method called a genetic algorithm (GA). The GA is a routine that falls into a “fuzzy logic” class of codes, an optimization scheme that does not depend on prior knowledge of the system. It has been used successfully to design several missile systems that have historically proven to be very difficult.

The breakthrough in this new process is twofold. The first is in the compression of the time required to develop a working design. The GA approach represents a reduction in design time from 36 to 45 man-years to less than a single man-year.

The second breakthrough is the design itself. Previously, one would hope to find one or two designs that met mission requirements. With the GA approach, usually several hundred designs are optimal in nature—the best that one can do under the constraints imposed in the design process. Furthermore, many of the designs are non-intuitive, ones that previous experience would never predict. This forces engineers to “think outside the box”, leading to unique solutions that expand the thought process in complicated problems.

In pioneering this effort, the department has been successful in solving complicated problems whose solutions previously eluded engineers, leading the U.S. Army Aviation and Missile Command to adopt the GA approach as the preliminary method by which its tactical missiles will be designed.

## Student teams chosen for NASA program

Teams STRIDE (Space Tether in Deployment) and PRIME (Particle Removal in a Microgravity Environment) were fortunate enough to have their proposals accepted by the NASA Reduced Gravity Student Flight Opportunities Program in 2002.

The program provides students the chance to ride in the KC-135 microgravity aircraft, also known as the Vomit Comet, at Johnson Space Flight Center. Each of the 32 teams selected annually experiences 30 20-second free falls in order to conduct tests they described in their proposals. The teams then assess their experiments and present their full projects to their peers.

Last year, Auburn's project proposals were a study of the interfacial instabilities of two immiscible fluids, submitted by team ALIFIE (Auburn Laboratory's Immiscible Fluids Interface Experiment), and a study submitted by team SMASH (Shape Memory Alloy Space Hardware) using miniature shape-memory alloys for the deployment of satellites. The proposals were not among those selected by NASA but Auburn teams will apply again this year.

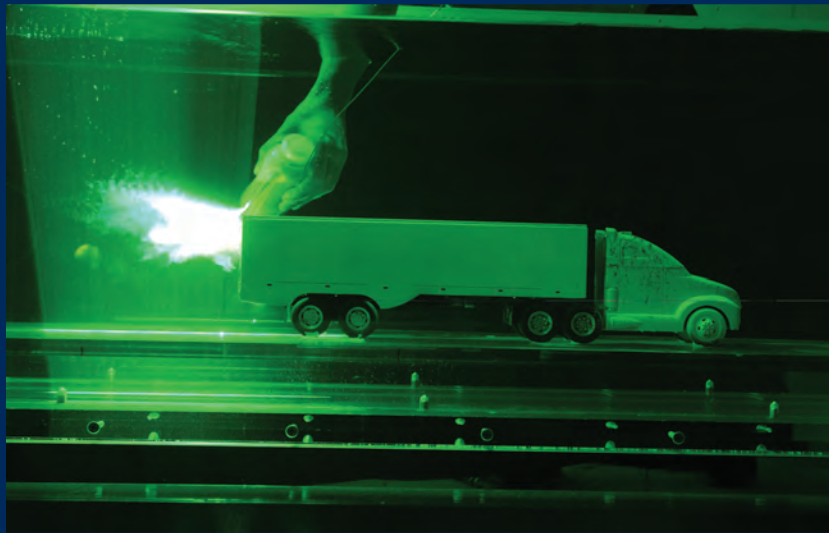
## Water and wind tunnels benefit research

Last August, the department's first water tunnel arrived. It will be of tremendous help to Anwar Ahmed, allowing him to study synthetic jets used to control aerodynamic forces on missiles and other vehicles. In both water and wind tunnels, he is measuring and analyzing pollution particle dispersion—the project that led to the grant that funded the tunnel—as well as studying chaos mixing by analyzing acoustic streaming and chaotic boundary layers in order to apply them in new ways.

Ahmed and his colleagues have also been working on the design of modifications to reduce drag on ground vehicles. Even small reductions in drag on commercial vehicles will mean big dividends in fuel savings



Theresa Campioli, a 2003 aerospace graduate from Falls Church, Va. and master's student at Virginia Tech, floats in microgravity.



In an experiment in the department's new water tunnel, silver coated hollow micro-spheres are introduced behind a model tractor-trailer to illustrate complexity of flow using Particle Image Velocimetry.

reduced emissions. Two methods of reduction have been considered. The first uses tailored surface softness to reduce skin friction drag. The second involves pulling more high-energy air into the areas behind large vehicles (the base) to reduce pressure drag. However, since the flow over a vehicle changes with speed, a big challenge is to devise vehicle modifications that will adapt to varying speeds. In addition, Ahmed is attempting to reduce drag by studying formation flight through conduction of tests in the wind tunnel.

He is also involved in research to reduce dud rate in air-launched munitions, a project focusing on improving efficiency of arming devices on munitions. And in conjunction with the Department of Textile Engineering, he is working on high-pressure jets to reduce effluent discharge from pressure washers. Because it contains dyes and other harmful pollutants, reducing such discharge will help the environment. Finally, working with colleagues in the College of Pharmacy, Ahmed is studying fluid dynamics of drug delivery systems in bronchial cavities.

### Faculty pioneer use of Kalman filters

David Cicci is currently involved in the application of Kalman filters to estimate the state of a tethered satellite. This research, which has been funded by a U.S. Air Force contract, is thought to be the first occurrence of Kalman filters being used to determine whether a satellite is tethered. The filters are also used to estimate the orbit of center of mass of the tethered system and the locations of the satellites with respect to the center of mass. Cicci has also recently conducted a multi-body separation analysis for staged missiles and a control system analysis for pintle motors used in missiles for the Aviation and Missile Research, Development, and Engineering Center (AMRDEC) at Redstone Arsenal.

### Launch and crash research assists military

Butch Foster has just finished two research projects for the U.S. Army. In Huntsville, he was studying the impact and penetration of penetrator rods into armored vehicles. By studying the amount of energy the penetrator rods need in order to make certain impacts and penetrations, then analyzing the results, Foster was able to contribute to the Army's efforts in developing a High Velocity Impact, Anti-Tank Missile System.

Also for the Army he was performing crash-worthy studies of the medical equipment system on board medical evacuation helicopters. The aim was to detect and analyze structural failures in the medical equipment system in order to set standards to qualify the use of such equipment. Although the most recent stage of the project has been completed, Foster looks forward to continuing the project.

Lastly, he is working on a project for NASA that involves colleagues from Auburn University, Penn State, Tuskegee University, and the University of Alabama in Huntsville on a propulsion system for the New Generation Launch Vehicle. The team is working on making predictions for the life cycle of a combustion chamber. Foster anticipates that the project will continue for another two to three years.

# Alumni notes

## Morgan retires from Aviation and Missile Command

Last summer, Donald Morgan '70 retired as chief of the Aviation Certification and Interoperability Office of the U.S. Army Aviation and Missile Command. He began his 33-year federal government career in aviation working for the U.S. Navy in the Naval Air Rework Facility. Success there led to his move to the Army Aviation Development Test Activity at Ft. Rucker in 1976 where he focused on developing and flight testing Aircraft Survivability Equipment (ASE) such as RADAR warning receivers, IR and RADAR jammers, and laser detectors. He also served as the project test engineer for the first UH-60 Blackhawk Northern CONUS test in Ft. Drum and later as project officer for the CH-47 C Cold Chamber test at Eglin Air Force Base. He was promoted and assigned the duties of test program manager for all ASE testing in support of PM ASE, AVSCOM in St. Louis and was recognized for his organizational skills in the management of more than 20 tests per year, becoming the first to integrate an ASE suite on the AH-1 Cobra aircraft.

The national call for a "Star Wars" defense program brought Morgan back to Huntsville in 1984, where he joined the Airborne Optical Adjunct Project Office, Space and Strategic Defense Command managing aviation aspects of modifying a Boeing 767 aircraft. Later assigned as the Optical Discrimination Algorithm (ODA) program manager in the Discrimination Division, Sensors Directorate, he founded the ODA Center and his team was the first to develop and baseline optical discrimination algorithms for use in missile defense. Subsequent to this tour, Morgan initiated the Blue October program for the Sensors Directorate that resulted in DA support and led to Air Force funding of the Joint Modeling and Simulation System (JMASS). The Blue October team designed and developed the first EO/IR environment player for JMASS and built an end-to-end missile engagement simulation.

After 15 years in research and development, Morgan rejoined the aviation community in 1999 as digitization manager, Project Management Office, Aviation Electronics Combat, leading a team of senior engineers and analysts in the development of aviation's first C4I Definition Documentation, Information Assurance and Interoperability Certification, which resulted in a successful Division Capstone Exercise in April 2001.

Morgan is the recipient of the Civilian Meritorious Performance of Duty, Commander's Award with two Oak Leaf Clusters, two Quality Step Increase Awards and numerous outstanding performance awards.

—Information contributed by the staff of Donald Morgan

## Alumni share career experience with freshmen

Over the past several years, Auburn alumni who have worked in the aerospace industry or for the government have spoken to engineering freshmen as part of a course intended to better inform them regarding the different disciplines. Past speakers include:

Axel Roth, *associate director*, George C. Marshall Space Flight Center

Rex Powell, *director (retired)*, Guidance and Sensors Directorate, Army Aviation and Missile Research Development and Engineering Center (AMRDEC)

George Landingham, *associate director*, Simulation Directorate, AMRDEC

Jeff Hester, *engineer*, Simulation Directorate, AMRDEC

Tom Richardson, *technical director*, Missile and Space Intelligence Center (MSIC)

Mike Kelly, *chief*, Medium Range SAM Division, MSIC

Norm Speakman, *engineering manager*, AMTEC Corporation

Darrell Thaxton, *deputy department manager*, Missile Systems, Dynetics, Inc.

Additionally, last fall Charles Fuller and Richard Kretzschmar described their experiences as aerospace engineers and, in Fuller's case, spin-offs from his aerospace career.

Fuller BAE '65, MSAE '66 was one of three organizers of REMTECH, Inc., a Huntsville engineering company that performed extensive work for NASA in high-speed aerodynamics in the '60s and '70s. Currently, his company supplies information technology to industrial clients including U.S. Steel in Birmingham.

Richard Kretzschmar BAE '90, MSAE '97 is a supervisory aerospace engineer for the U.S. Army Aviation and Missile Research Development and Engineering Center in Huntsville. He has more than 13 years of aerospace engineering experience encompassing a variety of missile and unmanned aerial vehicle systems, including configuration design, analytical evaluation, aerodynamic prediction program development, wind tunnel testing, and flight testing. In addition to managing a functional group with a charter to perform aerodynamic analysis, wind tunnel testing and flight test support for Army missile and fixed wing UAV platforms, he manages a \$90 million hypersonic engine development program. Kretzschmar was selected into the Sloan Fellows Program at the Massachusetts Institute of Technology in 2000. While participating in this program, he earned a MBA and conducted research on the commercialization strategies of firms in the personal digital assistant industry.

### Three aerospace graduates recognized for excellence

The Department of Aerospace Engineering is proud to announce Auburn University's first recipient of a Marshall Fellowship. Sarah Blackmar, a 2003 aerospace graduate, was awarded the fellowship by Imperial College in London where she is studying hypersonics. England established the fellowship after World War II to honor the Marshall Plan intended to provide Americans the opportunity to study in England. Only 30 such fellowships are awarded each year.

Theresa Campioli, also a 2003 aerospace graduate, is pursuing her master's degree at Virginia Tech. She is studying propulsion and received honorable mention from the National Science Foundation (NSF). She is the second Auburn aerospace graduate in three years to be recognized by the foundation. In 2002, Joan Tisdale received a NSF fellowship and went on to study renewable energy at MIT.

## Aerospace engineering **awards**

2003 Outstanding Alumnus – George Landingham

2003 Outstanding Faculty Award – Ronald Barrett

2003 Outstanding Aerospace Student – Sarah Blackmar

Fred H. Pumphrey Teaching Award – Ronald Barrett

2003 Fred H. Pumphrey Outstanding Pre-Engineering Student –  
Daniel Dunn, John Worley, Heather Hill, Lauren Mitchell

2003 Pitts Award – Sarah Blackmar  
Jonathan Newby

2003 Djordjevic Award – Kent Lucas

2003 Undergraduate Research Fellowships – Lori Prothero  
Andrew Stark

# Graduation announcements

The Department of Aerospace Engineering would like to congratulate all of its graduates. We are sure that your degree and experiences here will serve you well in your future accomplishments. We hope we have enriched your life as much as you have enriched ours, and that you are as proud of yourselves as we are of you. Be sure to keep in touch, we like to hear from our alumni regardless of whether they pursue a career in aerospace engineering. On behalf of all of us in aerospace engineering, congratulations!

## Bachelor of Aerospace Engineering summer 2002

Michael Troy Jennings  
Chad Edward Patterson  
David Ray Sunderman

## Master of Aerospace Engineering summer 2002

Russell Edgar Huffman III (BAE '99, Auburn University)

## Doctorate in Aerospace Engineering summer 2002

Jung Hyun Jo, "Error Assessment of an Autonomous Real-Time Precision Orbit Determination Program of a Low-Earth-Orbit Satellite using GPS Observation Data" (dissertation directed by John Cochran)

## Bachelor of Aerospace Engineering fall 2002

Christopher Matthew Conlin  
Daniel Patrick Gray  
Donald David Mackay Jr.  
Troy Cade Moseley  
Chris Alan Whitestone

## Master of Aerospace Engineering fall 2002

Maurice W. Tucker (BS '92, University of Alabama in Huntsville)

## Master of Science fall 2002

Kenneth R. Fidler (BAE '98, University of Central Florida)  
"Grid Fin Flight Surface Used for Pitch Control and Yaw Stability on a Fix-Winged Unmanned Aerial Vehicle During VTOL and Forward Flight" (thesis directed by Ronald Barrett)

## Bachelor of Aerospace Engineering spring 2003

Sarah Catherine Blackmar (Summa Cum Laude)  
Brian Robin Boudreau  
Theresa Lynn Campioli (Summa Cum Laude)  
Curtis M. Carpenter  
Ryan Elliot Carter (Magna Cum Laude)  
Duriel Ramon Holley  
Kenton Daniel Lucas  
Jason Richard Meikus  
Angela Nicole Morris  
Jonathan Whitely Newby (Summa Cum Laude)  
John Paul Roy  
Robert Grant Shaw Jr.  
Justin Harris Terry  
Julide Julie Topsakal (Magna Cum Laude)  
Daniel Lee Wallace  
John W. Woods

## Master of Aerospace Engineering spring 2003

Yukihiro Morita (BS '92 Tohoku University, MS '97, San Diego State University)

## Master of Science in Aerospace Engineering spring 2003

Zafar Abbas Bangash (BAE '95, College of Aeronautical Engineering)  
"Measurements in the Flow Field of Single and Coaxial Axisymmetric Synthetic Jets" (thesis directed by Anwar Ahmed)

## Doctorate in Aerospace Engineering summer 2003

Nammi Jo Choe, "Detection and Orbit Determination of Tethered Satellite Systems" (dissertation directed by John Cochran)

THE AE NEWSLETTER IS PUBLISHED ONCE YEARLY BY THE DEPARTMENT OF AEROSPACE ENGINEERING. ADDRESS CHANGES, NEWS ITEMS, AND SUGGESTIONS SHOULD BE SENT TO: 211 AEROSPACE ENGINEERING BUILDING, AUBURN UNIVERSITY, AL, 36849-5338.

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