The Department is pleased to announce a new Chair, Pro. Daniel J. Inman (left) Prof. Inman joins UM from Virginia Tech where he is currently the Director of the Center for Intelligent Material Systems and Structures, the Director of the Center for Energy Harvesting Materials and Structures, and the G.R. Goodson Professor in the Department of Mechanical Engineering. Pending approval by the University’s Board of Regent’s, Professor Inman will begin his term August 15, 2011.

Pro. Wei Shyy relinquished his responsibilities as Chair of the Aerospace Engineering Department effective August 1, 2010, after serving since January 2005. He has joined The Hong Kong University of Science and Technology, where he is serving as Provost. Pro. Kenneth G. Powell served as Interim Chair during the department’s search. “The Aerospace Department is in a very strong position, thanks in no small part to Professor Wei Shyy’s tremendous leadership. We have added a number of very talented and energetic new faculty members, and have fostered a marked increase in collaborative teaching and research in the Department. It is an honor to be asked to serve as Interim Chair, and we look forward to Dan joining us as Chair.” (Continued on page 2)

CubeSat takes Flight!

“I’ll never forget the first time we saw the rocket. It was like a scene from a movie. I remember thinking to myself, ‘This is it. This is the real deal.’”

—Matt Bennett, RAX Project Manager

For almost two years, the motto of the Radio Aurora Explorer (RAX) CubeSat team has been “Alaska or Bust.” This past October, Pro. James Cutler, RAX Project Manager Matt Bennett (recent ME-Space Systems graduate 2010) and RAX team member Ben Kempke (CSE PhD Student) boarded a flight to fulfill that motto by loading RAX onto a Minotaur IV rocket as part of the STP-S26 launch out of Kodiak, Alaska. UM students, in partnership with SRI International, built RAX for the National Science Foundation.

On November 19th, 2010, the rocket carrying RAX with six other satellites and sixteen experiments took off with a roar. Back in Ann Arbor, the RAX team gathered in the project’s lab in FXB to watch the launch. “It was weird watching something you can’t control at all do something amazing which you’ve been a part of,” said team member Sara Spangelo (Aero PhD Candidate). The rocket launch was visually dramatic, but the most meaningful event was the receipt of a confirmed beacon from RAX heard by an amateur radio operator in Honolulu, HI. This was the first indication to the team that RAX had survived the ride to orbit and was operating nominally.

RAX and its team became local celebrities, with television coverage by Fox 2 Detroit, the Big Ten Network, as well as radio interviews and newspaper articles. In the midst of this media frenzy and rocket launch afterglow, the team got straight to work listening for beacons as RAX made its passes over Ann Arbor. Just days later, the RAX team successfully sent commands and began controlling spacecraft functions.

The following week was spent piecing together telemetry data obtained by the
New Department Chair Continued  

Daniel J. Inman received his Ph.D. from Michigan State University in Mechanical Engineering in 1980 and is the Director of the Center for Intelligent Material Systems and Structures, the Director of the Center for Energy Harvesting Materials and Structures, and the G.R. Goodson Professor in the Department of Mechanical Engineering at Virginia Tech. He also serves as the Brunel Professor of Smart Technologies at the University of Bristol in the UK. Since 1980, he has published six books (on vibration, control, statics, and dynamics), eight software manuals, 20 book chapters, 254 journal papers and 511 proceedings papers, given 48 keynote or plenary lectures, graduated 54 Ph.D. students and supervised more than 75 MS degrees. He is a Fellow of the American Academy of Mechanics (AAM), the American Society of Mechanical Engineers (ASME), the International Institute of Acoustics and Vibration (IIAV), and the American Institute of Aeronautics and Astronautics (AIAA). He is currently Technical Editor of the Journal of Intelligent Material Systems and Structures (1999-) and Technical Editor of the Journal of Shock and Vibration (1999-). He won the ASME Adaptive Structures Award in April 2000, the ASME/IIAV SDM Best Paper Award in April 2001, the SPIE Smart Structures and Materials Life Time Achievement Award in March of 2003, the ASME/Boeing Best Paper Award by the ASME Aerospace Structures and Materials Technical Committee 2007, the ASME Den Hartog Award in 2007 and the Life Time Achievement award in Structural Health Monitoring in 2009. He is currently a Member-at-Large on the Society of Experimental Mechanics Executive Board (2008-2010) and a former Chair of the ASME Applied Mechanics Division.

CubeSat Continued  

team in Ann Arbor and amateur radio colleagues all over the world. The team was able to determine how fast RAX was tumbling in its orbit, a consequence of being ejected from the rocket. They observed that the onboard stabilization system was gradually aligning RAX to the earth’s magnetic field as it was intended—exactly in the way the magnet in a handheld compass needle points north. This alignment was chosen to enable more effective communications with the ground station network and enhance the accuracy of the science data.

Not everything went according to mission plan, however. The team discovered early on that several of RAX’s solar cells shorted out, limiting energy production on two of the satellite’s four solar panels. This required the team to place RAX in a low power mode to prevent the battery from being drained while it began to spend more time behind Earth’s shadow. Thankfully, the team designed RAX’s vital systems to survive low power generation conditions. According to team member John Springmann (Aero PhD Candidate), “The entire checkout process, where we iteratively test each subsystem of the satellite, is a bit nerve-wracking since you never know what issues may come up. Nevertheless, the RAX team is very talented and equipped to take on potential challenges.”

When asked what was the most inspiring thing while working on RAX, the team responded it was their colleagues who made it an invaluable experience. “I don’t think the activity or the result has inspired me nearly as much as the people,” remembers Matt Bennett, “I don’t know how we could have done this with any other team. The dedication by this team, Professor Cutler, and support staff was unmatched. The whole RAX experience was just incredible.”

RAX-1 successfully carried out its first radar test in December, detecting the ground radar signals and even radar scatter off meteors entering the atmosphere. This test proved RAX-1 was ready to perform its space weather science mission. However, while all other subsystems performed well, the solar panel anomaly eventually prevented RAX-1 from generating sufficient power to complete its one-year mission. Despite an early end, RAX-1 made great strides in small satellite design, and demonstrated bistatic radar measurements could be performed on a CubeSat.

Cheers and high-fives surrounded the moment, capped by the official call from the U.S. Air Force giving Prof. Cutler command authority. 

The team is busy applying the lessons learned from RAX-1 to the design of a second flight unit, RAX-2, which has an upcoming launch through the NASA Educational Launch of Nanosatellites (ELaNa) program scheduled for October 2011. Keep updated at:

http://rax.engin.umich.edu/

The Radio Aurora Explorer CubeSat  
Photo Credit: Tanner Beck
Professor Ilya Kolmanovsky’s research interests include applications of control, estimation and diagnostics to aerospace and automotive systems, and to propulsion systems and optimal energy management, in particular. He has also been conducting research on control theory and algorithms for enforcing pointwise-in-time state and control constraints (such as imposed by actuator magnitude/rate limits and safety limits), and for control/estimation based on nonlinear, stochastic and distributed parameter system models.

Prof. Kolmanovsky is a former graduate of the department of aerospace engineering. He re-joined the department in January of 2010 as a professor, after spending close to 15 years in industry. Recent research of Professor Kolmanovsky, his graduate students and collaborators has been focused on constrained control as it relates to mitigation of Pilot Induced Oscillation (PIO); spacecraft rendezvous and docking; constrained aerospace and automotive engine control; stochastic energy management problems for aerospace and automotive applications, and other topics.

PIO refers to an inadvertent, sustained aircraft oscillation that is the consequence of an abnormal interaction between the aircraft and the pilot. Despite much research over the years, PIO has remained a significant issue for existing and future aircraft. PIO is both interesting and challenging because it results from feedback coupling between the human pilot, aircraft dynamics, and flight control system, and from nonlinearities and constraints, including actuator magnitude and rate limits. A control algorithm that modifies control allocation to mitigate the PIO has been developed capable of handling PIO even for open-loop unstable, cross-coupled aircraft configurations with multiple inputs. This algorithm is being pilot-tested in 6-DOF vertical motion simulation at NASA Ames Research Center.

The control of spacecraft rendezvous, docking and proximity operations involves handling multiple constraints on thrust magnitude and direction, approach velocity, Line-of-Sight cone positioning and debris avoidance. The approach to handling these constraints is based on the receding horizon on-line optimization of thrust trajectory subject to the imposed constraints. This provides a closed-loop guidance algorithm that is robust to disturbances and uncertainties such as thrust errors. It has been shown that with a dynamic (on-the-fly) reconfiguration of the constraints, a variety of the rendezvous maneuvers can be performed using a conventional quadratic programming solver to perform the receding horizon optimization. This approach has been further extended during recent summer visit by Professor Kolmanovsky and one of his students to Space Vehicle Directorate of Air Force Research Laboratory.

For an aircraft turbo-fan engine, a significant part of control system functionality protects the engine from extreme operating conditions and states that can result in stall/surge, combustion instability, turbine blade melt-down, component burst/rupture, etc. The constraints are imposed conservatively, to account for the worst-case variability present in the system. This can compromise engine transient response during aggressive maneuvering e.g., during runway incursion by another aircraft or in case aircraft yaw needs to be controlled using differential engine thrust as the rudder has failed during landing. Constrained control techniques are being employed to enable less conservative and still safe
**Doman Helicopters Flight and Development: 1947-1961**

**Glidden Doman (BSEA 1942)** along with his son, **Steve Doman (BSEA 1966)**, visited Michigan’s Aerospace Department to present “Doman Helicopters Flight & Development, 1947-1961” on October 12, 2010.

Glidden Doman spent WW2 at Sikorsky Aircraft doing intensive flight testing and experimentation to improve their helicopters’ blade life. In 1945 he left Sikorsky and founded his own firm to pursue further improvements in helicopter technology. He was also a founding member of the American Helicopter Society. He and his new company first designed a rotor system that mounted on a Sikorsky R-6. Following those successful flight tests, they designed and built a whole helicopter, the LZ-4/CW-40, and subsequently the LZ-5/YH-31. **Glid Doman is pictured above with the Doman LZ-5 helicopter in 1953.**

Numerous patents were obtained for this unique rotor system. Three LZ-5s were built, extensively flight tested, and FAA certificated; they toured the U.S., Canada, Europe, and one performed at the 1960 Paris Air Show. Unfortunately the company was not able to raise enough capital to put the helicopters into production. Doman Helicopters went out of business in 1969 and he subsequently moved to apply his in depth knowledge of helicopter rotor system dynamics to wind turbines, working for United Technologies, and later Alenia in Italy. He has numerous patents in wind turbine technology.

Glid Doman is currently CEO of Gamma Ventures, a wind turbine technology company. Steve Doman is retired from Boeing after 42 years, starting as a design engineer on the 737 airliner and working as a software developer.

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**Alumnus Honored with 2010 Merit Award**

**Paul Adams (BSEA 1983)** is Senior Vice President, Engineering at Pratt & Whitney—a world leader in the design, manufacture, and service of aircraft engines, space propulsion systems, and industrial gas turbines, and a unit of United Technologies Corporation. He assumed his current role in 2006, having joined Pratt & Whitney from Williams International in 1999.

Mr. Adams has more than 25 years of leadership experience in management and engineering, with extensive global experience in the aircraft engine industry. In his current position, he has overall responsibility for Pratt & Whitney’s engineering, technology, and technical strategy. The results of his efforts and leadership contribute significantly to the year-over-year productivity improvements enjoyed by the company. Previously, he was Vice President of Engineering Module Centers. At Williams International, he held a variety of engineering and program management positions with increasing responsibilities. He is a board director for Infotech Enterprises Limited, an engineering services company based in Hyderabad, India, and for IAS engineering services, a joint venture of Infotech and Pratt & Whitney based in Puerto Rico.
Steve Chappell (BSEAE 1991)
Selected for NASA Mission

Aero alumnus Steve Chappell was selected for NASA Extreme Environment Mission Operations (NEEMO) 14. The NEEMO project involves undersea habitation and research by small groups of astronauts, engineers, doctors, and professional divers. The undersea laboratory utilized as the NEEMO mission habitat, Aquarius, located 3.5 miles off the coast of Key Largo, Florida, was home for Steve and his co-inhabitants for two weeks in May, 2010. The team performed experiments both inside and outside the habitat related to NASA’s mission to expand human presence in the solar system; working in the undersea environment parallels many of the same challenges humans face in the exploration of space. For NEEMO 14, the dives outside the habitat focused on performing exploration tasks, such as working with landers, rovers, and performing other tasks in simulated space suits with different weights and centers of gravity.

Steve currently works for Wyle Integrated Science & Engineering at NASA Johnson Space Center. He is helping to define and execute the research needed to optimize human performance in the next-generation spacesuits and extravehicular activities (EVA) systems. You can read his expanded biography and mission details at the NASA website: http://www.nasa.gov/mission_pages/NEEMO/NEEMO14/index.html

Pictured above is Chapell outside the Aquarius (top) and working small crane operations (bottom).

Earl F. Weener (BSEAS 1971, MSE 1972, PhD Aero 1975)

Appointed as Member, National Transportation Safety Board

Dr. Earl F. Weener took the oath of office as a Member of the National Transportation Safety Board on June 30, 2010. Dr. Weener is a licensed pilot who has dedicated his entire career to the field of aviation safety. He most recently has been a consultant and fellow for the Flight Safety Foundation (FSF), where he worked to reduce accidents through coordinated industry programs in Alexandria Virginia. The FSF was founded in 1947, and is an international non-profit organization focused on safety for all segments of the aviation industry. Previously, Dr. Weener was co-leader of the international FSF Runway Safety Initiative which has recently produced the FSF safety toolkit entitled, “Reducing the Risks of Runway Excursion.” He was co-leader of the FSF Ground Accident Prevention Program and was the initiator and initial leader of the FSF Controlled Flight Into Terrain (CFIT) and Approach and Landing Accident Reduction (ALAR) Task Forces. Dr. Weener retired from The Boeing Company in 1999 where he held positions that included: Chief Engineer-Airworthiness, Reliability and Maintainability, and Safety; Chief Engineer–Systems Engineering; and Chief Engineer–Safety Technology Development. Dr. Weener received the 1994 Aviation Week and Space Technology Laurels Award in Operations for his leadership in CFIT prevention. He is also the recipient of the 2005 Honeywell-Bendix Trophy for Aviation Safety. Dr. Weener is an active pilot with a Commercial License and Instrument and Flight and Ground Instructor ratings.
Harris McClamroch Retires from Aerospace Engineering

**N. Harris McClamroch**, professor of Aerospace Engineering, retired on May 31, 2010, after a long-standing career in Michigan’s Aerospace Engineering Department, where he served as faculty member for 43 years (1967-2010). Harris also held joint appointments in the Program in Computer, Information and Control Engineering, as well as in Electrical Engineering and Computer Science. He was a leader in service to the University and in his discipline, having served as department chair and graduate program advisor, as a member of the College of Engineering’s Executive Committee, Chair of the Senate Advisory Committee on University Affairs, and Faculty Ombuds. He has published more than 250 articles and mentored 27 doctoral students. He served as editor of *IEEE Transactions on Automatic Control*, and held several offices, including President of the Control Systems Society. He was recognized as Fellow of IEEE in 1988, and was awarded the IEEE Third Millennium Medal in 2000.

A symposium, “*Synergies and Interplay of Nonlinear Dynamics and Control,*” was held in Ann Arbor on May 22, 2010, honoring his contributions and service. Harris is pictured above (center) with two of his former students Taeyoung Lee (left) and Ilya Kolmanovsky (right). His teaching spanned a diverse set of topics related to dynamics and control, including: aircraft flight dynamics and control, spacecraft attitude dynamics and control, robotics, manufacturing, wheeled vehicles, and civil structures. He crafted the uses and development of tools from nonlinear dynamics and control, geometric mechanics, optimization, estimation, and mathematical systems theory, and is internationally recognized as a leader in dynamics and control.

Elaine S. Oran
Doctor of Science, honoris causa, University of Leeds and American Institute of Aeronautics and Astronautics (AIAA) Honorary Fellow

The University of Leeds, United Kingdom, conferred Elaine Oran with an honorary Doctor of Science degree on July 15, 2010. In his address to the Chancellor, Leed’s Professor of Mechanical Engineering, Derek Bradley, stated, “*Professor Elaine Oran is a prominent scientist of international renown who has provided inspirational leadership in the field of reacting flows.*” Elaine is currently an Adjunct Professor of Aerospace Engineering here at Michigan and Senior Scientist for Reactive Flow Physics at the Naval Research Laboratory (NRL) in Washington, DC. Her contributions cover computational techniques for the solutions of the complex interactions in gas flows undergoing chemical or nuclear reaction. Her team has created many individual algorithms and the modern computer methodology for the accurate numerical simulation of such flows. Applications include combustion, rocket and jet propulsion, re-entry and microdynamic flows, the complex transition from turbulent combustion to damaging detonations, thermonuclear supernovae, ionospheric chemistry and physics, materials engineering, lower-atmospheric physics, astrophysical phenomena, and biophysical fluid dynamics.

Elaine was also elected as Honorary Fellow of the American Institute of Aeronautics and Astronautics. Honorary Fellow is the highest distinction offered by AIAA and no more than four are chosen each year. Dr. Oran is only the fourth woman to receive that honor since the first Honorary Fellow, Orville Wright, was named in 1933 by one of AIAA’s predecessor organizations.
Bram van Leer: AIAA Fluid Dynamics Award

The 2010 AIAA Fluid Dynamics Award was given to Bram van Leer. The award citation reads: "For seminal groundbreaking work in computational fluid dynamics, especially in the development of shock capturing methods, and outstanding contributions in aerospace education." He was honored at a luncheon during the 40th AIAA Fluid Dynamics conference in June 2010, where he delivered his lecture, "History of CFD: Part II". In it he reviewed the period from 1970-1985, in which high-resolution methods for CFD were developed and found their way into aerospace engineering, a period when he was especially active and influential. Bram is recognized for his groundbreaking work in computational fluid dynamics, especially in the development of shock-capturing methods, and outstanding contributions in aerospace education, and is known worldwide for the development of high-accuracy, non-oscillatory computational methods for compressible flow, used in a wide range of disciplines. He has been a professor at UM since 1986, where he is currently the Arthur B. Modine Professor of Aerospace Engineering.

2011 AIAA Fellows Elected

Professors Iain Boyd and Tony Waas have been elected as Fellows of the AIAA in 2011. It is a great recognition of their scholarship, mentorship, and leadership. Professor Boyd's (top right) citation is for outstanding contributions to development of physical models and numerical techniques for predicting nonequilibrium gas and plasma flows including application and verification for aerospace systems. He is the James E. Knott Professor of Aerospace Engineering and directs the Nonequilibrium Gas and Plasma Dynamics Laboratory (NGPDL). His research interests include: hypersonic aerothermodynamics, electric propulsion, rocket plumes, computation of nonequilibrium gas, and plasma dynamics. Professor Waas' (bottom right) citation is for major contributions to aerospace composite structures analysis and design for both new scientific insight and improved industrial practices. He is the Felix Pawlowski Collegiate Professor of Aerospace Engineering and directs the Composite Structures Laboratory. His research interests are in mechanics of lightweight aerostructures and materials, structural stability, nanocomposites, and biologically inspired materials.

Iain Boyd Selected for U.S. Air Force Scientific Advisory Board

Iain Boyd has also been selected to serve on the Air Force Scientific Advisory Board (SAB) for a four-year term, October 2010-14. The SAB is a Federal Advisory Committee organized under the Federal Advisory Committee Act. The SAB provides a link between the Air Force and the nation's scientific community. The SAB promotes the exchange of the latest scientific and technical information that may enhance the accomplishment of the Air Force mission. In addition, it may consider management challenges that affect Air Force use of scientific knowledge and technological advances. The Board's function is solely advisory and provides findings and recommendations to the Air Force senior leadership, namely the Secretary of the Air Force or the Chief of Staff of the Air Force.

U.S. Air Force Office of Scientific Research (AFOSR) Young Investigator Research Awardees

The AFOSR awarded Chris Fidkowski (top right) a 2011 Young Investigator Research Program award for unsteady output-based adaptive simulation of separated and transitional flows. The scope of his research interests also includes development of robust solution techniques for computational fluid dynamics, error estimation, computational geometry management, parallel computation, large-scale model reduction, and design under uncertainty. The AFOSR also awarded Matthias Ihme (bottom right) a 2011 Young Investigator Research Program award for detailed characterization of nonideal effects on shock tube ignition dynamics using large-eddy simulation.
Ella Atkins was selected to participate in the 16th National Academy of Engineering’s (NAE) U.S. Frontiers of Engineering Symposium (September 2010, NY). Her article, “Certifiable Autonomous Flight Management for Unmanned Aircraft Systems,” was published in the NAE’s annual journal, The Bridge (Dec. 2010). She has authored over 60 archival and conference publications, serves as associate editor for the AIAA Journal of Aerospace Computing, Information, and Communication (JACIC), as well as the AIAA’s technical program chair for the Infotech@Aerospace conference, and chair-elect of the Intelligent Systems Technical Committee. She is an Associate Fellow of AIAA, a member of AAII and IEEE, and a private pilot (ASEL).

John Shaw received the UM College of Engineering’s Monroe-Brown Foundation Education Excellence Award, recognizing his excellence in curricular development, instruction, and guidance. John teaches “Introduction to Solids Mechanics/Aero Structures” (AE 215) and “Aircraft & Spacecraft Structures” (AE 315). He has also developed two graduate courses, “Foundation of Solid and Structural Mechanics” (AE 513) and “Interactive Solids and Structures” (AE 714). He has been faculty advisor for numerous undergraduate research projects, has served on the undergraduate committee, and serves as Aero’s ABET coordinator. John was promoted to full professor by the Board of Regents in May 2011.

Veera Sundararaghavan

Veera received a 2010 National Science Foundation Faculty Early Career Development Award for his proposal, “Computational Approaches for Multi-scale Design of Magnetostrictive Alloy.” His research aims to develop multiscale computational methodologies to optimize microstructures of the magnetostrictive galfenol, during the thermo-mechanical processing, including validation of the macro-meso model for predicting microstructure formation, finite element homogenization technique for prediction of microstructural response under coupled magnetic and stress fields. This NSF award will provide support for ground breaking research in this topical area.

Barnaby S. Wainfan
Joins Aerospace Engineering as Adjunct Professor

Barnaby S. Wainfan is Technical Fellow for Aerodynamics Design and Analysis at Northrop Grumman’s Aerospace Systems Western Region and has been appointed as an adjunct professor in the Department of Aerospace Engineering. He is currently involved in helping teach Aircraft Design in the department.

Barnaby earned his M.S. in Aerospace Engineering from U-M in 1978 and a B.S. in from Cornell (1977). He has extensive experience in vehicle design and configuration integration, with a background in the aerodynamics of airplanes, missiles, ground vehicles, and watercraft, as well as expertise in innovative wing design, transonic aerodynamics, high-lift systems, and general aviation. He has been involved in all phases of project management from conception through flight-testing, and consulting for various vehicle projects. Most recently, as Chief of Aerodynamics for Edison2, he was responsible for the aerodynamic design of the Edison2 Very Light Car, which won the Progressive Insurance Automotive X Prize.

Dr. Donald C. Winter
Appointed Professor of Engineering Practice

The Departments of Aerospace Engineering and Naval Architecture and Marine Engineering are pleased to announce Dr. Donald C. Winter, former Secretary of the Navy, has been appointed as the College of Engineering’s first Professor of Engineering Practice.

During his tenure as 74th Secretary of the Navy (2006-09) he focused on the country’s war effort in Iraq and Afghanistan while planning and building the Navy’s future fleet. He carried out far-reaching acquisition reforms, with an emphasis on rebuilding an acquisition corps of professionals and a systems engineering approach to acquisitions.

Dr. Winter will participate in classroom instruction as a guest lecturer in existing courses and as the instructor of newly developed specialized short-course in systems engineering. He will also give a series of lectures on risk management and decision-making during the development process of complex systems.
**Student Activities in Aerospace Engineering**

2010 Summer Internships

**Evelyn Hull** worked at NASA’s Jet Propulsion Lab developing a software interface to aid in scheduling space missions. She wrote Python scripts that took information from mission flow charts created in MagicDraw, an easy to use graphical program, and produced files that could be used by a JPL developed scheduling program to create an efficient schedule that was free of conflicts. This was tested using MagicDraw flow charts for the commissioning phase of the Soil Moisture Active Passive (SMAP) mission. *Evelyn Hull (Far Right) is pictured above with other JPL summer interns.*

**Dan Kiefer** spent his summer internship working for Sikorsky Aircraft Corporation (a division of United Technologies Corp.) in Stratford, CT. He worked as a systems engineering intern on the S-70i International Black Hawk helicopter program. Dan wrote/allocated requirements at both the aircraft level and system design level. He coordinated system-level meetings and prepared presentation materials specifically for aircraft system verification/validation. Dan also competed in a cross-functional intern design competition.

**Steve Mazur** had the opportunity to work for Pratt & Whitney in the Systems Engineering and Validation Department as a test engineer on the F-135 engine that powers the F-35 Joint Strike fighter. The job dealt with both the engine build phase in Middletown CT, and the engine test phase in West Palm Beach, FL. During the engine build phase, Steve was part of a team responsible for correct instrumentation and hardware installed to fulfill various testing requirements. In West Palm Beach, the team was responsible for monitoring performance parameters during test as well as ensuring data fidelity. The F-135 produces 43,000 lbs. max thrust and is capable of being coupled with a lift fan to power the Short Take Off and Vertical Landing (STOVL) version of the JSF aircraft. *Steve is pictured at right with other Pratt & Whitney interns in front of a PW 4000 engine.*

**Brian Min** spent his summer as an engineering intern at Williams International—a leading company in small gas turbine engines. Brian was assigned to the manufacturing engineering department at Walled Lake, Michigan facility. After receiving a series of training on computer programs such as CimX and ProE for process planning and CAD design, he was able to participate in releasing drawings and process planning for newly designed parts. His role was crucial on setting quality standards and organizing manufacturing process based on such settings. This move ensured every parts WI manufactures meet the aerospace level quality standards. In most cases, he worked on new gas turbine engines that go into business jets and cruise missiles. Later on he implemented new tools to efficiently produce prototype parts for new FJ44 series engines. Brian found what he learned at UM aerospace engineering and experienced at UM Baja Racing team invaluable for his success at his WI summer internship.

(Continued on page 11)
engine operation. Constrained control techniques are also being employed for the control of turbocharged automotive engines to improve engine transient response while avoiding compressor surge, maintaining acceptable boost pressure overshoot and fulfilling actuator limits and constraints. The treatment of these multivariable and nonlinear constrained problems requires the development of novel advances in theory. Related research addresses problems of fast engine calibration and of trajectory optimization to determine performance limits of powertrain systems incorporating advanced boosted engines and transmissions.

Stochastic modeling and stochastic constrained optimal control approaches are employed to handle a variety of energy management problems. Glider flight management represents an interesting energy management problem where altitude is gained in the thermals and lost in the still air. Through stochastic modeling and stochastic constrained optimal control, an optimal decision policy for time to spend in a thermal and for speed to fly has been constructed. For ground vehicles, a similar approach is used to adjust vehicle speed and following distance to reduce average fuel consumption over given routes without degrading significantly average travel time.

Professor Kolmanovsky has been enjoying collaborations with Aero professors Dennis Bernstein, Ella Atkins, Carlos Cesnik, Elmer Gilbert, Harris McClamroch, Galip Ulsoy (mechanical engineering), and Jing Sun (Naval), and with co-advised graduate students on topics related to nonlinear adaptive spacecraft control, autonomous spacecraft fault detection, mitigation and handling, load alleviation for very flexible aircraft, modular plug and play control systems, and constrained control theory.
**Student Activities**

**Joseph Starek** received the 2010 Distinguished Undergraduate Achievement Award. This is awarded by the department to an undergraduate aerospace engineering student of exemplary scholastic record and outstanding academic achievement. Joseph has worked for two summers at NASA Ames Research Center, first as a member of the 2009 NASA Ames Academy for Space Exploration and second as an Education Associates Program research intern. He is active in Tau Beta Pi, Sigma Gamma Tau, and Students for the Exploration and Development of Space (SEDS).

**Scott Stapleton**, a 4th year Ph.D. student in Aero, won the 1st Harry H. and Lois G. Hilton Student Paper Award in Structures at the 51st AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference in Orlando, FL, April 12 – 15, 2010. This award was given to the best student paper in the Structures track of the conference, and included a monetary award. Approximately 30 Structures student papers were judged based on the full length conference proceedings manuscript, with six finalists being selected to have their conference presentation judged as well. Mr. Stapleton’s paper, “Modeling Progressive Failure of Bonded Joints Using a Single Joint Finite Element,” co-authored by Prof. Waas, and their NASA collaborator, Dr. Brett Bednarcyk, was selected as the winning paper and was recognized at the conference Awards Luncheon.

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**Aerospace Engineering Graduate Student Advisory Council (GSAC)**

GSAC provides graduate student input to the department on student life and the effect of future policy changes. GSAC’s mission is to improve the aerospace graduate experience from a student perspective. The committee elects a president and representatives for each discipline in the department: Gas Dynamics, Structures, Flight Dynamics and Controls (FDC), and the Master’s program. Members meet the last Tuesday of each month during the academic semester to discuss issues affecting students and synthesize ideas into policy recommendations. Issues that encompass the entire graduate student spectrum have been addressed, from Master’s entry funding and preliminary exams to GSI appointments, PhD candidacy and defense presentations. Representatives interface with the Graduate Committee, and co-sponsor department town hall meetings with the department chair.

_Pictured are GSAC Co-Founders: Amor Menezes, Timothy Deschenes, W. Ethan Eagle, and Eric Gustafson; Kapil Sawlani is not pictured._ [AerospaceGSAC@umich.edu](mailto:AerospaceGSAC@umich.edu)

**Sigma Gamma Tau:**

**The High Flying Honor Society**

*Sigma Gamma Tau* is the National Honor Society for Aerospace Engineering, recognizing achievement and excellence in the Aerospace field by electing annually those students who uphold this high standard for the betterment of their profession. Over the past year, SGT has sponsored professional, scientific, and social activities, particularly focusing on outreach. From Matlab, Linux, and Solidworks tutorials to corporate sessions with GE, Pratt and Whitney, and SpaceX, SGT has provided valuable opportunities for students to market themselves to future employers and reach out to their community and department.

In the past year, the chapter took a tour of NASA Plumbrook in Cleveland, and hosted small rocketry labs to encourage elementary students to become engineers. Balancing academic rigor of the classroom, SGT frequently holds social events including intramural sports, “Killer” with HKN—a student/professor dinner, and aerospace-themed movie showings. Initiation—a colossal, demanding process survivable only by the worthy—occurs once every semester. [www.umsgt.org](http://www.umsgt.org) or [sgt.chairs@umich.edu](mailto:sgt.chairs@umich.edu)
Aerospace Engineering Alumni Society

The Leaders in Aerospace Innovation
And Best at Delivering Today’s Innovations

There is now an alumni group for all of the Aerospace Alumni, whether you work on things that fly, glide, drive or compute, the Aerospace Engineering Alumni Society is here to help you connect with the department and each other.

Please help us in supporting the Department of Aerospace Engineering by joining us on Facebook <http://www.facebook.com/group.php?gid=61550728880> or LinkedIn <http://www.linkedin.com/groups?gid=1573647&trk=hb_side_g>

We are currently looking to learn what you are doing now, mentoring students and Student Design Teams and Projects.

Resources for Alums

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October 28-29, 2011
Visit the College of Engineering website:
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