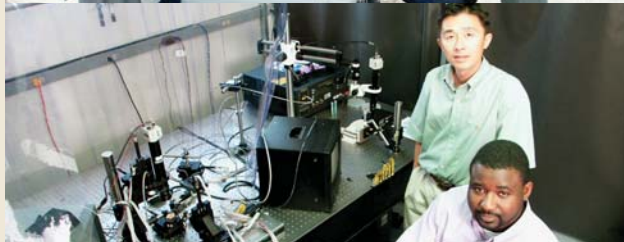




The University of Texas at Arlington
College of Engineering
2005 Annual Report





Dean's Message

Welcome to the **UTA Engineering 2005 Annual Report**. This was another year of growth and progress for the College of Engineering. The College produced 1,003 graduates in 2004-2005 – a five per cent increase over the previous year and the largest

production in our history. This figure reflects the enrollment increases we have experienced in recent years. Fall 2005 enrollment totaled 3,506 – 10% decline from fall 2004. This decline can be attributed to both local and national conditions, but, more specifically, UTA increased its admission standards and raised tuitions. Nevertheless, we remain the third largest engineering college in Texas and the most comprehensive in the Dallas/Fort Worth region. Nationally, we ranked 36th out of 358 institutions offering engineering programs.

Declining enrollments in engineering is a national concern; in the long term, it threatens U.S. leadership in the development of new technologies and innovations. Several years ago, we created our engineering summer camps for 7th, 8th, 9th and 10th graders, designed to attract young people to engineering so that we can keep the student pipeline flowing. In 2005, 153 enthusiastic students attended our camps. In other efforts this year, our CSE and EE departments received grants from the Texas Technology Workforce Development Grant program to fund efforts to attract more high school graduates to engineering and UTA. We hired an undergraduate recruiter to promote engineering and UTA to high school juniors and seniors around the region and state and an additional counselor to help with recruiting and retention efforts. We also increased the number and value of scholarships that we can offer to our most qualified applicants. Additionally, we entered into a partnership with the Society of Hispanic Professional Engineers to host their National Student Programs office. We believe that these and other initiatives will pay off in the years ahead in larger and more diverse undergraduate enrollments.

An important role of the College continues to be supporting economic development through research and technology transfer. External funding for our research activities showed an increase of nearly 50%, reaching \$18.6M. One of our young researchers, Seong Jin Koh, an assistant professor of Materials Science & Engineering, received a \$400,000, five-year Faculty Early Career Development (CAREER) grant from the National Science Foundation. The grant will allow Dr. Koh to develop a new method of nanoscale device fabrication based on controlled positioning of nanoscale objects in parallel processing. Also, our researchers continue to develop patentable intellectual property. Aerospace Engineering Professors Don Wilson and Frank Lu received U.S. Patent 6,857,261 for their design of a Multi-mode, Pulsed Detonation Propulsion System for potential application to hypersonic and aerospace vehicles. Electrical Engineering Associate Professor J. C. Chiao received U.S. Patent 6,850,353 for his MEMS Optical Components. His process features the low-cost manufacturing of multi-wavelength filters through self assembly. A number of additional provisional and full patent applications were also filed during the year. We continued to strengthen our research laboratories, completing a new materials science and engineering research lab, upgrading and enhancing the Aerodynamics Research Center,

adding state-of-the-art equipment in the Nanotechnology Research and Teaching Facility, and constructing a clean room at the Automation and Robotics Research Institute.

Fourteen faculty members were hired during the year. Among the new hires were Associate Dean for Research Dr. Richard E. Billo, who is also a professor of Computer Science and Engineering and Industrial and Manufacturing Systems Engineering, and Dr. Nur Yazdani, Professor and Chair of Civil and Environmental Engineering. Dr. Billo joins UTA from Oregon State University and Dr. Yazdani from Florida State University. Mrs. Ann Davidson joined the College as the Director of Development. She will create and implement strategies for the solicitation and stewardship of leadership gifts and endowment funds benefiting the College.

UTA students continue to perform well in national and international competitions. A team comprised of four UTA Aerospace Engineering students and one faculty advisor took top honors at the 3rd Annual Student Unmanned Aerial Vehicle Competition in Maryland. The team won first place for Best Overall Performance, plus the Best Mission Performance and Best Safety Design awards. The Formula SAE racing team won first place in an international competition in Japan. The three-day competition featured 25 teams from Japanese universities, plus one team each from the United Kingdom, Korea and UTA. The team won first in design, first in autocross, first in endurance and first overall.

We are entering the final year of the College of Engineering 2001-2005 Strategic Plan. I'm pleased to report significant progress toward each of our five goals:

- Prepare high quality, high demand graduates in disciplines addressing workforce needs of industry, government, and academe while preparing students for a life-long career in engineering or computer science.
- Conduct applied and cutting-edge research that is sensitive to the needs of industry and society and that serve as economic engines for the region, state, and nation.
- Engage in beneficial activities and projects at the campus, state, national, and international levels in areas of faculty, student, and staff expertise.
- Be recognized as the premier College of Engineering in the region.
- Increase contributions from alumni, friends, industry, and foundations in support of scholarships, endowments, and a new building.

We can only report on a fraction of our activities in this report, so please visit our website and subscribe to our E-News service to stay abreast of College activities and progress. I believe those among you who are UTA alumni will gain an increased sense of pride in your alma mater from reading this report. Please share this report with a friend.

Bill D. Carroll, Ph.D., P.E.
Dean of Engineering

College of Engineering 2005 Annual Report Statistics

ARRI - Automation & Robotics Research Institute
 BE - Bioengineering
 CEE - Civil & Environmental Engineering
 CSE - Computer Science & Engineering

EE - Electrical Engineering
 IMSE - Industrial & Manufacturing Systems Engineering
 MSE - Materials Science Engineering
 MAE - Mechanical & Aerospace Engineering

FY 2005 Funding*

	University**	External Grants	Contributons	Total
Dean	\$2,335	\$681	\$310	\$3,326
ARRI	1,243	7,270	42	8,555
BE	719	1,266	69	2,054
CEE	1,698	1,197	66	2,961
CSE	4,818	2,952	105	7,875
EE	4,406	2,684	200	7,290
IMSE	1,212	79	43	1,334
MSE	555	1,056	15	1,626
MAE	3,309	1,457	186	4,952
Totals	\$20,294	\$18,643	\$1,036	\$39,972

* In thousands of dollars

** Tuition, fees and state funds

2004-2005 Degrees Conferred

Program	BS	MS/ME	PhD	Total
BE	NA	55	3	58
CEE	25	46	0	71
CSE	112	174	10	296
EE	69	264	11	344
IMSE	12	74	5	91
MSE	NA	16	3	19
MAE	69	52	3	124
College	287	681	35	1,003

Fall Enrollment Trends

Program	2002	2003	2004	2005
BE	84	143	178	137
CEE	349	365	363	430
CSE	1,308	1,166	959	759
EE	1,120	1,237	1,069	879
IMSE	217	246	256	251
MSE	46	71	60	59
MAE	690	805	908	918
Undeclared	136	126	100	73
College	3,950	4,159	3,893	3,506

Fall Trends

	2002	2003	2004	2005
Degrees Granted	592	809	954	1,003
Enrollment	3,949	4,159	3,893	3,605
Faculty	127	128	139	153
Funding*	\$32,563	\$31,384	\$30,925	\$39,972

Fall Faculty

Program	2004	2005
BE	8	9
CEE	14	16
CSE	41	44
EE	35	36
IMSE	9	11
MSE	4	7
MAE	26	30
College	137	153

Information on current College of Engineering activities may be seen on our E-News page:
www.uta.edu/engineering/news

Automation & Robotics Research Institute

www.uta.edu/engineering/arri

Harry Stephanou, PhD

Director

Electrical Engineering

Dereje Agonafer, PhD

Mechanical & Aerospace
Engineering

Jung-Chih Chiao, PhD

Electrical Engineering

Brian Huff, PhD

Industrial & Manufacturing
Systems Engineering

Frank L. Lewis, PhD

Senior Fellow, Moncrief-
O'Donnell Endowed
Chair Electrical Engineering

Don Liles, PhD

Industrial & Manufacturing
Systems Engineering

Dan Popa, PhD

Electrical Engineering

Shashank Priya, PhD

Materials Science &
Engineering

Dmitry Rudkevich, PhD

Chemistry & Biochemistry

Panos Shiakolas, PhD

Mechanical & Aerospace
Engineering

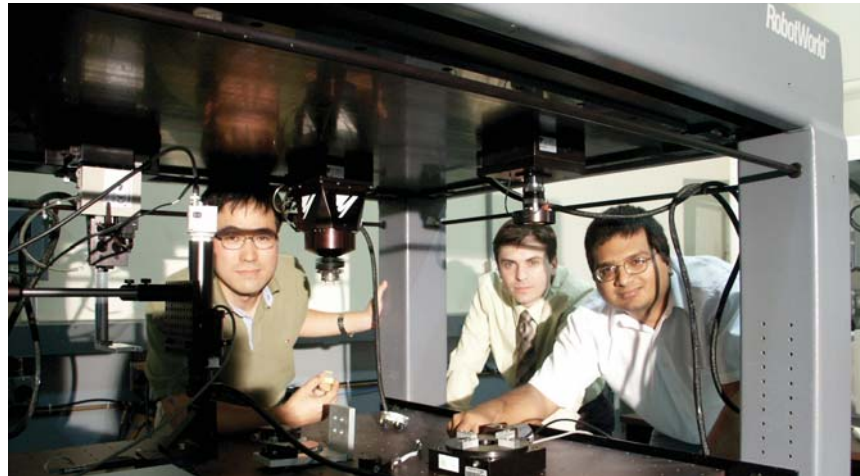
ARRI Research Staff

Heather Beardsley, PhD

Raul Fernandez, PhD

Woo Ho Lee, PhD

Jeongsik Sin, PhD



ARRI researchers Drs. Jeongsik Sin and Dan Popa, assisted by Electrical Engineering graduate student Manoj Mittal, prepare the RobotWorld modular microassembly platform for the automated packaging of Safe&Arm MEMS devices for the U.S. Navy. The research work at ARRI will enable the Navy to replace costly and less reliable manual manufacturing processes with S&A microdevices that will be used in next generation munitions.

Mission

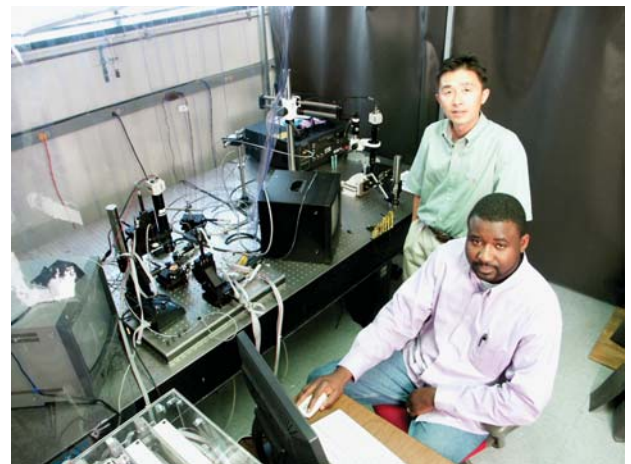
A core mission of ARRI is to stimulate economic growth through industrial innovations. This is accomplished through a combination of the Institute's well-established deployment activities and through a nationally-prominent, globally-competitive research and development program focused on micro/nano manufacturing and smart micromachine technologies.

Vision

The second half of the information revolution will be driven by the application of smart micromachines that can emulate human functions such as perception, cognition, motion and communication. These are integrated systems of micro sensors, processors and actuators that interact with the environment, among themselves, and with humans. Thus, they provide an interface between the information world and the physical world.

Research challenges are abundant, however, with a critical one being the development of manufacturing processes to enable the commercialization of inexpensive, possibly disposable, micromachines. Researchers in the Institute, working with those in other units of the College of Engineering, have already begun this process, creating new applications for existing sophisticated equipment and designing innovative processes.

The Institute will be a world leader in the commercialization of smart micromachines by fostering an entrepreneurial environment amalgamating world-class research, sophisticated branding and market awareness, state-of-the-art facilities and intimate ties to industry. Aggressively employing these tools, the Institute will be a beacon of economic growth for the Dallas-Fort Worth Metroplex, Texas and the nation.



ARRI researcher Dr. Woo Ho Lee and MAE graduate student Abiodun Fasoro investigate the results of laser soldering experiments to attach and seal optical fibers to packaged microelectromechanical systems (MEMS). The results of this research will extend the lifetime of packaged MEMS devices from the current several years to several decades.

Research Platforms

The research program at ARRI is conducted by an interdisciplinary team of students, staff and faculty with a strong combination of analytical, computational and experimental skills. Technology platforms are used to demonstrate and evaluate new capabilities, concepts and applications. These platforms provide: (i) research continuity by capturing and preserving intellectual residuals, (ii) a common market pull for realistically complex applications, and (iii) focal points around which interdisciplinary work can be continuously integrated. Building upon existing world-class research in control systems, microrobotics and MEMS reliability, three platforms are under development:

1. The Microfactory, aimed at the development of novel cost-effective, reliable and high-throughput processes for packaging, assembly and metrology at the meso, micro and nano scales and culminating into a series of highly modular, *factory in a shoebox* demonstrations illustrating the production of integrated microsystems with microfluidic and other devices for defense and medical applications.
2. Smart Micromachines, aimed at the development of microsensors and their low cost deployment into large scale networks for reliable surveillance in harsh, unstructured environments, and culminating into a series of demonstrations applied to scenarios such as power harvesting, urban warfare, health monitoring of aerospace structures and upstream petroleum operations.
3. Robot Society, aimed at the development of novel skin and muscle materials as well as computational intelligence algorithms for humanoid robots that can interact with humans, and culminating into a series of diverse demonstrations applied to defense, entertainment, nursing and automotive assembly.

Commercialization

ARRI maintains a strategic marketing alliance with the Bennington Microtechnology Center, a not-for-profit, Vermont-based company focused on the pilot and low-volume production of microsystems. This unique microsystems alliance provides a bridge between the university laboratory and the factory floor. Also, plans are underway for an ARRI-based Technological Entrepreneurship Center that will encourage doctoral students to commercialize innovations through company spin offs.



David Hanson of Hanson Robotics demonstrates a lifelike robotic head for a local TV news crew. Hanson developed realistic skin and features for the head and is working with ARRI researchers to improve the servos actuating its facial expressions.

Deployment

ARRI boasts a strong small manufacturing assistance program that includes the Texas Manufacturing Assistance Center (TMAC), the Cross Timbers Procurement Center and the Small Business Development Center (SBDC) for Enterprise Excellence.

TMAC is the Texas affiliate of the Manufacturing Extension Partnership, a program of the National Institute of Standards and Technology. UTA leads the alliance of seven organizations that comprise the Texas program. TMAC works with the manufacturing sector to substantially improve processes and products. Projects are focused on the integration of business strategies with lean and quality initiatives. TMAC assists companies on Quality Management System projects, leading to successful registrations to the ISO 9000 family of quality standards.

Cross Timbers is funded by the Department of Defense and helps businesses in North Texas sell their goods and services to federal, state and local governments and their prime contractors.

The SBDC for Enterprise Excellence assists companies through counseling and training. The SBDC is funded by the Small Business Administration and works with manufacturing firms to create manufacturing jobs and increase sales and capital investment.

ARRI Deployment Staff

Drew Casani
Director
Texas Manufacturing Assistance Center

Russ Aikman
Tom Beard
Randy Bohannon
Patrice Boutier
Joe Crosswell
B. J. Fontaine
Frank Groenteman
Ruben Hernandez
Jim Hicks
Kurt Middlekoop
David Ross
Mark Sessumes
Charaee Troop
Susan Tully

Jim Hicks
Director
Cross Timbers Procurement Center

Gary Harlin
Procurement Specialist

Jo-An Weddle
Director
Small Business Development Center for Enterprise Excellence

Bioengineering

uta.edu/engineering/bme

Khosrow Behbehani, PhD, PE, Chair

Respiratory and anesthesia device design, Biosignal Processing, Physiological systems modeling

C. J. "Charles" Chuong, PhD

Cellular mechanics, Cardiovascular biomechanics, Shockwave lithotripsy

Robert Eberhart, PhD

Bioresorbable stents; Magnetic anchor laparoscopy system

Digant Dave', PhD

Optical imaging, Optical biopsy

Hanli Liu, PhD

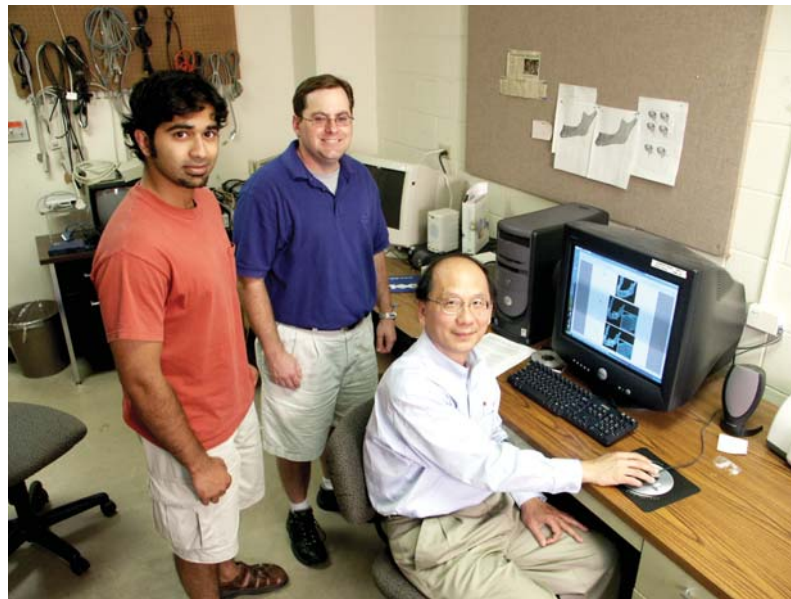
Optical imaging, Tumor detection and diagnosis

Liping Tang, PhD

Controlled drug delivery, Biocompatibility, Stem cell therapies

Karel Zuzak, PhD

Translational medicine, Hyperspectral imaging



Dr. Charles Chuong and master's students Jacob Abraham and Tre Raymond Welch view simulations of stress points on a surgical connection typical to two methods of jaw bone reconstruction. Their research will provide better information to surgeons on the best practices to use in facial reconstruction.

Since 1974, The University of Texas at Arlington and The University of Texas Southwestern Medical Center at Dallas have combined resources to conduct a Biomedical Engineering Program. Over the years, the program, and the field of engineering for health care in general, has experienced a major expansion. Because of this growth, the Biomedical Engineering Program at UTA was elevated to the departmental level in the spring of 2005 and was renamed the Bioengineering Department.

Students may pursue M.S. and Ph.D. degrees in biomedical engineering or, in a five-year, combined degree plan, a B.S. in Biology and a M.S. in Biomedical Engineering. Graduate course work is offered in five areas: bioinstrumentation, medical imaging, biomaterials/tissue engineering, biomechanics, and molecular/computational engineering. Students get to utilize numerous well-outfitted research laboratories on both campuses. Basic life science projects and clinical research projects at one of five university-affiliated hospitals are also available.

Medical Imaging

Dr. Hanli Liu and her students have invented an optical infrared spectral method to measure the oxygenation of small regions of living tissue. In one application, a 1.2-millimeter diameter optical fiber is inserted into the brain

and advanced to the globus pallidus, normally the site of damage that excites the tremor of Parkinson's disease. Neurosurgeons are able to quickly identify the lesion and initiate treatment (programmed electrical stimulation or ablation), saving hours of time in the operating room. In another application, an external fiber optic pair is applied to the breast to non-invasively detect tumors. As the technology matures, further rewarding clinical applications are expected.

Before joining UTA in the fall of 2003, Dr. Karel Zuzak completed five years of post doctoral training at the National Institutes of Health (NIH). During his tenure at NIH, Dr. Zuzak and his associates developed a novel method of using visible light to image peripheral vasculature. Dr. Zuzak brought this technology to UTA and is currently working on quantifying the impact of diabetes on retinas and an assessment of lower extremities blood circulation in individuals with diabetes. Using hyperspectral analysis, he studies images to assess the level of oxygen in the peripheral vasculature. The device and the associated analysis techniques have applications in assessing sickle cell anemia, characterizing diabetes-mediated poor circulation in the extremities, and possibly detecting melanoma.

Dr. Digant Dave' joined the Bioengineering Department in the fall of 2004. His work has been focused on the imaging of individual cells for cancer detection using short

pulse laser sources. This research involves the application of Phase Sensitive Optical Coherence Tomography (OCT) to the biomedical fields of retinal imaging, burn depth determination, cancer imaging and blood flow imaging. Dr. Dave' plans to develop Endoscopic OCT and Functional OCT systems for optical biopsy that will be capable of producing images with sub-cellular resolution. He is also investigating the development of a polarization-maintaining, fiber-based OCT instrument for *in vivo* imaging and combining multi-photon microscopy and Functional OCT.

Immune Response to Medical Implants

Dr. Liping Tang has an excellent record in developing methods to understand the role of fibrinogen (a clotting protein) in organizing the response of the immune system to implanted devices. His methods may permit quantification of the magnitude and type of response of the multifaceted immune system to implanted devices, a central issue in tissue engineering. Dr. Tang has been active in developing biocompatible nanoparticles for delivering drugs and genes to a desired body site. His work also includes the investigation of stem cells and their response to various biological signals.

Bioinstrumentation

Dr. Behbehani is the co-inventor of the first FDA-approved microprocessor-based controller for the mechanical ventilator, the principal tool for respiratory therapy in the modern hospital. Since joining UTA, he has successfully developed a system for control of obstructive sleep apnea, a debilitating condition which afflicts 5 to 10 percent of adults in the U.S. The system monitors the changes in airway pressure prior to the occurrence of airway occlusion and uses a patented method of adjusting the applied pressure to the airway to keep it open. The system is designed such that the sleeping patient does not notice the pressure adjustment. Dr. Behbehani holds five U.S. Patents on respiratory devices for treatment of sleep apnea. More recently, he and his associates have been working on ways to detect obstructive sleep apnea at a reduced cost and with greater comfort for the patient. In this regard, Dr. Behbehani and his associates are investigating detection of apnea from electroencephalography (EEG) and electrocardiography (ECG).

Biomechanics

Dr. Charles Chuong is developing methods to understand the locomotion and biomechanics of cells, with applications in enhancing wound healing in eye injuries. He also has developed several clinically significant simulations of tissue function. One, the flexure of the aortic valve and aortic outflow tract of the heart, together with the fluid mechanical behavior of the ejected blood, has been successfully simulated in the first combined solid- and fluid-mechanics computer analysis of a medical problem. Based on predictions of the model, cardiologists have been able to discriminate two previously masked valvular conditions, improving the diagnostic effectiveness of noninvasive cardiac ultrasonography.

Biodegradable Stents for Healing of Diseased Vessels

Professor Robert Eberhart and his students have invented a mechanically robust polymer stent that can incorporate therapy-enhancing drugs, genes and radioisotopes. The stent is deployed by a catheter delivery system and then expanded to more than twice its diameter. The mechanical support of this polymer stent matches that of metal stents for diseased vessel walls (artery, trachea, esophagus, ureter, etc.), with the advantage that the new devices biodegrade to carbon dioxide and water once their support function is no longer required.



Graduate students Kapil Langer and Manish Kankari and Dr. Digant Dave watch as graduate student Rakhee Subramanyam adjusts an inverted microscope platform, part of a multimodal optical imaging system they are constructing using lasers to detect anomalous tissue and cells and to distinguish normal cells from cancerous ones.

Civil & Environmental Engineering

uta.edu/engineering/ce

**Sia Ardekani,
PhD, PE, Chair**

Traffic flow theory, Roadway design

Ali Abolmaali, PhD

Structures, Finite element analysis

**Ernest C. Crosby,
PhD, PE**

Environmental engineering,
Water resources, Natural systems

Sahadat Hossain, PhD

Geotechnical engineering

**Laureano R. Hoyos,
PhD**

Geotechnical engineering

**Andrew Kruzic,
PhD, PE**

Environmental engineering,
Wastewater treatment

John H. Matthys, PE

Structural analysis & design of concrete, steel and masonry

**Stephen P. Mattingly,
PhD**

Traffic planning/policy,
Intelligent transportation systems

**Anand J. Puppala,
PhD, PE**

Soil testing, stabilization, reinforcements and modeling

**Guillermo Ramirez,
PhD, PE**

Experimental analysis,
Prestressed concrete,
Composite materials

**Syed R. Qasim,
PhD, PE**

Environmental engineering,
Water supply, Waste treatment

**Melanie L. Sattler,
PhD, PE**

Environmental engineering,
Air quality

Max Spindler, PhD, PE

Water resources engineering,
Hydraulics

**James C. Williams,
PhD, PE**

Traffic engineering,
Transportation systems analysis



A project sponsored by the Texas Air Research Center is evaluating reductions in air pollution by synchronizing traffic signals to improve traffic flow. Drs. Melanie Sattler (left) and Steve Mattingly (right) look on as graduate students Rupangi Munshi (in van) and Auttawit Upayokin prepare to collect tailpipe emission measurements.

The Department of Civil and Environmental Engineering offers a comprehensive program culminating in B.S., M.S. and Ph.D. degrees. The B.S. degree in Civil Engineering is an ABET-accredited, broad-based degree. The M.S. and Ph.D. degree programs are offered in six specialty areas: environmental, geotechnical, structures, transportation, water resources and infrastructure systems. Externally funded research projects are conducted in all of these areas.

Enrollment in civil and environmental engineering grew from 274 students in fall 2001 to 363 students in fall 2004. Most of this growth occurred in the B.S. and Ph.D. categories. The undergraduate enrollment grew from 147 students in 2001 to 209 in 2004. Similarly, the number of Ph.D. students in the program increased from 23 students to 36 students in the same three-year time period. Coinciding with this was a growth in external research funding in the department.

Research Activities

A research project currently underway by Dr. Melanie Sattler, Dr. Steve Mattingly and four graduate students should help the Dallas-Fort Worth area meet new air

pollution standards set by the Environmental Protection Agency. Using a department van outfitted with a tailpipe emissions analyzer, the project will measure emission reductions associated with synchronizing traffic signals. Synchronizing signals allows a vehicle to travel through multiple traffic signals at a constant speed without stopping. Not only should this please motorists, but it should also reduce emissions associated with vehicle accelerations/decelerations.

Over the course of a year, the research team will measure tailpipe emissions “before-and-after” synchronization along four corridors in Arlington and Grand Prairie. The study should yield information of what region-wide benefits could be achieved through traffic signal retiming. The project is part of a thoroughfare assessment program by the North Central Texas Council of Governments and is supported by a grant from the Texas Air Resources Center.

In a Texas Department of Transportation research study titled “Pricing Strategies for Managed Lanes,” Drs. Mattingly, Williams and Ardekani, along with Dr. Jinling Li of the School of Urban and Public Affairs, have studied drivers’ attitudes toward managed lanes. Managed lanes are freeway lanes that are free to use for certain classes of vehicles (public transit and other high-occupancy vehicles), while tolled for other vehicle types (single-occupancy



Dr. John Matthys, master's student Jarrod Burns and Dr. Ali Abolmaali examine the reinforcing cage of a concrete box culvert. The team's research in the Structural Engineering Laboratory will use hydraulic rams and a variety of laser sensors to investigate the shear capacity of pre-cast concrete box culverts.

vehicles). Based on these studies, a toll evaluation model was developed to estimate the impact of toll prices applied to single-occupancy vehicles (SOVs) in managed lanes.

The toll evaluation concept can be illustrated by an example whereby, if the toll amount is set a too low a level, many SOVs are expected to shift from free lanes to the adjacent managed lanes. This could result in an unacceptable level of congestion in the managed lanes. On the other hand, an unreasonably high toll value could translate to underutilized managed lanes and congestion in the adjacent free lanes. The computer model developed in this research allows searching for an optimal pricing policy option that satisfies one or more operational objectives in the managed lanes.

Dr. Ali Abolmaali received a \$138,440 grant from the American Concrete Pipe Association (ACPA) to investigate the shear capacity of pre-cast concrete box culverts. Several nationally-recognized research centers competed to conduct the study, which will be conducted over a two-year period. In addition to the ACPA funds, industry partners are providing approximately \$100,000 worth of in-kind donations (material, labor and equipment), making this a \$240,000 research grant.

Dr. Abolmaali, the PI, will be assisted by Civil and Environmental Engineering Professor John H. Matthys, Dr. Raul Fernandez of the Automation & Robotics Research Institute and civil engineering graduate students. The team will conduct numerical studies in the National Science Foundation-funded Structural Simulation Laboratory and

experimental studies in the Structural Engineering Laboratory. The experimental studies will use hydraulic rams and a variety of laser sensors, some mounted on a motorized rail that traverses the length of the culvert section.

Individual and joined sections of concrete box culvert, supplied by the ACPA and measuring 4' by 4' by 8' and weighing several tons, will be subjected to shear-type loading, simulating actual loading conditions. A complete finite element model (FEM) of the box culverts will be developed for shear crack predictions of both single and joined sections. The FEM analysis results will then be compared with those of the experiments for validation purposes. The findings of this research could be potentially implemented in design codes for box culverts nationwide.

The two graduate and three undergraduate research assistants will be assisting investigators in conducting this full-scale experimental and analytical research. The graduates are Ph.D. student Anil Kumar Garg and M.S. student Jarrod Burns. Burns is the recipient of the prestigious Eisenhower Fellowship from the National Highway Institute. Three undergraduate research assistants supported by the National Science Foundation's Research Experience for Undergraduates (REU) program will also be participating in this research. The REU students are Olivia Corey (Case Western University), Francheska Seigo-Montes (University of Puerto Rico) and Richard Nichols (University of Texas at Arlington).

Computer Science & Engineering

uta.edu/engineering/cse

Roger Walker, PhD, PE Interim Chair

Lasers and optic systems, Signal processing, Real-time instrumentation

Ishfaq Ahmad, PhD

Multimedia systems, Parallel and distributed computing

Alp Aslandogan, PhD

Database systems, Data mining, Information retrieval

Bob Weems, PhD

Databases, Parallel computing, Data structures, Algorithms, Discrete optimization

Bill Carroll, PhD, PE

Fault-tolerant, parallel and real-time computing, Logic design

Sharma Chakravarthy

Data mining and warehouse, Information integration

Hao Che, PhD

Network architecture, Network processor design

Hua-mei Chen, PhD

Image and video processing, Video surveillance

Diane Cook, PhD

Artificial intelligence, Machine learning, Parallel algorithms

Sajal K. Das, PhD

Wireless networks and protocols, Parallel/distributed computing

Gautam Das, PhD

Data mining, Relational and heterogeneous databases, Computational geometry

Ramez Elmasri, PhD

Database systems, Conceptual modeling, XML

Leonidas Fegaras, PhD

Databases, Programming languages

Jean Gao, PhD

Computer vision, Pattern recognition, Bioinformatics, Image processing

Larry Holder, PhD

Artificial intelligence, Machine learning, Data mining

Manfred Huber, PhD

Autonomous robot systems, Machine learning

Farhad Kamangar, PhD

Computer vision, Image processing, Neural networks

Mohan Kumar, PhD

Pervasive computing, Mobility and wireless networks

David Kung, PhD

Object-oriented systems, Modeling and verification

JungHwan Oh, PhD

Multimedia processing, Multimedia database management system

Distinguished in recent years as No.1 in research funding among UTA's academic departments, the Department of Computer Science and Engineering continued to have strong success in 2005 funding its diverse, multidisciplinary research programs.

Government and industry research awards to the department's world-class faculty researchers covered the gamut in the leading areas of computer science and engineering, and researchers continued to produce breakthrough technology for real-world use.

The department continued to boost its longstanding research strengths in database and information technology, embedded systems, high-performance computing, intelligent systems, software engineering, and telecommunications and networking. The department has recently gained strength in multimedia and video processing, mobile and pervasive computing, and homeland security. It is now focusing on growing its bioinformatics, and computer and network security research programs.

The department's sponsorship of the world's leading conference on pervasive computing and communications, PerCom, highlights its strength in that field. PerCom, co-sponsored by IEEE, drew more than 300 of the world's leading scientists in pervasive computing.

PerCom was founded by CSE faculty in 2003 under the department's Top 25 Initiative, a multi-faceted plan adopted by the department in 2000 to enhance its teaching and research excellence and boost its standing to among the top CSE departments in America. The highly successful initiative has more than doubled the department's annual new research funding. Also through the initiative, the

department has increased tenure-track faculty by more than 40 percent and doctoral students by more than 150 percent, opened two new research centers, doubled faculty scholarly output, and received a major surge in support of CSE programs from North Texas' leading technology companies.

Research under way in the department included the development of specialized cell phones for people with disabilities. The research was funded by a \$2.2 million grant from the Texas Health and Human Services Commission. CSE researchers customized cell phones to meet the needs of people with a range of disabilities, including blindness, hearing and cognitive impairment. The cell phones were provided to more than 600 Texans with disabilities, with 1,000 health care providers, family and friends also participating in the research.

Other continuing research included a \$2 million research project on smart home technology funded by the National Science Foundation. The project includes a smart apartment on the UTA campus. The smart home project, which

is led by Professor Diane Cook and has attracted national and international press attention, is seeking to combine artificial intelligence, machine learning, databases, mobile computing, robotics and multimedia computing to create a fully integrated, intelligent home. The research goal is to create a home that learns from its occupants, makes decisions and automatically acts to optimize the comfort, safety, security, health, money savings and the pleasure of the people who live there.

Researchers from UTA, the University of Kentucky and the University of Pennsylvania are seeking to develop pervasively secure infrastructures, such as railroads, the



Graduate research assistant Amar Singh and Dr. Larry Holder, principal investigator on the Sentry project, are developing techniques for integrating data from a variety of sensors, including the millimeter-wave camera and multi-zone walk-through metal detector shown here, in order to improve the detection of security threats.



Dr. Ishfaq Ahmad and senior Charles Vaughn evaluate prototypes of real-time audio and video communications devices for use by law enforcement officers. The headband-mounted cameras provide a 360-degree view of the scene of an emergency and the hand-held device can transmit a suspect's photo back to headquarters for immediate identification.

Internet and air traffic control, to help protect the nation against terrorist attack. The project, led by CSE Professor Sajal Das and funded by a \$1.6 million grant, uses telecommunications and information technology to tie together diverse technologies to build a broad security network that collects and analyzes data to make real-time security decisions and provide related services. The research may also be helpful in protecting major infrastructures during natural disasters.

Backed by \$500,000 in earmark funds from the Justice Department, CSE researchers are developing for the Arlington Police Department a pervasive, wireless communications system that includes the use of multimedia devices that officers wear on their uniforms for multi-way transmission of live video, audio and text messaging. Professor Ishfaq Ahmad, the principal investigator on the project, and his colleagues plan to use audio-video compression, wireless mobile communications, sensor networks and other leading-edge technology to develop the communications system, which is expected to have application for other police departments.

Professors Larry Holder and Diane Cook received three grants totaling almost \$800,000 to continue their pioneering work in graph-based data mining using the Subdue system. The funding includes a \$352,000 grant from the National Science Foundation to analyze public health data, construct a toolset to provide early detection of health epidemics and other related work. The U.S. Air Force funded \$253,000 for the design and evaluation of new methods for performing pattern learning on structured data represented as graphs and the evaluation of their

application to structural relational databases. The remaining funding was from the Naval Research Laboratory, which provided \$119,000 to employ the Subdue system in security research to identify potential threats.

Dr. Holder is also the lead investigator on a \$250,000 grant from the NSF to develop advanced security detection methods, including the development of a walk-through security portal.

Dr. JungHwan Oh is the lead investigator on a \$579,000 grant from the NSF to develop advanced endoscopy videos. The grant sponsors collaborative research with the Mayo Clinic and Iowa State University to develop an Endoscopic Multimedia Information System to capture high-quality endoscopy videos, analyze the captured videos and provide efficient access of their content to medical providers.

The Transportation and Instrumentation Lab, which has received more than \$8 million in government research money and is led by Professor Roger Walker, who is acting department chair, continued to receive new funding in 2005 from the Texas Department of Transportation to research instrumentation systems for evaluating highway construction. The research includes the use of embedded real-time systems, microcomputer systems, lasers and optic systems and signal processing.

Numerous other research projects were under way in the department in 2005, including in embedded systems, robotics, artificial intelligence and information technology.

Lynn Peterson, PhD
Natural language processing,
Artificial intelligence

Yu Lei, PhD
Distributed systems, Computer
networks, Software
engineering

Gergely Zaruba, PhD
Wireless and optical
networking, Protocols

Yonghe Liu, PhD
Wireless networks, media
access control, scheduling,
and security

Matthew Wright, PhD
Security

Lecturers

**Arthur Alexander
Reyes, PhD**
Software engineering,
Unmanned aerial vehicles,
Distributed simulation

Linda Barasch, PhD
Programming languages,
Graph theory, Computer
science education

Kalyan Basu, MCE
Network design, Wireless
networking and computing

Gil Carrick, BS
Compilers, Natural language
processing, Web ontology

Kenneth Damrau, MS
Computer architecture,
System design

Henry Kearny, MS
Graph theory, Algorithms,
Data structures

Bahram Khilili, PhD
Software engineering,
Distributed systems,
Operating systems

David Levine, MS
Software engineering,
Distributed objects, Operating
systems

Mike O'Dell, MS
Computer networks, Network
applications, Software
engineering

John Patterson, PhD
Computer architecture

Tom Rethard Jr, MS
Languages, Operating
systems, Software process and
management

Ray Springston, MS
Computer science in
education, Artificial systems

Carter Tiernan, PhD
Programming languages,
Ethics

**Ramesh Yerraballi,
PhD**
Embedded systems, Network
protocols, Multimedia systems

Electrical Engineering

uta.edu/engineering/ee

Raymond Shoults, PhD, Chair

Power system planning, operations & analysis; transmission pricing

Kambiz Alavi, PhD

Semiconductor materials and device arrays, Electro-optics

Jonathan Bredow, PhD

Remote sensing, Microwave circuits, Antennas

Donald Butler, PhD

MEMS, Semiconductor and superconductor devices/materials

Ronald Carter, PhD, Associate Chair

Analog integrated circuit design, simulation and characterization

Zeynep Celik-Butler, PhD

Noise and reliability in devices, MEMS, Sensors

Jung-Chih Chiao, PhD

MEMS, Microwaves, Quasi-optics, Optical communications, Semiconductors

Alan Davis, PhD

Microwave component design, Semiconductor circuit design

Venkat Devarajan, PhD

Image processing, Virtual reality, Digital photogrammetry

William Dillon, PhD

Power system analysis, High voltage techniques

Adrian K. Fung, PhD

Wave scattering, Radar image simulations and interpretation

Bei Gou, PhD

Electric power system analysis, control, generation, quality and market

Sungyong Jung, PhD

Optical transceiver circuit design, Mixed signal circuit design

Wiley P. Kirk, PhD

Nanoscale and quantum electronic devices, Semiconductor materials

George Kondraske, PhD

Performance modeling, Sensor and instrumentation design

Wei-Jen Lee, PhD

Power system load flow, transient/dynamic stability

The Department of Electrical Engineering began several initiatives to focus on recruiting the best students possible to our program. Between fall 2000 and fall 2003, total student enrollment in the department experienced significant growth (683 vs. 1,237) but for various reasons decreased by 13.6% in fall 2004. Efforts were initiated to recruit top graduate students directly out of their baccalaureate universities and entrance requirements were increased to attract better qualified graduate student applicants. Some of our faculty traveled to their home countries to visit top universities and directly recruit highly qualified candidates. These efforts included recruiting the best BSEE students from our own program and have proven to be effective.

Of particular note was a 17% drop in undergraduate enrollment from fall 2003. Consequently, the department stepped up its effort to increase undergraduate enrollment with a goal of increasing both the number of students and the rate of retention, leading to a larger number of baccalaureate degrees granted. This effort ties in with existing programs supported by the state of Texas.

One important engineering-education initiative gaining national significance is Project Lead The Way (PLTW), a four-year sequence of courses beginning with middle school and continuing through high school. PLTW introduces students to the scope, rigor and discipline of engineering and engineering technology prior to entering college. The department is positioning itself to participate to the fullest extent possible with area high schools conducting PLTW programs, with the goal of attracting high-quality, motivated young men and women into our program.

The quality and breadth of our faculty was increased in recent years. Since the fall of 2001, the department added 11 tenure-track faculty and three non tenure-track faculty. During this same time, two senior members of the faculty, Mo Shing Chen and Charles Smith, retired.

Input from industry representatives is an important element in our continuing efforts to provide excellence in our programs. The department re-established its Industry Advisory Board at the beginning of the 2004 fall semester. Twenty leading representatives from industry agreed to serve, with Dr. Jason Losh, Distinguished Member of the Technical Staff at Motorola, serving as chairman.

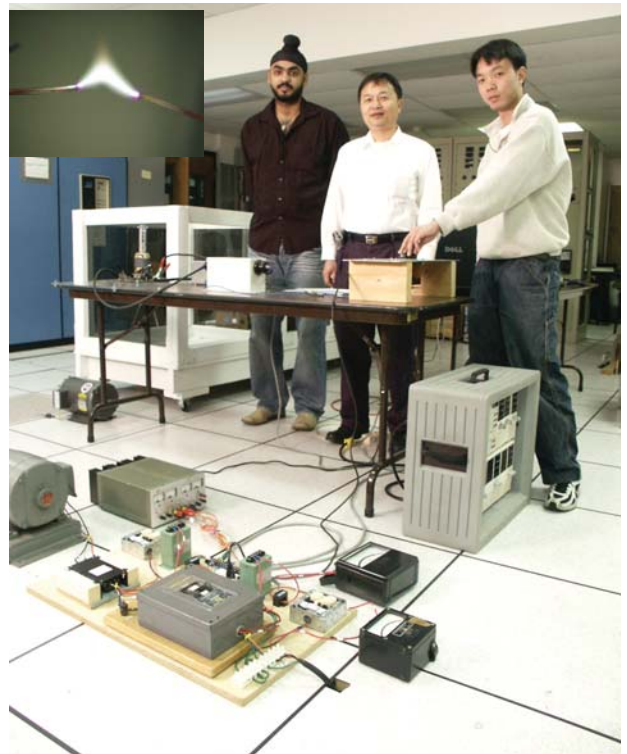
In August, a Canadian software company settled a lawsuit filed by the University of Texas System over patent infringements on technology created by Professor George Kondraske and a graduate student in 1987. The company

paid \$1.8 million to obtain licensing rights. More than 40 similar lawsuits are pending.

Research Activities

New grants received during 2004-05 totaled more than \$2.5 million. Research activities by the faculty spanned 10 major areas of interest:

- 1) Digital and Microprocessor/controller Systems
- 2) VLSI and Semiconductors
- 3) Systems, Controls, and Automated Manufacturing
- 4) Electromagnetic Fields and Applications
- 5) High Frequency Microelectronic Devices and Circuits
- 6) Digital Signal and Image Processing
- 7) Telecommunications and Information Systems
- 8) Power Systems and Industrial Power Electronics
- 9) Optical Devices and Systems
- 10) Nanotechnology and MEMS.



Ph.D. student Kittipong Methaprayoon, Professor Wei-Jen Lee and Ph.D. student Mandhir Sahni prepare another text on internal arcing fault or corona discharge inside a motor. They are developing an algorithm that will provide early warning information for early-stage deterioration of the insulation or a bad connection, enabling maintenance personnel to fix the problem before it forces a system shutdown.

Funded research included these projects:

- J.C. Chiao, PI, "Manufacturing and Integration of Millimeter-wave Sensing Systems." National Science Foundation. This is a collaborative project with the University of California, Berkeley.
- L. Holder, I. Ahmad, S. Das, F.L. Lewis, F. Lu, PIs, "Acquisition of Instrumentation for Engineering Research in Advanced Security Detection Systems," NSF MRI.
- R. Kenarangi, PI, in-kind support: perpetual software license for WindMil and LightTable, Milsoft Utility Solutions.
- W. P. Kirk and R. M. Wallace, PIs, "Mobility Degradation Mechanisms in Advanced High-k CMOS Devices," Texas Advanced Technology Program.
- G. Kondraske, PI, "Effect of Spark and POS3 on Selected Performance Capacity Measurements."
- W-J Lee, PI, "Dynamic Performance Monitoring System for the Interconnection Between The Co-generation and Utility Grid," Formosa Plastics USA.
- F.L. Lewis and J. Mireles, PIs, "Bi-National Effort on Distributed Manufacturing Supervisory Control Systems," NSF Supplement-Workshop supplement.
- Q. Liang, PI, "Energy Efficient Wireless Sensor Networks for Future Combat Systems Using Fuzzy Logic", Office of Naval Research (ONR) Young Investigator Award.

- S. Oraintara and J. Bredow, "DSP Starter Kits and Code Composer Studio for Development of Signal Processing Courses," TETC Texas Instruments Grant.
- B. Schneider, PI, (Harvard Medical School), G. Kondraske, Co-PI and proposal author) "Objective Competency Assessment in Minimally Invasive Surgery with Novel Performance Theory Based Methods." Society of American Gastrointestinal and Endoscopic Surgeons.
- M. Tao and W. P. Kirk, PIs, "Valence-Mended Si(100) Surface for Si-CMOS Nanoelectronics," Texas Advanced Technology Program.
- M. Vasilyev and N. Stelmakh, PIs, "Planar-mode Reshaper for High-Power Laser Diodes and Arrays," NSF/DARPA Photonics Technology Access Program.
- J.B. Zhang, PI (A-Star Institute of Manufacturing Technology), F.L. Lewis, Co-PI, "Integrating Equipment Health Prognostics in High Value Manufacturing," Singapore Science & Engineering Research Council.

A summary of Electrical Engineering shows that faculty members have produced

- 50 papers in refereed journals,
- 16 papers in conference proceedings,
- 9 books of which a faculty member served as editor or author of one or more chapters,
- 21 technical reports, and
- 112 additional papers published.



Professor Frank Lewis and master's student Koushil Sreenath examine an inexpensive wireless sensor that can be programmed to detect a variety of actions and conditions and, if necessary, summon a large robot to perform a task. The units are part of a program on the deployment of a wireless sensor network.

Frank L. Lewis, PhD, PE

Nonlinear control systems, Neural networks, MEMS

Qilian Liang, PhD

Wireless communications and networking

Michael Manry, PhD

Neural networks, Statistical signal processing

Soontorn Oraintara, PhD

Signal processing, Image/video/ audio processing and coding

Vasant Prabhu, PhD

Digital and analog communications, Microwave propagation

Kamisetty R. Rao, PhD

Digital signal and image processing, Data compression

Harry Stephanou, PhD

MEMS, Control Systems, Automated Manufacturing

Meng Tao, PhD

Nanofabrication, Photovoltaics, Thin film deposition

Saibun Tjuatja, PhD

Electromagnetic waves, Remote sensing, Wireless communications

Michael Vasilyev, PhD

Nonlinear, quantum and ultra-fast optics, Optical systems & networks, Photonic devices

Enjun Xiao, PhD

RF integrated & VLSI design, Semiconductor device modeling, Analog, digital and mixed signal circuits

Kai Yeung, PhD

Systems and automatic control

Lecturers

Steve Gibbs, PhD,

Associate Chair

Digital and analog communications

Rasool Kenarangi, PhD, PE

Power systems analysis and operation

Nikolai Stelmakh, PhD

Semiconductor lasers, Passive lightwave circuits, Pulse propagation

Bernard Svihel, SM, PE

Digital circuit design, Control systems

Industrial & Manufacturing Systems Engineering

Donald H. Liles,
PhD, Chair

Enterprise engineering

Bonnie Boardman,
PhD

Resource planning, Logistics

Victoria C. P. Chen,
PhD

Statistical modeling,
Stochastic dynamic
programming

H.W. Corley, PhD, PE

Operations research,
Optimization, Statistics,
Stochastic processes

Brian Huff, PhD

Manufacturing systems
design, Industrial automation

Sheik Imrham, PhD

Applied ergonomics, Industrial
hygiene, Safety

John W. Priest,
PhD, PE

Product development,
Producibility, Knowledge
engineering, Manufacturing

K. Jamie Rogers,
PhD, PE

Systems design & analysis,
Agile virtual enterprises

Jay Rosenberger, PhD

Stochastic programming and
optimization, Simulations,
Network flows

Adjunct

Royce Lummus, PhD

Program management

uta.edu/engineering/imse

Industrial Engineering has to do with the analysis and design of complex systems of people, processes, and technology so as to accomplish organizational goals. The core disciplines include statistics, operations research, economic decision-making, human engineering and management.

The Industrial Engineering faculty includes three professors, four associate professors, two assistant professors and one senior lecturer. The Department offers degrees in Industrial Engineering at the BS, MS, and Ph.D. levels, plus master's degrees in Logistics and Engineering Management. The Engineering Management program is designed primarily for the working professional who aspires to manage people and technology in technical environments. Also, all graduate Industrial Engineering courses are available on the Internet in a streaming video format, supported by class web pages.

A new master's program in Systems Engineering was offered beginning in the spring of 2005. Systems Engineering relates to a collection of elements that work together as a unit. In practice, one or more of the elements may itself be a system. Therefore, Systems Engineering may be thought of as engineering systems of systems. Systems Engineering considers the total systems life cycle, from customer requirements and concept through design and development, system use, system maintenance and system disposal.

Our Center of Stochastic Modeling, Optimization and Statistics (COSMOS) continues to do research in the core disciplines of advanced Statistics and Operations Research. Representative research areas include new linear programming algorithms, convex multivariate adaptive regression splines, scheduling and logistics for combat and program development environments, and statistical optimal control of water reservoirs.

The IMSE Department, along with the School of Nursing, the Information Systems and Operations Management Department and the Psychology Department continues to develop the Healthcare Enterprise Research Center (HERC). The objective of the center will be to conduct research to improve the effectiveness of the healthcare enterprise through the creation and deployment of new knowledge, techniques, tools and practices. Other areas of interest include healthcare extended enterprise, lean healthcare processes and administration, human factors and ergonomics for healthcare environments and cancer pain management.

The environmental analysis research areas include current and emerging technologies for waste water treatment, design and analysis of photochemical model computer experiments, decision making frameworks for controlling ground-level ozone concentrations, and notably, the analysis of an airliner de-icing problem using data mining. Transportation research topics include: airline yield management, robust capacity planning, simulation of bus maintenance facilities, resource allocation, revenue management, schedule recovery, and new this year, the analysis of high speed rail congestion.

Manufacturing research topics include RFID, autonomous systems for defense applications, producibility, manufacturing systems simulation and analysis, enterprise engineering, reconfigurable manufacturing systems and systems



Associate Professors Sheik Imrham and Victoria Chen; UTA School of Nursing Clinical Instructor Deborah Green, R.N.C.; Assistant Professor Jay Rosenberger, Baylor Director of Health Inform Management Terese Clark pose with graduate students Durai Kannan Sundaramoorthi and Prattana Punnakitikashem in front of the Baylor Regional Medical Center in Grapevine. UTA and Baylor are collaborating to develop decision support tools to optimize the later stages of nurse planning, such as hiring additional temporary agency nurses to work a shift and assigning nurses to patients. Preliminary results suggest that the optimizing assignment can reduce excess workload by as much as 25%.



Dr. Brian Huff evaluates a prototype wireless interface designed by master's students Udayakumar Vasudeva (left) and Praveen Kalidindi to support interaction with a team of autonomous ground vehicles. Practical uses of this technology include humanitarian minefield reclamation and the creation of mobile wireless sensor networks and autonomous actuators for a broad range of applications.

engineering in aerospace. We also work with the Texas Manufacturing Assistance Center, located at the Automation & Robotics Research Institute.

Over the last two years, the IMSE Department has been extending its traditional research in the application of industrial automation to include autonomous unmanned ground, sea, and air vehicles (UxV's). The focus of this research is on the integration of the UxV enabling technologies to create cost effective mobile platforms capable of performing specific tasks in an unstructured world. Recent events have brought new meaning to the concept of using automation to perform dull, dirty and dangerous work. Autonomous systems are also being evaluated for security and agricultural applications. There is a very broad range of potential application areas if low-cost, reliable, and safe UxV platforms can be created. Possibly more important than the mobility platforms themselves is the ability to incorporate these platforms into heterogeneous man / multi - UxV teams to perform collaborative tasks on a large scale.

The creation of autonomous UxV systems is inherently a multi-disciplinary task. Researchers within the IMSE Department are collaborating to make functioning autonomous mobile devices a reality. Dr. Brian Huff is using his expertise in manufacturing, automation, and controls to create a team of wandering autonomous sensor platforms (WASPs). This team of autonomous ground vehicles will be used to explore collaborative control problems and

application domains such as humanitarian mine clearing. IMSE faculty from COSMOS are also lending support to this effort. Dr. Roger Corley has provided guidance on the selection and use of sensor fusion and decision making algorithms. Drs. Victoria Chen and Sheikh Imrhan have contributed their expertise in stochastic data analysis and modeling to support sensor data characterization. Dr. Jay Rosenberger is contributing his skill in systems optimization to define efficient sensor deployment models for ad-hoc wireless sensor networks and their augmentation and maintenance by supporting UxV systems.

The collaboration on autonomous systems research goes beyond the confines of the IMSE Department. Dr. Huff is a faculty member of the multi-disciplinary UTA Autonomous Vehicle Laboratory (AVL). The AVL is a collaborative effort with faculty from the MAE and CSE Departments to enhance autonomous systems research at UTA. In just its second year of operation, the AVL was able to develop an autonomous unmanned aerial vehicle capable of autonomous take-off, aerial search and landing. These capabilities were demonstrated at the Association for Unmanned Vehicle Systems International (AUVSI) 3rd Annual Student UAV Competition held July 2 at the Naval Air Station Patuxent River, Webster Field Annex in Maryland. UTA's undergraduate student team competed there against 12 other colleges and universities. UTA placed first in the categories of mission performance and safety, and secured first place in the overall competition.

Materials Science & Engineering

uta.edu/engineering/mse

Efstathios I. Meletis, PhD, Director

Surface and nano science and engineering

Pranesh Aswath, PhD

Fracture, Fatigue, Tribology, Synthesis, Solders, Ceramics

Wen S. Chan, PhD

Design and analysis of composites, Structures

Ronald Elsenbaumer, PhD

Electrically conductive polymers, Enhanced lubricants & coatings

Roger Goolsby, PhD

Mechanical behavior of materials, Fracture

Choong-Un Kim, PhD

Alloy design, Interconnect technology, Materials characterization

Seong Jin Koh, PhD

Single electron transistors, Nanotube field effect transistors, Self-aligned nanoparticles

Shashank Priya, PhD

Ceramic processing, Thermodynamic measurements, Magnetoelectric composites



Graduate students Liang-Chieh Ma, Ramkumar Subramanian, Vishva Ray and Hong-Wen Huang join Dr. Seong Jin Koh at a chemical hood in the Nanotechnology facility. The team is developing a new technology combining wet chemistry and silicon fabrication that will enable the wafer-level fabrication of nanoscale systems such as single electron transistors and carbon nanotubes devices.

The Materials Science and Engineering (MSE) Program is a broad, interdisciplinary graduate program, actively involving faculty in both the College of Engineering and the College of Science. The program is organized around a group of eight core faculty in the College of Engineering (Aswath, Chan, Elsenbaumer, Goolsby, Kim, Koh, Meletis, Priya) supplemented by an additional 12 to 15 associated faculty from both colleges. The graduate-level program provides students with a fundamental understanding of the phenomena occurring in materials and their associated electrical, mechanical, chemical and physical properties. About 65 M.S. and Ph.D. students are enrolled in the program.

Dr. Efstathios I. Meletis was hired in January as the new Director of the MSE Program. Dr. Meletis received his Ph.D. from Georgia Tech and was formerly an endowed professor of the MSE program at Louisiana State University. His research interests include the understanding of the basic processing-structure-property relationship with an emphasis on vacuum and electro-plasma processes, small scale materials (nanomaterials, thin films, surface layers, NEMS, etc.) and material-environment interactions. His research is supported by NSF, SERDP and NASA.

A new member was added to the faculty last fall, Dr. Shashank Priya, who received his Ph.D. from Pennsylvania State University in 2003. His research and teaching interests are in ferroelectric/ferromagnetic materials and devices.

Most recently, Dr. Priya was a member of the technical staff at APC International.

Drs. Aswath and Elsenbaumer are continuing work on a project developing low phosphorous engine lubricants funded by Platinum Research Organization. The developed formulations are undergoing evaluations at General Motors and several engine oil additive manufacturing companies. High performance greases developed in the project are close to commercialization. Drs. Aswath, Shiakolas and Eberhart are working on a Center for Convergent Biotechnology-funded project developing new methods of drug delivery using femtosecond laser micromachining coupled with hot embossing of Poly lactic acid scaffolds.

Dr. Choong-Un Kim is working on the stability of the diffusion barrier and its impact on low-k/Cu integration reliability funded by the Semiconductor Research Corporation. He also began a related study on ultra-low-k dielectrics for the Texas Higher Education Coordinating Board's Advanced Technology Program.

Research Activities

The program provides superior opportunities for research and training. The following are two examinations of current research projects and student participation.

Dr. Seong Jin Koh received a \$400,000, five-year Faculty Early Career Development (CAREER) grant from the

National Science Foundation. The grant will allow Dr. Koh to develop a new method of nanoscale device fabrication that will be based on controlled positioning of nanoscale objects in parallel processing.

Dr. Koh's research will address two important issues currently confronting the nanoscale science community: the precise positioning of nanoscale objects (carbon nanotubes, nanoparticles, nanowires, proteins, DNAs, and other molecules, etc.) on a substrate, and a practical and reliable way of connecting nanoscale devices among themselves and to the outside macroscopic world.

This grant will also enable Dr. Koh to develop new educational and outreach programs. An interdisciplinary course, "Current Topics in Nanotechnology," will be extensively enhanced by creating several modules of "hands-on" laboratories. Dr. Koh will also develop a "hands-on" educational program for K-12 students and teachers in the Arlington and Mansfield school districts. Students will have direct exposure to cutting-edge equipment and real-world research.

Dr. Shashank Priya and his associates are inventing novel methods for harvesting the naturally available mechanical energy to create electricity. Piezoelectric materials generate electric charge when stressed. In a special arrangement called as bimorph only minor flexing needs to occur for generation of the significant magnitude of the electric power. In order to harvest this power and store it in a capacitor or battery a special circuit is required.

Dr. Priya and his student researchers have fabricated various prototypes to generate electricity from wind flow, automobile engine vibrations, and industrial machine vibrations. The researchers have successfully demonstrated the output power of 5 - 50 mW from wind flow of 5 - 10 mph. This technology has tremendous relevance for "energy on demand" platforms. Dr. Priya's research group has also been successful in developing an extremely high energy density piezoelectric ceramic with the highest sensitivity coefficient known so far.

Developments by the team have been published in the *Japanese Journal of Applied Physics*. Dr. Priya foresees piezoelectric energy harvesting being utilized to power a variety of small devices, including portable radios and CD players powered by the vibrations caused by walking, running or riding a bicycle and creation of the "self-powered" sensor nodes for structural health monitoring, accelerometer and strain gauges.

Materials Characterization Center

The Materials Characterization Center provides resources for highly specialized analysis of a wide range of materials. Although housed in the MSE program, the facility is used by researchers from throughout the engineering and science colleges, as well as those from local industry. The center is home to five x-ray diffractometers, two high-

resolution transmission electron microscopes (HRTEM), TEM sample preparation facilities, a scanning electron microscope (SEM), an Auger electron spectrometer (AES), and an x-ray photoelectron spectrometer (XPS).

In addition to research, the characterization equipment is used in graduate and undergraduate lab classes. For example, students in a typical graduate level x-ray diffraction course set-up run and analyze results from the Laue, Lang and powder diffractometers. Similarly, students in the TEM theory and lab course receive hands-on operating experience.



Graduate students Setul M. Shah, Rashed Adnan Islam and Vaneet Sharma and Assistant Professor Shashank Priya watch as graduate student Miteshkumar Joshi (seated) uses a digital oscilloscope to measure the output voltage and current waveform generated from their piezoelectric-based electric energy generator. The generator converts the wind energy into electric energy.

Mechanical & Aerospace Engineering

uta.edu/engineering/mae

Craig Dutton, PhD, PE, Chair

Fluid dynamics, Gas dynamics,
Laser diagnostic
measurements, Heat transfer,
Propulsion

Dereje Agonafer, PhD

Electronic packaging, Thermal
engineering, Finite element
techniques

Dale Anderson, PhD

Computational fluid dynamics,
Algorithms, Geometry
modeling

Pranesh Aswath, PhD

Fracture, Fatigue, Tribology,
Synthesis, Solders, Ceramics

Wen Chan, PhD

Design and analysis of
composite structures, Solid
mechanics

Brian Dennis, PhD

Computational mechanics and
design optimization, High-
performance computing,
Inverse problems

Atilla Dogan, PhD

Flight dynamics and control,
Nonlinear flight simulation,
Probabilistic methods

Roger Goolsby, PhD, PE

Mechanical behavior of
materials, Fracture

A. Haji-Sheikh, PhD, PE

Heat transfer analysis, Fluid
flow

Bumsoo Han, PhD

Bioheat and mass transfer,
Bionanotechnology,
Biomedical engineering,
Thermal sciences

David Hullender, PhD, PE

Hydraulics, Pneumatics,
Control systems, Stochastic
processes

Kent Lawrence, PhD, PE

Applied mechanics, FEM

Frank Lu, PhD, PE

Fluid mechanics,
Aerodynamics, Shocks and
blasts

John Mills, PhD

Design theories and methods

Seiichi Nomura, PhD

Micromechanics, Functionally
graded materials, Image
processing for failure
detection

The MAE Department offers B.S., M.S., M.Engr. and Ph.D. degrees in both Aerospace Engineering and Mechanical Engineering, with a broad array of courses, research opportunities and extracurricular activities available to students.

The MAE Department has experienced strong growth in enrollment over the last several years, more than doubling in size from the fall of 2000 to the fall of 2004. A total of 910 students were enrolled in MAE in the fall of 2004, with 680 undergraduate students and 230 graduate students. MAE currently has by far the largest undergraduate student population in the College of Engineering.

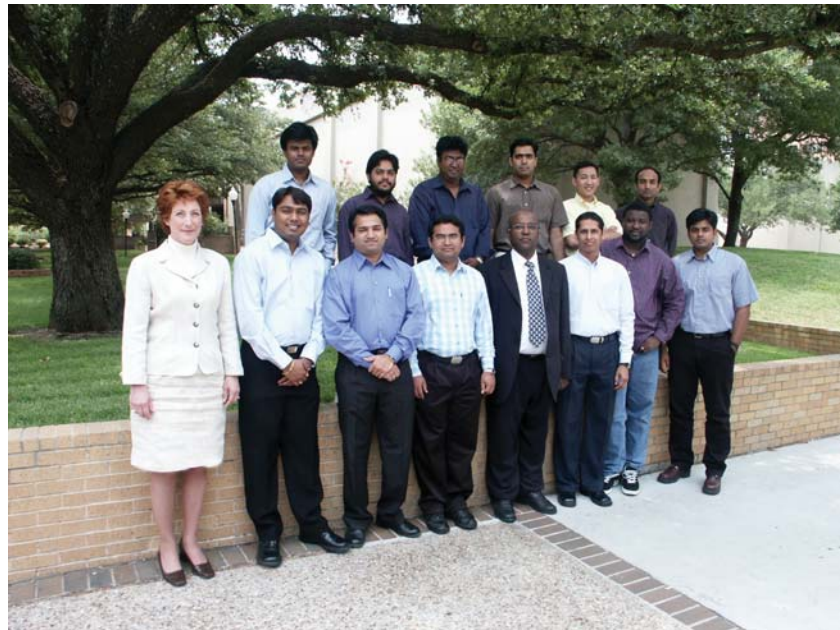
In addition to enrollment growth, we have added several excellent new faculty to further strengthen the education, research and service programs of the Department. Dr. Craig Dutton is the new Chair of the Department. He received his Ph.D. from the University of Illinois at Urbana-Champaign. His research interests are centered in experimental fluid mechanics, especially high-speed separated flows, mixing flows, shock wave/boundary layer interactions and laser-based measurement methods.

Dr. Brian Dennis joined the department as an Assistant Professor. Brian received his Ph.D. from Pennsylvania State University. His research expertise is in the areas of numerical modeling of fluid mechanics, heat transfer, solid

mechanics, and electromagnetics, as well as implementation of constrained optimization methods. Dr. Bumsoo Han comes to MAE as an assistant professor from the University of Minnesota, where he earned his Ph.D. Bumsoo's research interests are in the areas of biomedical engineering and thermal science, specifically experimental and numerical research on cellular and tissue-level heat and mass transfer in various biomedical applications. Dr. Zhen-Xue Han joined MAE as a Senior Lecturer. He received his Ph.D. from Beijing University of Aeronautics and Astronautics. Zhen-Xue's main duties are as a course instructor and undergraduate advisor, although he also pursues his research interests in the areas of numerical simulation and optimization.

Student Activities

The 2004-05 year was a very active and successful one for MAE students in terms of national and international student competitions. The UTA Formula SAE racing team took first place in the first international competition in Japan for student-designed, built and raced cars. The three-day competition featured 25 teams from Japan and one each from the United Kingdom, Korea, and UTA. The Formula SAE team also hosted approximately 25 teams



Professor Dereje Agonafer gathers with his Electronics, MEMS and Nanoelectronics Systems Packaging Center team. Front row – Administrative Secretary Sally Thompson, graduate students Abhijit Kaisare, Veerendra Mulay and Nikhil Lakhkar, Professor Agonafer, graduate students Vishwas Bedekar, Abbey Fasoro and Srikar Paruchuri. Back row – graduate students Raghuram Basavanahalli, Fahad Zahedi, Mohammad Hossain, Ashutosh Kole, Jake Phan and Amit Patil.

from across the U.S. for a challenging autocross competition held at UTA.

A team of four students represented UTA at the 2nd Annual Association for Unmanned Vehicle Systems International Student Unmanned Aerial Vehicle Competition in Maryland. A team of MAE students won a shared top-tier award for their design entry for an exploration air vehicle in a competition organized by the Aerospace Vehicle Systems Technology Office at the NASA Langley Research Center. The students designed an autonomous, unmanned aircraft that could perform diverse missions on Mars and other planets. Finally, a team of four students took top honors at the 3rd Annual Student Unmanned Aerial Vehicle (UAV) competition in Maryland. The competition challenges undergraduate teams to design, build, and fly an aerial vehicle capable of automatically flying a sequence of preprogrammed locations and imaging ground targets. The team won first place for Best Overall Performance, plus the Best Mission Performance and Best Safety Design awards.

Faculty Honors

Several MAE faculty received honors and recognitions during the past year.

Dr. Dereje Agonafer was a guest co-editor of a special issue of the *ASME Journal of Heat Transfer* honoring Richard Chu, one of the developers of the IBM System/360 and who holds more than 100 patents on heat transfer technology.

Dr. Kent Lawrence received the prestigious Minnie Stevens Piper Professorship, which honors effective and dedicated teachers in the state of Texas. Only 15 such awards are presented each year across the state.

Dr. Frank Lu has been appointed to the Editorial Advisory Board for Springer Science and Business Media's book series, *Shock Wave and High Pressure Phenomena*. Professor Lu has also been appointed Editor-in-Chief of the nation's pre-eminent series of publications documenting the rapid technological advances in aerospace, aeronautics, and related fields, *Progress in Astronautics and Aeronautics*, published by AIAA.

Drs. Don Wilson and Frank Lu received a U.S. patent for their design of a Multi-Mode, Pulsed Detonation Propulsion System for potential application to hypersonic and aerospace planes.

Dr. S. M. You and his co-authors, K.N. Rainey and S. Lee, received the prestigious 2004 ASME Heat Transfer Division Best Paper Award for their *Journal of Heat Transfer* paper, "Effect of Pressure, Subcooling, and Dissolved Gas on Pool Boiling Heat Transfer from Microporous Surfaces in FC-72."



Graduate research assistant Nitin Uppal and Dr. Panos Shiakolas examine the hole pattern of a silicon-based micromold micromachined with their femtosecond laser system. The micromolds will be replicated on polymers on a hot embossing system, with potential applications in controlled drug delivery and single-use medical tests. (Detail)

This award is presented annually to the authors judged to have made the most significant contribution published in the *Journal of Heat Transfer* or Heat Transfer Division archival symposium volume during that year.

Research

The MAE Department maintains active research programs across a broad spectrum of the sub-disciplines in AE and ME. Research in mechanical engineering falls into four major areas: dynamic systems and controls; design, mechanics and manufacturing; materials science; and thermal sciences. Examples of specific research topics include electronic packaging, phase change in porous media, bio-transport phenomena, multi-physics modeling and design optimization, composite materials, static and dynamic response of structural systems, BioMEMS, femtosecond laser micromachining, hot-embossing microreplication and microfabrication, multi-phase free-surface flow, and nanofluid enhancement of boiling heat transfer.

Research in aerospace engineering is focused in the areas of computational and experimental fluid dynamics; structures and materials; atmospheric and orbital flight dynamics; and guidance, navigation and control. Example current projects include reconfiguration of formation flight and aerial refueling of UAVs, modeling and control of morphable, flexible structures; pulse detonation engines, high-speed separated flows; smart structures, hydrocarbon fuel reformation; and development of robust methodologies for airfoil shape optimization.

Don Seath, PhD

Aircraft aerodynamics, Flight mechanics and design

Panayiotis Shiakolas, PhD

Robotics, Manufacturing, Design, Automation, MEMS, CAD

Kamesh Subbarao, PhD

Aerospace vehicle dynamics, Nonlinear robust and adaptive control, Optimization methods

Albert Tong, PhD, PE

Numerical modeling, Spray combustion, Multiphase flows

Bo Ping Wang, PhD

Design optimization, Computational mechanics, Structural dynamics

Don Wilson, PhD

Gas dynamics, Propulsion, High-speed aerodynamics

Robert Woods, PhD, PE

Dynamic systems, Controls, Fluid controls, Automotive engineering

Seung Mun You, PhD

Thermal engineering, Heat transfer

Lecturers

Zhen Xue Han, PhD

Numerical simulation, Design optimization

Kevin Rainey, PhD

Boiling heat transfer and two-phase flow, Electronics cooling, Friction/impact/shock physics

Ray Wimberly, PhD

Aerodynamics, Heat transfer, Structural analysis

Nanotechnology Research & Teaching Facility

uta.edu/engineering/nano

Zeynep Celik-Butler, PhD,
Director

Electrical Engineering

Dereje Agonafer, PhD

Mechanical & Aerospace
Engineering

Kambiz Alavi, PhD

Electrical Engineering

Richard Billo, PhD

Computer Science &
Engineering

Industrial Engineering

Donald Butler, PhD

Electrical Engineering

Jung-Chih Chiao, PhD

Electrical Engineering

Ron Elsenbaumer, PhD

Chemistry

Choong-Un Kim, PhD

Materials Science &
Engineering

Wiley Kirk, PhD

Electrical Engineering

Seong Jin Koh, PhD

Materials Science &
Engineering

Ali Koyman, PhD

Physics

Frank L. Lewis, PhD, PE

Electrical Engineering

Hanli Liu, PhD

Bioengineering

J. Ping Liu, PhD

Physics

Fred MacDonnell, PhD

Chemistry

Martin Pomerantz, PhD

Chemistry

Dan Popa, PhD

Electrical Engineering

Automation & Robotics

Nikolai Stelmakh, PhD

Electrical Engineering

Harry Stephanou, PhD

Electrical Engineering

Automation & Robotics



Several pieces of specialized equipment were acquired during the year. Shown above, clockwise from top left: Zeiss 1540XB three-gas, Focused Ion Beam system; Zeiss Supra 55VP Scanning Electron Microscope, capable of sub-nanometer resolution; Neocera turn-key pulsed laser deposition system with 18-inch turbo-pumped vacuum chamber; RHK Ultra-high Vacuum Scanning Tunneling Microscope with surface preparation chamber.

The Nanotechnology Research and Teaching Facility (NanoFab) hosts interdisciplinary research activities, primarily involving several College of Engineering and College of Science units, plus researchers from local universities and area electronics industries. Housed in a 35,000 sq. ft. two-story building, the facility contains a variety of specialized research and teaching sections. The 6,000+ sq. ft., Class 1000 main clean room is separated into areas for materials deposition, characterization and processing, photolithography and teaching. An additional 4,800+ sq. ft. of space is devoted to laboratories containing particular equipment and/or testing facilities

Renovations valued at \$4.6 million added 11 new laboratories with a total area of about 4,000 sq. ft. to NanoFab building. These included three labs to accommodate an SEM, an STM and an E-Beam writer, plus two wet chemical labs, two optoelectronics labs, a nano-giga electronics lab, a cryoelectronics lab and a nano-device lab. The labs will benefit seven Electrical Engineering faculty (two are new additions) and four Materials Science and Engineering faculty (three are new additions). Faculty associated with the Center for Nanostructured Materials (CNM) as well as other UTA faculty also have full access to

the facilities. NanoFab staff provide training to UTA researchers at no cost to use the facilities.

Currently, 24 faculty and more than 100 students and post-docs use the facility. The faculty associated with NanoFab have received ~\$6 million in research funding.

Research activities in the facility are conducted through mutually-beneficial associations of chemistry, electrical engineering, mechanical and aerospace engineering, materials science and physics faculty, graduate students and research assistants at UTA, as well as collaborative efforts with investigators at other universities and in the private sector. The following are descriptions of projects being conducted by Electrical Engineering Assistant Professor Michael Vasilyev.

Nonlinear-optical devices for optical communication and information processing

The rapid progress in the speed of computation and signal processing realized by silicon integrated circuits is expected to slow down dramatically in the near future. This

is because the nanometer-scale size of the circuit elements and their characteristic response times are approaching their limits imposed by quantum mechanics. As engineers start looking for alternatives to electronic processing, they are turning to nonlinear optics. Indeed, the high frequency of light waves allows one to pack thousands of times more information into the light compared to the electronic signal. The low-loss transmission media such as optical fibers, along with wide-band optical amplifiers, let the lightwave signals propagate over thousands of miles without significant degradation. However, the current show-stopper preventing the use of optics in signal processing is the difficulty of making optical decision circuits which require nonlinear input-output relation similar to that of electronic diodes and transistors. This functionality is the scope of nonlinear optics, and the focus of research carried out by the group led by Dr. Vasilyev.

Dr. Vasilyev and his collaborator, Dr. Taras I. Lakoba at the University of Vermont, have recently invented a new all-optical decision circuit that can simultaneously process optical signals carried by many different wavelengths, resulting in a hundred-fold increase of signal-processing capacity. Such functionality was not possible to achieve in any existing nonlinear-optical materials, because the nonlinear response needed for making the decision also inevitably mixes the signals from different wavelengths, making the output incomprehensible. The solution proposed by the team is a new type of nonlinear medium that has not existed in nature. The new artificial medium,

by design, separates the effect of optical nonlinearity needed for making the decision from the nonlinear crosstalk effects corrupting the signal. Dr. Vasilyev's group, in collaboration with Dr. Nikolai Stelmakh of UTA's Electrical Engineering Department, is currently working on fabrication of this novel medium and demonstrating the decision-circuit operation in the lab. This technology is valuable for high-speed information processing, as well as for improving reach, capacity and flexibility of optical communication networks.

Nanoscale quantum optics is another of Dr. Vasilyev's projects, this one carried out in collaboration with Dr. Prem Kumar at Northwestern University. By placing a tiny light emitter such as a quantum dot or a fluorescent polymer molecule into a nanometer-scale cavity, a virtually complete control over the properties of the emitted light can be obtained. As a result, it's possible to make an optical switch controlled by just a few photons or a laser producing single photons on demand. The former of these devices is important for integrating the optical signal-processing functions on a chip. The latter is indispensable for ensuring unconditional security of optical communications (quantum cryptography) and is also very promising as a building block for the most advanced computing technology on the horizon, the quantum computer.

The research by Dr. Vasilyev's lab is supported by the National Science Foundation, Lockheed Martin Corporation and UTA's Research Enhancement Program.



Graduate student Sravanthi Thotakura and Dr. Michael Vasilyev prepare to test an optical amplifier prototype for their 10 Gb/s recirculating-loop testbed. The testbed is used to study the operation and cascability of the novel devices performing nonlinear-optical signal processing of high-speed signals carried by multiple wavelengths.

Meng Tao, PhD
Electrical Engineering

Michael Vasilyev, PhD

Electrical Engineering

Andrew White, PhD
Physics

Alex Weiss, PhD
Physics

Weidong Zhou, PhD
Electrical Engineering

Adjunct Faculty

Edward Kolesar, PhD
Engineering Texas Christian University



College of Engineering Distinguished Alumni

Michael S. Greene
Chairman & CEO
TXU Power

Mike Greene has 35 years of experience with TXU, its forebears and various subsidiaries, including TXU Power, the generation arm of TXU. He graduated from UTA in 1969 with a bachelor's degree in mechanical engineering and he began that year as a junior engineer in the power department at Texas Electric Service Co. Mr. Greene has held several positions at TXU, including power sales representative, plant superintendent, general manager of engineering, vice president of marketing and president of electric transmission. In 2003, he became president of Oncor Group, consisting of Oncor Electric Delivery and TXU Gas, before assuming his current position in May of 2004.



College of Engineering Hall of Achievement

Michael Glinski
Manager
General Motors Arlington Assembly Plant

Michael Glinski is responsible for providing overall plant leadership to assure that business objectives such as production, quality, safety, responsiveness and cost initiatives are met or exceeded. He received a BS in Electrical Engineering from the University of Wisconsin and has completed Penn State's Executive Development Program. Mr. Glinski worked as an electrical systems designer before joining GM in 1984 as an electrical engineer. He progressed through managerial positions in GM plants in Janesville, Wisconsin and Fort Wayne, Indiana before coming to Arlington in 2002. Mr. Glinski is an active leader in several boards and committees for the UTA College of Engineering and the Arlington Chamber of Commerce. He is also the assistant Cubmaster for Pack 905 in Southlake and a licensed Professional Engineer.

Academic and Professional Achievements of Faculty

Biomedical

Behbehani, Khosrow

US Patents: ECG Derived Respiratory Rhythms For Improved Diagnosis of Sleep Apnea, 2002; Method and Apparatus for Detection and Diagnosis of Airway Obstruction Degree, 2000; Method and Apparatus for Treatment of Sleep Disorder Breathing Employing Artificial Neural Network, 1999; Methods and Apparatus for Controlling Sleep Disorder Breathing, 1995; Methods and Apparatus for Controlling Sleep Disorder Breathing, 1993

Chuong, Charles

Fellow, AIMBE; Member, Special Emphasis Review Panel, National Heart, Lung, Blood Institute (NIH), 1999-present; Member, Scientific Review Committee, National Health Research Institutes, Taiwan, 1995-present; Engineering Initiation Award, NSF, 1987

Eberhart, Robert C.

Fellow, ASME; Founding Fellow, AIMBE; Chair, Research Review Committee for Pharmacology, Pharmaceutical Sciences and Biomaterials, Foundation for Science and Technology of Portugal, 2001; Career Achievement Award, Houston Society for Engineering in Medicine and Biology, 1997; President, American Society for Artificial Internal Organs, 1995

Liu, Hanli

US Patent (pending): Method and Apparatus for Probe Localization in Brain Matter; Young Scientist Award, Houston Society for Engineering in Medicine and Biology, 1998

Nelson, Kevin D.

US Patent: Drug Releasing Biodegradable Fiber Implant; US Patents (pending): Surface Attachment of Warfarin as a High Albumin Affinity Ligand to Enhance Biocompatibility; Co-precipitation of Hydrogel into Vascular Graft for Gene/Drug Therapy

Tang, Liping

Outstanding Young Investigator Award, Biomaterials Society, 2001

Civil & Environmental

Abolmaali, Ali

Member, Oklahoma Science Academy,

Faria, David A.

Fellow, National Transit Institute

Gregory, Garry H.

Member, Embankment Materials Committee, US Society of Dams, 2001; Outstanding Graduate Student, South Dakota School of Mines and Technology, 1993

Horn, Jr., Howard R.

CECT Engineering Excellence Awards, 1972 (2), 1984, 1985; National Award for Excellence, Post-Tensioning Institute, 1983

Hoyos, Jr., Laureano R.

Outstanding Ph.D. Graduate, College of Engineering, Georgia Institute of Technology, 1998

Matthys, John H.

Fellow, ASTM; President's Award, The Masonry Society, 1998; Outstanding Published Paper on Masonry, ASTM, 1991

Nedderman, W. H.

Anson Marston Medal, Iowa State University, 2000; Lamar Medal, Association of Texas Colleges and Universities, 1997; Service to People Award, Texas Section, ASCE, 1987; Engineer of the Year, Texas Section, ASCE, 1965

Parker, Clinton, E.

Fellow, ASCE; Life Member, Water Environmental Federation; Life Member, American Water Works Association; Life Member, Water Environment Association of Texas

Puppala, Anand J.

Best Paper Award in Geotechnical Engineering, Texas Section, ASCE, 1998

Qasim, Syed R.

Life Member, ASCE; Life Member, Water Environment Federation

Williams, James C.

Fellow, ASCE; Fellow, ITE; Outstanding Student Chapter Advisor, ASCE, 2001; Section Technical Award, ITE, 1990

Computer Science

Al-Khaiyat, Maher

USIA Fulbright Grant, 1995

Aslandogan, Y. Alp

US Patent (pending): Method and System for Safe Emergency Vehicle Operation Using Route Calculation; Best Student Paper Award, ACM Multimedia, 2000

Carroll, Bill D.

Fellow, IEEE; Third Millennium Medal, IEEE, 2000; NASA Technology Innovation Awards, 1980, 1982; NSF Professional Development Fellowship, 1979- 80; Dow/ASEE Outstanding Young Faculty Award, 1975

Cook, Diane

NSF Career Development Award, 1995; NSF Research Initiation Award, 1993; NASA Summer Research Faculty Fellow, Ames Research Center, 1991

Das, Sajal K.

US Patent: Selectively Delaying Data Communications in a Wireless Communication System to Provide Voice Communications Capacity, 2001; US Patents (pending) – "A Frame Discarding Algorithm for IS-99 CDMA Radio Link Protocol," "Telecommunication Enhanced Mobile IP Architecture for Intra-Domain Mobility," "Methods and Systems for a Generalized Mobility Solution Using a Dynamic Tunneling Agent," "Supporting Fast Intra-Domain Handoffs and Paging in Wireless Cellular Networks;" Best Paper Awards: SAIC ESTC, 2003; 16th ICOIN, 2002; 3rd ACM MSWIM, 2000; 5th ACM/IEEE MobiCom, 1999; 11th ACM/IEEE PADS, 1997; Outstanding Service Awards from ACM and IEEE

Elmasri, Ramez

US Patent: Time Index Access Structure for Temporal Databases Having Concurrent Multiple Versions, 1995

Holder, Larry

UTA Awards: Academy of Distinguished Teachers, 2002; Chancellor's Council Award for Excellence in Teaching, 2000; Outstanding Young Faculty Award, 2000; Teaching Excellence Award, 1999

Kung, David

Ranked 11th Software Engineering Scholar Internationally by Journal of Systems and Software, 1996

Peterson, Lynn Louise Meister

UTA Academy of Distinguished Teachers, 1998

Reyes, Arthur Alexander

NASA Graduate Student Research Fellowship, 1993-96

Shirazi, Behrooz A.

US Patent (pending): PARSA - A Software Development Environment; Meritorious Service Award, IEEE Computer Society, 1998; Distinguished Lecturer, ACM Series, 1993-97; Distinguished Visitors Program, IEEE Computer Society, 1993-96; AFOSR Summer Research Faculty Fellow, 1990

Walker, Roger

Top10 Research Innovation Award, Texas Department of Transportation, 2000

Weems, Bob

UTA Awards: Outstanding Graduate Advisor, 2000; Outstanding Teacher in College of Engineering, 1998; R.Q. Lee Award for Excellence in Engineering Teaching, 1993; Halliburton Outstanding Young Faculty Member, 1989

Yerraballi, Ramesh

NASA Fellowship, 1994, 1995

Zaruba, Gergely

Best Paper Award, 3rd ACM MSWIM, 2000

Electrical

Alavi, Kambiz

US Patent: Multi-Quantum Well Lasers, 1986; NSF Research Fellowship, Texas Instruments Central Research Lab. 1997

BuAbbud, George H.

US Patents: Shared Laser Tandem Optical Time Domain Reflectometer, 1991; Echo Canceling Circuit for Use with Laser, 1991; Closed Loop Control System for Laser, 1990

Butler, Donald

US Patents: Uncooled Amorphous YBaCuO Thin Film Infrared Detection, 1998; Amorphous YBaCuO Thin Film Infrared Bolometer for Uncooled Infrared Detection. 1998; Uncooled YBaCuO Thin Film Infrared Detector (Divisional Application for Pyroelectric Effect), 1997; Uncooled YBaCuO Thin Film Infrared Detector, 1996; Distinguished Lecturer, IEEE Electron Device Society, 2000-present; IEEE Third Millennium Medal, 2000; Outstanding Service Award, Dallas Chapter of the IEEE Electron Device Society, 1990, 1996, 1999

Carter, Ronald L.

NSF Research Fellowship, Hewlett-Packard Network Measurements, 1990-91

Celik-Butler, Zeynep

US Patents: Uncooled Amorphous YBaCuO Thin Film Infrared Detection, 1998; Amorphous YBaCuO Thin Film Infrared Bolometer for Uncooled Infrared Detection, 1998; Uncooled YBaCuO Thin Film Infrared Detector (Divisional Application for Pyroelectric Effect, 1997; Uncooled YBaCuO Thin Film Infrared Detector, 1996; Distinguished Lecturer, IEEE-Electron Devices Society, 1998 –present; Sigma Xi Research Award, 1997; Electron Devices Society, Dallas Section Outstanding Service Awards, 1995, 1996, 1997

Chen, Mo-Shing

Fellow, IEEE

Chiao, Jung-Chih

US Patent: Temperature Compensation of a Wedge-Shaped Liquid-Crystal Cell, 2000; US Patents (pending): Quasi-Optical Beam-Steering Arrays and Reconfigurable Medium, Antenna Phased-Array based on Reconfigurable Photonic-Bandgap (PBG) Ground Plane, Self-assembly Integrated MEMS Optical Wavelength Multiplexers/DeMultiplexers, RF MEMS Reconfigurable Transceivers and Components

Devarajan, Venkat

Rockwell International Fellowship, UTA, 1977-79

Kirk, Wiley P.

US Patents: Anode Plate for Flat Panel Display, 1997; US Patent (pending): Gate Adjusted Resonant Tunnel Diode; NBS Precision Measurements Award, 1987

Kondraske, George V.

Fellow, IEEE; US Patents: Electronic Angular Position and Range of Motion Measuring Device, 1991; Sensor Conditioning Method and Apparatus, 1989

Lee, Wei-Jen

Chapter Chair: Stability Analysis, IEEE Standard 399-1998 (Brown Book), 1998; Chapter Chair: Surge Voltage Protection, IEEE Standard 141-1993 (Red Book), 1995; Chapter Chair: Energy Management for Motors, Systems, and Electrical Equipment, IEEE Standard 739 (Bronze Book Revision); Chapter Chair: Load Flow Analysis, IEEE Std. 399 (Brown Book - Revision)

Lewis, Frank

Fellow, IEEE; US Patents: Method and Apparatus for Testing and Controlling a Flexible Manufacturing System, 2000; Method for Feedback Linearization of Neural Networks, 1999; Discrete-Time Tuning of Neural Network Controllers, 1999; Guest Professor, Shanghai Jiao Tong University, China; Foundin Member, Board of Governors, Mediterranean Control Association; Editor, Adaptive and Intelligent Control, Automatica, 1999-2002; IEEE Control Systems Society Distinguished Lecturer, 1998-2002; New York Academy of Sciences, 2000; Board of Governors, IEEE Control Systems Society, 1995; ASEE F.E. Terman Award for Authors Under Forty, 1989; Fulbright Research Award, 1988

Liang, Qilian

Young Investigator Award, Office of Naval Research, 2003; Outstanding Transactions Paper Award, IEEE Neural Networks Society, 2002

Oraintara, Soontorn

US Patents: Systems and Methods for Improving Power Spectral Estimation of Speech Signals, 2002; Soft Decision Signal Estimation, 2002; Technology Development Award, Boston University, 2000

Phabhu, Vasant K.

Fellow, IEEE; Centennial Medal, IEEE, 1984; US Patents: Dynamic Radio Resource Allocation in a Wireless Communication System, 2001; Frequency-hopped Single Sideband Mobile Radio System, 1984; Spread Spectrum FH-MFSK Receiver, 1981. Exceptional Contribution Award, AT&T Bell Laboratories, 1989-1991; Distinguished Member of Staff Award, AT&T Bell Laboratories, 1981; Lockheed Martin Excellence in Teaching Award, UTA, 1998

Rao, Kamisetty R.

Fellow, IEEE; Distinguished Research Award, UTA, 1992; Halliburton Award for Outstanding Research, UTA, 1984-85

Shoultz, Raymond

Senior Member, IEEE; Halliburton Award for Outstanding Research, UTA, 1995

Smith, Jr., Charles Vincent

US Patents: Apparatus and Method for Generation of Microspheres of Metals, 1998; Heat-Resistant Broad-Bandwidth Droplet Generator, 1996

Svihel, Bernard T.

Life Senior Member, IEEE; US Patents: Collection and Conversion of Solar Energy, 1979; Heating and Cooking Food by Electrical Conduction, 1974

Tao, Meng

South Central Bell Professorship, Louisiana Tech University, 2001

Tjuatja, Saibun

Senior member, IEEE; Outstanding Young Faculty Award, UTA, 1997

Wang, David C.

US Patent: Methods and Apparatus for Local Number Portability in Telecommunications Systems, 2002; Asian American Engineer of the Year Award, Chinese Institute of Engineers, 2002

Industrial & Manufacturing Systems

Liles, Don H.

President, Alpha Pi Mu (National IE Honor Society); Board Member, Texas Manufacturing Assistance Center

Priest, John W.

US Patents: Apparatus and Method for Generation of Microspheres of Metals, 1998; Heat-Resistant Broad-Bandwidth Liquid Droplet Generators, 1996

Rogers, K. J. (Jamie)

Member, Engineering Accreditation Commission

Materials Science & Engineering

Chan, Wen S.

Associate Fellow, AIAA; Editor, *Journal of Aeronautics & Astronautics of Taiwan* (2003-present); Keynote Speaker, Aerospace Technology Conference, National Science Council, Taiwan, 2000; Phi Beta Delta, Honor Society for International Scholars, 1999; Best Structures Paper Award, American Helicopter Society, 1996; Bell Helicopter Invention Award, 1990; Best Composites Paper Award, 31st SAMPE, 1986

Elsenbaumer, Ronald S.

26 US Patents, including: Conductive Polymer Film Formation Using Initiator Pretreatment, 1993; Conductive Polymers Formed from Conjugated Backbone Polymers, 1993; Thermally Stable Forms of Electrically Conductive Polyaniline, 1992; Solution Processible Forms of Electrically Conductive Polyaniline, 1991; Stabilized Polyelectrolyte Precursors of Polyaromatic and Heteroaromatic Vinylenes, 1991; Adjustable Tint Windows with Electrochromic Conductive Polymer, 1991

Goolsby, Roger D.

ASEE/Navy Summer Faculty Fellowship, 1987

Petty-Galis, Jamie Lee

US Patents: High Temperature Tooling for Compression Molds of Graphite-Reinforced Composites, 1988

Mechanical & Aerospace

Agonafer, Dereje

Fellow, ASME; US Patents: Cavity Plate and Jet Nozzle Assemblies for Use in Cooling an Electronic Module, 2002; Air Flow Distribution in Integrated Circuit Spot Coolers, 1998; Methods and System for Thermal Analysis of Electronic Packages, 1997; Convertible Heat Exchanger for Air or Water Cooling of Electronic Circuit, 1996; US Patent (pending): Isothermal Heat Sink with Tiered Cooling Channels; Chair, Electrical and Photonic Packaging Division, ASME, 2000; Distinguished Engineering Alumnus, University of Colorado, 1998; Distinguished PhD Alumnus, Howard University, 1998; Outstanding Contribution in Computer-Aided Thermal Management of Electronic Packages Award, ASME, 1998

Anderson, Dale A.

Associate Fellow, AIAA; Keynote Speaker, Aerospace Technology Conference, National Science Council, Taiwan, 2000; Alumni Merit Award, St. Louis University, 1986

Dulikravich, George S.

Fellow, ASME; Associate Fellow, AIAA; Founder and Editor-in-Chief, *Inverse Problems in Engineering*, 1994-present; Associate Editor, *Novi Sad Journal of Mathematics*, 1996-present; Associate Editor, *International Journal of Nonlinear Modeling in Science and Engineering*, 2000-present; Associate Technical Editor, *ASME Journal of Heat Transfer*, 2001-2004; Eli Carafoli Award and Commemorative Medal, Politechnica, Bucharest, Romania, 2001; ALCOA Foundation Faculty Research Fellow Award, 1996-1998; Keynote – mini-symposium on “Computational Treatment of Inverse Problems in Mechanics” at the 5th World Congress on Computational Mechanics, Vienna, Austria, 2002

Emanuel, George

Fellow, AAAS; Associate Fellow, AIAA

Gaines, J. H.

Fellow, AIAA

Haji-Sheikh, A.

Fellow, ASME; Exemplary Service Award, *ASME Journal of Heat Transfer*, 1993

Hullender, David Allan

US Patent: Autonomous Controlled Drug Dispensing System, 1995; Best Paper Award, American Control Conference, 1993

Joshi, Shiv P.

Founding Member, American Society for Composites

Lawrence, Kent L.

Fellow, ASME

Lu, Frank K.

Associate Fellow (Life Member), AIAA; Advisor Board Member, AIAA Progress in Astronautics and Aeronautics, 2003-present; Editor, *Shock Wave Journal*, 2001-present; Keynote - Paul Vieille lecture, 24th International Symposium on Shock Waves, Beijing, 2003; Keynote - I. I. Glass Memorial Lecture, Symposium on Shock Waves, Tokyo, 2000; Outstanding Ground Testing Paper, 35th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit, Los Angeles, 1999; provisional US Patent: "Ejector-Augmented Pulsed Detonator Rocket"

Mills, John J.

Visiting Professor, Technical University of Eindhoven, The Netherlands, 2000; Guest Professor, Swiss Federal Institute of Technology, Switzerland, 2000; Star of Advanced Management Program, Martin Marietta Corp.; Alexander von Humboldt Fellow, 1971-73; British Oxygen Research Fellow, 1964-66

Nomura, S.

Advisory Editor, *Advanced Composites*, 1998 - present

Payne, Fred R.

Founder, Integral Methods in Science and Engineering series of international conferences, 1985; Inventor, universal differential equation solver, 1980; NASA/ASEE Summer Faculty Fellowship, Ames Research Center, 1988, 1989

Seath, Donald D.

NASA/AIAA Summer Faculty Fellowship, Johnson Space Center, 1984

Tong, Albert Y.

Summer Faculty, Sandia Livermore National Lab, 1987; AFOSR/SCEEE Summer Faculty Fellowship, Wright-Patterson AFB, 1984

Wang, Bo Ping

Certificate of Recognition, Tech Brief publication, NASA, 1978

Wilson, Donald R.

Associate Fellow, AIAA; Ground Testing Award, AIAA, 2001; NASA/ASEE Summer Faculty Fellowship, Lewis Research Center, 1971, 1972; provisional patent - "Ejector-Augmented Pulsed Detonator Rocket"

Yih, T. C.

US Patent (pending) - Skew Pantograph Robotic Apparatus; Senior Summer Research Fellow, DoD NAVAIR, 1997, 1998, 1999; Staff Scientist/Faculty Fellow, Lawrence Berkeley National Laboratory, 1983-1994; Summer Faculty Research Fellowship, Oak Ridge National Laboratory, 1990, 1995.

You, Seung-Mun

US Patent: Boiling Enhancement Coating, 1998

New Faculty for Fall 2005

Bernd Chudoba is an Assistant Professor of Mechanical & Aerospace Engineering. He received his Ph.D. in aircraft design from Cranfield University, England. His research interest is in aerospace vehicle design. Dr. Chudoba will teach a course on aerodynamics of incompressible flows.

Yaowu Hao is an Assistant Professor in Materials Science and Engineering. He received his Ph.D. from MIT. His research interests are micro/nano fabrication; electrical, optical and magnetic properties; nanobiotechnology; magnetic materials and electronic thin film technology. This fall, Dr. Hao will teach an Introduction to Materials Science course.

Michael Jin is an Assistant Professor in Materials Science and Engineering. He received his Ph.D. from the University of Illinois at Urbana-Champaign. Dr. Jin's research interests include photovoltaic material and devices, polycrystalline semiconductors, conducting polymers and soft lithography. He will be teaching a Polymer Materials Science course this fall.

Seoung Bum Kim is an Assistant Professor of Industrial and Manufacturing Systems Engineering. He received his Ph.D. in Industrial and Systems Engineering in 2005 from the Georgia Institute of Technology. Before joining UTA, he had worked at the Emory University Medical School as a post-doctoral fellow. He was awarded the Jack Youden Prize as the best expository paper in Technometrics for the Year 2003. He is a member of the Institute for Operations Research and Management Science and Institute of Mathematical Statistics. His research interests include machine learning algorithms and multiple hypotheses testing in large-scale problems. A special focus of his work involves the application of statistic and data mining techniques to biomedical and environmental problems.

Donggang Liu is an Assistant Professor of Computer Science & Engineering. He received his Ph.D. from North Carolina State University. His research interests are information security and problems in wireless sensor networks. Dr. Liu will be teaching a course on sensor network security.

Mingyu Lu is an Assistant Professor of Electrical Engineering. He received his Ph.D. at the University of Illinois at Urbana-Champaign. His research interests are microwave and electromagnetics engineering, time domain electromagnetic simulation, fast algorithms and parallelization. He will be teaching a course on electromagnetics.

Kytai Truong Nguyen is an Assistant Professor of Bioengineering. She received a Ph.D. in Chemical Engineering from Rice University and was formerly with the Department of Biological Engineering at Utah State University. Dr. Nguyen's research interests are tissue

engineering strategies to reduce implants' adverse reactions; nanoparticles as drug and gene therapy delivery systems to treat cardiovascular diseases, obesity, and cancer; and the effects of biomechanical and biochemical factors on the regulation of vascular cells. She will teach a course on drug delivery.

Dan Popa is an Assistant Professor of Electrical Engineering who received his Ph.D. in Computer & Systems Engineering from the Rensselaer Polytechnic Institute. His research interests are mobile robotics, sensor networks, motion planning, intelligent control, virtual reality, micro-technology and MEMS. He will teach a course on nonlinear and adaptive control and conduct research at the Automation & Robotics Research Institute, playing a leading role in strengthening the micro-manufacturing research program and laboratory infrastructure.

Kevin Rainey is an Assistant Professor in Mechanical & Aerospace Engineering. After receiving his Ph.D. from UTA in 2001, Dr. Rainey began working at the Los Alamos National Laboratory. His research interests are heat transfer and fluid dynamics, nucleate boiling heat transfer, electronics cooling, high-speed friction under impact loading conditions, microwave interferometry and high explosive diagnostics. He will teach a thermal engineering course.

Zhou Wang is an Assistant Professor of Electrical Engineering. He received his Ph.D. in Electrical and Computer Engineering from The University of Texas at Austin. Before coming to UTA, Dr. Wang was a Howard Hughes Research Associate in the Laboratory for Computational Vision at New York University's Center for Neural Science and Courant Institute of Mathematical Sciences. His research interests are in signal/image/video/multimedia processing and computational vision. He will be teaching a course on digital signal processing.

Nur Yazdani, P.E., is the new chair of the Civil & Environmental Engineering Department. Dr. Yazdani was formerly with Florida A&M University - Florida State University, where he was a professor and the director of the Infrastructure Research Laboratory. His research interests include structural engineering; concrete/timber bridge design, evaluation and rehabilitation; concrete properties; and infrastructure disaster mitigation, preparedness, response and recovery. He received his Ph.D. from the University of Maryland - College Park.

The University of Texas at Arlington
College of Engineering
Advisory Board Members

Marvin Applewhite – Texas Instruments (retired)
Jerry Beaty – Motorola, Inc.
Tom Blakely – Lockheed-Martin Aeronautics
Allen Bowling – Texas Instruments
Brad Bradford – National Semiconductor
Vernon Broomall – Vought Aircraft Industries
Monte Cely – SBC Labs
Frank Delisle – L-3 Communications, Link Simulation
Thomas Dudark – BAE Systems
Ed Dudley – Verizon Communications
Steve Evans – TriQuint Texas
Glenn Gaustad – G&G Techcon
Val Gavito – L-3 Communications, Integrated Systems
Brian Gawick – Fujitsu Network Communications
Mike Glinski – General Motors
Mike Greene – TXU Power
David Hunn – Lockheed Martin Missiles & Fire Control
Steven Jackson – MCI Communications
Wes Jury – Arlington Chamber of Commerce
Bruce Mallett – U.S. Nuclear Regulatory Commission
Linda McCalla – Texas Instruments (retired)
Michael McLeland – SBC Communications
Glenn Miller – Lockheed Martin Missiles & Fire Control
Mike Morrison – Freese & Nichols
Craig Murphy – Sabre Holdings
Don Perry – Dallas County Community College District
Steven Sanders – GSWW
Michael Shiflett – Kleinfelder
Jeff Smith – SensorLogic
Mark Sunderland – Nokia Mobile Phones
Elaine Vaught – Bell Helicopter Textron
James Watson – STARTech Technology Development
Keith Weiss – Raytheon Space & Airborne Systems



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