THE UNIVERSITY *of*
NEW ORLEANS

DEPARTMENT OF ELECTRICAL ENGINEERING REPORT

2004-2005
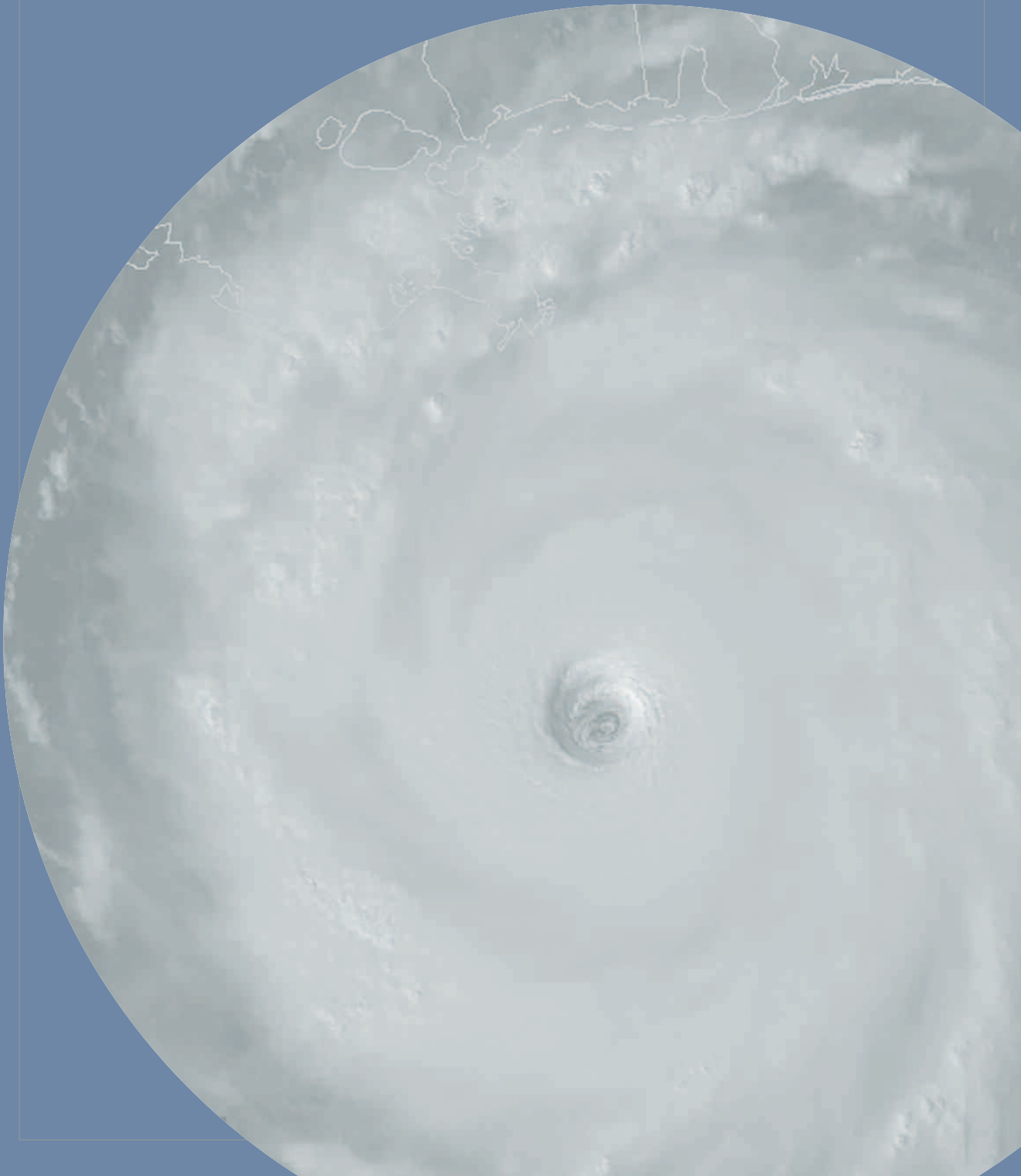
CHAIRS' WELCOME AND INTRODUCTION

If you didn't know of our existence before, you were not alone. Before Katrina, not many people outside Louisiana or the Gulf Coast Region knew of us – but the Hurricane changed all that. If it hasn't, this report will.

Along the U. S. Gulf Coast everyone knows how seriously Katrina has affected our lives – by forcing us away from our homes, destroying our houses and workplaces, separating us from friends and family, closing down our children's schools, and drastically reducing our student enrollment.

The impact of Katrina on the affected Gulf Coast region cannot be overstated. Many people in the region talk in such terms as "pre-Katrina" and "the post-Katrina world." Currently we are all working in difficult conditions. Our houses have not been repaired and our office building has not reopened officially even today, eight months after Katrina. But as engineers, we can and will help rebuild our University and our City and improve their infrastructure. We will continue to strive for outstanding programs and research contributions and will overcome the difficulties brought on by this most devastating storm and its aftermath.

We are pleased to prepare this report not only as documentation of our accomplishments but as an affirmation of our commitment to rebuild and grow. The devastation caused by Katrina has delayed us, but it will not derail our pursuit of academic excellence.

Our Department has experienced quite an eventful period in 2004-2005. We continue to go through changes that enable the shift from a teaching-centered department to one that focuses on research as well as teaching, as amply evidenced by the activities and achievements documented in this report.

The Department continued growing in faculty size, as it has since the year 2000, a trend that simultaneously yields increased research productivity, improved quality of education and service to our community and profession. We have expanded our areas of expertise while strengthening our core focus areas with new hires. Major contributions have been made in several of our focus areas by faculty who range from promising young assistant professors to world-renowned scholars. We are all committed to continued improvement for academic excellence.

A distinctive characteristic of the Department is the size of its junior faculty. We are happy to report that many of our young assistant professors have made a quantum leap in their careers, especially in terms of publications and external funding.

One of our strengths, and another distinctive characteristic of the Department, is our strong ties to industry in the Greater New Orleans area. While we continue to enjoy local industry's strong involvement in our educational programs, our partnership in research and development has been strengthened even more significantly in this period. According to the post-Katrina technology revitalization plan prepared by the Louisiana Technology Council, revitalization of the Information and Systems Technology Research Center, led by our Department, is one of its three primary initiatives for the development and revitalization of the technology industry in the New Orleans region after Katrina.

Our academic achievements and major contributions covering the years 2004 and 2005 are described in the following pages. We include information about our programs and research areas, about our students, faculty, board, and alumni. Major contributions in the academic areas of research, teaching, and professional service are presented. We also encourage our audience to contact us for any other information.

Enjoy your reading!

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DEPARTMENT OF ELECTRICAL ENGINEERING
UNIVERSITY OF NEW ORLEANS   NEW ORLEANS, LA 70148, U.S.A.

SUMMARY STATISTICS

UNIVERSITY STATISTICS

Total number of full-time faculty members: 590
Number of degrees awarded in Academic Year 2004-2005:
- Bachelor's: 1,727
- Master's: 869
- PhD: 79
- Student enrollment (Fall 2004): 17,350
  - Undergraduate: 13,225
  - Graduate: 4,125

DEPARTMENT STATISTICS

Total number of faculty members in 2004-2005:
- Full time: 14
- Part time: 11
- Visiting: 1

Number of degrees awarded in 2004-2005:
- Bachelor's: 77
- Master's: 28
- PhD: 2

Student enrollment (Fall 2004):
- Undergraduate: 447
- Graduate: 47

Total number of courses offered in 2004-2005:
- Undergraduate: 117
- Graduate: 30

Total number of faculty publications in 2004-2005:
- 3 book chapters
- 42 journal articles
- 96 conference proceedings papers
- 2 abstracts

Faculty life-time publication record
- 42 books
- 6 edited volumes
- 20 book chapters
- 548 journal articles
- 525 conference proceedings papers
- 6 patents
- 37 abstracts

SCI citations in 2004-2005 of faculty publications since joining UNO: 706
Externally funded research projects in 2004-2005:
- Total number: 18
- Total amount: $1.7M

The Katrina and Rita Legacy

This little ditty
Is about our beat-up city,
And how its great university
Measured up to adversity.

Our point-of-view is electrical engineering,
About our stories and about persevering.
Unprecedented devastation — that's Katrina and Rita.
They made us all drink too much Abita.

Now, our motto is "survive, then advance!"
Submit more publications, write bigger grants.
But most important, provide quality education
To our students around the globe and the entire nation.

Amps, chips, circuits and gates,
They learn it all, and taught first rate.
Each class informed by Katrina's "blessings."
Their careers launched with incredible lessons.

Our story unfolds as if by Fourier analysis,
No deep scars, no serious paralysis.
Please read our tales, but shed not a tear.
Bigger, better -- we are here!

—Dr. Bobby L. Eason

Dateline New Orleans, Friday, August 26, 2005, 4:30 p.m.

The UNO Faculty Club is hosting its monthly happy hour for faculty and staff. Several of us Electrical Engineering (EE) professors and staffers wander over. The drinks are smooth, the hors d'oeuvres plentiful, but not one word is said about a "little" hurricane just inching into the Gulf of Mexico. The last we heard, the Category I storm was turning up the western coast of Florida and heading eastward back into the Atlantic. At 6:30 p.m., our crowd leaves for home. Nonchalantly, we seek weather information. The storm has not turned back into the Florida peninsula, but is heading toward the Florida panhandle. Dubiously we listen as some models predict Louisiana. Zhansheng Duan, a newly arrived PhD student, unaware, studies in his off-campus apartment two blocks from the now famous London Canal. He has not heard the reports until the Director of UNO's International Students and Scholars called him: "You should consider evacuation." A few calls are made; he perceives little concern; and he decides to stay.

Saturday, August 27, 2005, a.m.

Most of the faculty, students, and staff of the Department of Electrical Engineering, now better informed, evacuate New Orleans. We secure our homes, reserve hotels, inform family members, and leave town. From our hurricane history, we know to pack for three days. The interstates and back roads are clogged in response to the evacuation warnings. Zhansheng remains unaware. He prepares for a Saturday afternoon seminar on information fusion.

Saturday, August 27, 2005 p.m.

The Mayor of New Orleans announces that the National Hurricane Center now recommends total evacuation. Contra flow of highways is implemented. The weather channel tells the full story. Even most of the die-hards evacuate, but not Zhansheng. Before he fully understands, the few faculty and students that he knows have left. With no car and few resources, his only choice is to stay in his second floor apartment. Zhansheng feels alone.

Sunday, August 28, 2005

In Houston, Dallas, Birmingham, Little Rock, Memphis, Tallahassee, and in hundreds of other towns and cities out of harm's way, we book our lodging, only no vacancy signs await the laggards. We squat in front of TVs listening for updates. We pray the storm will turn, but the ominous models offer little hope. Zhansheng invites a new friend and countryman to his apartment. They begin the vigil. Some bottled water and canned goods are retrieved. A tote bag is filled with identification papers and other essentials. The wait begins.

Monday, August 29, 2005 early a.m.

With pizza boxes strewn about with several empty beverage bottles, we pass on sleep and watch and listen to the media provide storm updates. New Orleans has lost electricity, cell phones stop working, the storm has hit. We wait for light to see the first glimpses of the destruction. Zhansheng and friend have spent a terror-filled night as windows break and rain and wind fill their apartment. Zhansheng on battery radio, and we evacuees on TV hear good news: at the last moment the storm turned a few degrees to the East. Except for wind damage to buildings and trees, yet again New Orleans is spared the ravages of a direct hit. At light, Zhansheng ventures a peep. The wind is howling, he sees tree and roof damage, and road signs down. But it has stopped raining and things look better than expected. But one thing is strange, with the rain stopped, the water in the street, although shallow, is slowly rising.

Monday, August 29, 2005 late afternoon and early evening

For us evacuees, more take-out food – can't leave the TV. What destruction! But it could have been worse. We think of our return and how to clear the trash and debris from our streets and yard. We wonder if our roofs held true. Zhansheng however, even before the media, knows the truth. The innocent water first noticed in the early hours is now rapidly rising toward his second floor, a real threat. No cell phone, no electricity, and no one to call for help. With the water inches away from his threshold, Zhansheng feels fear. Sipping drinking water and eating crackers, he and his friend contemplate what to do with the rising flood. Mercifully, the water stops rising. They move to his balcony and waive to three French international students. Then, helicopters, 30 or more, fly by, they spot the students, but none stop despite the frantic waves and yells. Finally night falls, Zhansheng briefly sleeps, the last sleep he will receive for several nights. Then from CNN, we learn what Zhansheng knows, the levee is breached, our worse fear has happened. The below sea level geographical bowl that is New Orleans is filling with water. Our homes are being destroyed as we watch on television.

Tuesday, August 30, 2005, early a.m.

Zhansheng's new French friends have success. With cell phones, they connect with a boat rescue team. In the pitch of night, with only back packs, the five are carried to an elevated highway and greeted by 500 other rescuees. Although the temperature is hot and humid, Zhansheng shivers as the wind blows over his perspiring body. Women are holding crying children, and Zhansheng misses his wife and child back in Xian, China. Zhansheng feels depressed.

Tuesday, August 30, 2005

As scattered evacuees, we now know that return to New Orleans is weeks, if not months, away. So much for our three-day supply of clothes. On TV, we wait for a leader to emerge—none does! Then we see what the world is seeing, shelters in New Orleans are not working. By now Zhansheng and his companions are a part of the masses in the Superdome shelter. At first Zhansheng feels relief. The National Guard provides water, food, security, and restroom facilities. But his feeling of protection doesn't last long. Relegated inside, the Dome's roof is partially gone, the seats are soggy, and the bathrooms are backed up with raw sewage. Rumors of evil and crime have started. Zhansheng feels fear.

Wednesday, August 31, 2005

For us EE evacuees, we are settling in. We pass time with TV, idle chatter, and repeated sentences of disbelief. What will we do next? Some of us will travel hundreds if not thousands of miles to the homes of relatives. Others will stay with friends. Yet others will gain a FEMA authorization code and stay in a hotel. People we meet are sympathetic, but we are not comforted. We smile and talk, but our funk is obvious. We call our insurance agents, FEMA, and try to call colleagues. Most cell phones don't work. Zhansheng spends another day at the Superdome. Dozens of international students have found each other and share a common section in the Dome. Late Wednesday, the Guard moves them to the New Orleans Arena, the home of the NBA Hornets. The Arena is filled with the elderly and infirmed, but the food and organization is better. The students learn to use their youth and knowledge to assist the doctors and nurses. Zhansheng likes having something to do. His job is to create fans and cool the patients. Just before evening, Zhansheng has good news. A student loans him a cell phone and he connects with his wife in China, "I'm O.K." he reports. Finally night-time, a dry stadium seat for a bed and the sweet words of his wife provide comfort. Zhansheng feels happy.

Thursday, September 1, 2005

Thursday is moving day for the evacuees, but not to New Orleans. We have seen what the world has seen—police chasing looters, desperate people at shelters without adequate preparation, reports of snipers firing at the national guard, helicopters trying to plug the breached levees, CNN anchors on the street, and that ever present ocean of water filling our beloved historic city and our homes. We start our vagabond journeys. It is also moving day for Zhansheng. One of the international students has contacted his Embassy. All students are to be moved to better conditions—the Hyatt Regency Hotel, the mayor's headquarters and operation central. Zhansheng's group is placed on the baggage floor, but the food and water are plentiful and security is tight. Still the heat and smell are relentless. Then the announcement comes, "We are taking you to Houston." But just as quickly, "Sorry, we have no more buses, you must stay in the hotel." Zhansheng inventories his feelings—fear, anger, depression, sorrow, pity, regret, and loneliness, but not humor.

Friday, Saturday, and Sunday September 2-3-4, 2005

Friday, Zhansheng spends more time waiting in the hotel with temperature approaching 100 degrees. The heat combined with the smell of human filth is stifling. Then a sound of buses, Zhansheng is excited to learn that he and his friends are Dallas bound. After an all night drive, the group arrives at a FEMA shelter. Most students are met by respective embassy personnel. Not Zhansheng, he and his friend have only the shelter. Feeling discomfort, they walk to a train station and make calls to a fellow countryman studying at another university. While Zhansheng and his friend rest in the terminal, electrical engineering students from the University of Missouri drive all night and pick them up. Sunday, the group checks into a hotel, the bath is glorious, then to Missouri. Zhansheng sleeps for most of the drive to Columbia.

September 5-October 9, 2005

Meanwhile, for us homeowners, the water is finally pumped from our homes, and we are allowed to return. We find mayhem. No electricity, no water, no grocery stores, and no activity define our communities. In our homes, layers of water rings, like family bathtubs of old, surround the exteriors. Some two feet, some eight and all in between meant one thing— our homes and our possessions are destroyed. Trembling, we enter and are greeted with utter devastation. We experience furniture overturned, stench from refrigerators, priceless art collections destroyed, water logged carpets, buckled wood floors, and the ubiquitous mold colonies spreading from floor to ceiling. We retreat and then organize. We don our respirator masks, unearth the wheel barrow, and with hammers in hand, begin gutting our homes. We haul one hundred, two hundred, then three hundred wheel barrow loads before we stop counting— all of our memories, now curb side, await a FEMA truck. We find our friends and tell our story, but no one listens, their story is even more poignant than ours. Unfocused with academics, we dutifully check our UNO e-mail messages and wait for the recovery plan. Meanwhile, Zhansheng is in Columbus, Missouri, and living with gracious strangers. Likewise, many of us are living with more fortunate friends as we cope with our loss.

October 10, 2005

We have known about October 10 for several weeks. Incredibly the Chancellor has found a way to open UNO for a fall semester. Working from day one after the storm, he and his staff have found a few dry classrooms and have assembled a patched up internet system for on-line courses. The clarion call has been made, and even though 250,000 homes in the New Orleans area were flooded, enough of us heed that call so that more than 7,000 students receive instruction during the fall 2005 term. UNO, one of ten New Orleans universities, is the only one to do so. The Chancellor, vice chancellors and deans share one office. Faculty lounge is all the faculty has. With homes destroyed, less than half of EE faculty can return, yet 25 classes are offered to 150 EE students. After a brief opening ceremony, we EE faculty meet our students and begin our work. We call roll, teach our courses, restart our research, conduct our business and perform service—after all, we are electrical engineers. Meanwhile Zhansheng makes a decision. Another university has enrolled him in their doctoral program and offered him financial assistance. Without hesitation, "No thanks!", Zhansheng acknowledges his appreciation, and buys a ticket for New Orleans. Zhansheng feels pride, he is a UNO electrical engineer.

(This section was contributed by Dr. Bobby L. Eason.)

FACULTY

Research Focus Areas

Information fusion and target tracking, detection, and recognition

Signal, image, and data processing

Optics and optical systems

Computing and communications

Faculty Expertise

Information fusion and target tracking, detection, and recognition

Signal and data processing (digital, statistical, optical, biomedical, radar, sonar, and audio)

Polarization, reflection, and thin-film optics; ellipsometry and polarimetry

Statistical inference, estimation, decision, filtering, identification, and forecasting

Image processing (texture analysis, image compression, computer vision, and face recognition)

Communications (digital, wireless, and optical), sensor networks, error-correction and speech coding

Computing (reconfigurable, optical, and high performance), electronic design, embedded systems

Control systems (stochastic systems, stability analysis, system identification), and optimization

Neural networks, learning, pattern recognition, and computational intelligence

Sensors and sensor systems (fiber-optic sensors, radar and sonar systems)

Power systems, power electronics, electrical machinery, and high-voltage engineering

X. Rong Li

UNIVERSITY RESEARCH PROFESSOR AND DEPARTMENT CHAIR

DIRECTOR, INFORMATION AND SYSTEMS TECHNOLOGY RESEARCH CENTER

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M.S., 1990 UNIVERSITY OF CONNECTICUT, ELECTRICAL ENGINEERING
M.S., 1984 ZHEJIANG UNIVERSITY, CHINA, ELECTRICAL ENGINEERING
B.S., 1982 ZHEJIANG UNIVERSITY, CHINA, ELECTRICAL ENGINEERING

Dr. X. R. Li, Fellow of IEEE, is an internationally recognized leading expert in information fusion and target tracking and, in an NSF panel of experts' words, *"has made a ground-breaking contribution"* in these areas. He was elected the President of the International Society of Information Fusion (ISIF) in 2003. He has published four scholarly books, seven book chapters, more than 200 refereed journal articles and conference proceedings papers; served as an Editor of the *IEEE Transactions on Aerospace and Electronic Systems* (1997–2003), Associate Editor (1995-1996), and Editor of the *Communications in Information and Systems* since 2001; served as the General Chair and/or organizer of several international conferences and workshops; delivered plenary speeches in several international conferences and workshops; received a CAREER award and an RIA award from National Science Foundation (NSF); given more than 80 invited seminars and several short courses in America, Europe, Oceania, and Asia; honored as a Guest Professor by several universities and Chief Scientist of a research center for information fusion; served as the President of the Chinese Professionals Association in New Orleans since 2002 and as a Vice President during 1995–1996. Dr. Li is the principal investigator of more than 20 research projects with a total funding over $4M from various federal and state government agencies and the private sector.

Dr. Li's main research interests are in the areas of *Information and Systems.* They include Estimation, Filtering, and Decision; Information Fusion; Target Tracking, Classification, and Detection; Uncertain Reasoning; Performance Evaluation; Statistical Inference; Stochastic Systems; Statistical Signal Processing; Learning, Pattern Recognition, and Computational Intelligence; Fault Detection and Isolation. Dr. Li also has a strong background in Power Systems and High Voltage Engineering.

Selected Publications

Y. Bar-Shalom and X. R. Li, M*ultitarget-Multisensor Tracking: Principles and Techniques,* YBS, Storrs, CT, 1995, 615 pages.

X. R. Li, and V. P. Jilkov, "Survey of maneuvering target tracking. Part V: multiple-model methods," *IEEE Transactions on Aerospace and Electronic Systems*, 41(4):1255–1321 (67 pages), October 2005.

X. R. Li, Z.-L. Zhao, and X. B. Li, "General model-set design methods for multiple-model approach," *IEEE Transactions on Automatic Control*, 50(9):1260–1276, September 2005.

X. R. Li, V. P. Jilkov, and J.-F. Ru, "Multiple-model estimation with variable structure—part VI: expected-mode augmentation," *IEEE Transactions on Aerospace and Electronic Systems*, 41(3): 853–867, July 2005.

X. R. Li and T. Solanky, "Applications of sequential tests to target tracking by multiple models," N. Mukhopadhyay, S. Datta, S. Chattopadhyay, eds., *Applied Sequential Methodologies*, Chapter 12, Marcel Dekker, New York, 2003, pp. 219–247.

X. R. Li, Y.-M. Zhu, J. Wang, and C.-Z. Han, "Optimal linear estimation fusion—part I: unified fusion rules," *IEEE Transactions on Information Theory*, 49(9):2192–2208, September 2003.

Y.-M. Zhu and X. R. Li, "Unified fusion rules for multi-hypothesis network decision systems," *IEEE Transs. on Systems, Man, and Cybernetics—Part A: Systems and Humans*, 33(4):502–513, July 2003.

X. R. Li, "Tracking in clutter with strongest neighbor measurements—part I: theoretical analysis," *IEEE Transactions on Automatic Control*, 43(11):1560–1578, November 1998.

X. R. Li, "Hybrid estimation techniques," C. T. Leondes, ed., *Control and Dynamic Systems: Advances in Theory and Applications*, Vol. 76, Academic Press, San Diego, 1996, pp. 213–287.

X. R. Li and Y. Bar-Shalom, "Performance prediction of hybrid algorithms," C. T. Leondes, ed., *Control and Dynamic Systems: Advances in Theory and Applications*, Vol. 72, Academic Press, San Diego, 1995, pp. 99–151.
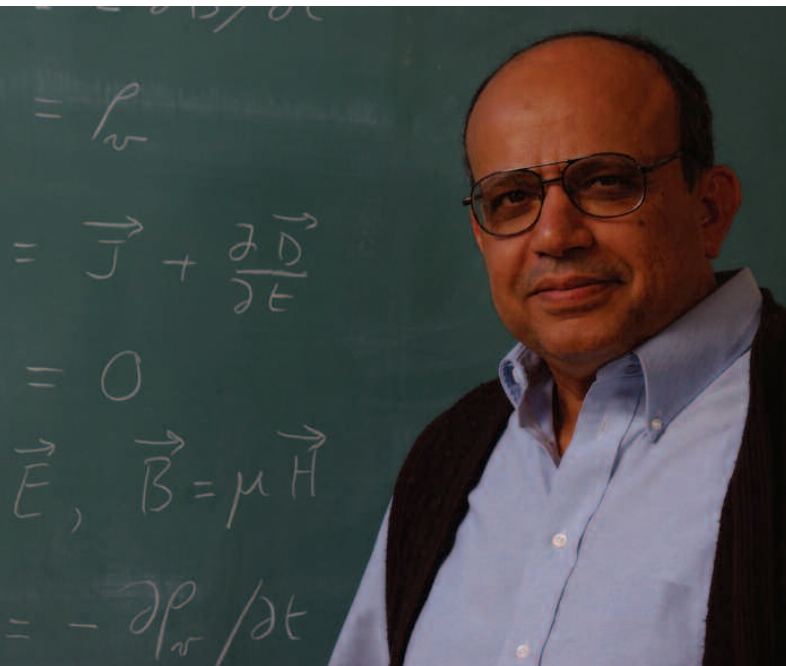
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PH.D., 1971 UNIVERSITY OF NEBRASKA-LINCOLN, ELECTRICAL ENGINEERING
B. SC. (HONORS), 1967 CAIRO UNIVERSITY, EGYPT, ELECTRICAL ENGINEERING

Research Interests

Polarized light: its mathematical representations and physical measurement; Ellipsometry: its theory, instrumentation, and applications for the characterization of surfaces and thin films; Optical polarimetry based on reflective silicon detectors and diffraction gratings; Optics of thin films and design of optical devices for polarized light; Optics of anisotropic media and liquid crystals; Theory of reflection.

Honors, Distinctions, and Professional Service

G. G. Stokes Award of SPIE – The International Society for Optical Engineering, Fellow of SPIE; Fellow of OSA – The Optical Society of America; Fellow of TWAS – The Third World Academy of Sciences (Trieste, Italy); Fulbright Senior Research Scholar, Université de Provence, France; Citations for Outstanding Service by SPIE; Outstanding American Inventor (Intellectual Property Owners, Inc., Washington, D. C.); Photonics Circle of Excellence Award; R & D 100 Award; Topical Editor for *Journal of the Optical Society of America*, Topical Editor of *Applied Optics*; Member of the OSA Publications Council; Chair of the OSA Max Born Award Committee; Organizer, Cochairman, and Proceedings Coeditor of several international conferences on ellipsometry, polarized light, and optical polarimetry; 5 U. S. Patents and many corresponding international patents; Successful technology transfer to 2 U. S. companies with millions of dollars worth of new products; Thousands of citations in more than 100 refereed science and engineering journals.

Selected Publications

Ellipsometry and Polarized Light (North Holland, Amsterdam, 1977) R.M.A. Azzam and N.M. Bashara, Authors. Reprinted in England, 1979. Translated into Russian and published by the Soviet Publishing House Mir, Moscow, 1981. Translated into Chinese, 1986. Paperback edition, 1987, 4th printing, 2003.

U.S. Patent No. 4,681,450, July 21, 1987, "Photodetector Arrangement for Measuring the State of Polarization of Light." This device was described as "among the most outstanding recent American inventions," by Donald W. Banner, former President of IPO, Inc., and former U.S. Commissioner of Patents and Trademarks. This invention has been featured in *Lasers and Applications* (September 1985), *Chemical and Engineering News* (July 13, 1987 & October 12, 1992), *Laser Focus World* (March, 1993), and in *The New York Times* (July 25, 1987), and other newspapers. Corresponding Japanese, Canadian, and European patents have been secured. Licensed to Gaertner Scientific Corp.

Selected Papers on Ellipsometry, SPIE Milestone Series (SPIE The International Society for Optical Engineering, Bellingham, Washington, 1991), R. M. A. Azzam, Editor.

Azzam, R. M. A., "Ellipsometry," Chap. 27 in *Handbook of Optics*, Vol. II, M. Bass, Editor-in-Chief, sponsored by the Optical Society of America (McGraw-Hill, New York, 1995).

Krishnan, S., Hampton, S, and Azzam, R. M. A., "Spectroscopic ellipsometry using the grating division-of-amplitude photopolarimeter (G-DOAP)," Thin Solid Films **455-456**, 24-32 (2004).

Azzam, R. M. A., "Phase shifts that accompany total internal reflection at a dielectric-dielectric interface," J. Opt. Soc. Am. A **21**, 1559-1563 (2004).

Azzam, R. M. A., and Spinu, C. L., "Achromatic angle-insensitive quarter-wave retarder based on total internal reflection at the Si-SiO2 interface," J. Opt. Soc. Am. A **21**, 2019-2022 (2004).

Azzam, R. M. A. and Sudradjat, F. F., "Single-layer-coated beam splitters for the division-of-amplitude photopolarimeter," Appl. Opt. **44**, 190-196 (2005).

Azzam, R. M. A., De, A., and Sudradjat, F. F., "Bilayer pellicle and bilayer-coated beam splitters for the division-of-amplitude photopolarimeter," Opt. Eng. **44**, 073802- 073811 (2005).

Azzam, R. M. A., and Spinu, C. L., "Linear-to-circular polarization transformation upon optical tunneling through an embedded low-index film," Opt. Lett. **30**, 3183-3185 (2005).

Paul M. Chirlian

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ENG. SC.D., 1956 NEW YORK UNIVERSITY
M.E.E., 1952 NEW YORK UNIVERSITY
B.E.E., 1950 NEW YORK UNIVERSITY

Research Interests

Dr. Chirlian's research interests include effective bandwidth of signals and systems, where bandwidth is based on error in the transient response, and cryogenic electronics where research with Ph.D. students solved the problem of excess noise in analog cryotron amplifiers. Much of his research has been in the area of signal processing especially in the area of network and filter synthesis. Recently he has been working in the area of fiber-optic utilization in shipboard applications. This research resulted in a number of damage control sensors and a fiber-optic based devise to measure torque and thrust. Dr Chirlian is dedicated to the education of students and most of his research has been conducted in conjunction with his Ph.D. students.

Dr Chirlian is the author of 28 textbooks many of which have been translated into a number of languages. These are in the areas of electronics, circuit theory, and computer languages. As PI or Co-PI he has received support of over $2.5 million from various government agencies.

Honors, Distinctions, and Professional Service:

Fellow of the IEEE

Henry Morton Great Teacher Award, Stevens Institute of Technology

UNO National Alumni Association's Career Award for Excellence in Research

Member of Sigma Xi, Eta Kappa Nu and Tau Beta Pi

Selected Publications

Dr. Chirlian is the author of 28 books and over 70 research publications. Some representative ones are:

A Cryotron Linear Amplifier, IEEE Trans. on Component Parts, Vol. CP-10, pp. 144-146, Dec. 1963

The Cryotron as an Ultra Low Noise Amplifier - Elimination of Excessive Cryotron Noise," IEEE Trans. on Magnetics, Vol. MAG-2, pp. 390-393, 1966. Also presented at Integmag Conference, Stuttgart, Germany, April 1966, (Coauthor: A.K. Johnson)

Restrictions Imposed Upon the Transient and Frequency Response of Networks," Quart. of Applied Math., Vol. 26, pp. 413-423, 1968

Restriction on the Effective Bandwidth of a Signal, IEEE Trans. on Circuit Theory, Vol. CT-18, pp. 422-425, 1971 (Coauthor: C. Giardina)

Linear Phase Filter Design on a Time Domain Basis, Proc. IEEE, Vol. 69, pp. 836-837, 1981. (Coauthor: B. Philobus).

An Analysis of Errors in Wave Digital Filters, IEEE Trans. on Circuits and Systems, Vol. CAS-28, pp. 154-160, 1981 (Coauthor: D. VanHaften).

On The Effective Bandwidth of Sampled Signals, IEEE Trans. on Circuits and Systems, Vol. CAS-33, pp. 268-274, 1986, (Coauthors: C. Giardina and C. Suffel)

Bounds on The Effective Bandwidth of Two Dimensional Functions, Invited Paper - Twentieth Southeastern Symposium on System Theory, March 20-22, 1988, Charlotte, NC (Coauthor: C. Amirat)

On the Critical Point Detection of Digital Shapes, IEEE Transactions on Pattern Analysis and Machine Intelligence 17(8): 737-748, 1995, (Coauthor: P. Zhu)

A New Generalized Energy Criteria for the Passivity of Digital Networks, IEEE Transactions on Signal Processing, vol. 45 No. 8 1997 pp. 1909-1918 (Coauthors: J. Bush and S. Basu)

The Department of Electrical Engineering continued to grow in 2004-2005. We were fortunate to have an opening in the area of power electronics and power systems, filled by a promising young Assistant Professor, Dr. Zhenhua Jiang. Also in 2005 we had the good fortune of hosting Dr. Amit Ailon who worked with us as a Visiting Professor in the area of nonlinear control and autonomous robotic systems. A summary of their background and accomplishments follow.

Dr. Amit Ailon received the B.Sc. and M.Sc. degrees in aeronautical engineering from the Technion, Israel Institute of Technology, Haifa, Israel, and the Ph.D. in control theory and applications from Tel Aviv University, Tel Aviv, Israel, in 1982. He was a Visiting Assistant Professor at Rensselaer Polytechnic Institute, Troy, NY during 1982-1984. Since 1984, he has been a member of the faculty of the Department of Electrical and Computer Engineering, Ben Gurion University of the Negev, Beer Sheva Israel, where he is currently a Professor. He is a Senior Member of the IEEE Control Systems Society. During the year of 1992, he stayed at the Université de Technologie de Compiègne as a Fellow of the French Ministère de la Recherché. From 1996 to 1998, he was a Professor in the Department of Mechatronics, Kwangju Institute of Science and Technologie, Kwangju, Korea. He has been with the Department of Electrical Engineering, University of New Orleans, as a Visiting Professor since August 2005. He is a reviewer of the journals, IEEE Trans. Automatic Control; IEEE Trans. Robotics and Automation; Journal of Robotic Systems; Automatica; Control-Theory and Advanced Technology; Journal of Circuits, Systems, and Signal Processing; Systems & Control Letters; International Journal of Control; IEE Proceedings Control Theory and Applications; The Journal of the Franklin Institute; International Journal of Robotics and Automation. He was a principal researcher and was associated with numerous research projects in the fields of control and autonomous robotic systems. He was a member of various national and international professional committees. His research interests are in control of robot manipulators, in spacecraft attitude control, and in motion planning and control of autonomous vehicles subject to nonholonomic constraints. He has published more than 100 journals and conference proceedings papers.

Dr. Zhenhua Jiang received the B.Sc. and M.Sc. degrees both in electrical engineering from Huazhong University of Science and Technology, Wuhan, China, in 1997 and 2000, respectively and the Ph.D. degree in electrical engineering at the University of South Carolina, Columbia, in 2003. He was a postdoctoral research fellow at the University of South Carolina, Columbia from August 2003 to August 2005. He participated actively in the ONR-sponsored Virtual Test Bed (VTB) Project and All-Electric Ships Project, and many others. He joined the Department of Electrical Engineering, University of New Orleans as an Assistant Professor in August 2005. His research interests are in power electronics and controls, fuel cells, renewable energy sources (solar energy, wind energy, etc), energy storage systems (battery, supercapacitor, SMES, flywheels), hybrid power sources and systems, distributed energy resources (DER) integration, multi-agent systems, advanced control techniques, electrical power systems, and modeling and simulation of interdisciplinary systems. He has published over 35 referred journals and conference proceedings papers. He served as a session chair for the 2001 International Conference on Energy Conversion and Applications. He served as a regular reviewer for IEEE Transactions on Industry Applications, IEEE Transactions on Energy Conversion, IEEE Transactions on Aerospace and Electronic Systems, IEEE Transactions on Industrial Electronics, IEEE Transactions on Power Electronics, IEE Proceedings - Electric Power Applications, and many IEEE conferences.
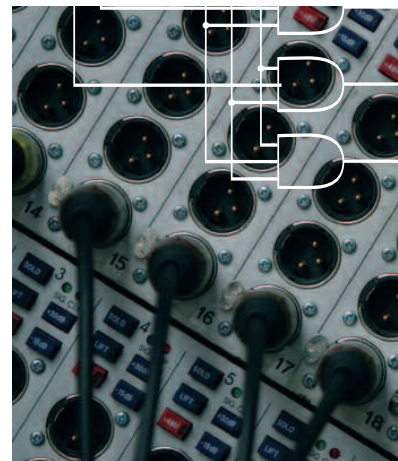
FACULTY

Amit Ailon
VISITING PROFESSOR

PH.D. 1982, TEL AVIV UNIVERSITY

M.SC. 1975, THE TECHNION ISRAEL INSTITUTE OF TECHNOLOGY, AEROUNAUTICAL ENGINEERING

B.SC. 1970, THE TECHNION, ISRAEL INSTITUTE OF TECHNOLOGY, AEROUNAUTICAL ENGINEERING

Henri A. Alciatore Jr.
INSTRUCTOR

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M.S., 1986 UNIVERSITY OF NEW ORLEANS, ELECTRICAL ENGINEERING
B.S., 1982 UNIVERSITY OF NEW ORLEANS, ELECTRICAL ENGINEERING

Research Interests

Amit Ailon research interests are in the fields of linear control systems, robotics, and autonomous systems. He studied and published many results on control of linear singular systems (systems with coupled differential and algebraic equations), in particular on decoupling, pole placement, observers, and output-based controllers. Concerning robotics his research is focusing on optimal control of robot manipulators, analysis and synthesis of output-based controllers, and control of holonomically constrained robots. His studies are also dealing with the stabilization problem of robotic systems with time delays. The aim of his research in the field of spacecraft control is to explore analytical tools for output controllers for attitude control, under conditions of system uncertainties and time-delay. Recently his research topics are associated with controllability and trajectory following control of autonomous vehicles with nonholonomic constraints, and Vertical Take Off and Landing (VTOL) aircraft.

Honors, Distinctions, and Professional Service

Amit Ailon is a Senior Member of IEEE. He published about 100 papers in refereed journals and conference proceedings. He published invited papers in special issues of international journals in the fields of control theory and applications, and was an invited speaker in several conferences and workshops. He obtained visiting professorship positions in universities in USA, Europe and Asia, and served as a reviewer of leading international journals in control and robotics. He was on the programme committees of national and international conferences in control. He was involved in many funded researches in the fields of control and autonomous robotic systems.

Selected Publications

Ailon and G. Langholz, "On the existence of time-optimal control of mechanical manipulators, Journal of Optimization Theory and Applications, vol. 46, pp. 1-21, 1985.

Ailon, L. Baratchart, G. Grimm and G. Langholz, "On polynomial controllability with polynomial state for linear constant systems," IEEE Transactions on Automatic Control, vol. 31, pp. 155-156, 1986.

Ailon, "An approach for pole assignment in singular systems," IEEE Transactions on Automatic Control, vol. AC-34, pp. 889-893, 1989.

Ailon, "Output controllers based on iterative schemes for set-point regulation of uncertain flexible-joint robot models," Automatica, vol. 32, pp. 1455-1461, 1996.

Ailon, N. Berman, and S. Arogeti, "On controllability and trajectory following of a kinematic vehicle model," Automatica, vol. 41, pp. 889-896, 2005.
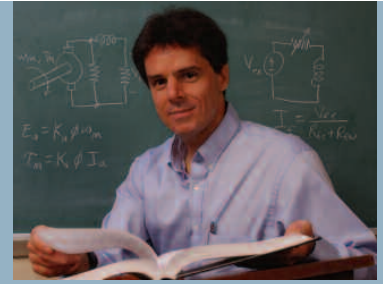
Research Interests

Power System Modeling and Analysis, Electric Machinery, Protective Relaying, SCADA Systems, Power System Fault Detection, Real Time Data Acquisition and Control Systems, Engineering Design and Simulation Software Development.

Honors, Distinctions, and Professional Service

Mr. Alciatore received the UNO Dean's Student Organization Council Distinguished Teaching Award in 1992, 1995, and 2002. He was selected Teacher of the Year by the UNO Branch of IEEE in 1992, 1993, and 1994. He was listed in Who's Who Among America's Teachers 2004. He has served as faculty advisor at UNO for both the IEEE and Eta Kappa Nu student organizations. He is a Lifetime Member of Eta Kappa Nu electrical engineering honor society. He has been an active member in IEEE Power Engineering Society, IEEE Power Systems Relaying Committee, IEEE Industrial Electronics Society. He has been an active member of the New Orleans section of IEEE and has served as IEEE New Orleans Section Educational Activities Co-Chairman 1991-92, IEEE New Orleans Section Student Activities Chairman 1992-93, and IEEE Southeastcon'90 Registration Co-Chairman.

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PH.D., 2001 UNIVERSITY OF ALABAMA, ELECTRICAL AND COMPUTER ENGINEERING (COMPUTER ENGINEERING)
M.S., 1998 UNIVERSITY OF ALABAMA, ELECTRICAL ENGINEERING (COMMUNICATIONS)
B.S., 1996 UNIVERSITY OF ALABAMA, ELECTRICAL ENGINEERING

Research Interests
Optical Information Processing, Fiber Optic Sensors, Face Recognition, Biometric Identification, Target Tracking, Biomedical Imaging, Image Processing, Satellite Communication.

Honors, Distinctions, and Professional Service:
Dr. Alsamman is a member of SPIE and a member of IEEE. He is an invited speaker to several SPIE conferences and served as reviewer for leading international journals such as Applied Optics, Journal of Optical Engineering, IEEE Transactions on Industrial Electronics, Optics Communications, and others. His services at UNO include serving as an Engineering faculty senator and chairing of the Computer Engineering curriculum committee. He was also instrumental in creating building new laboratory facilities including three computer engineering labs and more recently a terabyte cluster machine. Dr. Alsamman is the recipient of IEEE Teacher of the Year Award 04 from IEEE UNO branch.

Selected Publications
A. Alsamman, Mohammad S. Alam, "Comparative study of face recognition techniques that use joint transform correlation and principal component analysis," Applied Optics, Vol 44, pp. 688-692, 2005.

A. Alsamman and M. S. Alam, "Ultrafast Multiwavelet Analysis Using Phase-encoded JTC," Journal of Optical Engineering, Vol. 43, p. 1746 - 1750, 2004.

A. Alsamman, "Spatially efficient pseudo-random phase encoded JTC for fast target recognition," Proc. of SPIE, Optical Pattern Recognition XVI, vol 5816, p. 252-257, 2005.

A. Alsamman, "A comparison of optoelectronic-based face recognition to ICA and PCA based face recognition, Proc. of SPIE, Optical Pattern Recognition XVI, vol 5816, p. 295-302, 2005.

D. Charalampidis and A. Alsamman, "Optical implementation of a quality control algorithm for the removal of nonprecipitation echoes in weather radars," Proceedings SPIE, Enabling Photonic Technologies for Aerospace Applications VI, vol 5435, p. 127-136, 2004.

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B.S., 1986 SUMMA CUM LAUDE, UNIVERSIDAD AUTÓNOMA DE CENTRO AMÉRICA, COLEGIO STUDIUM GENERALE COSTARRICENSE, SAN JOSÉ, COSTA RICA, ELECTRICAL ENGINEERING

Research Interests
Dr. Bourgeois's general areas of interest are digital communication systems, modulation and coding, underwater acoustics, remote sensing, neural networks, fuzzy systems, and signal processing. Of particular interest recently are underwater communications, ocean floor sediment and buried target classification, and applications of neural networks to these problems. She is currently PI for the project "Accurate detection and classification algorithms for PARADISE", funded by the Naval Research Lab. She has recently served as reviewer for several conferences and journals in the communications and computational intelligence areas, and contributed to several SPIE and IEEE conferences.

Honors, Distinctions, and Professional Service
Dr. Bourgeois was Chair of the New Orleans Section of the IEEE in 2004 and 2005. She is a member of many University, College, and Departmental committees including the Policy Committee, University Planning Group, and Accreditation Committees. She is a strong supporter of, and is heavily involved in student and academic activities in her role as Associate Department Chair. Dr. Bourgeois is an active member of the IEEE, ASEE, and SWE, and of the Tau Beta Pi and Eta Kappa Nu honor societies. She appeared in 8 Who's Who listings in the last two years and received the 2004 DSOC Distinguished Teaching Award for Associate Professor.

Selected Publications
Kaminsky, E., H. Danker-McDermott, and F. Douglas, "Fuzzy-Neural cost Estimation for Engine Tests," Chapter IX in Computational Economics: A Perspective from Computational Intelligence, Idea Group Publishing (Hershey, PA), ISBN 1-59140-649-8, 2006.

Cartwright, K. and E. Kaminsky, "Asymptotic Performance of the Pth Power Law Phase Estimator," in IEEE Globecom 2005 Conf. Proc., St. Louis, MO, 28 Nov-2 Dec. 2005, paper10_5, vol. 1, pp. 331-336.

K. Cartwright and E. Kaminsky, "Blind Phase Recovery in Cross QAM Communication Systems with the Reduced Constellation Eighth-Order Estimator", in IEEE Globecom 2005 Conf. Proc., St. Louis, MO, 28 Nov-2 Dec. 2005, paper 13_1, vol. 1, pp. 388-392.

Kaminsky, E. J., and N. Deshpande, "TCM Decoding using Neural Networks," Engineering Applications of Artificial Intelligence, Vol 16, no. 5-6, Aug.-Sept., 2003, pp. 473-489.

Kaminsky, E. J., J. Ayo, and K. V. Cartwright, "TCM Without Constellation Expansion Penalty", IKCS/IEEE Journal of Communications and Networks, Vol. 4, No. 2, June 2002, pp. 90-96.

Dimitrios Charalampidis
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PH.D., 2001 UNIVERSITY OF CENTRAL FLORIDA, ELECTRICAL ENGINEERING
M.S., 1998 UNIVERSITY OF CENTRAL FLORIDA, ELECTRICAL ENGINEERING
DIPLOMA IN ELECTRICAL ENGINEERING AND COMPUTER TECHNOLOGY,
UNIVERSITY OF PATRAS, GREECE, JULY 1996

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PH.D., 2002 UNIVERSITY OF CONNECTICUT, ELECTRICAL AND
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B.E., 1996 TSINGHUA UNIVERSITY, BEIJING, CHINA, DEPARTMENT
OF AUTOMATION

Research Interests

Dimitrios Charalampidis's research interests are in image and signal processing applications, and pattern recognition — including texture analysis and synthesis, signal processing applications in remote sensing, image compression, speech coding, and neural networks.

Honors, Distinctions, and Professional Service

During 2004-2005 Dimitrios Charalampidis served as the Session Chair for two sessions, namely "Image Retrieval & Image Quality," and "Image Compression Techniques," as part of the *International Conference on Imaging Science, Systems, and Technology*, Las Vegas, June 2005. Furthermore, he has been a reviewer for several journal and conference proceedings, including among others the IEEE Transactions on Neural Networks, IEEE Transactions on Image Processing, IEEE Transactions on Pattern Analysis and Machine Intelligence, and IEEE Signal Processing Letters. He is the IEEE Student Branch Counselor at The University of New Orleans. He received the Dean's student organization council distinguished teaching award as an Assistant Professor in May 2003.

Selected Publications

D. Charalampidis, "Improved Robust VQ-based Watermarking," IEE Electronics Letters, Vol. 41, No. 23, pp. 1272-1273, 10 November 2005.

D. Charalampidis, "A Modified K-means Algorithm for Circular Invariant Clustering," IEEE Transactions on Pattern Analysis and Machine Intelligence, Vol. 27, No. 12, pp. 1856-1865, December 2005.

D. Charalampidis, V. Jilkov, and T. Nguyen, "Enhanced Image Feature Extraction for Object Tracking," Proceedings of the 8th International Conference on Information Fusion, Philadelphia, July 25-29, 2005.

D. Charalampidis and V. Kura, "A Novel Wavelet-based Technique for Pitch Detection and Segmentation of Non-Stationary Speech," Proceedings of the 8th International Conference on Information Fusion, Philadelphia, July 25-29, 2005.

D. Charalampidis, "An Improved Adaptive Technique for Compression of Still Images," Proceedings of the International Conference on Imaging Science, Systems, and Technology, Las Vegas, June 27-30, 2005.

Research Interests

Dr. Chen's research interests are in general areas of statistical signal processing, estimation theory, and information fusion with applications to target detection and target tracking.

Honors, Distinctions, and Professional Service:

Reviewer for *IEEE Trans. Automatic Control, European Transactions on Telecommunications and Applied Mathematics Letters*, since 2005.

Reviewer for *IEEE Transactions on Signal Processing, IEEE Signal Processing Letters*, and *IEE Electronics Letters* since 2004.

Reviewer for *Automatica* since 2003.

Reviewer for *IEEE Trans. System, Man and Cybernetics* since 2002.

Reviewer for *IEEE Trans. Aerospace and Electronic Systems* since Oct. 2001.

Session chair for Services Oriented Architecture, *IEEE Int. Conf. on Services Computing*, Orlando, FL, July 2005.

Member of TPC for *First Int Workshop on Broadband Wireless Services and Applications*, San Jose, CA, Oct. 2004.

Selected Publications

H. Chen, T. Kirubarajan, and Y. Bar-Shalom, "Performance Limits of Track-to-Track Fusion vs. Centralized Estimation: Theory and Application", IEEE Trans. Aerospace and Electronic Systems, 39(2), Apr. 2003, pp. 386-400.

H. Chen, Y. Bar-Shalom, K. R. Pattipati, and T. Kirubarajan, "MDL Approach for Multiple Low Observable Track Initiation", IEEE Trans. Aerospace and Electronic Systems, 39(3), July 2003, pp. 862-882.

H. Chen, X.-R. Li, and Y. Bar-Shalom, "On Joint Track Initiation and Parameter Estimation under Measurement Origin Uncertainty", IEEE Trans. Aerospace and Electronic Systems, 40(2), Apr. 2004, pp. 675-694.

Potamitis, H. Chen, and G. Tremoulis, "Tracking of Multiple Speakers with Multiple Microphone Arrays", IEEE Trans. Speech and Audio Processing, 12(5), Sept. 2004, pp. 520-529.

Y. Bar-Shalom, and H. Chen, "IMM Estimator with Out-of-Sequence Measurements", IEEE Trans. Aerospace and Electronic Systems, 41(1), Jan. 2005, pp. 90-98.

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PH.D., 2003 UNIVERSITY OF SOUTH CAROLINA, ELECTRICAL ENGINEERING

M.S., 2000 HUAZHONG UNIVERSITY OF SCIENCE AND TECHNOLOGY, CHINA, ELECTRICALENGINEERING

B.S., 1997 HUAZHONG UNIVERSITY OF SCIENCE AND TECHNOLOGY, CHINA, ELECTRICAL ENGINEERING

Research Interests

Dr. Huang's current research interests include wireless communication and sensor networks, reconfigurable computing and applications, embedded systems architecture and co-design techniques, VLSI signal processing algorithms, and high-speed digital testing techniques for ASIC verification.

Honors, Distinctions, and Professional Service:

Dr. Huang received the UNO College of Engineering Faculty Award in 2005, the IBM Faculty Fellowship Award in 2004. Prior to joining the UNO faculty in January 2003, he was a Member of Technical Staff at Bell Labs of Lucent Technologies, where he received the Central Bell Labs Annual Excellence Award in 2002. He is a member of IEEE Computer Society and Communications Society.

Selected Publications

J. Ma, P. Athanas and X. Huang, "Incremental Design Methodology for Multimillion Gate FPGAs," Journal of Circuits, Systems and Computers, vol. 14, no. 5, pp.1015-1026, 2005.

X. M. Huang and J. Ma, "An Application-Specific Routing Protocol for Meshed Wireless Sensor Networks," in Proceedings of International Conference on Wireless Networks (ICWN'05), Las Vegas, NV, June 2005.

J. Ma and X. Huang, "A System-on-Programmable Chip Approach for MIMO Sphere Decoder," in Proceedings of the IEEE Symposium on Field-Programmable Custom Computing Machines (FCCM'05), Napa, CA, April 2005.

X. M. Huang, J. Ma, "A FPGA-Based Accelerator for Multi-physics Modeling," in Proceedings of the 2004 Engineering Reconfigurable System Architecture Conference (ERSA'04), pp. 209-212, Las Vegas, NV, June, 2004.

X. M. Huang, J. Ma, J. Li, "Application of Shadow Memory Method in C-Based Modeling for Wireless ASIC Co-Verification," in Proceedings of IEEE 13th North Atlantic Test Workshop (NATW'04), pp. 78-84, Essex Junction, VT, May, 2004.

Research Interests

Dr. Jiang's research interests include power electronics and controls, fuel cells, renewable energy sources (solar energy, wind energy, etc), energy storage systems (battery, supercapacitor, SMES, flywheels), hybrid power sources and systems, distributed energy resources (DER) integration, multi-agent systems, advanced control techniques, electrical power systems, and modeling and simulation of interdisciplinary systems.

Honors, Distinctions, and Professional Service

Dr. Jiang is a member of IEEE. He was a postdoctoral research fellow at the University of South Carolina, Columbia from August 2003 to August 2005. He participated actively in the ONR-sponsored Virtual Test Bed (VTB) Project and All-Electric Ships Project, and many others. He served as a regular reviewer for the IEEE Transactions on Industry Applications, IEEE Transactions on Energy Conversion, IEEE Transactions on Aerospace and Electronic Systems, IEEE Transactions on Industrial Electronics, IEEE Transactions on Power Electronics, IEE Proceedings – Electric Power Applications, and many IEEE conferences. He served as a session chair for the 2001 International Conference on Energy Conversion and Applications.

Selected Publications

Z. Jiang and R. Dougal, "A Compact Digitally-Controlled Hybrid Fuel Cell/Battery Power Source", in press, to appear in IEEE Transactions on Industrial Electronics, Special Issue on Renewable Energy and Distributed Generation Systems, 2006.

Z. Jiang, L. Gao, and R. Dougal, "Flexible Multiobjective Control of Power Converter in Active Hybrid Fuel Cell/Battery Power Sources", IEEE Transactions on Power Electronics, Vol. 20, No. 1, pp. 244-253, Jan. 2005.

Z. Jiang and R. Dougal, "Synergetic Control of Power Converters for Pulse Current Charging of Advanced Batteries from a Fuel Cell Power Source", IEEE Transactions on Power Electronics, Vol. 19, No. 4, pp. 1140-1150, July 2004.

Z. Jiang and R. Dougal, "Control Strategies for Active Power Sharing in a Fuel Cell Powered Battery-Charging Station", IEEE Transactions on Industry Applications, Vol. 40, No. 3, pp. 917-924, May 2004.

Z. Jiang, S. Liu, and R. Dougal, "Design and Testing of Spacecraft Power Systems Using VTB", IEEE Transactions on Aerospace and Electronic Systems, Vol. 39, No. 3, pp. 976-989, July 2003.

Vesselin P. Jilkov

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B.S. AND M.S., 1982 UNIVERSITY OF SOFIA, BULGARIA, MATHEMATICS
(OPERATIONS RESEARCH)
PH. D., 1988 BULGARIAN ACADEMY OF SCIENCES, SOFIA, BULGARIA, TECHNICAL
SCIENCES (ELECTRICAL ENGINEERING)
SENIOR RESEARCH FELLOW OF THE BULGARIAN ACADEMY OF SCIENCES,
SOFIA, BULGARIA, 1997

Jing Ma

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PH.D., 2003 VIRGINIA TECH, BLACKSBURG, VA, ELECTRICAL ENGINEERING
M.S., 1998 NATIONAL UNIVERSITY OF SINGAPORE, SINGAPORE,
COMPUTER ENGINEERING
M.S., 1995 NORTHWESTERN POLYTECHNIC UNIVERSITY, CHINA,
ELECTRICAL ENGINEERING
B.S., 1993 NORTHWESTERN POLYTECHNIC UNIVERSITY, CHINA,
APPLIED ELECTRONICS

Research Interests

Dr. Jilkov's research interests are in the areas of *Stochastic Systems* (estimation, decision, nonlinear filtering, identification/adaptation, optimization), *Target Information Processing* (target tracking, detection, recognition, and multi-sensor data fusion), and *Statistical Inference* (estimation, decision, learning, Monte Carlo methods).

Honors, Distinctions, and Professional Service

Dr. Jilkov is a member of IEEE-Aerospace and Electronic Systems Society, SIAM (Society for Industrial and Applied Mathematics), ISIF (International Society of Information Fusion), and Phi Beta Delta (Honors Society for International Scholars). He also serves regularly as a reviewer for *IEEE Transactions on AES, IEEE Transactions on AC, IEEE Transactions on SP, IEEE Transactions on ITS, IEE Proceedings, AIAA J. Guidance, Control and Dynamics, and International Journal of Automation and Computing.* Selected for inclusion in *Who's Who in America, 2006.* During 2004-2005 Dr. Jilkov was engaged as a Co-PI or Co-Investigator in three research projects funded by the Army Research Office, Navy and Department of Defense, respectively. He has more than 65 publications and about a hundred citations in more than sixty scholarly references (books, journal articles, conference papers, *etc.*)

Selected Publications

Overall Dr. Jilkov is author/coauthor of over 55 journal articles and conference papers, and one book.

V. P. Jilkov and X. R. Li, "Bayesian Estimation of Transition Probabilities for Markovian Jump Systems," IEEE Transactions on Signal Processing, Vol. 52, No. 6, 2004, pp. 1620-1630.

X. R. Li and V. P. Jilkov, "A Survey of Maneuvering Target Tracking, Part V: Multiple-Model Methods," IEEE Transactions on Aerospace and Electronic Systems, Vol. 41, No. 4, October 2005, pp. 1255-1321.

X. R. Li, V. P. Jilkov and J. Ru, "Multiple Model Estimation with Variable Structure–Part VI: Expected-Mode Augmentation Approach," IEEE Transactions on Aerospace and Electronic Systems, Vol. 41, No. 3, July 2005, pp. 853-867.

X. R. Li and V. P. Jilkov, "Survey of Maneuvering Target Tracking, Part I: Dynamic Models," IEEE Transactions on Aerospace and Electronic Systems, Vol. 39, No. 4, 2003, pp. 1333 - 1364.

V. P. Jilkov, D. S. Angelova, Tz. A. Semerdjiev, "Design and Comparison of Mode-Set Adaptive IMM Algorithms for Maneuvering Target Tracking," IEEE Transactions on Aerospace and Electronic Systems, Vol. 35, No. 1, 1999, pp. 343-350.

Research Interests

Dr. Ma's current research interests include reconfigurable computing applications, wireless communications, wireless sensor networks, computing, fault-tolerant hardware, rapid prototyping and architecture design using FPGA, and other applications in network and communications.

Honors, Distinctions, and Professional Service:

Dr. Ma joined the UNO faculty in January 2003 after she received her Ph.D. degree in Electrical Engineering from Virginia Tech. She has one U. S. patent and about twenty-six publications on refereed journals and conference proceedings. She is a member of IEEE Computer Society and Circuits and Systems Society.

Selected Publications

J. Ma, P. Athanas, and X. Huang, "Incremental Design Methodology for Multimillion Gate FPGAs," Journal of Circuits, Systems and Computers, vol.14, no. 5, pp. 1015-1026, 2005.

A.A. Kassim, M.A Mannan, and J. Ma, "Machine Tool Condition Monitoring Using Workpiece Surface Texture Analysis", Machine Vision and Applications (USA), vol. 11, pp 257-263, 2000.

M.A. Mannan, A. A. Kassim and J. Ma "Application of Image and Sound Analysis Techniques to Monitor the Condition of Cutting Tools " Pattern Recognition Letters, 21 (11), pp. 969-979, 2000.

J. Ma and X. Huang, "A System-on-Programmable Chip Approach for MIMO Sphere Decoder," in Proceedings of the IEEE Symposium on Field-Programmable Custom Computing Machines (FCCM'05), Napa, CA, April 2005.

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B.S., 1970 UNIVERSITY OF NEW ORLEANS, ENGINEERING SCIENCES

Research Interests

Dr. Riemer's teaching and research interests include analog and digital electronics and bio-medical instrumentation, analog and digital communications, analog and digital audio engineering, digital audio signal processing, and digital bio-medical, image and signal processing.

Honors, Distinctions, and Professional Service

Selected for inclusion in the third edition of *Who's Who Among America's Teachers*, 1994; Selected for inclusion in the sixth edition of *Who's Who Among America's Teachers*, 1996; Selected as Teacher of the Year 2000 by the UNO Student Branch of IEEE. Currently a member of the textbook technical review committee for Wiley, Inc., and McGraw-Hill in the areas of Digital Signal Processing, and Electronics. Current Projects include: Developing a high frequency acoustic translator for hearing impaired; and Electronic electroporation measurement and delivery systems for drug delivery. Recent Projects include: Developed the control and instrumentation systems for a multiple organ preservation system; Engaged in the development of a micro-computer based vehicle management system, including evaluation of battery and associated charging system components.

Selected Publications

M. W. Losh, T. E. Riemer, and R. E. Trahan, Jr., "Level Independent Detection of Signal Saturation in Sensor Data", *Digital Signal Processing*, Vol.4, 1994, pp. 189-197.

B.-C. Jan, J. A. Henriquez, T. E. Riemer, and R. E. Trahan, Jr., *"The Modified Window Correlation Technique for Estimation of Arbitrary Time Delays in Multi-channel Multi-event Systems", Journal of The Acoustical Society of America*, Vol. 93, No.3, March, 1993, pp. 1466-1470.

M. Rog, M. W. Losh, T. E. Riemer, and R. E. Trahan, Jr., "Time Delay Estimation of Noisy Signals Using Spatial Amplitude Distribution Analysis", presented at 124th Meeting of the Acoustical Society of America, New Orleans, Louisiana, October 31 - November 4, 1992. Abstracted in the *Journal of The Acoustical Society of America*, Vol. 92, No. 4, Part 2, October, 1992, pp. 2323.

B.-C. Jan, J. A. Henriquez, T. E. Riemer, and R. E. Trahan, Jr., "The Focus Measurement Technique for Estimation of Arbitrary Time Delays in Multichannel, Multievent Systems", *Journal of The Acoustical Society of America*, November 1991, pp. 2480-2488.

Research Interests

Dr. Trahan's research interests over the past several years have primarily involved the application of sensors and data acquisition systems to ships and shipbuilding. The latest research project has involved the application of LIght Detection and Ranging (LIDAR) in the shipbuilding industry. Three dimensional measurements of large ship structures have been demonstrated with LIDAR technology. Special software has been used to translate raw point cloud data obtained from a LIDAR system into usable drawings. Other projects have involved the development of fiber optics based shipboard sensors to measure parameters such as temperature, smoke, liquid level, and shaft torsion. Additionally, Dr. Trahan has collaborated on a project to study the feasibility of using control surfaces to minimize the high impact slamming of planing boats.

Honors, Distinctions, and Professional Service

2005 Named one of "Favorite Professors" by UNO Alumni Association • 2005 Included in Marquis Who's Who in Science and Engineering, 8th Edition • 2005 Included in Marquis Who's Who in American Education, 7th Edition • Member of Louisiana Council of Engineering Deans, 2003-present, Chair 2004-05 • Member of Board of Directors Greater New Orleans Science and Engineering Fair, 2003-present • Member of Board of Directors Louisiana Engineering Advancement Program (LEAP), 2003-present • Member of IT Cluster of GNO, Inc. 2004-present • Member of Board of Directors of Louisiana Technology Council, 2005-present • Member of Board of Directors of University of New Orleans International Alumni Association, 2004-present

Selected Publications

C. W. Alexander and R. E. Trahan, "A comparison of traditional and adaptive control strategies for systems with time delay," *ISA Transactions*, Vol. 40, No. 4, September 2001, pp 353-368.

R. E. Trahan, et al, "Active Control of Planing Hull Motions-Final Report," Gulf Coast Region Maritime Technology Center Project No. AMTC99-311, January 2003.

P. M. Chirlian, R. E. Trahan, and K. D. Jovanovich, "Fiber Bragg Grating Based Temperature Sensor-Final Report," Gulf Coast Region Maritime Technology Center Project No. AMTC97-145A, March 2000.

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ADJUNCT FACULTY

The Department is grateful to have had the services of the following adjunct faculty members during 2004-2005:

Lionel Dutreix, Deputy Chief, Test Operations Division, Engineering and Science Directorate, NASAJuan Henriquez, Director, UCC User Training and Support, UNO

Leo Holzenthal, Vice President, M S Benbow and Associates, New Orleans

Kim Jovanovich, President, Omni Technologies, Inc., New Orleans

Maria Kalcic, Marine Geosciences Division, Naval Research Lab, Stennis Space Center, MS

Bob Kemp, Electrical Engineering Manager, Marine Imaging Systems Division, Input/Output, Inc.

Kenneth Lannes, Senior Engineer, R&D Group, Northrup Grumman Ship Systems, Oceans Springs, MS

Stephen Lipp, Engineering Dynamics, Inc., New Orleans

Michael Nixon, Associate Professor Electrical Engineering Technology, Delgado Community College

Robert Rioux, Instructor, University of Louisiana Lafayette

Robert Ryan, Manager, Systems Engineering, Lockheed Martin, Stennis Space Center, MS
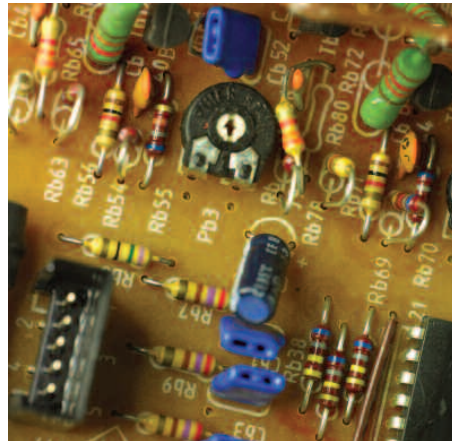
PUBLICATIONS

THE FOLLOWING IS THE RESEARCH PRODUCTIVITY RECORD
OF OUR CURRENT FACULTY

Research Productivy Record (current faculty 2004-2005)

Book chapters: 3
Refereed journal articles: 42
Conference proceedings papers: 96
Abstracts: 2
SCI citations during 2004-2005 of publications of faculty since joining UNO: 706

Faculty Life-time Publication Record

Books: 42
Edited volumes: 6
Book chapters: 20
Journal articles: 548
Conference proceedings papers: 528
Patents: 6
Abstracts: 37

Amit Ailon

Journal Papers

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Abdul R. Alsamman

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Edit J. Kaminsky Bourgeois

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Dimitrios Charalampidis

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Huimin Chen

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Z. Zhao, H. Chen, and X. R. Li, "Semiparametric Model Selection with Applications to Regression", Proc. of *IEEE Workshop on Statistical Signal Processing*, Bordeaux, France, July 2005.

H. Chen, and S. Huang, "A Comparative Study on Model Selection and Multiple Model Fusion", *International Conference on Information Fusion*, Philadelphia, PA, July 2005.

S. Huang, H. Chen, and L.-J. Zhang, "Progressive Auction Based Resource Allocation in Service-Oriented Architecture", *IEEE Int. Conf. on Services Computing*, Orlando, FL, July 2005.

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H. Chen and T. Kirubarajan, "A Convex Minimization Approach to Data Association with Prior Constraints", *Proc. of SPIE Conf. on Signal and Data Processing of Small Targets*, Orlando, USA, April 2004.

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M. Yang, X. R. Li, H. Chen, and N. S. V. Rao. "Predicting Internet end-to-end delay: An overview", *Proc. of 36th IEEE Southeastern Symposium on Systems Theory*, March 2004.

Xinming Huang

Journal Papers

Jing Ma and X. Huang, "Incremental Design Methodology for Multimillion Gate FPGAs," *Journal of Circuits, Systems and Computers*, vol. 14, no. 5, pp.1015-1026, 2005.

J. G. Montalvo, T. VonHoven, D. P. Thibodeaux, J. Rodgers, W. Blake, and X. M. Huang, "Update On Cotton Maturity, Fineness and Micronaire Measurements", ICAC Recorder, September 2005.

Conference Papers

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X. M. Huang and J. Ma, "An Application-Specific Routing Protocol for Meshed Wireless Sensor Networks," in *Proceedings of International Conference on Wireless Networks (ICWN'05)*, Las Vegas, NV, June 2005.

J. Ma and X. Huang, "A System-on-Programmable Chip Approach for MIMO Sphere Decoder," in *Proceedings of the IEEE Symposium on Field-Programmable Custom Computing Machines (FCCM'05)*, Napa, CA, April 2005.

J. Ma, C. Liang and X. Huang, "A Comparison of Lattice Decoding Algorithms in Hardware Implementation," in *Proceedings of SPIE*, Vol. 5819, March 2005.

J. Ma, X. Huang and S. Kura, "A High Data Rate Universal Lattice Decoder on FPGA," in *Proceedings of SPIE*, Vol. 5819, March 2005.

L. E. LeBlanc, X. M. Huang and J. Ma, "A geographical multi-hop routing protocol for street-based networks," in *Proceedings of SPIE*, Vol. 5820, pp. 54-62, March 2005.

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X. M. Huang and J. Ma, "Node Collaboration Techniques for Wireless Sensor Networks," (Invited Paper), in *Proceedings of the SPIE*, Vol. 5818, pp. 115-126, March 2005.

J. Ma and X. Huang, "Design of a Lattice Decoder for MIMO Systems in FPGA," in *Proceedings of the IEEE workshop on Signal Processing Systems (SIPS'04)*, pp. 22-29, Austin, TX, October, 2004.

J. Ma, X. Huang, "Design and Implementation of a Lattice Decoder for MIMO Systems," in *Proceedings of the IEEE Radio and Wireless Conference (RAWCON'04)*, pp. 383-386, Atlanta, GA, September, 2004.

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X. M. Huang, J. Ma, J. Li, "Application of Shadow Memory Method in C-Based Modeling for Wireless ASIC Co-Verification," in *Proceedings of IEEE 13th North Atlantic Test Workshop (NATW'04)*, pp. 78-84, Essex Junction, VT, May, 2004.

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Zhenhua Jiang

Journal Papers

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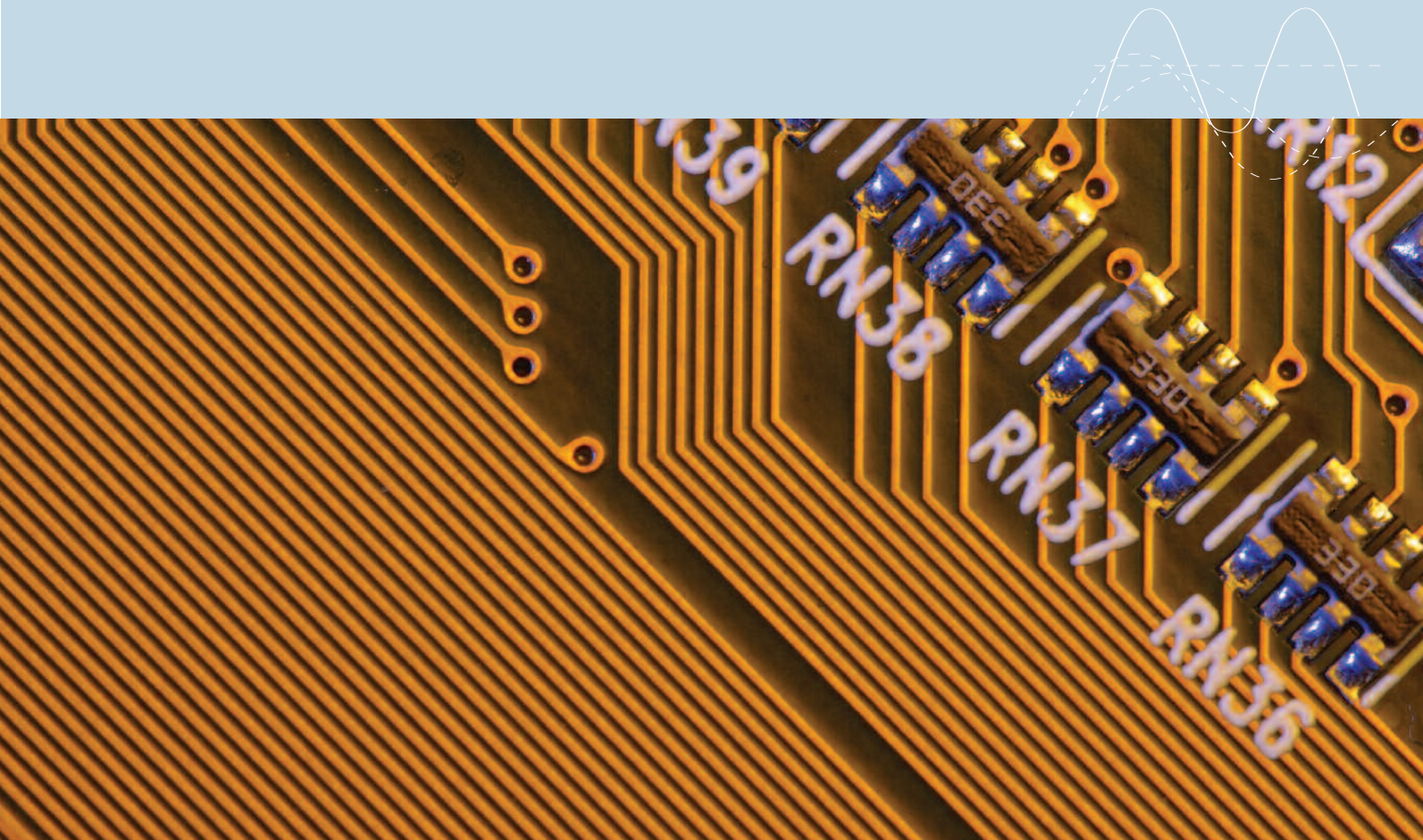
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X. Rong Li

Book Chapters

M. Yang, J.-F. Ru, H.-M. Chen, X. R. Li, and N. S. V. Rao, "Predicting Internet End-to-End Delay: A Statistical Case Study," *The Annual Review of Communications,* vol. 58, 2005, pp. 665–677.

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V. P. Jilkov and X. R. Li, "Estimation of transition probability matrix for Markovian jump systems," *IEEE Transactions on Signal Processing,* 52(6):1620–1630, June 2004.

H. Chen, X. R. Li, and Y. Bar-Shalom, "On joint track initiation and parameter estimation under measurement origin uncertainty," *IEEE Trans. Aerospace and Electronic Systems,* 40(2): 675–694, April 2004.

Conference Papers

J.-F. Ru, X. R. Li, and V. P. Jilkov, "Multiple-Model Detection of Target Maneuvers," *Proc. 2005 SPIE Conf. Signal and Data Processing of Small Targets,* San Diego, CA, August 2005.

J.-F. Ru, H.-M. Chen, X. R. Li, G.-S. Chen, "A Range Rate Based Detection Technique for Tracking A Maneuvering Target," *Proc. 2005 SPIE Conf. Signal and Data Processing of Small Targets,* San Diego, CA, August 2005.

J. Aravena. K.-M. Zhou, F. Chowdhury, and X. R. Li, "Integrated Failure Accommodation Methods," *Proc. 2005 AIAA Conf. Guidance, Navigation,* Control, San Francisco, CA, August 16-18, 2005.

H.-M. Chen, and X. R. Li, "Bayesian Model Selection for multisensor track-to-track association and track fusion,"

Proc. 2005 IEEE Workshop on Statistical Signal Processing, Bordeaux, France, July 2005.

Z.-L. Zhao, H.-M. Chen, and X. R. Li, "Semiparametric Model Selection With Applications To Regression," *Proc. 2005 IEEE Workshop on Statistical Signal Processing,* Bordeaux, France, July 2005.

X. R. Li and Z.-L. Zhao, "Relative Error Measures for Evaluation of Estimation Performance," *Proc. 2005 International Conference on Information Fusion*, Philadelphia, PA, July 2005, paper A7-4.

Z.-L. Zhao and X. R. Li, "Interaction Between Estimators and Estimation Criteria," *Proc 2005 International Conference on Information Fusion*, Philadelphia, PA, July 2005, paper A11-1.

J.-F. Ru, V. P. Jilkov, X. R. Li, and A. Bashi, "Sequential detection of target maneuvers," *Proc. 2005 International Conference on Information Fusion*, Philadelphia, PA, July 2005, paper A12-2.

K.-S. Zhang, Y.-M. Zhu, and X. R. Li, "The Relation of Optimal Local Compression Rule and Local Likelihood Ratio Rule," *Proc. 2005 International Conference on Information Fusion*, Philadelphia, PA, July 2005, paper C6-3.

Z.-L. Zhao and X. R. Li, "Behavior of model probabilities in multiple-model algorithms," *Proc. 2005 International Conference on Information Fusion*, Philadelphia, PA, July 2005, paper A11-4.

Z.-S. Duan, C.-Z. Han, and X. R. Li, "Sequential Unscented Kalman Filter for Radar Target Tracking with Range Rate Measurements," *Proc. 2005 International Conference on Information Fusion*, Philadelphia, PA, July 2005, paper A4-4.

R. R. Pitre, V. P. Jilkov, and X. R. Li, "A comparative study of multiple-model algorithms for maneuvering target tracking," Proc. 2005 SPIE Conf. Signal Processing, Sensor Fusion, and Target Recognition XIV, Orlando, FL, March 2005.

M. Yang, J.-F. Ru, X. R. Li, H. Chen, and A. Bashi, "Predicting Internet End-to-End Delay: A Multiple-Model Approach," Proc. 2005 IEEE Global Internet Symposium, Miami, FL, March 2005, pp. 31–35.

K.-S. Zhang and X. R. Li, "Optimal Sensor Data Quantization for Best Linear Unbiased Estimation Fusion," Proc. IEEE Conference on Decision and Control, Atlantis, Paradise Island, Bahamas, December 2004, pp. 2656–2661.

H.-M. Chen, K.-S. Zhang and X. R. Li, "Optimal Data Compression for Multisensor Target Tracking with Communication Constraints," Proc. IEEE Conference on Decision and Control, Atlantis, Paradise Island, Bahamas, December 2004, pp. 2650–2655.

X. R. Li, "Recursibility and Optimal Linear Estimation and Filtering," Proc. IEEE Conference on Decision and Control, Atlantis, Paradise Island, Bahamas, December 2004, pp. 1761–1766.

Z.-L. Zhao and X. R. Li, "Probabilistic Model Approximation Measure and Multiple Model Estimation," Proc. 38th Asilomar Conf. on Signals, Systems and Computers, Pacific Grove, CA, USA, November 7-10, 2004.

W. May, G.-L. Shan, X. R. Li, "An Efficient Bayesian Algorithm for Joint Target Tracking and Classification," Proc. 7th International Conf. on Signal Processing, Beijing, China, August 31–September 4, 2004, pp. 2090–2098.

Z.-S. Duan, C.-Z. Han, X. R. Li, "Sequential Nonlinear Tracking Filter with Range-Rate Measurements in Spherical Coordinates," Proc. 2004 International Conf. Information Fusion, Stockholm, Sweden, June-July 2004, pp. 599–605.

X. R. Li, "Recursibility, and Batch and Recursive Forms of Optimal Linear Estimation and Filtering" Proc. Workshop On Multisensor Target Tracking: A Tribute to Oliver E. Drummond, Key West, FL, USA, June 2004.

X. R. Li and V. P. Jilkov, "A survey of maneuvering target tracking: approximation techniques for nonlinear filtering," Proc. 2004 SPIE Conf. Signal and Data Processing of Small Targets, Vol. 5428-62, Orlando, FL, April 2004, pp. 537–550.

J.-F. Ru, A. Bashi, and X. R. Li, "Performance comparison of target maneuver onset detection algorithms," Proc. 2004 SPIE Conf. Signal and Data Processing of Small Targets, Vol. 5428-62, Orlando, FL, April 2004, pp. 419–428.

Y. M. Zhu and X. R. Li, "Extended Dampster-Shafer combination rules based on random set theory," Proc. 2004 SPIE Conf. Multisensor, Multisource Information Fusion: Architectures, Algorithms, and Applications, Vol. 5434-11, Orlando, FL, April 2004.

M. Yang, X. R. Li, H.-M. Chen, and N. S. V. Rao, "Predicting internet end-to-end delay: an overview," Proc. 36th IEEE Southeastern Symposium on Systems Theory, Atlanta, GA, March 2004, pp. 210–214.

Jing Ma

Journal Papers

Jing Ma and X. Huang, "Incremental Design Methodology for Multimillion Gate FPGAs," *Journal of Circuits, Systems and Computers*, vol. 14, no. 5, pp.1015-1026, 2005.

Conference Papers

J. Ma and X. Huang, "A SoPC Architecture of MIMO Sphere Decoder for Mobile Communications," in *Proceedings of Engineering Reconfigurable System Architecture Conference (ERSA'05)*, Las Vegas, NV, June 2005.

X. M. Huang and J. Ma, "An Application-Specific Routing Protocol for Meshed Wireless Sensor Networks," in *Proceedings of International Conference on Wireless Networks (ICWN'05)*, Las Vegas, NV, June 2005.

J. Ma and X. Huang, "A System-on-Programmable Chip Approach for MIMO Sphere Decoder," in *Proceedings of the IEEE Symposium on Field-Programmable Custom Computing Machines (FCCM'05)*, Napa, CA, April 2005.

J. Ma, C. Liang and X. Huang, "A Comparison of Lattice Decoding Algorithms in Hardware Implementation," in *Proceedings of SPIE*, Vol. 5819, March 2005.

J. Ma, X. Huang and S. Kura, "A High Data Rate Universal Lattice Decoder on FPGA," in *Proceedings of SPIE*, Vol. 5819, March 2005.

L. E. LeBlanc, X. M. Huang and J. Ma, "A geographical multi-hop routing protocol for street-based networks," in *Proceedings of SPIE*, Vol. 5820, pp. 54-62, March 2005.

X. M. Huang and J. Ma, "A Cluster-Based Routing Algorithm for wireless sensor networks," in *Proceedings of SPIE*, Vol. 5820, pp. 45-53, March 2005.

X. M. Huang and J. Ma, "Node Collaboration Techniques for Wireless Sensor Networks," (Invited Paper), in *Proceedings of the SPIE*, Vol. 5818, pp. 115-126, March 2005.

J. Ma and X. Huang, "Design of a Lattice Decoder for MIMO Systems in FPGA," in *Proceedings of the IEEE Workshop on Signal Processing Systems (SIPS'04)*, pp. 22-29, Austin, TX, October 2004.

J. Ma, X. Huang, "Design and Implementation of a Lattice Decoder for MIMO Systems," in *Proceedings of the IEEE Radio and Wireless Conference (RAWCON'04)*, pp. 383-386, Atlanta, GA, September 2004.

X. M. Huang, J. Ma, "A FPGA-Based Accelerator for Multi-physics Modeling," in *Proceedings of the 2004 Engineering Reconfigurable System Architecture Conference (ERSA'04)*, pp. 209-212, Las Vegas, NV, June 2004.

X. M. Huang, J. Ma, J. Li, "Application of Shadow Memory Method in C-Based Modeling for Wireless ASIC Co-Verification," in *Proceedings of IEEE 13th North Atlantic Test Workshop (NATW'04)*, pp. 78-84, Essex Junction, VT, May 2004.

X. M. Huang, J. Ma, "Accelerate Multi-physics Modeling Using FPGA," in *Proceeding of the SPIE Independent Component Analyses, Wavelets, Unsupervised Smart Sensors Neural Networks Conference*, vol. 5439, pp. 249-260, Orlando, FL, April 2004.

X. M. Huang, J. Ma, L. E. Leblanc, "Wireless Sensor Network for Streetlight Monitoring and Control," In *Proceedings of the SPIE Digital Wireless Communication Conference*, vol. 5440, pp.313-321, Orlando, FL, April 2004.

J. Ma and X. M. Huang, "Design and Implementation of a Real-time Image Noise Canceller," in *Proceedings of the SPIE Visual Information Processing Conference*, vol. 5438, pp. 273-281, Orlando, FL, April 2004.

Industrial Support and Connections

INDUSTRIAL
SUPPORT AND CONNECTIONS

THE DEPARTMENT CONTINUALLY STRIVES TO MAINTAIN VERY STRONG CONNECTIONS WITH LOCAL INDUSTRIES TO HELP ENSURE THAT OUR GRADUATES ARE OBTAINING THE KNOWLEDGE AND SKILLS NECESSARY TO SUCCEED AS PRACTICING ENGINEERS IN TODAY'S EVER CHANGING INDUSTRIAL AND TECHNOLOGICAL WORLD. THERE ARE THREE MAJOR INTEGRAL COMPONENTS IN OUR PROGRAM WHICH FOSTER AND SUPPORT TIES TO LOCAL INDUSTRY, THE ELECTRICAL ENGINEERING ADVISORY BOARD, THE CAPSTONE PROJECT COURSE, AND THE RESEARCH PROJECTS WITH INDUSTRIAL COLLABORATIONS.

ELECTRICAL ENGINEERING ADVISORY BOARD

THE EE ADVISORY BOARD IS INTENDED TO PROVIDE A MECHANISM FOR THE DEPARTMENT LEADERS AND INDUSTRY REPRESENTATIVES TO COLLABORATE ON ISSUES OF IMPORTANCE TO THE DEPARTMENT. THIS INCLUDES DIRECT SUPPORT FOR THE DEPARTMENT MISSION BY:

- Ensuring the mission is appropriate both from an institution and industry view.
- Provide the Department access to effective industry techniques, process and expertise.
- Ensure students are as prepared as possible for careers in industry.
- Supporting departmental accreditation and certification efforts.
- Validating that processes are in place to ensure the mission remains current an relevant.

The EE Advisory Board membership will typically include the EE Department Chair, one to two ad hoc members of the EE Department, a non-voting IEEE Student Chapter representative and 8-10 industry representatives. An industry representative generally serves as the Chair of the Advisory Board for a term of 2 years. The Chair is responsible for meeting schedules and logistics, publishing meeting minutes and tracking action items, maintenance of the Advisory Board Handbook and other activities in support of the Board's Mission.

The current objectives for the EE Advisory Board are listed below

- Assist the EE Department in maintaining a general focus on design courses in the EE program. In particular, assist in developing and sponsoring industry related senior design (Capstone) courses during each semester.

- Participate in industry surveys to ensure that the EE program remains aligned with the needs of regional industries.

- Provide advice and oversight related to the processes of continually reviewing the EE program to ensure it remains aligned with the needs of the students, industry and the community.

- Participate in the assessment of equipment used to support laboratory and other courses. Where appropriate, advise or assist in the provisioning of equipment needed to address and identified improvement opportunities.

INDUSTRIAL SUPPORT AND CONNECTIONS

THE INDUSTRIAL REPRESENTATIVES ON THE EE ADVISORY BOARD DURING 2004-2005 ARE LISTED BELOW.

Reynold J. Abadie, Jr.
Director of Facilities & Environmental Operations,
Lockheed Martin Space Systems Company,
Michoud Operations

Anwer Bashi
Senior Research Engineer, Computrols, Inc.

Stephen D. Bourg
Principal, Crescent Consultants, Inc.

Mike Brown
Senior Electrical Engineer, Neptune Sciences, Inc.

Darryl D. d'Aquin
President, CommTech Industries, Inc.

Brian L. Hardouin
Manager, BellSouth Telecommunications.

Edwin Herasymiuk
Vice President, Gulf X-Ray Services, Inc.

Ray J. Johnson
Chair EE Advisory Board
Vice President and Chief Information Officer, Entergy
Corporation.
Chair EE Advisory Board

Charles J. Ledet
Vice President and Business Unit Manager, IO Marine
Systems, Inc.

Steve Liggio
Engineering Division Manager, Point Eight Power, Inc.

John J. Maggiore, Jr.
Senior Electrical Engineer, Waldemar S. Nelson &
Company, Inc.

Robert Mejia
Vice-President, Instrumentation & Control Systems
Technical Manager, M S Benbow and Associates

Gene Stafford
Powertronics System, Inc.

Harry Thompson
Director, Program Support Office, U.S. Navy, Space
and Naval Warfare Command Information Technology
Center

CAPSTONE PROJECT COURSE

The Senior Design sequence consists of a series of two courses: a 1-credit hour Senior Design I in which students perform preparatory work, including selection of the project, preliminary design work, and project scheduling. The remainder of the design work, all the implementation, and all the system testing are performed during Senior Design I, a 3-credit hour course in which the Capstone Project culminates. The general goal of this course is to have students work in teams to complete the design of an interdisciplinary engineering project. Most of these design projects are sponsored and mentored by local industry representatives.

In the Capstone Project Course, it is expected that students use computer tools throughout the project. This includes numerical calculation, report writing, preparation of drawings and visual aids, programming software, project planning software, etc. Students are required to work on a project in which they will design, develop, troubleshoot, and implement a working device or process. Since graduating-senior standing is required, students will be required to implement analog, digital, programming, microprocessor skills, etc, as well as to work with other interdisciplinary subjects such as dynamics, chemistry, etc. when and if required by the project. In addition, students are required to work as team members and to be able to follow timelines and goals as set in the project. This includes attendance to group meetings, writing of reports, oral presentations to other members in the group, and the ability to work within project management flow guidelines and budget constraints.

A project leader is assigned for each student team. The project leader's responsibility is to coordinate the group members' tasks and needs, and to ensure that the project is running within timelines and within budget. The project leader is responsible for keeping a log of a group member's attendance and general contributions.

The Capstone Project Course is an excellent tool for instilling in our students the importance of working on organized teams in engineering projects. It also provides our students with very valuable experience working with local industry on a real-world engineering project.

Some recent Senior Design Capston Projects and their local industry sponsors are listed below.

DIGITAL ID PRINTER
Sponsored by: Gulf X-Ray Services Incorporated

This project is to develop, design, and prototype a portable battery operated digital radiography film identification printer similar in size and shape of a handheld spell checker or electronic dictionary. Film ID printers are used to permanently identify radiography film with vital information that is used to identify the part that is being inspected. Information such as, customer name, serial number, location of the part, radiography testing company, radiographer, date, and others are commonly used.

PID-PONG CONTROL
Sponsored by: M. S. Benbow and Associates

This project requires the participants to plan and implement hands on process control project. The objective is to design a process control system that will productively levitate an object in a stream of air. A blower will discharge a constant stream of air. The position of the object in the column of air will be changed by diverting a portion of the air. The position of the object will be monitored with an infrared position transmitters or radar gauge. A PID controller will measure the object position and modulate the diverter valve position. The location of the object will be displayed on screen. A user interface should allow for setting up the desired object's position within 5% error. The system should also include a mechanism that allows manual control of the object bypassing the automatic control.

HARDNESS INSTRUMENT DESIGN PROJECT
Sponsored by: Gulf X-Ray Services Incorporated

This project is to develop, design and prototype a portable battery operated hardness measurement instrument. During a hardness test, an impact body with a spherically shaped tungsten carbide or diamond tip impacts under spring force, the test surface from which it rebounds. The impact and rebound velocities are measured when the impact body is approximately 1mm from the test surface. This is accomplished by means of a permanent magnet mounted in the impact body which during the test moves through a coil in the impact device and induces an electric voltage on both the impact and rebound movements. These induced voltages are proportional to the respective impact and rebound velocities. The instrument measures the voltage signals from the impact device, and displays the reading for the user. The small signal from the measuring device must be conditioned and converted to a digital signal for interfacing to a microcontroller. The microcontroller then computes a hardness value based on the two signal measurements and displays and records the value for the user.

WIRELESS CONTROL OF MOTOR FAN
Sponsor: M. S. Benbow and Associates

The objective of this project was to design and build an Allen Bradley programmable logic controller based motor control center for a manufacturing facility. The motor control center had to monitor and control up to 40 different motors ranging in size from 10HP to 75HP. The motor control center had to communicate with various control points located 100ft to 1000ft away.

FACULTY PROJECTS

In addition to the industrial ties of the Electrical Engineering Advisory Board and the Capstone Project Course, there is also a continual effort by the Department faculty to be involved with research and development projects in collaboration with local industries, including, for example, the NASA Stennis Space Center and Northrop-Grumman Ship Systems (formerly Avondale Industries).

Some recent faculty research projects in collaboration with local industry are listed below.

PROJECT TITLE: COORDINATED UV ROUTING IN VARIABLE ENVIRONMENTS
Faculty Members: Dr. X. Rong Li, Dr. Vesselin P. Jilkov, Dr. Huimin Chen
Industrial Partner: Planning Systems, Inc

This is Phase II of a Small Business Technology Transfer (STTR) project sponsored by the Navy in the amount of $750,000. The objective of the project is to create effective, realizable Unmanned Aerial Vehicle (UAV) search plans that adapt to changing conditions (environmental and threat), based on high-level, user-defined objectives and multi-parameter cost-function metrics. The major technical problem is to sense and then automatically adapt to changing conditions, without exhaustive computations. Our technical approach is based on multi-objective optimization combined with efficient data fusion techniques.

PROJECT TITLE: ACCURATE DETECTION AND CLASSIFICATION ALGORITHMS FOR PARADISE
Faculty Member: Dr. Edit Bourgeois
Industrial Partners: NRL Stennis Space Center; Omni Technologies, Inc.

This work addresses important issues in the area of detection and classification of underwater targets using trifocal systems. We are developing classification methods appropriate for PARADISE (parametric detection imaging sensor) when used to locate point targets and, particularly, long targets such as cables, pipes, and similar targets in oceanic environments. The targets of interest are buried in seafloor sediments of various types and at various depths. The Naval Research Lab (NRL) is currently developing a suite of these PARADISE sonars for different platforms, along with the processing software. Omni Tech is developing some of the hardware for this sonar system.

PROJECT TITLE: DEVELOPMENT OF A VISION SYSTEM FOR WELDING APPLICATIONS IN SHIPYARDS
Faculty Members: Dr. Dimitrios Charalampidis, Dr. Abdul Alsamman
Industrial Partner: Northrop-Grumman Ship Systems.

The objective of this project is to develop a novel, compact, multi-sensor robotic vision system for application to shipyard welding. The system will provide 360 degrees sensing in the visible spectrum and be compact for maneuverability. This system will consist of components such as fiber bundles, specialized lenses and filters, and CCD cameras, and image processing algorithms. These algorithms will analyze the images obtained during welding, in real-time, for the purpose of detecting the welding seam and the root gap, whose accurate measurement is very significant for high-quality welding.

PROJECT TITLE: ALGORITHMS AND SOFTWARE ARCHITECTURE FOR THE PROCESSING OF LIDAR DATA
Faculty Member: Dr. Dimitrios Charalampidis
Industrial Partner: Diamond Data Systems

This project deals with the development of a new, advanced architecture, algorithms and software to support the end-to-end processing of LIDAR data to derive useful information products such as Digital Elevation Models (DEM). The approach is innovative in three ways. First, it proposes a complete end-to-end system instead of a solution that addresses only a single step of the complex problem of accurately gathering, processing, and reporting of the data. Secondly, it proposes a system that is designed to minimize human interaction and manual data entry. Thirdly, and possibly the most important part of this innovation, is that it proposes both the implementation of multiple algorithms to perform the data processing, as well as an extensible, open software architecture which allows algorithms to be incorporated into the system in the future.

PROJECT TITLE: A NOVEL MANEUVER DETECTION TECHNIQUE WITH RANGE RATE MEASUREMENTS
Faculty Member: Dr. Huimin Chen
Industry partner: Intelligent Automation, Inc.

In this project, we have developed a novel target maneuver detection technique using radar measurement including range rate for tracking and surveillance systems to reliably indicate the presence of target maneuver and its magnitude. The approach is computationally efficient and avoids the potential problems of using the extended Kalman filter to incorporate the range rate measurement. The algorithms have been tested with various practical tracking scenarios using simulated Navy E2C radar.

PROJECT TITLE: A ROBUST ADAPTIVE TARGET STATE ESTIMATOR FOR HIT-TO-KILL INTERCEPTOR
Faculty Member: Dr. Huimin Chen
Industry partner: Intelligent Automation, Inc.

In this project, Intelligent Automation, Inc. (IAI) and University of New Orleans (UNO) propose an innovative target state estimation techniques based on multiple model estimation theory, namely, a robust adaptive target state estimator for hit-to-kill interceptor. The primary goal is to accommodate interceptor command guidance corrections for short time-of-flight engagement of threats such as rockets, artillery, mortars. In our multiple model based target state estimator, within each module, the linear minimum mean square error filter is used to characterize a particular target motion. The proposed method has been tested in a ballistic missile tracking scenario and it yields significantly faster "settle down" performance than existing filtering methods.

PROJECT TITLE: COOPERATIVE DECISION AND CONTROL FOR MULTIPLE AERIAL VEHICLES
Faculty Member: Dr. Huimin Chen
Industry partner: Intelligent Automation, Inc.

In this project, Intelligent Automation, Inc. (IAI) and University of New Orleans (UNO) propose a new and innovative cooperative decision and control methodology for autonomous unmanned aerial vehicles (UAVs) that explicitly accounts for intermittent or asynchronous communications and infrequent information updates. We develop a general framework for the design of a hierarchical control architecture that exploits the advantages of a sensor network onboard the UAVs by combining both collaborative decision making (coordination) and decentralized real time control.

PROJECT TITLE: CMOS IMAGE SENSORS
Faculty Member: Dr. Xinming Huang
Industrial Partner: IBM

The market for solid-state image sensors has been experiencing explosive growth in recent years due to the increasing demands of mobile imaging, digital still and video cameras, Internet-based video conferencing, surveillance, and biometrics. With over 230 million parts shipped in 2004 and an estimated annual growth rate of over 28% (In-Stat/MDR), CMOS image sensors have become a significant silicon technology driver. This project investigates the integrated digital architecture for embedded signal processing in the CMOS image sensor device. The algorithm is prototyped on FPGA devices for real-time performance evaluation.

PROJECT TITLE: WIRELESS TELEMETRY FOR STREETLIGHT CONTROL AND MANAGEMENT
Faculty Member: Dr. Dimitrios Charalampidis
Industrial Partner: Diamond Data Systems

This project deals with the development of a new, advanced architecture, algorithms and software to support the end-to-end processing of LIDAR data to derive useful information products such as Digital Elevation Models (DEM). The approach is innovative in three ways. First, it proposes a complete end-to-end system instead of a solution that addresses only a single step of the complex problem of accurately gathering, processing, and reporting of the data. Secondly, it proposes a system that is designed to minimize human interaction and manual data entry. Thirdly, and possibly the most important part of this innovation, is that it proposes both the implementation of multiple algorithms to perform the data processing, as well as an extensible, open software architecture which allows algorithms to be incorporated into the system in the future.

PROJECT TITLE: A NOVEL MANEUVER DETECTION TECHNIQUE WITH RANGE RATE MEASUREMENTS
Faculty Members: Dr. Xinming Huang and Dr. Jing Ma
Industrial Partners: Telemics Inc. and SoftPower Inc.

This research investigates the technology of wireless sensor networks and directly applies it to a unique industry for streetlight remote control and monitoring. Two industrial partners, SoftPower Inc. and Telemics Inc., will actively participate in this project. Streetlight system maintenance and control is a labor-intensive high-cost task for public facility operations, including municipalities, universities, and Department of Transportation (U.S. DOT). This research will provide a scalable, reliable and low-cost solution to control and monitor streetlight infrastructure remotely. This project will directly impact Louisiana in the near-term by creating new jobs and developing a cost saving technology.

PROJECT TITLE: MINIMALIST SHORT-RANGE WEARABLE NETWORKS FOR SOLDIER TRAINING
Faculty Members: Dr. Xinming Huang and Dr. Jing Ma
Industrial Partner: Innovative Strategic Advanced Systems, LLC.

The overall objective of this project is to investigate the enabling technology of wearable sensor networks (WSN) for real-time monitoring of geolocation, physical status, and environmental conditions of actively training soldiers. The goal of this research project is to enable information capture, processing, and reporting of the active status of every soldier in the training field to the central camp station as well as relaying the critical information to the personal digital assistant (PDA) devices carried by the instructors. This proposal is to develop a local-range low-power wearable network through an integration of wireless communications and sensor web technologies. The wearable systems will be used to improve the safety and effectiveness of training and decrease the likelihood of environmentally-induced injuries.

RESEARCH
AND PROFESSIONAL ACTIVITIES

Abdul Rahman Alsamman

Honors and Activities:
- Member IEEE
- Member SPIE
- IEEE Teacher of the Year Award 04 – UNO Branch
- Reviewer for Journal of Optical Engineering
- Reviewer for IEEE Transactions on Industrial Electronics
- Reviewer for Optics Communications

Presentations:

"Spatially efficient pseudo-random phase encoded JTC for fast target recognition," SPIE Defense and Security Symposium Orlando, April 2005.

"A comparison of optoelectronic-based face recognition to ICA and PCA based face recognition," SPIE Defense and Security Symposium Orlando, April 2005.

"Optical implementation of a quality control algorithm for the removal of nonprecipitation echoes in weather radars," SPIE Defense and Security Symposium Orlando, April 2004.

"Ultrafast Multiwavelet Analysis Using Phase-encoded JTC," SPIE Defense and Security Symposium, Orlando, April 2004.

"Optical Processing for Fast Recognition," the 9th Annual Joint Engineering Society Conference (JESC), New Orleans, LA, February 2005.

Rasheed Azzam

Professional Positions

Appointed to the *Publications Council* of the *Optical Society of America (OSA)*, January 2005 – December 2007. OSA is the leading publisher of journals of optics and photonics, with more than 27,000 refereed journal pages published in 2005.

Currently serving on the *Membership Committee, Engineering Sciences & Technologies, Third World Academy of Sciences (TWAS, Trieste, Italy), 2004-2006.*

Conference Presentations

R. M. A. Azzam, F. Sudratjat, "Single-layer-coated silicon-wedge beam splitter for the division-of-amplitude photopolarimeter," Annual Meeting of the Optical Society of America, Rochester, NY, 29 Sept. - 3 Oct., 2004.

R. M. A. Azzam and C. L. Spinu, "Linear-to-circular polarization transformation upon optical tunneling through an embedded low-index film," Annual Meeting of the Optical Society of America, Rochester, NY, 29 Sept. - 3 Oct., 2004.

Other Professional Activities

Participated in the *Optical Society of America Leadership Conference*, Washington, D. C., February 2005.

Attended the *First National Conference on Scientific Research*, as an invited guest of the Egyptian Academy of Scientific Research and Technology, Cairo, Egypt, May 28 – 29, 2005.

Invited guest, *Einstein Symposium*, held in celebration of the "World Year of Physics," at *Bibliotheca Alexandrina*, Alexandria, Egypt, June 2-4, 2005.

Served on International Steering Committee, *Fourth Japanese-Mediterranean Workshop on Applied Electromagnetic Engineering for Magnetic, Superconducting, and Nano Materials*, Cairo, Egypt, September 17-20 (2005). Invited keynote speaker at this conference, but could not attend because of Hurricane Katrina.

Received the G. G. Stokes Award for exceptional contributions to polarization optics at the 50th Annual Meeting of SPIE, San Diego, California, July 31 to August 4, 2005.

Reviewed proposals for the National Science Foundation, and refereed many papers for journals of optics and photonics.

Edit Kaminsky Bourgeois

Professional Positions and Activities
- Chair, New Orleans Section of the IEEE, 2004 and 2005.
- Member, IEEE T&D 2005 Conference Committee, 2004-2005.
- Reviewer for Wireless Comm Conf., 2005
- Reviewer for Computational Economics: A perspective from Computational Intelligence, 2004.
- Honorary Advisor, National Engineering Honor Society, *Tau Beta Pi*, Epsilon Chapter of LA.

Presentations:

E. Kaminsky, "Asymptotic Performance of the Pth Power Law Phase Estimator," presented at *IEEE Globecom 2005 Conf.*, Session 10.5, St. Louis, MO, 29 Nov. 2005.

E. Kaminsky, "Blind Phase Recovery in Cross QAM Communication Systems with the Reduced Constellation Eighth-Order Estimator", presented at *IEEE Globecom 2005 Conf.*, Session 13.1, 30 Nov. 2005.

E. Kaminsky, "An Optimum Hardware Detector for Constant Envelope Quadrature-Quadrature Phase Shift Keying (CEQ2PSK)", presented at *IEEE Globecom 2005 Conf.*, Session 13.2, St. Louis, MO, 30 Nov. 2005.

E. Kaminsky, "*Chirp Slope Keying for Underwater Communications*", presented at *SPIE Conf. on Sensors, and Command, Control, Communications, and Intelligence (C31) Technologies for Homeland Security and Homeland Defense IV Conf.*, Orlando, FL, 31 March 2005.

Dimitrios Charalampidis

Professional Positions and Activities
- Session Chair for "Image Retrieval & Image Quality," as part of the *International Conference on Imaging Science, Systems, and Technology*, Las Vegas, Nevada, U.S.A, June 29, 2005.
- Session Chair "Image Compression Techniques," as part of the *International Conference on Imaging Science, Systems, and Technology*, Las Vegas, Nevada, U.S.A, June 29, 2005.
- Member of IEEE,
- Member of IEEE Signal Processing Society,
- Member of ASEE
- IEEE Student Branch Counselor, UNO branch (attended March meeting: paper contest, attended April Region 5 conference in Denver, advised IEEE officers).

Conference Presentations

"An Improved Adaptive Technique for Compression of Still Images," at the *International Conference on Imaging Science, Systems, and Technology*, Las Vegas, June 29, 2005.

"Novel Circular-Shift Invariant Clustering," at the *5th International Workshop on Pattern Recognition in Information Systems*, Miami, May 24, 2005.

A Method for Pitch Detection in Non-Stationary Speech, Information and Systems Technology Research Center Seminar – New Orleans, February 18, 2005.

Recent Advances in Image Compression, 9th JESC Conference and LES Statewide Honors & Awards Spring Meeting – New Orleans, February 4, 2005.

Production of Digital Elevation Models from LIDAR Data, 2nd IST-Workshop, Tulane University, December 13, 2004.

Review of Motion Detection, Information and Systems Technology Research Center Seminar – New Orleans, September 10, 2004.

Dr. Huimin Chen

Professional Activities

• Reviewer for IEEE Trans. Automatic Control, European Transactions on Telecommunications and Applied Mathematics Letters, since 2005.
• Reviewer for IEEE Transactions on Signal Processing, IEEE Signal Processing Letters, and IEE Electronics Letters since 2004.
• Reviewer for *Automatica* since 2003.
• Reviewer for IEEE Trans. System, Man and Cybernetics since 2002.
• Reviewer for IEEE Trans. Aerospace and Electronic Systems since Oct. 2001.
• Session chair for *Services* Oriented Architecture, *IEEE Int. Conf. on Services Computing*, Orlando, FL, July 2005.
• Member of TPC for First Int Workshop on Broadband Wireless Services and Applications , San Jose, CA, Oct. 2004.

Conference Presentations

Y. Chen, H. L. Bart, S. Huang, and H. Chen, "A Computational Framework for Taxonomic Research: Diagnosing Body Shape within Fish Species Complexes", Proc. of *Int. Conf. on Data Mining*, Houston, TX, Nov. 2005.

Y. Bar-Shalom and H. Chen, "Track-to-Track Association for Tracks with Features and Attributes", Proc. of *SPIE Conf. Signal and Data Processing of Small Targets*, San Diego, CA, August 2005.

J. Ru, H. Chen, X. R. Li, and G. Chen, "A Range Rate Based Detection Technique for Tracking A Maneuvering Target", Proc. of *SPIE Conf. Signal and Data Processing of Small Targets*, San Diego, CA, August 2005.

H. Chen, and X. R. Li, "Bayesian Model Selection for Multisensor Track-to-Track Association and Track Fusion", Proc. of *IEEE Workshop on Statistical Signal Processing*, Bordeaux, France, July 2005.

Z. Zhao, H. Chen, and X. R. Li, "Semiparametric Model Selection with Applications to Regression", Proc. of *IEEE Workshop on Statistical Signal Processing*, Bordeaux, France, July 2005.

H. Chen, and S. Huang, "A Comparative Study on Model Selection and Multiple Model Fusion", *International Conference on Information Fusion*, Philadelphia, PA, July 2005.

S. Huang, H. Chen, and L.-J. Zhang, "Progressive Auction Based Resource Allocation in Service-Oriented Architecture", *IEEE Int. Conf. on Services Computing*, Orlando, FL, July 2005.

H. Chen, and Y. Ruan, "Joint Target Recognition and Tracking Using Class Speci.c Features", *IEEE 38-th Asilomar Conference on Signals, Systems, and Computers*, Paci.c Grove, CA, Nov. 2004.

H. Chen and T. Kirubarajan, "A Convex Minimization Approach to Data Association with Prior Constraints", *Proc. of SPIE Conf. on Signal and Data Processing of Small Targets*, Orlando, USA, April 2004.

Y. Bar-Shalom and H. Chen, "IMM Estimator with Out-of-Sequence Measurements", *Proc. of SPIE Conf. on Signal and Data Processing of Small Targets*, Orlando, USA, April 2004.

Invited talks

A Comparative Study on Model Selection and Multiple Model Fusion, Computer Science Department, University of New Orleans, Feb. 2005.

Semiparametric Model Selection with Applications to Regression, Intelligent Automation Inc., MD, Jun. 2005.

Xin-Ming Huang

Conference presentations

J. Ma and X. Huang, "A SoPC Architecture of MIMO Sphere Decoder for Mobile Communications," in *Proceedings of Engineering Reconfigurable System Architecture Conference (ERSA'05)*, Las Vegas, NV, June 2005.

X. M. Huang and J. Ma, "An Application-Specific Routing Protocol for Meshed Wireless Sensor Networks," in Proceedings of International Conference on Wireless Networks (ICWN'05), Las Vegas, NV, June 2005.

L. E. LeBlanc, X. M. Huang and J. Ma, "A geographical multi-hop routing protocol for street-based networks," in *Proceedings of SPIE*, Vol. 5820, pp. 54-62, March 2005.

X. M. Huang and J. Ma, "A Cluster-Based Routing Algorithm for wireless sensor networks," in Proceedings of SPIE, Vol. 5820, pp. 45-53, March 2005.

X. M. Huang and J. Ma, "Node Collaboration Techniques for Wireless Sensor Networks," (Invited Paper), in *Proceedings of the SPIE*, Vol. 5818, pp. 115-126, March 2005.

X. M. Huang, J. Ma, "A FPGA-Based Accelerator for Multi-physics Modeling," in *Proceedings of the 2004 Engineering Reconfigurable System Architecture Conference (ERSA'04)*, pp. 209-212, Las Vegas, NV, June 2004.

X. M. Huang, J. Ma, J. Li, "Application of Shadow Memory Method in C-Based Modeling for Wireless ASIC Co-Verification," in *Proceedings of IEEE 13th North Atlantic Test Workshop (NATW'04)*, pp. 78-84, Essex Junction, VT, May 2004.

X. M. Huang, J. Ma, "Accelerate Multi-physics Modeling Using FPGA," *in Proceeding of the SPIE Independent Component Analyses, Wavelets, Unsupervised Smart Sensors Neural Networks Conference*, vol. 5439, pp. 249-260, Orlando, FL, April 2004.

X. M. Huang, J. Ma, L. E. Leblanc, "Wireless Sensor Network for Streetlight Monitoring and Control," In *Proceedings of the SPIE Digital Wireless Communication Conference*, vol. 5440, pp.313-321, Orlando, FL, April 2004.

Invited Talks

X. M. Huang, "Extended Memory Interface for FPGA-Based Test Support Processor," *IBM Microelectronics Labs Research Seminar*, Burlington, VT, August 2004.

X. M. Huang, J. Ma, "Advanced Computing Architectures and Algorithms for Wireless Communications," at *the 2nd Information Technology and Systems Research Center (ISTRC) Workshop*, Tulane University, December 2004.

X. M. Huang, J. Ma, "Recent Advances on Integrated Computing and Communications Research," at *the 9th Annual Joint Engineering Society Conference (JESC)*, New Orleans, LA, February 2005.

X. M. Huang, "Introduction to Wireless Communication Networks and Standards," at *the International Conference on Compound Semiconductor Manufacturing (MANTECH)*, New Orleans, LA, April 2005.

X. M. Huang, "Introduction to RF Circuit Design for Wireless Systems", at *the International Conference on Compound Semiconductor Manufacturing (MANTECH)*, New Orleans, LA, April 2005.

Professional Activities

- Program Committee, Intl Conf on Embedded Software and Systems, 2005
- Local Chair, IEEE Conference on Robotics and Automation (ICRA), 2004
- Reviewer for IEEE Communications Letter
- Reviewer for IEEE Transactions on Wireless Communication
- Reviewer for IEEE Communications Magazine
- Reviewer for IEEE Micro Magazine

Zhenhua Jiang

Conference Presentations

Z. Jiang, R. Dougal, R. Leonard, "A Novel Digital Power Controller for Fuel Cell/Battery Hybrid Power Sources", *Proceedings of IEEE Applied Power Electronics Conference*, Austin, TX, pp. 467-473, March 6-10, 2005.

Z. Jiang, R. Dougal, "A Novel, Digitally-Controlled, Portable Photovoltaic Power Source", *Proceedings of IEEE Applied Power Electronics Conference*, Austin, TX, pp. 1797-1802, March 6-10, 2005.

Z. Jiang, and R. Dougal, "Multiobjective MPPT/Charging Controller for Standalone PV Power Systems under Different Insolation and Load Conditions", *Proceedings of IEEE Industry Applications Society 39th Annual Meeting*, pp. 1154-1160, Seattle, WA, Oct. 3-7, 2004.

Z. Jiang, R. Leonard, R. Dougal, H. Figueroa, and A. Monti, "Processor-in-the-Loop Simulation, Real-Time Hardware-in-the-Loop Testing, and Hardware Validation of A Digitally-Controlled, Fuel Cell-Powered Battery-Charging Station", *Proceedings of IEEE Power Electronics Specialists Conference*, Aachen, Germany, pp. 2251-2257, June 20-25, 2004.

Z. Jiang, L. Gao, R. Dougal, "Multiobjective Control of Power Converter in an Active Hybrid Fuel Cell/Battery Power Source", *Proceedings of IEEE Power Electronics Specialists Conference*, Aachen, Germany, pp. 3804-3811, June 20-25, 2004.

L. Gao, Z. Jiang, and R. Dougal, "Performance of Power Converters in Hybrid Fuel Cell/ Battery Power Sources", *Proceedings of IEEE Power Electronics Specialists Conference*, Aachen, Germany, pp. 2018-2022, June 20-25, 2004.

Z. Jiang, Roger Dougal, "A VTB-Based Virtual Environment for Solar Array Maximum Power Point Tracker Design", *VTB Users and Developers Conference*, Columbia, SC, September 15-16, 2004.

Vesselin Jilkov

Conference Presentations

"Sequential Detection of Target Maneuvers", *Eight International Conference on Information Fusion,* June 26 – July 1, 2005, Philadelphia, PA, USA

"Enhanced Image Feature Extraction for Object Tracking", *Eight International Conference on Information Fusion,* June 26 – July 1, 2005, Philadelphia, PA, USA

"Multiple Model Detection of Target Maneuvers", *2005 SPIE Conf. Signal and Data Processing of Small Targets,* August 2-4, 2005, San Diego, CA, USA

"A Survey of Maneuvering Target Tracking, Part VIb: Approximate Density Based Nonlinear Filters", *2005 SPIE Conf. Signal and Data Processing of Small Targets,* August 2-4, 2005, San Diego, CA, USA

"A Survey of Maneuvering Target Tracking, Part VIa: Optimal Nonlinear Filtering", *2005 SPIE Conf. Signal and Data Processing of Small Targets,* August 2-4, 2005, San Diego, CA, USA

"Modeling Ballistic Target Motion During Boost for Tracking", *2005 SPIE Conf. Signal and Data Processing of Small Targets,* August 2-4, 2005, San Diego, CA, USA

"A Comparative Study of Multiple-Model Algorithms for Maneuvering Target Tracking", *2005 SPIE Conf. Signal Processing, Sensor Fusion and Target Recognition XIV,* March 28-30, 2005, Orlando, FL, USA

"A Survey of Maneuvering Target Tracking: Approximate Techniques for Nonlinear Filtering," *2004 SPIE Conf. Signal and Data Processing of Small Targets 2004,* April 13-15, 2004, Orlando, FL

Reviewer
- IEEE Transactions on Aerospace and Electronic Systems,
- IEEE Transactions on Automatic Control,
- IEEE Transactions on Signal Processing,
- IEEE Transactions on Intelligent Transportation Systems,
- AIAA Journal on Guidance, Control, and Dynamics,
- IEE Proceedings on Radar, Sonar and Navigation,
- International Journal of Automation and Computing

X. Rong Li

Honors and Professional Activities
- Honored as Cheung Kong Lecturing Professor, Xian Jiaotong University, China, 2005.
- Featured in April 2005 in <u>Louisiana Research</u>, an annual publication of the Louisiana Board of Regents for higher education, which features each year about a dozen of research activities and accomplishments.
- The 2005 Edward R. Freitag Award, IEEE New Orleans Section, in recognition of service to the Institute and the profession as well as technical achievements.
- Fellow, IEEE (Institute of Electrical and Electronic Engineers), 2004–present
- Overseas Outstanding Young Scholar Award, National Natural Science Foundation of China, 2004.
- Honored as Guest Professor, Zhejiang University, China, 2004.
- Local Arrangement Chair, 2004 IEEE International Conference on Robotics and Automation, New Orleans, April-May 2004.
- Panelist, Sensors and Sensor Networks Program, National Science Foundation, 2004.
- President, The Chinese Professionals Association in New Orleans, 2002– present.
- Editor, *Communications in Information and Systems,* 2001–present.
- Member, Board of Directors, International Society of Information Fusion, 2004–present.

RESEARCH AND PROFESSIONAL ACTIVITIES

Invited Speeches

"Data Fusion for Estimation and Decision: A Unification," California Institute of Technology, Los Angeles, CA, March 31, 2005.

"Maneuvering Target Tracking," Beijing University of Aeronautics and Astronautics, China, June 2005.

"Thoughts on Doing Research," Beijing University of Aeronautics and Astronautics, China, June 2005.

"Estimation and Decision," Tsinghua University, China, June 2005.

"Estimation Fusion," Xian Jiaotong University, China, June 2005.

"Democracy, Election, and Information Fusion," Xian Jiaotong University, China, June 2005.

"Random Set Theory," Xian Jiaotong University, China, June 2005.

"Thoughts on Doing Research," Xian Jiaotong University, China, June 2005.

"Performance Evaluation (Credibility Tests and Measures)," Sichuan University, China, June 2005.

"Democracy, Election, and Information Fusion," Sichuan University, China, June 2005.

"Thoughts on Doing Research," Sichuan University, China, June 2005.

"Introduction to Information Fusion," Zhejiang University, China, May 2005.

"Democracy, Election, and Information Fusion," Shanghai Jiaotong University, China, May 2005.

"Information Fusion under Uncertainty," Shanghai Jiaotong University, China, May 2005.

"Information & Systems Technology Research Center," Louisiana Technology Council, New Orleans, May 10, 2005.

"Introduction to Information Fusion," LES Joint Engineering Society Workshop, New Orleans, February 4, 2005.

"Research & Educational Programs at Electrical Engineering Department, University of New Orleans," LES Joint Engineering Society Workshop, New Orleans, February 4, 2005.

"Research Projects at Information & Systems Laboratory," IST Workshop, New Orleans, December 13, 2004.

"Introduction to Information Fusion," Tsinghua University, China, June 2004.

"Recent Advances in Information Fusion," Xian Jiaotong University, China, June 2004.

"Optimal Linear Estimation Fusion," Xian Jiaotong University, China, June 2004.

"Information Fusion under Uncertainty," Sichuan University, China, June 2004.

"Recent Advances in Information Fusion," Sichuan University, China, June 2004.

"Optimal Linear Estimation Fusion," Sichuan University, China, June 2004.

"Recursibility and Recursive Optimal Linear Estimation and Filtering" *Workshop on Multisensor Target Tracking: A Tribute to Oliver E. Drummond,* Key West, FL, USA, June 2004.

Presentations

X. R. Li and Z.-L. Zhao, "Relative Error Measures for Evaluation of Estimation Performance," *Proc. 2005 International Conference on Information Fusion,* Philadelphia, PA, July 2005, paper A7-4 .

Z.-L. Zhao and X. R. Li, "Interaction Between Estimators and Estimation Criteria," *Proc 2005 International Conference on Information Fusion,* Philadelphia, PA, July 2005, paper A11-1.

K.-S. Zhang, Y.-M. Zhu, and X. R. Li, "The Relation of Optimal Local Compression Rule and Local Likelihood Ratio Rule," *Proc. 2005 International Conference on Information Fusion,* Philadelphia, PA, July 2005, paper C6-3.

Z.-L. Zhao and X. R. Li, "Behavior of model probabilities in multiple-model algorithms," *Proc. 2005 International Conference on Information Fusion,* Philadelphia, PA, July 2005, paper A11-4.

Z.-S. Duan, C.-Z. Han, and X. R. Li, "Sequential Unscented Kalman Filter for Radar Target Tracking with Range Rate Measurements," *Proc. 2005 International Conference on Information Fusion,* Philadelphia, PA, July 2005, paper A4-4 .

K.-S. Zhang and X. R. Li, "Optimal Sensor Data Quantization for Best Linear Unbiased Estimation Fusion," *Proc. IEEE Conference on Decision and Control,* Atlantis, Paradise Island, Bahamas, December 2004.

H.-M. Chen, K.-S. Zhang and X. R. Li, "Optimal Data Compression for Multisensor Target Tracking with Communication Constraints," *Proc. IEEE Conference on Decision and Control,* Atlantis, Paradise Island, Bahamas, December 2004.

X. R. Li, "Recursibility and Optimal Linear Estimation and Filtering," *Proc. IEEE Conference on Decision and Control,* Atlantis, Paradise Island, Bahamas, December 2004.

"Thoughts on Doing Research," University of New Orleans, April 28, 2005.

"Voting Theory on the Eve of Presidential Election: An Information Fusion Perspective," University of New Orleans, October 29, 2004.

Jing Ma

Conference presentations

J. Ma and X. Huang, "A System-on-Programmable Chip Approach for MIMO Sphere Decoder," in *Proceedings of the IEEE Symposium on Field-Programmable Custom Computing Machines (FCCM'05)*, Napa, CA, April 2005.

J. Ma and X. Huang, "Design of a Lattice Decoder for MIMO Systems in FPGA," in *Proceedings of the IEEE workshop on Signal Processing Systems (SIPS'04)*, pp. 22-29, Austin, TX, October 2004.

J. Ma, X. Huang, "Design and Implementation of a Lattice Decoder for MIMO Systems," in *Proceedings of the IEEE Radio and Wireless Conference (RAWCON'04)*, pp. 383-386, Atlanta, GA, September 2004.

J. Ma, C. Liang and X. Huang, "A Comparison of Lattice Decoding Algorithms in Hardware Implementation," in *Proceedings of SPIE*, Vol. 5819, March 2005.

J. Ma, X. Huang and S. Kura, "A High Data Rate Universal Lattice Decoder on FPGA," in *Proceedings of SPIE*, Vol. 5819, March 2005.

J. Ma and X. M. Huang, "Design and Implementation of a Real-time Image Noise Canceller," in *Proceedings of the SPIE Visual Information Processing Conference*, vol. 5438, pp. 273-281, Orlando, FL, April 2004.

Invited Talks

J. Ma, "Computer Networking and Wireless Networks, Part I: Fundamentals of Computer Networks," at *the International Conference on Compound Semiconductor Manufacturing (MANTECH)*, New Orleans, LA, April 2005.

J. Ma, "Computer Networking and Wireless Networks, Part II: Wireless Networks," at *the International Conference on Compound Semiconductor Manufacturing (MANTECH)*, New Orleans, LA, April 2005.

X. Huang and J. Ma, "Recent Advances on Integrated Computing and Communications Research," at *the 9th Annual Joint Engineering Society Conference (JESC)*, New Orleans, LA, February 2005.

Second Workshop on Information and Systems Technology

The Second Workshop on Information and Systems Technology was held at Tulane University on Monday, December 13, 2004. Fifty attendees were from local business, industry, and government agencies as well as faculty and students from the University of New Orleans, Tulane University, Louisiana State University, University of Louisiana-Lafayette, and Southern University of Baton Rouge. The proceedings of the workshop have been published on the web at http://ece.engr.uno.edu/isl/CD/contents.htm

EXTERNALLY
FUNDED RESEARCH PROJECTS
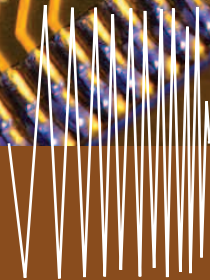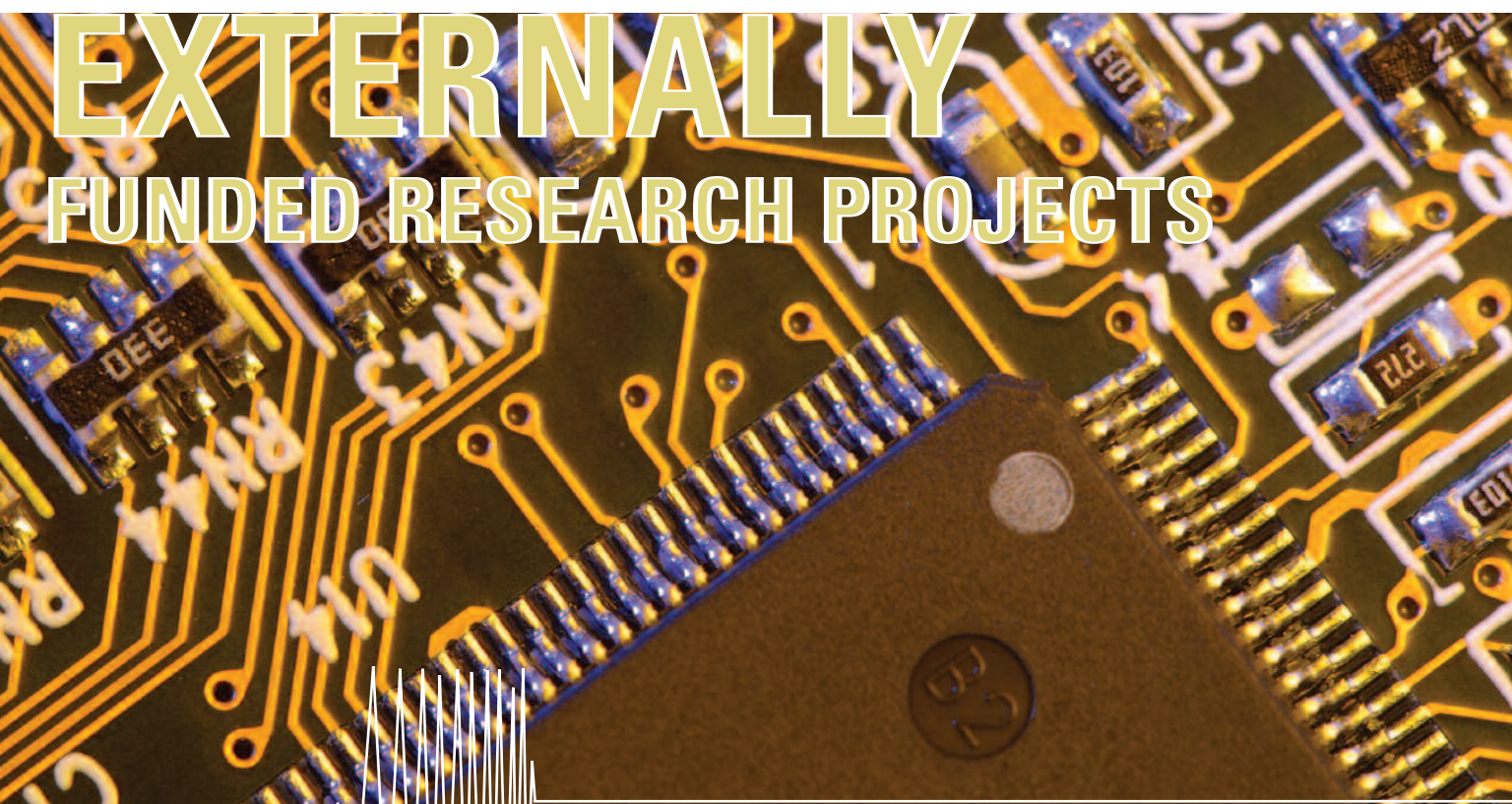
The following is a list of externally funded research projects at UNO during 2004-2005, of which our faculty served as principal investigators.

Aircraft Safety: Control Upset Management, X. R. Li, ,
NASA EPSCoR, $535,490, 8/01–7/06.

This is a five-year joint project with Louisiana State University and University of Louisiana, sponsored by NASA and Louisiana Board of Regents in the amount of $1.8M. The project received a two-year renewal after the success of the first three years. It aims at aircraft fault detection, identification, and early warning, as well as fault-tolerant control of aircraft. The UNO part of the project focuses on aircraft fault detection and identification based on the use of multiple-model and data fusion techniques. A simple yet powerful method has been developed.

Information Fusion for Target Inference,
X. R. Li, V. P. Jilkov, H. Chen, ARO, $300,000, 08/04-07/07.
This project deals with information fusion – combining information in multiple entities – for the purpose of target inference under various uncertainties. It studies an array of novel, rigorous and systematic methods and techniques based on data fusion in a unified, novel joint decision and estimation framework for target inference (detection, discrimination, classification, recognition, identification as well as tracking), in particular, ground target tracking and recognition. Another major focus is to conduct in-depth research on a novel, promising, and general methodology for inference based on the use of multiple models that takes into account explicitly the mismatch between the models used and the truth.

Coordinated UV Routing in Variable Environments, X. R. Li, V. P. Jilkov, H. Chen, Navy STTR Phase II through Planning Systems, Inc., $225,000, 11/05-9/07.
The objective of Phase II of this STTR project sponsored by the Navy in the amount of $750,000 is to create effective, realizable Unmanned Aerial Vehicle (UAV) search plans that adapt to changing conditions (environmental and threat), based on high-level, user-defined objectives and multi-parameter cost-function metrics. The major technical problem is to sense and then automatically adapt to changing conditions, without exhaustive computations. Our technical approach is based on multi-objective optimization combined with efficient data fusion techniques.

Integrated Sensing and Data Fusion for Ground Target Surveillance, X. R. Li, H. Chen, DoD DURIP through ARO, $135,431, 05/05-04/06.
This project aims at building a small-scale testbed consisting of several different surveillance cameras and mobile vehicles with sensors, GPS receivers and embedded computing and communication capability for the use of ground target surveillance including tracking people and moving vehicles. The system will allow testing of existing and new approaches for command and control across a dynamic scene varying sensor network. The major research focus is on the development of integrated sensing and data fusion techniques to enhance the tracking and discrimination capability in a dense target environment.

A Reconfigurable Co-Simulation Platform for Wireless System-on-a-Chip, X. Huang, J. Ma, Louisiana Board of Regents, $91,932, 07/04–06/07.

This project is to investigate a proof-of-concept high-level simulation platform for wireless system-on-a-chip (SOC). Simulation is the most effective method to validate the communication algorithms and design implementations. The goal of this research is to develop a platform that can simulate the SOC in a bit-exact cycle-accurate manner. This simulation platform is able to assist designers to avoid expensive semiconductor revisions. Therefore it is expected to reduce the development cost and time-to-market significantly.

Low-Cost Wireless Sensor Network for Streetlight Control and Management, X. Huang, J. Ma, Louisiana Board of Regents, $90,000, 07/04–06/06.
This research project is partnered with two industrial companies to investigate a low-cost high-performance solution for remote control and sensing of streetlight systems using advanced wireless communication and networking technologies. It replaces traditional physical patrols maintenance and manual switching on every light pole in the street or along the highway. Therefore it reduces the maintenance and management cost significantly. Real-time remote monitoring ensures immediate detection and quick recovery of streetlight failures that is an invaluable addition to public safety.

Acurate detection and classification algorithms for PARADISE, E. Kaminsky, Naval Research Lab, $70,000, 10/05-05/06.
This work addresses important issues in the area of detection and classification of underwater targets using trifocal systems. We are developing classification methods appropriate for PARADISE (parametric detection imaging sensor) when used to locate point targets and, particularly, long targets such as cables, pipes, and similar targets in oceanic environments. The targets of interest are buried in seafloor sediments of various types and at various depths. The Naval Research Lab (NRL) is currently developing a suite of these PARADISE sonars for different platforms, along with the processing software.

Development of a Vision System for Welding Applications in Shipyards, D. Charalampidis, ONR through GCRMTC, $60,000, 06/02–05/06.
The objective of this project is to develop a novel, compact, multi-sensor robotic vision system for application to shipyard welding. The system will provide 360 degrees sensing in the visible spectrum and be compact for maneuverability. This system will consist of components such as fiber bundles, specialized lenses and filters, and CCD cameras, and image processing algorithms. These algorithms will analyze the images obtained during welding, in real-time, for the purpose of detecting the welding seam and the root gap, whose accurate measurement is very significant for high-quality welding.investigated the amount and causes of thin steel deformation during the welding process.

A Framework of Wireless Intelligent Sensor Networks for Integrated Health Management Systems, X. Huang, J. Ma, NASA/BoR, $35,000, 07/05–06/06.
Wireless intelligent sensor networks (WISN) are considered the next generation technology to bridge between the physical world and the Internet. The development of a framework of distributed sensor networks for flight vehi-

cles and ground support equipment is highly desirable. This research is to develop the architecture and communication protocols of wireless intelligent sensor networks for integrated health management systems (IHMS). This project will develop interdisciplinary collaborative ventures and foster joint research opportunities with NASA researchers at Stennis Space Center. The core technology developed in this project can also be applied in many other areas in space science and aerospace technology.

Coordinated UV Routing in Variable Environments, X. R. Li, V. P. Jilkov, H. Chen, Navy STTR Phase I subcontract through Neptune Sciences, Inc., $25,000, 12/04-4/05.

The objective of Phase I of this STTR project is to conduct concept study on create effective, realizable Unmanned Aerial Vehicle (UAV) search plans that adapt to changing conditions (environmental and threat), based on high-level, user-defined objectives and multi-parameter cost-function metrics. The major technical problem is to sense and then automatically adapt to changing conditions, without exhaustive computations. The technical approach is based on multi-objective optimization combined with efficient data fusion techniques.

A Novel Target Maneuver Detection Technique with Range Rate Measurement, H. Chen, Naval Air Warfare Center through Intelligent Automation Inc., $24,000, 11/04-06/05.

In this project, we have developed a novel target maneuver detection technique using radar measurement including range rate for tracking and surveillance systems to reliably indicate the presence of target maneuver and its magnitude. The approach is computationally efficient and avoids the potential problems of using the extended Kalman filter to incorporate the range rate measurement. The algorithms have been tested with various practical tracking scenarios using simulated Navy E2C radar.

Algorithms and Software Architecture for the Processing of LIDAR Data, D. Charalampidis, NASA SBIR through Diamond Data Systems, $17,800, 01/05–07/05

This project deals with the development of a new, advanced architecture, algorithms and software to support the end-to-end processing of LIDAR data to derive useful information products such as Digital Elevation Models (DEM). The approach is innovative in three ways. First, it proposes a complete end-to-end system instead of a solution that addresses only a single step of the complex problem of accurately gathering, processing, and reporting of the data. Secondly, it proposes a system that is designed to minimize human interaction and manual data entry. Thirdly, and possibly the most important part of this innovation, is that it proposes both the implementation of multiple algorithms to perform the data processing, as well as an extensible, open software architecture which allows algorithms to be incorporated into the system in the future.

Track-to-Track Association and Fusion for Multitarget Surveillance, H. Chen, ONR through University of Connecticut, $15,000, 06/04-05/05.

This project studies the data fusion techniques for various network centric surveillance architectures.

The major focus is to develop a robust track-to-track fusion algorithm for a distributed tracking system, which accounts for the crosscorrelation between local (sensor-level) tracks, with a practical way to compute these crosscorrelations.

A Novel Maneuver Detection Technique Using Doppler Radar for Multitarget Surveillance, H. Chen, NSF/LEQSF Pilot Fund, $12,000, 02/05-05/06.

This project studies target maneuver detection technique using Doppler radar measurement including range rate for tracking and surveillance systems to reliably indicate the presence of target maneuver and its magnitude. On one hand, the research emphasizes on the theoretical development of joint change point detection and parameter estimation. On the other hand, it will find practical applications in multitarget surveillance for homeland security and law enforcement.

Track-to-Track Association for Tracks with Features and Attributes, H. Chen, ONR through University of Connecticut, $10,000, 10/05-8/06.

This project studies the track-to-track association problem — a prerequisite for fusion of tracks — for tracks described by both kinematic states and feature variables, which can be continuous valued target attributes as well as discrete valued target classification information. The sufficient statistic for the optimal association test (in the Neyman-Pearson sense) based on discrete-valued target classification information is derived. Its relationship with the class probability vector is discussed.

Cooperative Decision and Control for Multiple Unmanned Aerial Vehicles, H. Chen, NSF EPSCoR LINK program, $8,000, 06/05-08/05.

In this project, Intelligent Automation, Inc. (IAI) and University of New Orleans (UNO) propose a new and innovative cooperative decision and control methodology for autonomous unmanned aerial vehicles (UAVs) that explicitly accounts for intermittent or asynchronous communications and infrequent information updates. We develop a general framework for the design of a hierarchical control architecture that exploits the advantages of a sensor network onboard the UAVs by combining both collaborative decision making (coordination) and decentralized real time control.

A Robust Adaptive Target State Estimator for Hit-to-Kill Interceptor, H. Chen, NSF EPSCoR LINK program, $8,000, 10/05-12/05.

In this project, Intelligent Automation, Inc. (IAI) and University of New Orleans (UNO) propose an innovative target state estimation techniques based on multiple model estimation theory, namely, a robust adaptive target state estimator for hit-to-kill interceptor. The primary goal is to accommodate interceptor command guidance corrections for short time-of-flight engagement of threats such as rockets, artillery, mortars. In our multiple model based target state estimator, within each module, the linear minimum mean square error filter is used to characterize a particular target motion. The proposed method has been tested in a ballistic missile tracking scenario and it yields significantly faster "settle down" performance than existing filtering methods.

Integrated Sensor Systems for Cotton Quality Measurement, X. Huang, J. Ma, USDA, $6,000, 1/05–10/05.

This project is collaborated with the Southern Regional Research Center of USDA to conduct research in advanced sensor development. In particular, it focuses on design and construction of portable spectrophotometers to measure cotton quality, rapidly and nondestructively. This project is closely related to the USDA CRIS research project for the development of a portable tool to be used by cotton breeders to advance selections among genotypes for traits important to the textile industry.

FACILITIES

The Electrical and Computer Engineering department has a number of established laboratories for research and educational purposes. These laboratories are continuously upgraded and new laboratories are added based on the student, faculty, and department needs.

NEW FACILITIES

Computer Cluster A new computer cluster was recently developed by the Department of Electrical Engineering for the College of Engineering to provide increased computing power that will be useful for several high-demand scientific-computing applications. The cluster consists of eighty four processors each of which is a 64-bit AMD 2GHz server class processor. The cluster uses terabyte storage and runs under Linux. The system is fully racked into two towers with a dedicated server to manage accounts and uses a dedicated node to handle information storage. A workstation is designed to compile programs in the 64-bit environment. The system is supported using 16kVA server class UPS to provide regulated power and backup power time incase of a power outage.

Research Labs

Information and Systems Technology Research Center (IST-RC). The IST-RC is an inter-institutional center for theoretical and applied research in information and systems science and technology, led by UNO's EE Department. It is a cluster of research personnel from five Louisiana institutions of higher education: University of New Orleans, Louisiana State University, Tulane University, University of Louisiana-Lafayette, and Southern University-Baton Rouge. The focus areas of research are data fusion; target detection, tracking, and recognition; data mining and machine learning; signal and image processing; and sensors and sensor networks. IST-RC has a strong tie with the local technology industry. According to the post-Katrina technology revitalization plan prepared by Louisiana Technology Council, further development and funding of IST-RC is one of three primary initiatives for the development and revitalization of the technology industry in the New Orleans region.

Information and Systems Laboratory (ISL). The ISL is a laboratory for basic, applied, and advanced research with a focus in the areas of information and systems science and technology, such as processing of information, data, signal, and image in various systems. The systems involved include, but are not limited to, control, communication, computer, transportation, and power systems and networks. Typical examples of applications include data fusion, target tracking, signal detection, machine learning, and pattern recognition. The ISL is located in the UNO Research and Technology Park. The ISL research

staff includes several EE faculty members and a group of active graduate students. Its ongoing research projects are funded by NASA, Army Research Office, Navy, Department of Defense, NSF, and State of Louisiana. It has forged a strong partnership with the private sector, particularly the IT and defense industries, as evidenced by its significant number of joint research projects with the private sector.

Optics Laboratory. Facilities include large vibration-isolated optical table, coherent laser systems, grating photopolarimeter, polarizing optical components, polarization analyzer, setups for fiber-optic polarimetry, photo-elastic modulation ellipsometry, and normal-incidence rotating-sample ellipsometry.

Ellipsometry/Polarimetry Laboratory. Contains photopolarimeters using reflective silicon detectors (StokesMeters) and multi-modeGaertner ellipsometer.

These two optics labs at UNO have served as incubators of new technologies in light polarization measurement using multiple reflective silicon detectors and diffraction gratings. These patented technologies have been licensed and transferred to Gaertner Scientific Corporation (Skokie, IL) and Containerlesss Research, Inc. (Evanston, IL). Other work includes the development of Normal-Incidence Rotating-Sample Ellipsometer, ellipsometric characterization of contaminated high-voltage insulators, and detection of adsorbed layers on silicon surfaces.

Configurable Computing Research Laboratory (CCRL). The CCRL is focused on topics in configurable computing, including high-performance computing, CAS for FPGAs, reconfigurable system on a chip, wireless embedded sensor networks, and implementations of communication algorithms in reconfigurable hardware. Research projects include muliphysics modeling using FPGA, Sphere decoder on reconfigurable hardware, and digital test core or image sensor devices. This lab employs Cadence® design tools. The CCRL's research projects have been sponsored by federal and state agencies, including Louisiana Board of Regents, NASA, USDA, Army Research Office, and NSF. Our industrial sponsors and collaborators include IBM, Xilinx, Altera, Telemics, SoftPower, Long-Horn Technology, Control Research, Innovative Strategic Advanced Systems, and Momentum Technical Consulting.

Educational Labs
Computer Engineering Educational Labs

Computer Architecture and VLSI Laboratories are two laboratories established recently and developed for the Computer Engineering program. The two laboratories are adjacent and therefore they can be utilized simultaneously depending on the course needs. The Computer Architecture and VLSI Lab equipment includes forty computers, forty Altera FPGA boards and Altera MAX PLUS II software. The VLSI Lab equipment also includes Cadence Software Bundles for CIC Design, System Level Design, DSM Design, D&V, and PCB Systems.

The laboratories provide students the opportunity to work on experiments regarding Assembly language programming, digital design using microprocessors, microcomputer design and control, memory and I/O interfaces, bus interconnections, computer arithmetic, pipelining, memory hierarchies, multiprocessor systems, semantics of the VHDL language and its applications, Verilog and System-C, and field programmable gate arrays (FPGA).

Digital Signal Processing (DSP) Laboratory is a laboratory available to the undergraduate and graduate programs in Electrical Engineering. The main goal of the DSP lab is to provide hands on experience to students studying basic and advanced Digital Signal Processing through courses such as Introduction to DSP, and Audio DSP, and through Independent Studies. This laboratory was recently enhanced by ten new computers and ten TMS320 C6713 DSP Kits in order to better serve the graduate and undergraduate student needs. Additional equipment available in the laboratory includes eighteen computers, eight TMS320 C5000 DSP TEACHING Kits, eight TMS320 C6711 DSP Kits, two TMS320 C6201 Evaluation Kits, two TMS320 C6000 DSP Imaging Kits, TMDX3260C6416 Test & Evaluation Bundle+ XDS510PP+ Emulator, and TMS320 c6000 Code Composers. Typical examples of projects that students are able to work on are filter design, signal analysis including speech and audio processing, and image processing applications including image compression.

THE THREE EDUCATIONAL LABORATORIES DESCRIBED ABOVE HAVE A SIGNIFICANT IMPACT IN A NUMBER OF EXISTING COURSES AND HAVE BEEN FUNDAMENTAL FOR THE DEVELOPMENT OF NEW COURSES IN BOTH THE ELECTRICAL AND COMPUTER ENGINEERING CONCENTRATIONS. THESE COURSES INCLUDE:

Digital Design using Microcomputers, which teaches design of microcomputer based systems including both hardware and software considerations.

Microcomputer Design Lab, in which selected experiments in assembly language programming and digital design using microprocessors are performed.

Microcomputer Interfacing, which deals with the design of microcomputer based systems including both hardware and software considerations. It exposes the students to design and control of microcomputer hardware that is external to the PC, microcomputer structures, memory and I/O interfaces, bus interconnections, serial and parallel interfaces, and controller design.

Computer Systems Design I, which deals with the design process of digital computer systems from the instruction set level, system architecture level, and digital logic level. Topics include machine organization, register transfer notation, processor design, memory design, and input/output considerations.

Computer Systems Design II, which deals with the design, analysis and evaluation of contemporary computer systems in order to compare the performance of different architectures. Topics include performance metrics, computer arithmetic, pipelining, memory hierarchies, and multiprocessor systems.

Computer Architecture Lab, in which selected experiments examining programmable logic, VHDL and logic synthesis, and including a final design project, to accompany and complement the lecture course.

HDL Chip Design, in which a new design methodology for digital systems using hardware description languages (HDL) is introduced. It gives a complete treatment of syntax and semantics of the VHDL language and its applications. Emphasis will be on the design of combination logic, sequential logic, finite state machine, and register transfer level (RTL) digital system. Synthesis algorithms and issues will be elaborated. Other hardware description languages, e.g. Verilog and System-C will also be introduced. The design projects are simulated and implemented to a field programmable gate array (FPGA) system in the laboratory.

Embedded Microcomputer Systems, which introduces the student to the principles of embedded microcomputer system design and development for data acquisition and process control applications.

Digital Signal Processing, which deals with the time and frequency analysis of signals and systems, sampling and quantization, and various filter design techniques.

Audio Engineering, which deals with the time and frequency analysis of speech and audio signals and systems.

Other Educational Labs

Analog and Digital Controls Laboratories. Educational lab containing computers and data acquisition boards used with LabVIEW software to perform simulations and experiments pertaining to basic analog and digital feedback control systems. Additionally the lab contains Allen-Bradley PLC equipment used to introduce students to industrial application control systems.

Microwave Anechoic Chamber. The anechoic chamber is a sealed environment containing absorption cones and has both absorption and isolation capabilities to facilitate specific types of equipment testing.

Energy Conversion Laboratory. Educational lab which introduces students to building, operating, and mathematical modeling of Electric Machines and Electric Machine Systems. The lab contains three stations including power consoles, 3-phase Induction Motors, 3-phase Synchronous Machines, DC Machines, 3-phase Transformers, Single phase Transformers, Impedance Load Boxes, Resistance Load Boxes, Resistance Load Boxes. Also included and used in this lab are computers, analog and digital multimeters, analog and digital oscilloscopes, and analog and digital power meters.

Protective Relaying Laboratory. Educational lab which introduces students to the use of Power System Protective Relays and Control Relays. Computer simulation and modeling of faulted power systems are done with digital protective relays. The lab contains protective relays and test equipment donated by Schweitzer Engineering Laboratories Inc.

Circuits Laboratory. Educational lab which introduces students to building and testing basic electrical circuits and working with basic electrical laboratory test equipment to perform different types of electrical circuit measurements. The lab contains twelve workstations that include analog and digital oscilloscopes, analog and digital multimeters, and power supplies.

Electronics Laboratory. Educational lab which introduces students to building and testing electronic circuits, including amplifiers and filters. The lab contains twelve workstations that include analog and digital oscilloscopes, analog and digital multimeters, and power supplies. State-of-the-art ELVIS workshtations from NI are the newest addition to this lab.

Communications Lab. Educational lab which introduces students to building and testing communication system circuits, including modulators, demodulators, amplifiers, and filters. The lab contains power spectrum analyzers, oscilloscopes, digital multimeters, and NI ELVIS workstations.

Microprocessor Laboratory. Educational lab which introduces students to assembly language programming, and digital system design using microprocessors and microcontrollers. The lab contains computers and Motorola MC68KH11 development kits.

Senior Design Laboratory. Educational lab which provides working space, computers, and basic measurement equipment to support senior level students working on their special Senior Design Project assignments.
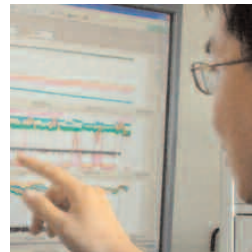
STUDENT AND ALUMNI ACCOMPLISHMENTS

STUDENT ACCOMPLISHMENTS

Christopher M. Bruno has maintained an overall GPA of 4.00 and full scholarship throughout his studies. He is expected to graduate Summa Cum Laude in May 2006. Chris spent the summer of 2005 at the Johns Hopkins University Applied Physics Lab in Laurel, Maryland. He has received multiple awards for academic achievement and is also an active member –or officer– of many honor and professional societies.

Zhansheng Duan, a PhD student, is coauthor of a book, Multisource Information Fusion (in Chinese), six journal articles, and five papers in proceedings of three international conferences during 2004-2005.

Kevin O'Flarity is a member of the honor societies Tau Beta Pi and Eta Kappa Nu and has been active in the IEEE Branch of UNO while pursuing degrees in Computer Science (Dec. 2005) and Electrical Engineering with a Computer Engineering concentration (expected in 2006).

Faisal Sudradjat (BS EE magna cum laude, 2004) is coauthor of 3 refereed journal papers that have been published in Thin Solid Films, Applied Optics, and Optical Engineering in 2004-2005. Faisal is expected to graduate with MS EE in May 2006.

Ming Yang, a PhD student, published one book chapter and two refereed conference proceedings papers in 2004-2005.

Zhanlue Zhao, a PhD student, is coauthor of three refereed papers in leading journals, including IEEE Transactions on Automatic Control, and IEEE Transactions on Aerospace and Electronic Systems, in 2004-2005. He also published six papers in international conference proceedings in 2004-2005. He is expected to receive his PhD degree in May 2006.

STUDENT AWARDS

Jeff Josiah	Boeing Minority Engineering Scholarship
Jacqueline Babin	Louisiana Engineering Society Scholarship Award
	National Association of Women in Construction Scholarship
	IEEE New Orleans Section Award for meritorious service and outstanding academic performance
Christopher Bruno	Frank H. Walk Scholarship
Stefan Pinsky	Wink Outstanding EE Student award
Scott LeBlanc	Women's Auxiliary to the New Orleans Chapter of the Louisiana Engineering Society Samuel Mc Cain Young Trust Scholarship
Christopher Levy	IEEE New Orleans Section Award for Outstanding EE Student
	Brian Seals Outstanding Senior Award.
Richard Hervey	Robert Chandler Outstanding Student Award
Zhanlue Zhao	Chevron Texaco Outstanding Graduate Student Award
Henry George	Chevron Texaco Outstanding Graduating Senior Award
Darren Daigle	Chevron Texaco Outstanding Junior Award
Kevin O'Flarity	CommTech Industries Scholarship
Saishruthi Sravani Musunuri	National Association of Women in Construction Award.

Kashif Riaz	Boeing Scholarship
	CommTech Industries Scholarship
	IEEE Student Branch Student of the Year Award.
Edmundo Toro	Boeing Scholarship
	IEEE New Orleans Section Award
Brent Brookerd	IEEE New Orleans Section Award
Hendrick Jap	Phi Kappa Phi Inductee
Jeff Josiah	Phi Kappa Phi Inductee
	Fritz E. Dohse Founding Dean Award for Outstanding Black Student in Engineering.
Ross Dessauer	Frank H. Walk Scholarship
Jacqueline Babin	Wink Engineering Outstanding EE Student Award
Scott LeBlanc	Women's Auxiliary to the New Orleans Chapter of the Louisiana Engineering Society Samuel Mc Cain Young Trust Scholarship
Richard Chee	IEEE Student Branch Leadership Award
Christopher Bruno	Robert Chandler Outstanding Student Award
Richard Baumgartner	Chevron Texaco Outstanding Graduate Student Award
Faisal Sudradjat	Chevron Texaco Outstanding Graduating Senior Award
Henry George	Chevron Texaco Junior Scholarship
Gregory Stein	Brian Seals Senior Award
Onome Ugbeme	Julian White Scholarship

ALUMNI ACCOMPLISHMENTS

Mr. Darryl d'Aquin (BSEE 1989) is Director of New Orleans' IT Cluster and President and CEO of CommTech Industries. He is also a member of the COE and the EE Advisory Boards.

Mr. Anwer Bashi (BSEE 1996, MS 1997) is Principal Security Architect and Senior Research Engineer at Computrols, Inc. He has been listed several times in "Who's Who in American Colleges and Universities".

Mr. Stephen Bourg (BSEE 2000) is owner of Crescent Consultants, Inc. He is also Director of the New Orleans Section of IEEE and recipient of the IEEE Region 5 Outstanding Small Company" Award.

Mr. Michael J. Carter (NSPE 1995) has been promoted to Manager of the Electrical Engineering Department in the Knoxville office of Barge Waggoner Sumner & Cannon (BWSC). Carter, who joined BWSC in 1999, was previously a project engineer at the firm. In his new position at BWSC, Carter is responsible for management for all operations in the Electrical Engineering Department including the design of power, lighting, communication systems, fire alarm systems and security systems. He graduate from our Electrical Engineering program in 1995. Mr. Carter is a member of the National Fire Protection Association (NFPA), National Society of Professional Engineers (NSPE), National Council of Examiners for Engineering and Surveying (NCEES), Tau Beta Pi engineering honor society, and Eta Kappa Nu electrical engineering honor society.

Mr. Chen He (MS 1998) was promoted to Principal Staff Software Engineer at the Freescale Semiconductor, Inc., in November 2004 and became an IEEE Senior Member in November 2005.

Mr. Ray Johnson (ENGR 1976) is currently the Chair for the Edison Electric Institute (EEI)- Technology Advisory Committee. He is a strong supporter of our Department and has served as the Chair of the Industry Advisory Board for many years. He is also CFO at Entergy.

Mr. Charles J. Ledet (BSEE 1987, MS 1989) is Vice President of I/O Marine Systems, Inc., a member of the Society of Exploration Geophysicist, the European Association of Geoscientist and Engineers, the IEEE, and of our EE Industry Advisory Board.

Dr. Ning Li (PhD 2001) has been with Wells Fargo Financial Acceptance, Chester, PA as Senior Risk Consultant, Decision Sciences, since 2005.

Dr. Jian Liu (MS 1996) is founder and CEO of PolarOnyx, a technology company in Sunnyvale, CA, that is developing advanced fiber laser products for next generation of optical wireless communications, optical sensing systems and biomedical applications. PolarOnyx will hold exhibits at six major conventions on lasers, photonics, and biomedical optics in 2006.

Mr. Riley Parker (BSEE 1998) began an offshore assignment as a Senior Reliability Engineer for Shell's Ram-Powell Tension Leg Platforms (TLP) in 2004. Subsequently, he was selected to lead Shell's North and South America Real-Time Capability Initiatives. Following Hurricane Katrina damage to the Mars TLP, he was assigned to the Mars TLP Recovery Team. Through his involvement in the control and automation discipline, he has been asked to review industry and company standards related to safety systems, fire and gas detection, and real-time operations.

Mr. Kashif Riaz (BSEE 2004, Magna Cum Laude) was with Diamond Data Systems from January 2005 to March 2006, starting as a Consultant I and soon promoted to Consultant II, receiving the company's highest ranking of 'A+' in his Annual Review. He is currently an Embedded Software Engineer with the Boeing Company.

Dr. Jifeng Ru (PhD 2005) had been with American GNC Corporation, Simi Valley, CA as Senior Staff Engineer until August 2005. Since then she has been with Air Traffic Systems, ARCON Corporation, Waltham, MA as Research Scientist.

Dr. Aed El-Saba (MS 1988) has been promoted to Associate Professor with tenure at the Department of Electrical and Computer Engineering, University of South Alabama, Mobile, AL, in 2005.

Dr. Keshu Zhang (PhD 2003) has been Human Interaction Research lab, Motorola, Inc., Tempe, AZ as Senior Research Staff Engineer since 2004.

GRADUATE COURSES

THE FOLLOWING GRADUATE COURSES WERE OFFERED IN 2004-2005

Estimation, Optimization, Tracking
Analog & Digital Filter Design
Linear Systems
Advanced Random Variables & Stochastic Processes
Adaptive Filtering
Estimation and Filtering
Signal Detection
Optimization Techniques in Engineering
Information Theory and Learning
Introduction to Information Fusion

Power Systems
Power Systems Planning & Design
Protective Relaying of Power Systems

Controls
Digital Control Systems Design
Process Control Systems
Advanced Control Theory
Robotics Control
Robotics

Signal and Image Processing
Introduction to Digital Signal Processing
Introduction to Digital Image Processing
Computer Vision
Neural Networks
Advanced DSP with Speech Applications
Adaptive signal processing and applications
Audio Digital Signal Processing

Computer Engineering
VLSI design
Network Application Design
HDL Chip Design
Wireless Sensor Networks

Communications and Audio
RF Circuit Design
Audio Engineering
Advanced Communication System Design
Optical Communications
Data and Computer Communications

Optics and Lasers
Introduction to Lasers
Introduction to Optical Networking

Special Topics and Independent Studies
Special topics in EE
Advanced special topics in EE
Advanced EE problems.

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