

Curriculum Vitae

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EDUCATION

Bachelor of Science, Electrical Engineering, University of Illinois, May 1977
Master of Science, Electrical Engineering, Rensselaer Polytechnic Institute, December 1979
Ph.D. in Electrical Engineering, Rensselaer Polytechnic Institute, December 1983

APPOINTMENTS

2008-Present Vice Chancellor for Research, Indiana University-Purdue University Indianapolis
2000-2008 Director, Institute for Micromanufacturing, Louisiana Tech University
1999-2001 Associate Dean for Research and Graduate Studies
College of Engineering and Science, Louisiana Tech University
1999-2000 Academic Director of Electrical Engineering and Computer Science Programs
Louisiana Tech University
1998-1999 Academic Director of Electrical Engineering and Physics Programs
Louisiana Tech University
1995-1998 Program Chair of Electrical Engineering, Louisiana Tech University
1997-2008 Entergy Distinguished Professor, Louisiana Tech University
1992-1995 Associate Professor of Electrical Engineering, Louisiana Tech University
1982-1992 Member of Technical Staff, IBM Corporation, Essex Junction, Vermont

PROFESSIONAL EXPERIENCE

1982-1992: IBM Corporation, Essex Junction, Vermont

Member of Technical Staff, Microelectronics Research, Development, and Manufacturing.

- Ten years of industrial experience in research, development, and manufacturing of microelectronic technologies at a world-class research and development, and manufacturing facility.

1992-2008: Louisiana Tech University, Ruston, Louisiana

1992: Hired as Associate Professor of Electrical Engineering
1995: Tenured and designated as Entergy Associate Professor of Electrical Engineering
1995: Chosen as Program Chair of the Electrical Engineering Program
1997: Promoted and designated as the Entergy Professor of Electrical Engineering
1998: Chosen as Academic Director of Electrical Engineering and Physics Programs
1999: Chosen as Academic Director of Electrical Engineering and Computer Science Programs,
1999 Chosen as Associate Dean for Research and Graduate Studies
2000: Chosen as Director of the university-wide interdisciplinary Institute for Micromanufacturing.

Designated in 1995 as the Entergy Associate Professor of Electrical Engineering, and in 1997 as the Entergy Professor of Electrical Engineering, in recognition of accomplishments and contributions made to the University in the areas of teaching and curriculum development, research and scholarly activities, and service.

As Associate Professor and later as Professor of Electrical Engineering:

- Envisioned and led the efforts for the realization of a new program in microelectronics and microtechnologies, supportive of the University efforts in the microsystems area, and established microelectronics as one of the main areas of emphasis in the Electrical Engineering Program, and the interdisciplinary Ph.D. in Engineering Program. As part of these efforts, developed and taught six new undergraduate and graduate level courses, which have served hundreds of students in electrical engineering as well as other engineering and science degree programs, including bachelor and master of science programs in biomedical, chemical, and mechanical engineering, and the interdisciplinary MS in Microsystems Engineering, and the Ph.D. in Engineering programs. These courses are:
 - ELEN 334 - Solid State Electronics
 - ELEN 437 - Microfabrication Principles
 - ELEN 438 - Microfabrication Applications and Computer-Aided Design
 - ELEN 535 - Advanced Topics in Microelectronics
 - ELEN 537 - Advanced Microfabrication with Computer-Aided Design
 - ELEN 538 - Advanced Microelectronic Devices with Computer-Aided Design.
- Subsequently, as the Director of the Institute for Micromanufacturing, was instrumental in the development of curricula in the science and engineering of micro/nano scale systems, covering materials, processes, devices, and systems. As part of this, envisioned and led the efforts in the development and offering of a comprehensive set of new undergraduate and graduate level courses in the science and engineering of micro/nano scale systems. These interdisciplinary courses have supported a multitude of engineering and science degree programs, ranging from bachelor and master of science programs in electrical, biomedical, chemical, and mechanical engineering, to physics, chemistry, and biological sciences. These courses are:

- MSE 401/501 – Microsystems Principles
 - MSE 402/502 – Microfabrication Principles
 - MSE 403/503 – Microfabrication Applications and Device Fabrication
 - MSE 404/504 – Advanced Materials for Micro/Nano Devices and Systems
 - MSE 405/505 – Nanotechnology Principles
 - MSE 406/506 – Micro/Nano Scale Materials Measurements and Analysis
 - MSE 512 – Biotechnology Principles
 - MSE 609 – Microsystems Analysis with Computer-Aided Design
 - MSE 610 – Microsystems Design with Computer-Aided Design
- The above-mentioned efforts have laid the foundation and been instrumental in the realization of innovative interdisciplinary degree programs, including the bachelor of science in Nanosystems Engineering (1st degree of its kind nationwide), the master of science in Microsystems Engineering, and the Ph.D. in Engineering programs.
 - Established, in support of the microelectronics and microtechnologies efforts, the Technology Computer-Aided Design (TCAD) Training and Research Laboratory, and secured leading-edge computer hardware and software resources, including a comprehensive set of TCAD software (e.g. TSUPREM-4, MEDICI, TAURUS, and SENTAURUS). Subsequently, as the Director of the Institute for Micromanufacturing (IfM), further expanded the resources and the capabilities of this laboratory, making it into the IfM Modeling and Simulation Laboratory, with a wide range of capabilities for modeling and simulation of micro/nano scale processes, materials, devices, and systems. As part of this, secured and made available a comprehensive suite of microsystems, fluidic, nanotechnology and biotechnology modeling and simulation software (e.g. Coventor, Ansys, Fluent, and Accelrys).
 - Developed and steadily expanded externally-sponsored research activities in the microelectronics area, including realization of state-of-the-art two- and three-dimensional models and simulations of ULSI deep submicron processes and devices, gaining industrial recognition, including from SEMATECH and its member companies (e.g. Motorola, Texas Instruments, and IBM). Received research sponsorship and support from SEMATECH, Texas Instruments, and TMA. The SEMATECH multi-year research project was sponsored by SEMATECH's Strategic Technologies Division, and constituted an integral part of SEMATECH's national program on Silicon-On-Insulator for low power electronics, involving other institutions as DARPA, NIST, MIT, UCLA, and IBM. This project also included a series of collaborations with IBM, Motorola, and MIT's Lincoln Laboratory.
 - Served as the Chair of the Ph.D. in Engineering Steering Committee, and previously served as a key member of the team that was instrumental in the realization and establishment of this interdisciplinary Ph.D. program. Led the efforts in the development and implementation of the micro/nano scale systems area of concentration, which constitutes the largest area of concentration associated with the given Ph.D. program (with respect to the number of participating faculty, enrolled students, research projects, and courses offered).

Chosen in 1995 as the Electrical Engineering Program Chair, in 1998 as the Academic Director of the Electrical Engineering and Physics Programs, in 1999 as the Academic Director of the Electrical Engineering and Computer Science Programs, and simultaneously as the Associate Dean for Research and Graduate Studies in the College of Engineering and Science, and in 2000 as the Director of the university-wide Institute for Micromanufacturing, in recognition of proven technical and administrative abilities, and demonstrated vision, leadership, energy, and enthusiasm contributed towards the achievement of the mission, vision, and strategic objectives of the College of Engineering and Science, and of the University.

As Academic Director:

- Assumed the directorship of multiple engineering and science programs in the College, managing a diverse group of faculty and staff from multiple programs, and leading the efforts for the betterment and vitalization of the Electrical Engineering, Physics, and Computer Science Programs, and serving in excess of 400 undergraduate and graduate students.
- Served on the College Leadership Team, and contributed to a wide range of efforts, including betterment of academic programs (e.g. complete redesign of undergraduate Electrical Engineering curriculum, and development and implementation of new interdisciplinary Ph.D. programs), development and expansion of research efforts and laboratory resources (e.g. Microelectronics Laboratory and related initiatives), budgeting and allocation of resources, performance reviews of personnel from different programs (i.e. program chairs, faculty, and staff), tenure and promotion evaluations and recommendations, development and execution of college-wide strategic plan, assessment of programs and activities, enhancement in student enrollment and retention of undergraduate and graduate students, recruitment of faculty for multiple engineering and science programs within the College, and development of industrial and corporate relationships.

As Associate Dean for Research and Graduate Studies:

- Guided and led the efforts associated with research and graduate studies in the College of Engineering and Science, resulting in increased level of research productivity and betterment of graduate programs in the College.
- Worked closely with the College Leadership Team, the Graduate School, and the College programs, faculty, staff, and students, in providing the best possible service in research and graduate studies.
- Served on the Louisiana Tech University Graduate Council, contributing to the betterment of graduate studies at the University.
- Served on the Louisiana Tech University Research Council, contributing to the advancement of research efforts at the University.

- Developed and oversaw complete reorganization of the College of Engineering and Science Research and Graduate Studies Office, guiding efforts in the streamlining and optimization of processes and procedures, resulting in effective operation of the office and in noticeable cost savings.
- Led the development and implementation of enhanced guidelines for the preparation and submission of research proposals by faculty in the College of Engineering and Science.
- Provided mentoring and guidance to the College faculty in their efforts in research and graduate studies.
- Provided mentoring and guidance to graduate students in receiving maximum benefit from the educational opportunities provided by the College and in performing well in their graduate studies.
- Led efforts leading to noticeable increases in graduate student recruitment and retention.
- Served as the Chair of the Ph.D. in Engineering Steering Committee, and previous to that served on the team which was instrumental in the realization and establishment of this interdisciplinary Ph.D. program.

Served, from 2000 to 2008, as the Director of the university-wide interdisciplinary Institute for Micromanufacturing, and contributed since 1992 to the growth and development of the Institute, including through planning and setting up of laboratory resources and facilities, development and implementation of major sponsored research initiatives, and envisioning and creation of academic courses and curricula, on the science and engineering of micro/nano scale processes, materials, devices, and systems. The Institute for Micromanufacturing is an integrated nanomanufacturing and micromanufacturing research and development facility, dedicated to micro/nano scale systems research, education, and commercialization. It consists of three components, totaling 65,000 sq. ft. of facilities. These are the R & D facility (housed in a 41,000 sq ft specially designed building) at Louisiana Tech University in Ruston, LA; the X-ray beam lines at the Center for Advanced Microstructures and Devices (CAMD) in Baton Rouge, LA; and the Technology Transfer Center in the Shreve Industrial Park in Shreveport, LA.

As the Director of the University-wide interdisciplinary Institute for Micromanufacturing:

- Led the efforts in making the Institute the largest and most productive research enterprise at the University. As part of this, led the development and realization of the Institute's vision and mission (as of year 2000). The Institute's vision is *to be a world-class resource for the realization of commercially-viable micro- and nanosystems, contributing to the economic infrastructure of Louisiana and the nation and benefiting humanity as a whole.* The Institute's mission is:
 - *To research and develop novel micro and nanosystems for biomedical, biological,*

environmental, chemical, information technology, and other applications

- *To generate and harness commercially viable intellectual property*
 - *To partner with industry, government, and academia in economic development*
 - *To transfer new technology and provide technical training to industry and government*
 - *To develop curricula and educate students in micro and nanotechnologies*
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- Led the growth and expansion of the Institute's research and educational efforts from its original micromanufacturing emphasis to its current five thrust areas and centers of excellence, organized and identified as Nanotechnology, Biotechnology, Biomedical Nanotechnology, Environmental Technology, and Information Technology.
 - Developed, coordinated, and managed major interdisciplinary research initiatives, attracting substantial support from external funding agencies.
 - Built alliances and partnerships with various units on campus (e.g. departments, colleges, and centers), as well as with external organizations and institutions, including local, state, and federal agencies and government, corporations, universities, alumni and donors.
 - Reversed years of budget shortfalls, through generation of increased revenue, and responsible spending and fiscal accountability. Each year, developed and responsibly managed the Institute's multi-million dollar operating budget, and the associated research funds and accounts.
 - Developed and expanded the administrative structure of the Institute to best serve its on-going growth and advancement. As part of this, established the Institute's Leadership Team, consisting of the director, heads of the research thrust areas, heads of the facilities and administrative/clerical sections, and senior staff.
 - Led the recruitment of the Institute faculty from a wide range of disciplines, ranging from biomedical, chemical, electrical, and mechanical engineering to biology, chemistry, physics, and computer science. Tripled the number of the Institute faculty and staff, and achieved high retention rate.
 - Developed and oversaw comprehensive organization and staffing of the Institute's facilities and administrative/clerical sections, designed to meet the high level of growth and the associated needs experienced by the Institute in recent years.
 - Developed and led major sponsored research projects and initiatives with federal and state funding agencies, including as:
 - The principal investigator of the research program on Integrated Micro/Nanomanufacturing for Miniaturized Micro/Nano Scale-Based Systems for Broad Military and Civilian Applications, sponsored by the Defense Advanced Research Projects Agency (DARPA).
 - The leader of a team of six universities (including Louisiana State University and Tulane

University) in a National Science Foundation Research Infrastructure Improvement Consortium, overseeing research, educational, and industrial outreach projects on microsystems, nanotechnology, biotechnology, and environmental technology.

- The principal investigator of a research program on New Technologies for Polymer and Bio-optic Systems for Broad Military and Civilian Applications, sponsored by DARPA. Led a team of the Institute faculty and staff in the realization of three main projects on, 1) New Technologies for Realization of All-Polymer Microelectronic and Optoelectronic Systems, 2) Ultra-Sensitive Polymer Tunneling Sensor Platform for Physical Sensing, 3) Bio-Inspired Micro-Optical System with Dynamically Varying Refractive Index.
- The leader of a team of the Institute faculty and staff, partnering with the School of Biological Sciences, in the realization of the Governor's Biotechnology Initiative (GBI) at Louisiana Tech University. As part of this, has overseen the recruitment of new GBI faculty, and the development and acquisition of new biotechnology laboratories and resources, resulting in leading-edge biotechnology education and research infrastructure and programs at the University.
- The principal investigator of the Joint Faculty Appointment Program (JFAP) Third Hire Opportunity grant, received by Louisiana Tech University and Grambling State University (HBCU), and supported by the National Science Foundation and the Louisiana Board of Regents.
- The co-principal investigator of the research program on Engineering Smart Cyber Centric Sensor Surveillance Systems for Large Geographic Domains, sponsored by the P-KSFI Program of the Louisiana Board of Regents. This initiative is dedicated to research and education in cyber security, sensors, and networks.
- The principal investigator of the research program on Nanotechnology for Nuclear Nonproliferation Applications, sponsored by the US Department of Energy (DOE). The main objectives of this work have been: 1) to develop a roadmap on nanotechnology research and development for nuclear nonproliferation applications, 2) to provide DOE and its partners with a broadly inclusive and critical view of nanotechnology, with emphasis on its applications to nuclear nonproliferation, and 3) to implement through research and development portions of the roadmap devised in 1).
- The co-principal investigator of a National Science Foundation Partnerships for Innovation grant. This initiative, which is built on several micro/nano scale systems technology platforms developed at the Institute for Micromanufacturing, focuses on the transformation of research outcomes to economic development, with emphasis on intellectual property development and commercialization, establishment of university, state, and private sector partnerships, and development of business plans by working with venture capital and business development specialists.

- Developed technical training programs tailored to meet the needs of working professionals to maintain their technical vitality and expand their knowledge in technological areas of importance. The programs developed are on subjects ranging from microelectronics and microelectromechanical systems, to nanotechnology and technology computer-aided design. These programs have been offered, as short courses, in-house and at customer locations, and have served professionals from a wide range of industrial and governmental organizations, including Texas Instruments, Motorola, SEMATECH, Delphi Corporation, NASA, and the Air force Institute of Technology.
- Successfully promoted the protection, transfer, and commercialization of intellectual property generated at the Institute. Demonstrated a long-standing commitment to innovative research that addresses state and national needs, and serves as a catalyst for commercialization and economic development. Made the generation and harnessing of commercially viable intellectual property, and the transfer of technology and contribution to economic development among the top priorities of the Institute.

PUBLICATIONS

- M. Balachandran, S. Shrestha, M. Agarwal, Y. Lvov, and K. Varahramyan, “SnO₂ Capacitive Sensor Integrated with Microstrip Patch Antenna for Passive Wireless Detection of Ethylene Gas,” *Electronics Letters*, Vol. 44, No. 7, p. 464, 2008.
- J. Liu, M. Agarwal, K. Varahramyan, E. Berney, and W. Hodo, “Polymer-based Microsensor for Soil Moisture Measurement,” *Sensors and Actuators B*, Vol. 129, p. 599, 2008.
- S. Shrestha, J. Vemagiri, M. Agarwal, and K. Varahramyan, “Transmission Line Reflection and Delay Based ID Generation Scheme for RFID and Other Applications,” *International Journal of Radio Frequency Identification Technology and Applications*, Vol. 1, No. 4, p. 401, 2007.
- Q. Chen, J. Fang, H. Ji, and K. Varahramyan, “Fabrication of SiO₂ Microcantilever Using Isotropic Etching with ICP,” *IEEE Sensors Journal*, Vol. 7, No. 12, p. 1632, 2007.
- J. Vemagiri, M. Balachandran, M. Agarwal, and K. Varahramyan, “Development of a Compact Half-Sierpinski Fractal Antenna for RFID Applications,” *Electronics Letters*, Vol. 43, No. 22, p. 1168, 2007.
- J. Vemagiri, A. Chamarti, M. Agarwal, and K. Varahramyan, “Transmission Line Delay Based Radio Frequency Identification (RFID) Tag,” *Microwave and Optical Technology Letters*, Vol. 49, No. 8, p. 1900, 2007.
- K. Bhat, J. Heikenfeld, M. Agarwal, Y. Lvov, and K. Varahramyan, “Nonwoven Electrowetting Textiles,” *Applied Physics Letters*, Vol. 91, p. 24103, 2007.

- A. Chamarti and K. Varahramyan, "Transmission Delay Line-based ID Generation Circuit for RFID Applications," *IEEE Microwave and Wireless Components Letters*, Vol. 16, p. 588, 2006.
- M. Agarwal, Y. Lvov, and K. Varahramyan, "Conductive Wood Microfibers for Smart Paper through Layer-by-Layer Nanocoating," *Nanotechnology*, Vol. 17, p. 5319, 2006.
- K. Varahramyan and Y. Lvov, "Nanomanufacturing by Layer-by-Layer Assembly – From Nanoscale Coating to Device Applications," *Journal of Nanoengineering and Nanosystems*, Vol. 220 (N1), p. 29, 2006.
- Z. Liu, F. Xue, Y. Su, Y. Lvov, and K. Varahramyan, "Memory Effect of a Polymer Thin-Film Transistor with Self-Assembled Gold Nanoparticles in the Gate Dielectric," *IEEE Transactions on Nanotechnology*, Vol. 5, No. 4, p. 379, 2006.
- D. Qi, K. Varahramyan, and S. Selmic, "Photodetecting and Electronic Properties of Poly(2-methoxy-5-(2'-ethylhexyloxy)-1,4-phenylenevinylene)-ethyl Viologen Dibromide Blended Thin Film Diodes," *Thin Solid Films*, Vol. 514, p. 292, 2006.
- M. Zhu and K. Varahramyan, "Performance Improvement of Organic Thin Film Transistors by SiO₂/Pentacene Interface Modification using an Electrostatically Assembled PDDA Monolayer," *Solid State Electronics*, Vol. 50/2, p. 129, 2006.
- Z. Liu, F. Xue, Y. Su, K. Varahramyan, "Electrically-Bistable Memory Device Based on Spin-Coated Molecular Complex Thin Film," *IEEE Electron Device Letters*, Vol. 27, No. 3, p. 151, 2006.
- F. Xue, Z. Liu, Y. Su, and K. Varahramyan, "Inkjet Printed Silver Source/Drain Electrodes for Low Cost Polymer Thin Film Transistors," *Microelectronic Engineering*, Vol. 83, p. 298, 2006.
- K. R. Aithal, S. Yenamandra, R. A. Gunasekaran, P. Coane, and K. Varahramyan, "Electroless Copper Deposition on Silicon with Titanium Seed Layer," *Materials Chemistry and Physics*, Vol. 98, p. 95, 2006.
- V. Chivukula, M. Wang, H. Ji, A. Khaliq, J. Fang, and K. Varahramyan, "Simulation of SiO₂ Based Piezoresistive Microcantilevers," *Sensors and Actuators A*, Vol. 125, p. 526, 2006.
- R. Nohria, R. Khillan, Y. Su, Y. Lvov, and K. Varahramyan, "Humidity Sensor Based on Ultrathin Polyaniline Film Deposited by Layer-by-Layer Nanoassembly" *Sensors and Actuators B*, Vol. 114, p. 218, 2006.
- R. Khillan, Y. Su, Y. Lvov, and K. Varahramyan, "Layer-by-Layer Nanoarchitecture of Ultrathin Films of PEDOT-PSS and PPy to Act as Hole Transport Layer in Polymer Light Emitting Diodes and Polymer Transistors," *IEEE Transactions on Components and Packaging*

Technologies, Vol. 28, No. 4, p. 748, 2005.

- W. Wang, J. Fang, and K. Varahramyan, “Compact Variable-Focusing Microlens with Integrated Thermal Actuator and Sensor,” *IEEE Photonics Technology Letters*, Vol. 17, p. 2643, 2005.
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- M. Zhu, G. Liang, T. Cui, and K. Varahramyan, “Temperature and Field Dependent Mobility in Pentacene-based Thin Film Transistors,” *Solid State Electronics*, Vol. 49/6 p. 884, 2005.
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- S. Williams, K. Varahramyan, W. Maszara, "Statistical Optimization and Manufacturing Sensitivity Analysis of 0.18 Micron SOI MOSFETs," Microelectronic Engineering, Vol. 49, p. 245, 1999.
- K. Varahramyan, S. Arshad, and W. Maszara, "Three-Dimensional Modeling and Evaluation of Body Tied versus Floating Body SOI MOSFETs," Microelectronic Engineering, Vol. 45, p. 29, February 1999.
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CONFERENCE PUBLICATIONS AND PRESENTATIONS

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