# CURRICULUM VITA - AFZEL NOORE

Professor and Associate Dean of Undergraduate Affairs
The Frank H. Dotterweich College of Engineering
Texas A&M University-Kingsville
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# BACKGROUND

## Education

| | | | |
|---|---|---|---|
| Ph.D. | Electrical Engineering | West Virginia University | 1987 |
| M.S. | Electrical Engineering | Indian Institute of Technology, Madras | 1981 |
| B.E. | Electronics & Comm. | Engineering, University of Madras, India | 1977 |

## Employment

2018 – Present: Associate Dean for Undergraduate Affairs
College of Engineering, Texas A&M University-Kingsville

2023 – Present: Interim Department Chair
Electrical Engineering & Computer Science, Texas A&M University-Kingsville

2020 – 2021: Interim Department Chair
Industrial Management & Technology, Texas A&M University-Kingsville

2018 – 2019: Interim Department Chair
Electrical Engineering & Computer Science, Texas A&M University-Kingsville

2009 – 2017: Associate Chair for Academic Affairs
Dept. of Computer Science & Electrical Engineering, West Virginia University

2007 – 2017: Professor
Dept. of Computer Science & Electrical Engineering, West Virginia University

2003 – 2004: Special Assistant to the Dean
College of Engineering and Mineral Resources, West Virginia University

1996 – 2002: Associate Dean for Academic Affairs
College of Engineering and Mineral Resources, West Virginia University

1992 – 2007: Associate Professor
Dept. of Computer Science & Electrical Engineering, West Virginia University

1987 – 1992: Assistant Professor
Dept. of Computer Science & Electrical Engineering, West Virginia University

1982 – 1986: Teaching Fellow, Department of Electrical Engineering,
West Virginia University

1980 – 1982: Product Development Engineer, Digital Design Group, Philips India.
Developed LED and LCD based microprocessor multimeter models in collaboration with Philips Eindhoven, Holland. Both products were successfully commercialized.

## Awards

### Teaching

- West Virginia University Foundation Outstanding Teacher Award - 1996
  (awarded to six faculty in the University)
- Teacher of the Year Award – 1994, 1996, 2005
  (awarded to one out of 140 faculty in the College)
  College of Engineering and Mineral Resources, West Virginia University

  Outstanding Teaching Award – (awarded to five out of 140 faculty in the College)
  1988, 1990, 1993, 1994, 1995, 1996, 2005, 2008, 2011, 2015
  College of Engineering and Mineral Resources, West Virginia University
- Outstanding Graduate Teaching Award - 1991, 1993, 1994, 1995, 1996
  (awarded to five out of 140 faculty in the College)
  College of Engineering and Mineral Resources, West Virginia University
- Outstanding Teaching Award
  Lane Department of Computer Science and Electrical Engineering
  1988, 1990, 1991, 1993, 1994, 1995, 1996, 2005, 2006
- Outstanding Graduate Teaching Fellow Award – 1985-S, 1985-F, 1986-S
  Department of Electrical Engineering, (awarded to one Teaching Assistant)

### Research

- Researcher of the Year Award – 2008
  (awarded to one out of 140 faculty in the College)
  College of Engineering and Mineral Resources, West Virginia University
- Outstanding Researcher Award – 2006, 2008, 2010
  (awarded to five out of 140 faculty in the College)
  College of Engineering and Mineral Resources, West Virginia University

### Service

- IEEE Service Award - 1991, 1992, 1993, 1994
  Consumer Electronics Society

## Honors

- IEEE Senior Member, 2012
- West Virginia University Faculty Class Advocate for the Class of 2002,
  1998 – 2002 (Appointed by University Provost and President)
- College Award for Planning and Coordinating the Accreditation of Engineering Programs, 1998
- West Virginia University – WVUIT Merger Task Force, 1995
  (Appointed by President Hardesty)
- Academy of Outstanding Teachers, 1996 - 2017
  College of Engineering and Mineral Resources, West Virginia University

- Excellence in Innovative and Distinguished Teaching
  International Directory of Distinguished Leadership, 1990
- Founding Editor, IEEE Consumer Electronics Society Newsletter, 1993 – 1994
- Outstanding Young Man of America, 1988 and 1989
- Tau Beta Pi, National Engineering Honorary
- Eta Kappa Nu, Electrical and Computer Engineering Honorary
- Phi Kappa Phi, Honor Society
- Epsilon Pi Tau, International Honor Society for Technology
- Sigma Xi, Scientific Research Honor Society

# ADMINISTRATIVE EXPERIENCE

## Associate Dean for Undergraduate Affairs
## College of Engineering
## Texas A&M University-Kingsville
## January 2018 - present

*Responsible for providing leadership and support to department chairs and faculty related to undergraduate programs; assists the Dean in academic matters and is responsible for the quality of all undergraduate programs in the College; presentations at new student orientation; coordinates and provides leadership on ABET and ATMAE accreditation of undergraduate engineering, computer science and technology programs; oversees student outreach, recruitment, and retention activities; oversees the Engineering Student Success Center (tutoring, student organizations, professional advising for at-risk students, internship opportunities, and scholarship awards); coordinates College-wide Senior Design Conference; certifies undergraduate students for graduation; develops articulation agreements with national and international universities; and works with the Texas Higher Education Coordination Board for approval of new degree programs.*

## Interim Department Chair
## Industrial Management & Technology
## Texas A&M University-Kingsville
## August 2020 – August 2021

*Responsible for providing leadership in ATMAE accreditation; providing leadership in undergraduate and graduate curriculum development; recruiting and mentoring new faculty; making teaching assignments; developing new undergraduate and graduate programs; offering online courses; developing a strategic plan for the department; implementing strategies for increasing enrollment and retention of undergraduate and graduate students; and evaluating faculty for promotion, tenure, and annual evaluation.*

## Interim Department Chair
## Electrical Engineering & Computer Science
## Texas A&M University-Kingsville
## December 2018 – July 2019

*Responsible for managing departmental budget, providing leadership in undergraduate and graduate curriculum development, strategic planning, recruiting and mentoring new faculty, making teaching assignments, developing new undergraduate and graduate programs, providing leadership in accreditation planning of electrical engineering and computer science programs, implementing strategies for increasing* enrollment *and retention of undergraduate and graduate students, evaluating faculty for promotion, tenure, and annual evaluation.*

## Accreditation Preparation and Coordination – 2018 through 2022
## Texas A&M University-Kingsville

- Engaged the faculty and prepared 30-day due process response for the new Natural Gas Engineering program. The Natural Gas Engineering program was accredited in August 2019.
- Reviewed 9 self-study reports covering engineering, computer science, and technology programs for ABET and ATMAE accreditation.
- Started an ABET Leadership Team to coordinate the Fall 2021 virtual visit.
- Implemented changes to the ABET assessment process.

## Accreditation Program Evaluator

- Program Evaluator, Engineering Accreditation Commission of ABET
- Program Evaluator for Accreditation of ATMAE Technology programs

## Coordinator of CS101 Introduction to Computer Application
## Lane Department of Computer Science and Electrical Engineering
## West Virginia University (January 2004 – 2017)

*Over 60 CS101 sections are offered every year with an average enrollment of over 3000 students. Major responsibilities include: recruit, train, and mentor qualified GTAs, instructors, and proctors for teaching CS101. Assess student learning and periodically update the topics as technology evolves. Plan lab upgrades and handle student related problems. Evaluate new textbooks and software for possible adoption in the course. Oversee the management of systems to support both instructors and students. Coordinate summer courses based on revenue model.*

- Develop projects and assignments to emphasize problem-solving and critical thinking rather than mastering basic computer skills.
- The change was synergistic with the University making a transition from the Liberal Studies Program (LSP) program to the new diverse General Education Curriculum.
- Projects and assignments are centrally developed to support instructors and ensure consistency across all sections.

- Web-based online sections were offered to include adult learners and for professional development.
- Assignments and instructor teaching material were updated to reflect changes in Microsoft Office.

## Associate Department Chair for Academic Affairs
## Lane Department of Computer Science and Electrical Engineering
## West Virginia University
## January 2009 - 2017

The Department has around 40 faculty and offers the following programs - Computer Engineering, Computer Science, Electrical Engineering, Software Engineering, Cybersecurity, and Biometric Systems. Major responsibilities include scheduling of courses, recruiting quality graduate teaching assistants, offering graduate teaching assistantships, mentoring graduate teaching assistants, organizing orientation workshop for graduate teaching assistants, and providing leadership in program assessment and continuous improvement. Assisted Department Chair with prioritizing and planning departmental academic support activities and personnel-related decisions.

## Special Assistant to the Dean
## College of Engineering, West Virginia University
## Jan 2003 – Dec 2003

*Responsible for providing leadership in the College for planning, coordinating, and working with Department Chairs and selected faculty to prepare all undergraduate engineering programs and graduate applied science programs for ABET accreditation. A major responsibility was to educate all constituencies regarding the transition to the new ABET 2000 criteria with special emphasis on developing program educational objectives and assessing student outcomes.*

## ABET Preparation and Coordination - 2003

- Authored Volume-2 of ABET Self Study report on background information pertaining to the Institution and the College. Topics include: mission statement, computing and library support, finances, personnel policies, admission requirements, graduation requirements, and certification process.
- Reviewed 11 Self-Study reports, performed curriculum analysis, performed transcript analysis and provided feedback to Department Chairs.
- Coordinated ABET assessment and provided support material to departments for Freshman Engineering, and courses such as Math, Physics, Chemistry, English, Economics, and Geology.
- Coordinated ABET on-campus accreditation visit for 9 undergraduate engineering programs (EAC) and 2 applied sciences graduate programs (ASAC) in the College with ABET Team Chairs, Department Chairs, and key personnel from University Administration.
- Prepared executive summary before ABET on-campus visit for key administrators – President, Provost, Dean, Vice-President of Student Affairs, Dean of Libraries, Director

of Information Technology Resource Center, and Director of Institutional Analysis and Planning.

- Coordinated mock visit and provided feedback to each program before the actual on-campus ABET site visit on materials displayed for evaluation.
- Prepared formal responses to ABET, including 7-day and 30-day due-process response on behalf of the College to address any concern raised by ABET visiting team.

*Accomplishments*

- All 9 undergraduate programs received the maximum accreditation.
- The graduate programs were accredited under the new guidelines of ABET and received 3 years of accreditation.

## Associate Dean for Academic Affairs
## College of Engineering, West Virginia University
## February 1996 – December 2002

*Responsible for Freshman engineering program, Co-op and internship program, recruiting and retention, new student orientation, student records, certification of students for graduation, reviewing and approving new graduate and undergraduate courses, coordinating scholarships, updating undergraduate and graduate catalogs, coordinating graduate and undergraduate program reviews, and serving as the Dean's liaison to the College Undergraduate Academic Affairs Committee, College Academic Standards Committee, and College Scholarship Committee.*

## Leadership in establishing Academic Policies for merged Academic Units

During my tenure as Associate Dean for Academic Affairs several mergers occurred. My role was to review all academic policies and procedures and develop common policies for the newly formed academic units.

- 1995 - The College of Engineering (COE) and the College of Mineral and Energy Resources (COMER) merged to form the new College of Engineering and Mineral Resources (CEMR). My role was to ensure a common Freshman Engineering program, uniform admission policies, graduation requirements, and other academic affairs policies and procedures.
- 1996 - West Virginia Institute of Technology merged with West Virginia University as a regional campus. I was appointed by President Hardesty and Provost Lang to serve in the President's Task Force to identify the challenges and academic opportunities of this merger. Subsequent program alignment of engineering and computer science programs were undertaken to make it easy for students to transfer to West Virginia University and earn their degrees not available at West Virginia University Institute of Technology campus. The program and curriculum were modified so that there was no delay in graduation due to the transfer.
- 1997 – The Computer Science Department in the Eberly College of Arts and Sciences merged with the Electrical and Computer Engineering Department in the College of

Engineering and Mineral Resources. The new Department was known as the Department of Computer Science and Electrical Engineering. I developed the proposal for the new degree program which was approved by the Senate and the Board of Trustees.

- 1998 – The Safety and Environmental Management Department merged with the Industrial Engineering Department to form the Industrial and Management Systems Engineering Department. The graduate program in Safety and Environmental Management went through an internal program review leading to several curricular changes that also helped in preparing for ABET accreditation for the first time.

## Upgraded the Freshman Engineering Courses

The Freshman engineering program which serves over 600 students was updated to synergistically evolve with the national trend. In an effort to rejuvenate the freshman engineering experience, several changes were made starting in 1996.

- Developed common freshman program after the College of Engineering merged with the College of Mineral and Energy Resources in 1995.
- Developed a new orientation and academic success course to help freshman students succeed and improve retention.
- Recruited outstanding faculty instead of graduate teaching assistants to teach freshman engineering classes.
- All freshman instructors were provided with undergraduate teaching assistants.
- Launched an annual Freshman Design Fair to showcase student projects and their learning accomplishments.
- Introduced the use of portfolios to assess student learning.
- Modernized freshman classrooms to facilitate teamwork and computer use.

*Accomplishments*

- The freshman program received visibility within the state and the nation.
- Student projects were showcased nationally (CNN) and in the state (TV and newspaper coverage).
- The freshman retention rate improved.

## Accreditation of undergraduate programs

- Authored the College self-study report for all engineering programs.
- Coordinated the 1997 on-campus visit with ABET headquarters, ABET Team Chair and program evaluators.
- Coordinated the accreditation visit with colleges that support the engineering programs and key administrators such as the Dean, the Provost, and the President.
- Reviewed self-study reports of nine engineering programs prepared by departments and provided feedback.

- Reviewed for consistency between the West Virginia University and WVUIT (regional campus) ABET reports after the merger.

*Accomplishments*

- All engineering programs received the highest accreditation.
- The new co-op program was accredited by ABET.
- The College received the best accreditation record in its history.

## Accreditation of graduate programs

- Authored the College ABET self-study report for applied science graduate programs.
- Coordinated the on-campus visit in 1997 and 2000 with ABET headquarters, ABET Team Chair and program evaluators.
- Coordinated the accreditation visit with Health Sciences, NIOSH, off-campus sites, libraries, Dean, Provost, and President.
- Reviewed the self-study reports of the two applied science graduate programs prepared by departments and provided feedback.

*Accomplishments*

- Two applied science graduate programs received ABET accreditation for the first time.

## Co-op and Internship Programs

- The first co-op office was established in the College in 1996.
- Recruited the first co-op and internship program coordinator.
- Established the process for placing students in the industry.
- Established the process of tracking student progress and employer satisfaction.
- Coordinated the co-op curriculum with individual departments.

*Accomplishments*

- The co-op program was nationally accredited by ABET in Fall 1998
- More companies are involved in recruiting our students for the co-op program.
- Periodic assessment of the co-op experience showed that companies are pleased with the quality of West Virginia University engineering and computer science students.

## Career Services Office

- Opened a satellite career services office in the College of Engineering to assist engineering and computer science students in job placement activities.
- This facilitated new corporate relationships to be developed and many companies participated in the career fair organized by the College.

## Board of Trustees Program Reviews - 1996

- Authored the self-study report for all Engineering Ph.D. programs.
- Authored the self-study report for the M.S. program in Engineering.
- Reviewed all 9 undergraduate engineering self-study reports.
- Reviewed all 11 graduate program self-study reports.
- Coordinated the reviews with departments.
- Served in the Board of Trustees Program Review Committee and reviewed over 40 self-study reports in engineering, math, physics, chemistry, computer science reports from different colleges and universities in the state of West Virginia.

*Accomplishments*

- The Board of Trustees reviews for all programs were positive.
- Three undergraduate programs were designated by the Board of Trustees as *Programs of Excellence.*

## Graduate Council Ph.D. Program Reviews – 1997 and 2000

- Coordinated and reviewed the 9 Ph.D. program self-study reports before submitting for a formal review to the West Virginia University Graduate Council.

## Board of Governors Program Reviews - 2001

- Coordinated and reviewed the self-study reports of 12 undergraduate programs and 14 graduate programs.

## Program Assessment Framework

- Developed a uniform framework for presenting assessment outcomes for engineering programs.
- Invited to present a talk on *Assessment in Higher Education* to West Virginia Association of Academic Administrators from across the state.
- Developed and coordinated a comprehensive Freshman Engineering Student Experience Assessment including Math, Chemistry, Physics, English, and Engineering courses.
- Developed a graduating student survey for undergraduate and graduate students.
- Provided assessment guidelines, sample employer survey and alumni survey for departments to modify and adapt.

*Accomplishments*

- Freshman student assessment report highlighted the strengths and weaknesses of different freshman courses (English, Math, Physics, Chemistry, and Engineering).
- The graduating student survey on the web was a pilot program in the University.

## Delivering Freshman Engineering Courses to High School Students

- Freshman Engineering Design and Analysis course was developed and offered to students from Liberty High School, Robert C. Byrd High School and Doddridge County High schools via the Internet.
- A pilot section was also offered to engineering students on campus to assess learning outcomes.
- The quality and course expectations were the same for West Virginia University freshman students and high school students.

*Accomplishments*

- The distance learning course has been well received by students, teachers and parents.
- The initiative was covered by several newspapers and KDKA-TV, Pittsburgh.

## Forensic Identification Program

- Member of the Admissions and Curriculum Committee of the new Forensic and Investigative Science degree program.
- Coordinated recruiting, co-op and internship opportunities for Biometric Systems and Forensic Science degree programs.

## Summer School

- Implemented a uniform faculty salary structure to support the new entrepreneurial model for summer school.
- Managed summer school through mergers of the two colleges, and the merger of the Computer Science Program within the Computer Science and Electrical Engineering Department.
- The summer school program was run on a revenue-based model that considered in-state and out-of-state student tuition and fees, and faculty salaries to maximize revenue streams for the college and departments.

## Extended Learning Courses

- Coordinated the off-campus courses in Software Engineering, offered at Charleston and Fairmont with the Division of Extended Learning, West Virginia Institute of Technology, and the Computer Science and Electrical Engineering Department.
- Coordinated the off-campus courses in Safety Management, and Industrial Hygiene through West Virginia University Extended Learning.

## Faculty Class Advocate

- Appointed by the President and Provost to serve as a faculty advocate for the class of 2002, comprising of over 3500 freshman students. This was part of a broader initiative to transform the university to a student-centered institution.
- Developed an integrated prototype advising system based on student input to empower

students develop their own class schedule, link available courses with catalog descriptions, give faculty access to student information at the click of a button, and provide administrators with information on student profiles.

- The system enhances the advising process by allowing students to spend quality time with their advisors.

*Accomplishments*

- The University invested in a commercial student portal called Campus Pipeline to provide similar features when linked to the Banner System from SCT.
- Served as a faculty focal point for the Campus Pipeline university-wide initiative.

## Recruiting

- Facilitated the initial redesign of the recruiting brochures to enhance marketing of undergraduate programs.
- Helped to focus on tracking recruiting activities better.
- Required developing a comprehensive database of students who have taken both the ACT and the SAT exams.
- Increased recruiting by organizing college visitation days, telethon activities, contacts with high school teachers, and hosting Math Counts, and Junior Engineering & Technology Society student competitions.
- Coordinated scholarship awards for incoming freshman students.

*Accomplishments*

- The College freshman enrollment increased by 30%, 25% and 10% in three successive years tracked.

## Developed Articulation Agreements

- Developed articulation agreements between the College of Engineering and Mineral Resources and selected colleges in West Virginia and other states. This enabled students to transfer to West Virginia University engineering programs without any deficiencies.
- Coordinated with administrators from West Virginia state colleges and universities (Potomac State College, Marshall University, WVU-Parkersburg, Bluefield State College, West Virginia University Institute of Technology, Shepherd University, and West Virginia State University) to discuss and exchange ideas on: new engineering degrees and course offerings, changes in curriculum, transfer of credits for advising students.

## Development of New Computer Science Courses and Programs

- Coordinated the approval of the new online Software Engineering program by working closely with the Computer Science faculty and NASA. The MS degree program is nationally ranked by the US News and World Report among the top 30 programs.
- Developed and introduced Python and R programming courses for non-CS majors.
- Contributed to the development of the Cybersecurity BS degree program.

# TEACHING

## Teaching Philosophy

I have taught undergraduate and graduate level courses. One of the pedagogical challenges I face every time I teach a class is to remind myself that students have disparate academic preparedness, varying levels of motivation, and diverse learning styles. By carefully synthesizing cycles of teaching, student learning and assessment, I tailor my teaching strategies to maximize student learning. I like to challenge all students to meet higher expectations. I work closely with those students who need extra help outside class so they can be better prepared, effectively participate in class, and engage in the active learning process. To enhance student learning and provide a broader perspective, I complement my lectures with real-world applications or integrate cutting edge research in selected topics.

## Teaching Awards

Student evaluation of instruction and evaluation of instruction by peers has been consistently high. I was recognized 18 times for Outstanding Teaching in the College. I was selected three times as the Outstanding Teacher of the Year from among 140 faculty in the College. In addition, I was recognized as one of six Outstanding Teachers at the University level.

## West Virginia University Instructional Improvement Network

I was one of three founding co-coordinators of an informal Instructional Improvement Network at West Virginia University. The other two faculty colleagues were from the College of Human Resources and Education. The goal of the network was to promote excellence in teaching and learning through collegial support. It was aimed at sharing experiences and mentoring young faculty with teaching strategies for collaborative learning, interdisciplinary instruction, inquiry-based learning, teaching large sections, and techniques for motivating students.

## Teaching Grants for Curriculum Innovation

- The recent NSF project as Co-PI focuses on a systemic approach to coordinate the programmatic initiatives with proactive support services and high-impact enrichment activities. This forges a pervasive sustainable reform effort to ensure improved student success and seamless transition as students enter Texas A&M University-Kingsville from high schools as freshmen or as transfer students from community colleges.
- I was awarded a teaching grant from ASEE (American Society of Engineering Education) for developing an innovative interdisciplinary course that provided graduates with an understanding of both technical and business issues that are traditionally not covered in either engineering or business degree programs. This was one of 10 projects selected in the country. The real-world case study material was developed for MBA graduate students and undergraduate senior design engineering students working in teams and

collaborated with an industry partner.

- Received an NSF grant on Science, Technology, Engineering, and Mathematics (STEM). This grant is an interdisciplinary collaborative effort between the Eberly College of Arts & Sciences, College of Engineering and Mineral Resources, and the College of Human Resources and Education. Teams of faculty, graduate students, and middle school mathematics and science teachers, were involved in developing interdisciplinary instructional modules and lesson plans. They jointly designed research investigations, collected and analyzed data, and prepared a work sample appropriate for assessing the investigation. The interactive research exercises improved teacher's understanding of science content, and their use of inquiry and scientific method to teach STEM subjects.
- I also received several teaching grants from Westinghouse, DuPont, General Electric, National Science Foundation, National Consortium for Technology in Business, National Biometric Security Project, and NASA.

## Freshman Engineering Program Development

As Associate Dean at West Virginia University, I provided leadership in modernizing the freshman engineering program by coordinating with the Office of Student Affairs and the College of Engineering aimed at the new university-wide freshman experience initiative. A one hour orientation and academic success course was developed for engineering students to become familiar with different engineering disciplines, the career paths for each major, and study skills. Freshman engineering courses were made more rigorous and projects were based on mathematical modeling, analytical approach and formal design. All freshman engineering students were required to showcase their projects in a Design Fair, which was open to faculty, staff, students, and the public. These projects generated a lot of enthusiasm among students. The design projects received local, national and international coverage, including CNN. MatLab and C programming languages were first introduced with the objective to train students to formulate, analyze, and solve engineering problems. All these changes in the Freshman Engineering program along with support from the Math, Physics, and Chemistry departments improved the retention rates of freshman students.

## CS101 Program Development

As Associate Chair of the Lane Department of Computer Science and Electrical Engineering I coordinated over 60 sections of CS 101 a year. Approximately 10% of the students in the University enroll in the introductory computer applications course. The content of the course was recently revised to emphasize problem-solving, math skills and scientific inquiry. Instead of familiarizing with Microsoft Office, students used these applications as tools to analyze data, solve problems, perform simple statistical analysis, visualize the results graphically, and develop critical thinking. The projects include real-world problems selected from disciplines such as science, mathematics, engineering, environment, social science, behavioral science, and business. The proposed changes in CS101 course is designed to integrate technology effectively in the curriculum and also meet the requirements of the new General Education Curriculum.

In 2016, I coordinated the development and introduction of two new courses in Python and R programming for non-CS majors.

## Undergraduate Courses Developed

Texas A&M University, Kingsville

- GEEN 1201 Engineering as a Career
  Freshman hands-on project course using Raspberry Pi and Python to design a robot.

West Virginia University

- Introduction to Computer Applications – 2007, 2010, 2013, 2015, 2016
- Intro. to Computer Applications (new General Education Curriculum) – 2005, 2006
- Collaborative Decision Making and Problem-Solving in a Multidisciplinary Environment (for engineering and business students) - 1994
- Freshman Engineering Analysis and Design using C Programming - 1993
- Fault-Tolerant Computing - 1988

## Graduate Courses Developed

- Quantum Computing - 2007
- Switching Circuit Theory (with VHDL) - 2006
- Switching Circuit Theory - 2005
- Software Metrics - 2001
- Special Topics on ASIC Design and Test - 1990
- Application of Queuing Theory to Computer Systems - 1990
- Fault Tolerance through Reconfiguration in VLSI and WSI Arrays - 1989
- Fault-Tolerant computing - 1988
- VLSI Design and Testing - 1988

## Undergraduate Courses Taught

Texas A&M University, Kingsville

- GEEN 1201 Engineering as a Career
  Taught freshman students the project-based course to design a robot using Raspberry Pi.

West Virginia University

- Freshman Engineering Design
- Freshman Engineering Design (Honors Section)
- Freshman Engineering Design and Analysis
- Introduction to Electronic Instrumentation
- Digital Electronics Laboratory
- Introduction to Digital Logic Design
- Introduction to Computer Architecture
- Introduction to Microprocessor Based Design
- Senior Design Seminar
- Senior Design Project
- Digital System Design

## Graduate Courses Taught

- Switching Circuit Theory
- Quantum Computing
- VLSI Design
- VLSI Testing Techniques
- Special Topics on ASIC Design and Test
- Application of Queuing Theory to Computer Systems
- Fault tolerance in VLSI and WSI Arrays
- Fault Tolerant Computing
- Software Metrics

## Graduate Students Advised and their Accomplishments

| | |
|---|---|
| **Names**: | N. Kohli, D. Yadav, M. Vatsa R. Singh, and A. Noore |
| **Research**: | Synthetic Iris Presentation Attack using iDCGAN |
| **Accomplishment**: | Best Paper Award at IEEE International Joint Conference on Biometrics (IJCB), 2017. |
| **Names**: | M. Singh, S. Nagpal, R. Singh, M. Vatsa, and A. Noore |
| **Research**: | Gender and Ethnicity Classification of Iris Images using Deep Class Encoder |
| **Accomplishment**: | Best Paper Award at IEEE International Joint Conference on Biometrics (IJCB), 2017. |
| **Names**: | D. Yadav, N. Kohli, P. Pandey, R. Singh, M. Vatsa, A. Noore |
| **Research**: | Effect of Illicit Drug Abuse on Face Recognition |
| **Accomplishment**: | Best Paper Award at IEEE Winter Conference on Applications of Computer Vision, 2016. |
| **Names**: | H.S. Bhatt, S. Bharadwaj, R. Singh, M. Vatsa, A. Noore, and A. Ross |
| **Research**: | On Co-training Online Biometric Classifiers |
| **Accomplishment**: | Best Poster Award at Third IEEE Conference on Biometrics: Theory, Applications and Systems, 2011. |
| **Names**: | Richa Singh, Mayank Vatsa, Arun Ross, and Afzel Noore |
| **Research**: | Online learning in Biometrics: A case study in face classifier update. |
| **Accomplishment**: | Best Poster Award at Third IEEE Conference on Biometrics: Theory, Applications and Systems, 2009. |
| **Names**: | Mayank Vatsa, Richa Singh, Afzel Noore, and Keith Morris |
| **Research**: | Simultaneous latent fingerprint recognition: A preliminary study. |
| **Accomplishment**: | Best Paper Award at Third IEEE Conference on Biometrics: Theory, Applications and Systems, 2009. |
| **Names**: | Mayank Vatsa and Richa Singh |
| **Research**: | Unification of Evidence Theoretic Fusion Algorithms: A case study in Level-2 and level-3 Fingerprint Features |

**Accomplishment**: Best Paper Award at First IEEE Conference on Biometrics: Theory, Applications and Systems, 2007.

**Names**: Mayank Vatsa and Richa Singh
**Research**: Unification of Evidence Theoretic Fusion Algorithms: A case study in Level-2 and level-3 Fingerprint Features
**Accomplishment**: Honeywell Best Student Paper Award at First IEEE Conference on Biometrics: Theory, Applications and Systems, 2007.

**Names**: Mayank Vatsa and Richa Singh
**Research**: Multimodal Fusion of SVM Enhanced Deformed Biometric Images
**Accomplishment**: Third Prize, Sigma Xi Research Poster Award, WVU April 2006.

**Names**: Richa Singh and Mayank Vatsa
**Research**: Performance Enhancement of 2D Face Recognition via Mosaicking
**Accomplishment**: Best Student Paper Award at Fourth IEEE Workshop on Automatic Identification Advanced Technologies (AUTOID), October 2005.

**Names**: Richa Singh and Mayank Vatsa
**Research**: Recognition of Faces with Variations in Disguise
**Accomplishment**: Best Paper Award at Summer School on Biometric Authentication: Multimodality and System Integration, Italy, June 2005.

**Names**: Mayank Vatsa and Richa Singh
**Research**: Enhancing Accuracy and Security of Multi-biometric Template using RDWT Watermarking
**Accomplishment**: Best Paper Award at Summer School on Biometric Authentication: Multimodality and System Integration, Italy, June 2005.

**Name**: Brian Powell
**Fellowship**: West Virginia University Foundation Distinguished Doctoral Fellowship Award
**Accomplishment**: Only one awarded for all Engineering and Science students

## Undergraduate Students Advised and their Accomplishments

**Names**: Jacob Steele
Honors College Summer Undergraduate Research Experience, 2011
**Project**: Discrete Wavelet Transform based Watermarking for Cameras
**Accomplishment**: Developed a FPGA Prototype

**Names**: Angelini, Castanos, Nicklow, Meshlum and Haun
**Project**: Flight Control Simulator
**Accomplishment**: First Place Award, Senior Design Fair, 1995

**Name**: Michael Sabolish
**Project**: Design of a Software Metrics Framework
**Accomplishment**: EG&G Research Scholarship (1 out of 8 Awards), 1995

**Names**: Don Reynolds, Suhail Nasser and Russ Williams
**Project**: Automatic Telephone Dialer
**Accomplishment**: First Place Award, Senior Design Fair, 1991

**Names**: Mike Heck, Andrew Kaicik and Russ Nix
**Project**: Robot Follower
**Accomplishment**: First Place Award, Senior Design Fair, 1990

## Postdoctoral Fellow

| | | |
|---|---|---|
| A. Agarwal | Illumination-Invariant Iris Presentation Attack Detection<br>Federal Bureau of Investigation (FBI) Project | 2019-2020 |

## Chairman of PhD Student Committees

| | | | |
|---|---|---|---|
| D. Yadav | PhD CS | On Matching Faces with Temporal Variations using Representation Learning | May 2019 |
| N. Kohli | PhD CS | Automatic Kinship Verification in Unconstrained Faces using Deep Learning | May 2019 |
| B. Powell | PhD CS | Design of Face Detection CAPTCHAs<br>Humans and Computers for Secure Authentication | May 2018 |
| M. Vatsa | PhD CS | Quality Induced Multi-classifier Fingerprint Verification using Extended Feature Set | Dec 2008 |
| R. Singh | PhD CS | Reducing the Effect of Covariates in Face Recognition | Dec 2008 |
| L. Tian | PhD CS | Dynamic Learning with Neural Networks and Support Vector Machines | Aug 2005 |
| P. Cross | PhD CpE | Fuzzy Reliability Modeling of Distributed Client Server Systems | Aug 1998 |
| A. Pyzdrowski | PhD EE | Dedicated Hardware Structures for Linear Filters and Controllers | Dec 1990 |

## Chairman of MS Student Committees

| | | | |
|---|---|---|---|
| N. Dobariya | MS CS | Machine Learning for Autonomous Fault Detection In Wind Turbine Blades | Dec 2022 |
| N. Kohli | MS CS | On Generative Adversarial Network Based Synthetic Iris Presentation Attack & its Detection | May 2019 |
| D. Yadav | MS CS | Textured Contact Lens Based Iris Presentation Attack in Uncontrolled Environment | May 2019 |
| N. Niasar | MS CS | Piece-wise Linear SVM to Classify Distributed Data | May 2015 |
| E. Koshak | MS EE | Reconfigurable Universal Fuzzy Flip Flop | Aug 2012 |

| | | | |
|---|---|---|---|
| J. Martin | MS CS | Coursework | Dec 2011 |
| A. Day | MS EE | Designing a Face Detection CAPTCHA | May 2010 |
| S. Moheuddin | MS CS | A Reconfigurable Distributed Multiagent System Optimized for Scalability | Aug 2010 |
| J. Price | MS CS | Coursework | May 2010 |
| Z. Ali | MS EE | FPGA Optimization of Barrel Shift Registers | May 2008 |
| B. Powell | MS CS | Coursework | Dec 2006 |
| V. Salla | MS EE | Error and Attack Tolerance of Complex Real Networks | Dec 2005 |
| R. Singh | MS CS | Unconstrained Face Recognition for Law Enforcement Applications | Dec 2005 |
| M. Vatsa | MS CS | Reducing False Rejection Rate in Iris Recognition by Quality Enhancement and Information Fusion | Dec 2005 |
| S. Gangisetty | MS EE | Text Independent Speaker Recognition | May 2005 |
| N. Tungala | MS EE | Contextual Biometric Watermarking of Fingerprint Images | Dec 2004 |
| A. Rajogopalan | MS EE | ProSE: A Process Support Environment for Collaborative Independent Verification & Validation | May 1996 |
| T. Montgomery | MS EE | Design, Implementation, and Verification of the Reliable Multicast Protocol | Dec 1994 |
| P. Cross | MS EE | Microprocessor Chip Design in a Concurrent Engineering Environment | Aug 1993 |
| S. Nestor | MS EE | Closed-Form Reliability Expression of Large Non-Homogeneous Distributed Systems | Aug 1993 |
| B. Lu | MS EE | Detection of Transient Faults in Computers | Dec 1992 |
| E. Strogen | MS EE | 2D and 3D Transition Count Testing | Aug 1992 |
| C. Wang | MS EE | Implementation of Matrix Operations with 3D Reconfigurable Array Structures using Field Programmable Gate Arrays | Jan 1992 |
| G. Rahall | MS EE | Development of Software Tools for the Analysis of Faulty and Fault-free Iterated Polyfunctional Networks | Dec 1991 |
| A. Rahil | MS EE | Built-in Current Testing of Transistor Stuck-open Faults of Static CMOS Complex Gates | Dec 1991 |
| I. Ahmad | MS EE | A Software Tool to Determine the Exact Reliability of Complex Networks | Aug 1991 |
| H. Nariman | MS EE | Availability Modeling of Fault-Tolerant Computer Systems | Aug 1991 |
| J. Potter | MS EE | Design of Radiation Hardened CMOS Static RAM | Dec 1990 |

## Workshop and Presentations on Teaching and Assessment

- Faculty Panel Discussion: Evidence-based Best Practices to Empower students
  *Center for Teaching Excellence,* Texas A&M University-Kingsville, February 2023
- Orientation for Graduate Teaching Assistants, Fall 2009 - present
  *Department of Computer Science & Electrical Engineering,* West Virginia University
- Orientation for Graduate Teaching Assistants
  *Eberly College of Arts and Sciences,* West Virginia University, August 1999
- Assessment in Higher Education
  *West Virginia Association of Academic Administrators,* March 15, 1998
- Those Who Can, Teach: Outstanding Tips From Outstanding Teachers
  *West Virginia University Faculty Development Series*, September 29, 1998
- Those Who Can, Teach: Outstanding Tips From Outstanding Teachers
  *West Virginia University Faculty Development Series*, November 18, 1998
- Monitoring the Pulse of the Faculty: The Different Faces of Needs Assessment
  *Professional and Organizational Development Network Conference*, October, 1995.
- Supporting Instructional Leadership within Colleges, Schools, and Departments
  West Virginia University, *Seventh Annual WVU Faculty Academy*, May 8, 1995
- Instructional Improvement Network: Progress and Prospects
  *West Virginia University Faculty Development Series*, April 11, 1995
- Critical Incidents in University Teaching
  *West Virginia University Faculty Development Series*, February 28, 1995
- Developing an Instructional Improvement Network: Action Planning.
  *Sixth Annual West Virginia University Faculty Academy*, May 9, 1994
- Developing an Instructional Improvement Network at West Virginia University
  *West Virginia University Faculty Development Series, April 19, 1994*
- Business-Engineering Case Development Workshop
  *First National Conference on Business & Engineering Education*, Auburn, April, 1994

## Professional Development

- 2022 ABET Program Evaluator Training
  Baltimore, May 16-17, 2022.
- 2021 ATMAE Accreditation Program Evaluator Training
  Orlando, FL 2021.
- 2021 ABET Workshop on Self-Study Report Development
  Virtual Workshop, March 30, 2021
- High-impact Practices and Student Success
  LEAP Texas 6th Annual Conference, Houston, Texas, March 2019.

- How to teach AI across K-12?
  Computer Science Teachers Association Workshops, Phoenix, Arizona, July 2019.
- Electrical & Computer Engineering Department Heads Association (ECEDHA) Conference
  March 18-22, 2016, La Jolla, CA.
- 2014 ABET Workshop, Institute for the Development of Excellence in Assessment Leadership (IDEAL) - August 4–7, Baltimore, Maryland.
- 2012 ABET Symposium
  April 19 – 21, Saint Louis, Missouri.
- Short course in Neural Network Applications in Image Processing
  January 18, 2004, SPIE Symposium, California.
- Short course in Image Processing & Recognition using Neural Networks, Wavelets, and Statistical Techniques, Jan 19, 2004, SPIE Symposium, California.
- Summer School on Biometrics: Authentication and Recognition
  Alghero, Italy, June 2, 2003 to June 6, 2003.
- Short course in Cryptography and Digital Watermarking
  Jan 2003, SPIE Electronic Imaging Science & Technology Symposium, CA.
- Short course in Advanced Image Processing
  Jan 24, 2003, SPIE Electronic Imaging Science and Technology Symposium, CA.
- ABET Dean's Day Workshops – EAC and ASAC, Baltimore
  July 1996, 1997, 2000, 2002, 2003.
- ABET Assessment Workshop, Pittsburgh
  October 28, 2002.
- ABET 2000 Program Evaluator Training
  San Jose CA, 1998.
- Xilinx University Professor Workshop, 1992
  University of Pennsylvania, PA.
- ASEE Faculty Development Program on ASIC Design
  Delco Electronics Corporation, IN, July 1991.
- Certificate of Achievement, Summer Workshop on VLSI Design
  Massachusetts Microelectronics Center, MA, 1990.

## Professional Affiliations

| | |
|---|---|
| IEEE | Member, Institute of Electrical and Electronics Engineers |
| | Member of Computational Intelligence Society |
| | Member of Consumer Electronics Society |
| | Member, Computer Society |
| ASEE | Member American Society of Engineering Education |

# RESEARCH

## Research Areas

My research interests include computational intelligence in mathematical modeling and experimental validation covering areas such as information fusion, data analysis and decision making with uncertain, non-ideal or missing data, fault tolerance, image processing, pattern recognition, and machine learning. These approaches have been effectively applied in diverse applications such as biometrics for human recognition and homeland security, digital watermarking of multimedia objects for enhanced security, software failure prediction, predicting electric power loads, and reconfiguring critical infrastructures in the event of failures or attacks using distributed multi-agents.

## Research Funding

I have received around $5 million in external funded research as PI and Co-PI. I have been involved in team projects and individual projects funded by NSF, US Department of Energy, National Institute of Justice, NSF Center for Identification Technology Research, NASA, EPRI, National Consortium for Technology in Business-ASEE, DARPA, DoD Army Research Laboratory, and the FBI. I have collaborated with faculty colleagues from different colleges such as Business and Economics, Forensic Sciences, Arts and Sciences, and Human Resources and Education during proposal writing. The diversity in faculty collaboration has given the opportunity in developing and undertaking challenging interdisciplinary research projects. Selected outcomes of research have been integrated in classroom instruction to enhance the learning experience of students.

## Research Awards

The outcomes of funded research projects have been disseminated in journals, conferences and book chapters. Received 10 best paper and poster awards in international conferences. In addition, was recognized as Outstanding Researcher three times in the college (one of 5 awards) and received the Researcher of the Year award given to one faculty out of 140 in the college of engineering.

## Publications – Journal Papers

1. Malhotra, A. Vatsa, M. Singh R. Morris K.B. and **A. Noore**, Multi-Surface Multi-Technique (MUST) Latent Fingerprint Database," *IEEE Trans. on Information Forensics and Security*, *accepted*, 2023.

2. Agarwal, **A. Noore**, M. Vatsa, R. Singh, **"**Generalized Contact Lens Iris Presentation Attack Detection," *IEEE Trans. on Biometrics, Behavior, and Identity Science*, vol. 4, no. 3, pp 373-385, 2022.

3. Agarwal**,** R. Singh, M. Vatsa, **A. Noore**, "Boosting Face Presentation Attack Detection in Multi-Spectral Videos Through Score Fusion of Wavelet Partition Images," *Frontiers in Big Data*, vol. 5, pp 1-17, 2022.

4. Agarwal**, A. Noore**, M. Vatsa, R. Singh, "Enhanced Iris Presentation Attack Detection via Contraction-Expansion CNN," *Pattern Recognition Letters*, vol. 159, pp. 61-69, 2022.

5. Agarwal, R. Singh, M. Vatsa, and **A. Noore**, "MagNet: Detecting Digital Presentation Attacks on Face Recognition," *Frontiers in Artificial Intelligence*," vol. 4, 2021.

6. Malhotra, A. Sankaran, M. Vatsa, R. Singh, KB. Morris, **A. Noore**, "Understanding ACE-V Latent Fingerprint Examination Process via Eye-Gaze Analysis," *IEEE Trans. on Biometrics, Behavior, and Identity Science*, vol. 3, no. 1, pp. 44-58, 2021.

7. TI. Dhamecha, **A. Noore**, R. Singh, M. Vatsa,"Between-Subclass Piece-wise Linear Solutions in Large Scale Kernel SVM Learning," *Pattern Recognition*, vol. 95, pp 173-190, 2019.

8. N. Kohli, D. Yadav, M. Vatsa, R. Singh, **A. Noore**, "Supervised Mixed Norm Autoencoder for Kinship Verification in Unconstrained Videos", *IEEE Trans. on Image Processing*, vol. 28, no. 3. pp 1329 - 1341, 2018.

9. N. Kohli, M. Vatsa, R. Singh, **A. Noore**, A. Majumdar, "Hierarchical Representation Learning for Kinship Verification," *IEEE Trans. on Image Processing*, vol. 26, no. 1. pp 289-302, 2017.

10. S. Soleymani and **A. Noore**, "Dynamically Reconfigurable Evolutionary Multi-Context Robust Cellular Array Design," *Intl. Journal of Circuits and Architecture Design*, vol. 2, no. 1, pp 1-12, 2016.

11. N. Kohli, D. Yadav, and **A. Noore**. "Multiple Projective Dictionary Learning to Detect Plastic Surgery for Face Verification," *IEEE Access*, Vol.3, pp. 2572-2580, 2015.

12. S. Bharadwaj, H.S. Bhatt, R. Singh, M. Vatsa, **A. Noore**, "QFuse: Online Learning Framework for Adaptive Biometric System," *Pattern Recognition*, vol 48, no. 11, pp 3428-3439, 2015.

13. D. Yadav, R. Singh, M. Vatsa, **A. Noore**, Recognizing Age-Separated Face Images: Humans and Machines, *PLoS ONE*, vol. 9 no. 12, e112234, 2014.

14. Powell, G. Goswami, M. Vatsa, R. Singh and **A. Noore**, fgCAPTCHA: Genetically Optimized Face Images CAPTCHA, *IEEE Access*, vol. 2, pp. 473-484, 2014.

15. G. Goswami, B.M. Powell, M. Vatsa, R. Singh, and **A. Noore**, FR-CAPTCHA: CAPTCHA based on Recognizing Human Faces, *PLoS ONE*, vol. 9, no. 4, e91708, 2014.

16. G. Goswami, B.M. Powell, M. Vatsa, R. Singh, and **A. Noore**, FaceDCAPTCHA: Face Detection based Color Image CAPTCHA, *Future Generation Computer Systems - Special Issue on Human-Involved Computational Systems, Elsevier*, vol. 31, pp. 59-68, 2014.

17. M. Vatsa, R. Singh, **A. Noore**, and K. Morris, Simultaneous Latent Fingerprint Recognition, *Applied Soft Computing,* vol. 11, pp. 4260–4266, 2011.

18. B.M. Powell, A.C. Day, **A. Noore**, R.Singh, and M. Vatsa, Image-based Face Detection CAPTCHA for Improved Security, *International Journal of Multimedia Intelligence and Security* vol. 1, no. 3, pp. 269-284, 2010.

19. R. Singh, M. Vatsa, A. Ross, and **A. Noore**, Biometric Classifier Update using Online Learning: A Case Study in Near Infrared Face Verification, *Image and Vision Computing*, vol. 28, no. 7, pp. 1098-1105, 2010.

20. M. Vatsa, H.S. Bhatt, S. Bharadwaj, **A. Noore**, and S.S. Nooreyezdan, Plastic Surgery: A New Dimension to Face Recognition, *IEEE Trans. on Information Forensics and Security*, vol. 5, no. 3, pp. 441 – 448, 2010.

21. E. Koshak, **A. Noore** and R. Lovassy, Intelligent reconfigurable universal fuzzy flip-flop, *IEICE Electronics Express*, vol. 7, no. 15, pp.1119-1124, 2010.

22. M. Vatsa, R. Singh, **A. Noore**, and A. Ross, On the Dynamic Selection of Biometric Fusion Algorithms, *IEEE Trans. on Information Forensics and Security*, vol. 5, no. 3, pp. 470 – 479, 2010.

23. M. Vatsa, R. Singh, **A. Noore**, and S.K. Singh, Combining Pores and Ridge Features for Improved Fingerprint Verification, *Signal Processing,* vol. 89. pp. 2676-2685, 2009.

24. S. Moheuddin, **A. Noore**, and M.A. Choudhry, A Reconfigurable Distributed Multiagent System Optimized for Scalability, *International Journal of Computational Intelligence*, vol. 5, no. 1, pp. 60-71, 2009.

25. R. Singh, M. Vatsa, and **A. Noore**, Unification of Evidence Theoretic Fusion Algorithms: A Case Study in Level-2 and Level-3 Fingerprint Features, *IEEE Trans. on Systems, Man, and Cybernetics – A,* vol. 39, no. 1, pp. 47-56, 2009.

26. R. Singh, M. Vatsa, and **A. Noore**, Face Recognition with Disguise and Single Gallery Images, *Image and Vision Computing - Special issue on Multimodal Biometrics*, vol. 27, no. 3, pp. 245-257, 2009.

27. M. Vatsa, R. Singh, and **A. Noore**, Quality-Augmented Fusion of Level-2 and Level-3 Fingerprint Information using DSm Theory, *International Journal of Approximate Reasoning*, vol. 50, no. 1, pp. 51-61, 2009.

28. M. Vatsa, R. Singh, and **A. Noore**, Feature Based RDWT Watermarking for Multimodal Biometric System, *Image and Vision Computing - Special issue on Multimodal Biometrics*, vol. 27, no. 3, pp. 293-304, 2009.

29. M. Vatsa, R. Singh, and **A. Noore**, Improving Iris Recognition Performance Using Segmentation, Quality Enhancement, Match Score Fusion, and Indexing, *IEEE Trans. on Systems, Man, and Cybernetics – B,* vol. 38, no. 4, pp. 1021-1035, 2008.

31. R. Singh, M. Vatsa, and **A. Noore**, Hierarchical Fusion of Multi Spectral Face Images for Improved Recognition Performance, *Information Fusion Journal*, vol.9, no. 2, pp. 200-210, 2008.

32. Z.A. Syed and **A. Noore**, Performance optimization to alleviate I/O constraints in designing large FPGA shifters, *IEICE Electronics Express,* vol. 5, no. 1, pp. 29-34, 2008.

33. R. Singh, M. Vatsa, and **A. Noore**, Integrated Multilevel Image Fusion and Match Score Fusion of Visible and Infrared Face Images for Robust Face Recognition, *Pattern Recognition - Special issue on Multimodal Biometrics*, vol. 41, no. 3, pp. 880-893, 2008.

34. R. Singh, M. Vatsa, A. Ross and **A. Noore**, A Mosaicing Scheme for Pose Invariant Face Recognition, *IEEE Trans. on Systems, Man, and Cybernetics – B, Special issue in Biometrics*, vol. 37, no.5, pp. 1212-1225, 2007.

35. R. Singh, M. Vatsa, and **A. Noore**, Improving Verification Accuracy by Synthesis of Locally Enhanced Biometric Images and Deformable Model, *Signal Processing Journal*, vol. 87, no. 11, pp. 2746-2764, 2007.

36. M. Vatsa, R. Singh, and **A. Noore**, Integrating Image Quality in 2-u SVM Biometric Match Score Fusion, *International Journal of Neural Systems,* vol. 17, no.5, pp. 343-351, 2007.

37. R. Morehead and **A. Noore**, Novel Hybrid Mitigation Strategy for Improving the Resiliency of Hierarchical Networks Subjected to Attacks, *Physica A: Statistical Mechanics and its Applications*, vol. 378, no. 2, pp. 603-612, 2007.

38. **A. Noore**, R. Singh, M. Vatsa, and M.M. Houck, Enhancing Security of Fingerprints through Contextual Biometric Watermarking, *Forensic Science International*, vol. 169, no. 2-3, pp. 188-194, 2007.

39. **Noore**, An improved SRAM cell design for tolerating radiation-induced single-event effects*,* *IEICE Electronics Express,* vol. 4, no. 3, pp. 100-105, 2007.

40. **Noore**, R. Singh, and M. Vatsa Robust Memory-Efficient Data Level Information Fusion of Multimodal Biometric Images, *Information Fusion Journal*, vol. 8, no. 4, pp. 337-346, 2007.

41. **Noore**, Improved IDDQ design-for-testability technique to detect CMOS stuck-open faults, *IEICE Electronics Express,* vol. 4, no. 3, pp. 94-99, 2007.

42. **Noore**, M. Vatsa, R. Singh, K. Morris, and M.M. Houck, Multiple Watermarking Enhances Security of Fingerprint Images, *Journal of Documents & Identity*, vol. 22, pp. 3-6, 2007.

43. R. Singh, M. Vatsa, **A. Noore**, and S.K. Singh, DS Theory based Fingerprint Classifier Fusion with Update Rule to Minimize Training Time, *IEICE Electronics Express,* vol. 3, no. 20, pp. 429-435, 2006.

44. **A. Noore**, Secure Distribution of Heterogeneous Multimedia Content on the Internet, *International Journal of Internet Protocol Technology,* vol. 1, no. 3, pp. 198-203, 2006.

45. M. Vatsa, R. Singh, **A. Noore**, M.M. Houck, and K. Morris Robust Biometric Image Watermarking for Fingerprint and Face Template Protection, *IEICE Electronics Express,* vol. 3, no. 3, pp. 1-6, 2006.

46. L. Tian and **A. Noore**, On-line prediction of software reliability using an evolutionary connectionist model, *Journal of Systems and Software,* vol. 77, no. 2, pp. 173-180, 2005.

47. L. Tian and **A. Noore**, Dynamic software reliability prediction: An approach based on Support Vector Machines, *Intl. Journal of Reliability, Quality and Safety Engineering,* vol. 12, no. 4, pp. 309-321, 2005.

48. M. Vatsa, R. Singh, and **A. Noore**, Improving biometric recognition accuracy and robustness using DWT and SVM watermarking, *IEICE Electronics Express,* vol. 2, no. 12, pp. 362-367, 2005.

49. R. Singh, M. Vatsa, and **A. Noore**, Textural Feature based Face Recognition for Single Training Images, *IEE Electronics Letters,* vol. 41, no. 11, pp. 640-641, 2005.

50. M. Vatsa, R. Singh, and **A. Noore**, Reducing the False Rejection Rate of Iris Recognition using Textural and Topological Features, *Intl. Journal of Signal Processing,* vol. 2, no. 1, pp. 66-72, 2005.

51. **A. Noore**, Reliable detection of CMOS stuck-open faults due to variable internal delays, *IEICE Electronics Express,* vol. 2, no. 8, pp.1-6, 2005.

52. L. Tian and **A. Noore**, Modeling distributed software defect removal effectiveness in the presence of code churn, *Mathematical and Computer Modelling,* vol. 41, pp. 379-389, 2005.

53. L. Tian and **A. Noore**, Evolutionary neural network modeling for software cumulative failure time prediction, *Reliability Engineering and System Safety,* vol. 87, no. 1, pp. 45–51, 2005.

54. **A. Noore** and P.L. Cross, Modeling the reliability of large dynamic distributed non-homogeneous networks, *Information Processing Letters*, vol. 93, no. 2, pp. 57-61, 2005.

55. **A. Noore**, An improved method to watermark images sensitive to blocking artifacts, *Intl. Journal of Signal Processing,* vol. 1, no. 2, pp. 129-134, 2004.

56. **A. Noore**, N. Tungala, and M.M. Houck, Embedding biometric identifiers in 2D barcodes for improved security, *Journal of Computers and Security*, vol. 23, no. 8, pp. 679-686, 2004.

57. L. Tian and **A. Noore**, A novel approach for short-term load forecasting using support vector machines, *International Journal of Neural Systems,* vol. 14, no.5, 2004.

58. L. Tian and **A. Noore**, Software reliability prediction using recurrent neural network with Bayesian regularization, *International Journal of Neural Systems,* vol. 14, no. 3, pp. 165–174, 2004.

59. **A. Noore**, Real Time Fault Tolerant Control of Robot Manipulators*, Mathematical and Computer Modelling*, vol. 38, no. 1-2, pp. 13-22, 2003.

60. **A. Noore**, Highly Robust Biometric Smart Card Design*, IEEE Trans. on Consumer Electronics*, vol. 46, no.4, pp. 1059-1063, 2000.

61. **A. Noore**, Fault Location in Multi-modular Redundant Systems*, Microelectronics and Reliability* vol. 37, no. 8, pp. 1267-1269, Aug 1997.

62. **A. Noore**, S. Nestor and M. Lawson, Computer-Based Multimedia Video Conferencing System, *IEEE Trans. on Consumer Electronics*, vol. 39, no.3, pp. 587-592, 1993.

63. **A. Noore**, The Effect on Yield and Chip-Area Utilization of Large Fault-Tolerant Processor Clusters, *Microelectronics and Reliability*, vol. 33, no. 3, pp. 403-412, 1993.

64. **A. Noore** and M. Lawson, Electronic Product Design and Manufacture in a Concurrent Engineering Environment, *IEEE Trans. on Consumer Electronics*, vol. 38, no.3, pp. 666-670, 1992.

65. **A. Noore**, W.L. Cooley and R.S. Nutter, Detecting and Masking Transient Failures in Computers Used for Coal Mining Operations*, IEEE Trans. on Industry Applications*, vol. 28, no.1, pp. 186-189, 1992.

66. **A. Noore**, S.K. Tewksbury and M. Divakurani, On Optimizing Yield, Reliability and Area Overhead in Large Memory Arrays, *Microelectronics and Reliability*, vol.32, no.1-2, pp. 67-78, 1992.

67. **A. Noore**, H. Nariman and M.A. Manzoul, Design of Reconfigurable Fault-Tolerant VLSI/WSI Processor Array Structures*, Microelectronics and Reliability*, vol. 31, no. 2-3, pp. 481-490, 1991.

68. **A. Noore**, Single Chip Decoder Design for Large Numeric Displays, *IEEE Trans. on Consumer Electronics*, vol. 37, no. 4, pp. 844-847, 1991.

69. **A. Noore**, Microcontroller Compatible Clock Chip Design Using Field Programmable Gate Array, *IEEE Trans. on Consumer Electronics*, vol. 37, no.3, pp. 629-634, 1991.

70. **A. Noore**, Simulation of VLSI Processing Deficiencies in Digital Integrated Circuits, *Mathematical and Computer Modeling*, vol. 14, pp. 354-359, 1990.

71. **A. Noore** and S. Nestor, Closed Form Reliability Expression of Large Non-Homogeneous Distributed Systems, *Mathematical and Computer Modeling*, vol. 14, pp. 196-200, 1990.

72. **A. Noore**, Testing CMOS Integrated Logic Circuits, *Intl. Journal of Science and Technology*, vol. 3, no. 2, pp. 17-20, 1990.

73. **A. Noore** and V.C.V.P. Reddy, Some Techniques for Testing of Digital Systems, *Institute of Electronics and Telecommunication Engineers Journal of Education*, vol. 22, no.2, pp.49-53, 1981.

## Publications – Book Chapters

1. D. Yambay, A. Czajka, K. Bowyer, M. Vatsa, R. Singh, **A. Noore**, N. Kohli, D. Yadav, S. Schuckers, "Review of iris presentation attack detection competitions" *Handbook of Biometric Anti-Spoofing*, pp.169-183, 2019.

2. N. Kohli, D. Yadav, M. Vatsa, R. Singh, and **A. Noore**, Deep Face Representation Learning in Kinship Verification, in *Deep Learning in Biometrics* published by CRC Press - Taylor & Francis, 2018.

3. **A. Noore**, M. Vatsa, and R. Singh, Sensor level fusion, in *Encyclopedia of Biometric Recognition,* S. Z. Li (editor), pp. 616-621, 2009.

4. R. Singh, M. Vatsa, and **A. Noore**, Recognizing Face Images with Disguise Variations, in *Face Recognition*, M.S. Bartlett, K. Delac, and M. Grgic (Editors), ITECH Publishing, Chapter 11, pp. 149-160, 2008.

5. R. Singh, M. Vatsa, and **A. Noore**, SVM based adaptive biometric image enhancement using quality assessment, in *Speech, Audio, Image and Biomedical Signal Processing using Neural Networks*, B. Prasad and S.R.M. Prasanna (editors), Springer-Verlag Publishers, Chapter 16, pp. 351-372, 2008.

6. R. Singh, M. Vatsa, and **A. Noore**, Intelligent Biometric Information Fusion using Support Vector Machine, in *Soft Computing in Image Processing: Recent Advances*, M. Nachtegael, D. Van der Weken, E.E. Kerre, W. Philips (editors), Springer-Verlag, pp. Chapter 12, 325-349, 2007.

7. L. Tian, and **A. Noore**, Computational Intelligence Methods in Software Reliability Prediction, in *Computational Intelligence in Reliability Engineering*, G. Levitin (editor), Springer-Verlag Publishers, pp. 375-398, 2007.

8. **A. Noore**, A. Pushkin, B. Morris, and M. Lawson, The 21st Century Incubator Project, in *Cross-Functional Management of Technology: Cases and Readings*, D. Aldridge and P. Swamidass (editors), pp. 183-208, 1996.

## Publications – Conference Papers

1. A. Agarwal, N. Ratha, **A. Noore**, R. Singh and M. Vatsa, " Misclassifications of Contact Lens Iris PAD Algorithms: Is it Gender Bias or Environmental Conditions?," *IEEE Winter Conference on Applications of Computer Vision*, 2023 (accepted).

2. S. Ghosh, R. Singh, M. Vatsa and **A. Noore**, "RGB-D Face Recognition using Reconstruction based Shared Representation," *IEEE Intl. Conference on Automatic Face and Gesture Recognit*ion, 2021.

3. M. Singh, S. Nagpal, D. Yadav, N. Kohli, P. Pandey, G. Prabhakaran, R. Singh, M. Vatsa, **A. Noore**, J. Brefczynski-Lewis, H. Mahajan, "Understanding Neural Responses to Face Verification of Cross-Domain Representations," *2021 International Joint Conference on Neural Networks (IJCNN)*, 2021, pp. 1-8.

4. D. Yadav, N. Kohli, M. Vatsa, R. Singh and **A. Noore**, "Age Gap Reducer-GAN for Recognizing Age-Separated Faces," *Intl. Conference on Pattern Recognition (ICPR)*, 2021.

5. D. Yadav, N. Kohli, M. Vatsa, R. Singh, **A. Noore**, "Detecting Textured Contact Lens in Uncontrolled Environment Using DensePAD," *IEEE Conference on Computer Vision and Pattern Recognition Workshop*, 2019.

6. S. Nagpal, M. Singh, M. Vatsa, R. Singh, **A. Noore**, "Expression Classification in Children Using Mean Supervised Deep Boltzmann Machine," *IEEE Conference on Computer Vision and Pattern Recognition Workshop*, 2019.

7. M. Singh, S. Nagpal, R. Singh, M. Vatsa, **A. Noore**, "Learning A Shared Transform Model for Skull to Digital Face Image Matching," *In Proceedings of IEEE International Conference on Biometrics: Theory, Applications and Systems (BTAS)*, 2018.

8. D. Yadav, N. Kohli, E. Kalsy, M. Vatsa, R. Singh, **A. Noore**, "Unraveling Human Perception of Facial Aging using Eye Gaze," *CVPR Workshop on Analysis and Modeling of Faces and Gestures*, 2018.

9. D. Yadav, N. Kohli, A. Agarwal, M. Vatsa, R. Singh, and **A. Noore**, "Fusion of Handcrafted and Deep Learning Features for Large-scale Multiple Iris Presentation Attack Detection," *International Conference on CVPR Workshop on Biometrics*, 2018.

10. R. Keshari, M. Vatsa, R. Singh, and **A. Noore**, "Learning Structure and Strength of CNN Filters for Small Sample Size Training," *Conference on Computer Vision and Pattern Recognition (CVPR)*, 2018.

11. D. Yadav, N. Kohli, S. Yadav, M. Vatsa, R. Singh, **A. Noore**, "Iris Presentation Attack via Textured Contact Lens In Unconstrained Environment," *IEEE Winter Conference on Applications of Computer Vision (WACV)*, 2018.

12. N. Kohli, D. Yadav, A. Noore, "Face verification with disguise variations via deep disguise recognizer," *IEEE Conference on Computer Vision and Pattern Recognition Workshop*, 2018.

13. M. Singh, S. Nagpal, R. Singh, M. Vatsa, **A. Noore**, "Learning A Shared Transform Model for Skull to Digital Face Image Matching," *In Proceedings of IEEE International Conference on Biometrics: Theory, Applications and Systems (BTAS)*, 2018.

14. D. Yadav, N. Kohli, E. Kalsy, M. Vatsa, R. Singh, **A. Noore**, "Unraveling Human Perception of Facial Aging using Eye Gaze," *CVPR Workshop on Analysis and Modeling of Faces and Gestures*, 2018.

15. D. Yadav, N. Kohli, A. Agarwal, M. Vatsa, R. Singh, and **A. Noore**, "Fusion of Handcrafted and Deep Learning Features for Large-scale Multiple Iris Presentation Attack Detection," *International Conference on CVPR Workshop on Biometrics*, 2018.

16. R. Keshari, M. Vatsa, R. Singh, and **A. Noore**, "Learning Structure and Strength of CNN Filters for Small Sample Size Training," *Conference on Computer Vision and Pattern Recognition (CVPR)*, 2018.

17. D. Yadav, N. Kohli, S. Yadav, M. Vatsa, R. Singh, **A. Noore**, "Iris Presentation Attack via Textured Contact Lens In Unconstrained Environment," *IEEE Winter Conference on Applications of Computer Vision (WACV)*, 2018.

18. S. Nagpal, M. Singh, A. Jain, R. Singh, M. Vatsa, and **A. Noore**, "On Matching Skulls to Digital Face Images: A Preliminary Approach", *International Joint Conference on Biometrics (IJCB),* 2017.

19. S. Nagpal, M. Singh, R. Singh, M. Vatsa, **A. Noore**, and A. Majumdar, "Face Sketch Matching via Coupled Deep Transform Learning", *International Conference on Computer Vision (ICCV),* 2017.

20. M. Singh, S. Nagpal, R. Singh, M. Vatsa, and **A. Noore**, "Gender and Ethnicity Classification of Iris Images using Deep Class Encoder", *International Joint Conference on Biometrics (IJCB),* 2017. **Received Best Paper Award**.

*21.* D. Yambay, B. Becker, N. Kohli, D. Yadav, A. Czajka, K. Bowyer, S. Schuckers, R. Singh, M. Vatsa, **A. Noore**, D. Gragnaniello , C. Sansone, L. Verdoliva, L. He, Y. Ru, H. Li, Z. Sun and T. Tan, "LivDet Iris 2017 - Iris Liveness Detection Competition", *International Joint Conference on Biometrics (IJCB),* 2017.

*22.* D. Yadav, N. Kohli, R. Singh, M. Vatsa, and **A. Noore**, "Unconstrained Visible Spectrum Textured Contact Lens Iris Database", *International Joint Conference on Biometrics (IJCB),* 2017.

23. A. Agarwal, M. Vatsa, R. Singh, and **A. Noore**, "SWAPPED! Digital Face Presentation Attack Detection via Weighted Local Magnitude Pattern", *International Joint Conference on Biometrics (IJCB),* 2017.

24. N. Kohli, D. Yadav, M. Vatsa R. Singh, and **A. Noore**, "Synthetic Iris Presentation Attack using iDCGAN", *International Joint Conference on Biometrics (IJCB),* 2017.

a. **Received Best Paper Award**.

25. A. Agarwal, D. Yadav, N. Kohli, R. Singh, M. Vatsa, and **A. Noore**, Face Presentation Attack with Latex Masks in Multispectral Videos, *IEEE Conference on Computer Vision and Pattern Recognition (CVPR) Workshop*, 2017.

26. D. Yadav, N. Kohli, S. Nagpal, M. Singh, P. Pandey, M. Vatsa, R. Singh and **A. Noore**, "Region-specific fMRI Dictionary for Decoding Face Verification in Humans", *International Joint Conference on Neural Networks*, 2017.

27. B. Powell, E. Kalsy, G. Goswami, M. Vatsa, R. Singh and **A. Noore**, "Attack-Resistant aiCAPTCHA using a Negative Selection Artificial Immune System", *International Workshop on Bio-inspired Security, Trust, Assurance and Resilience*, 2017.

28. N. Kohli, D. Yadav, M. Vatsa, R. Singh, and **A. Noore**, "Detecting Medley of Iris Spoofing Attacks using DESIST", *Proc. IEEE International Conference on Biometrics: Theory, Applications and Systems,* pp. 1-6, 2016.

29. B.M. Powell, A. Gupta, J. Thapar, G. Goswami, R. Singh, M. Vatsa, and **A. Noore**, "A Multibiometrics-based CAPTCHA for Improved Online Security", *Proc. IEEE International Conference on Biometrics: Theory, Applications and Systems,* pp. 1-6, 2016.

30. D. Yadav, N. Kohli, P. Pandey, R. Singh, M. Vatsa, and A. Noore, "Effect of Illicit Drug Abuse on Face Recognition", *IEEE Winter Conference on Applications of Computer Vision*, 2016. **Received Best Paper Award**.

31. G. Goswami, R. Singh, M. Vatsa, B. Powell and **A. Noore**, Face Recognition CAPTCHA, *In Proc. IEEE International Conference on Biometrics: Theory, Applications and Systems, pp. 412-417, 2012*.

32. H.S. Bhatt, S. Bharadwaj, R. Singh, M. Vatsa, **A. Noore**, and A. Ross, On Co-training Online Biometric Classifiers, *Proc. IEEE International Joint Conference on Biometrics*, 2011, **Received the Best Poster Award**.

33. H.S. Bhatt, S. Bharadwaj, R. Singh M. Vatsa, and **A. Noore**, Evolutionary Granular Computing Approach for Recognizing Face Images Altered due to Plastic Surgery, *Proc. IEEE International Conference on Face and Gesture Recognition*, pp. 720-725, 2011.

34. M. Vatsa, R. Singh, A. Ross, and **A. Noore**, Quality-based Fusion for Multichannel Iris Recognition , *Proc. International Conference on Pattern Recognition*, pp. 1314-1317, 2010.

35. M. Vatsa, R. Singh, S. Bharadwaj, S.B. Himanshu, and **A. Noore**, Matching Digital and Scanned Face Images with Age Variation, *Proc. IEEE International Conference on Biometrics: Theory, Applications, and Systems (BTAS '10)*, pp. 1-6, 2010.

36. M. Vatsa, R. Singh, and **A. Noore**, Context Switching Algorithm for Selective Multibiometric Fusion, *Proc. of Intl. Conference on Pattern Recognition and Machine Intelligence*, pp. 452-457, 2009.

37. M. Vatsa, R. Singh, and **A. Noore**, Context Switching Algorithm for Selective Multibiometric Fusion, *Proc. of Intl. Conference on Pattern Recognition and Machine Intelligence*, pp. 452-457, 2009.

38. Vatsa, R. Singh, and **A. Noore**, Fingerprint Indexing using Minutiae and Pore Features, *Proc. International Conference on Image Processing, Computer Vision and Pattern Recognition Conference*, pp. 870-875, 2009.

39. R. Singh, M. Vatsa, and **A. Noore**, Denoising and Segmentation of 3D Brain Images, *Workshop on Soft Computing in Image Processing and Computer Vision at Image Processing, Computer Vision and Pattern Recognition Conference*, pp. 561-567, 2009.

40. R. Singh, M. Vatsa, and **A. Noore**, Effect of Plastic Surgery on Face Recognition: A Preliminary Study, *Proc. IEEE Computer Society Workshop on Biometrics at Computer Vision and Pattern Recognition Conference*, pp. 72-77, 2009.

41. R. Singh, M. Vatsa, A. Ross, and **A. Noore**, Online learning in biometrics: A case study in face classifier update, *Proc. IEEE International Conference on Biometrics: Theory, Applications, and Systems (BTAS '09)*, pp. 1-6, 2009. **Received Best Poster Award.**

42. R. Singh, M. Vatsa, **A. Noore**, and K. Morris, Simultaneous latent fingerprint recognition: A preliminary study, *Proc. IEEE International Conference on Biometrics: Theory, Applications, and Systems(BTAS '09)*, pp. 1-6, 2009. **Received Best Paper Award.**

43. M. Vatsa, R. Singh, **A. Noore**, and S.K. Singh, Belief Function Theory based Biometric Match Score Fusion: Case Studies in Multi-Instance and Multi-Unit Iris Verification, *Proc. International Conference on Advances in Pattern Recognition*, pp. 433-436, 2009.

44. R. Singh, M. Vatsa, and **A. Noore**, Multimodal Medical Image Fusion using Redundant Discrete Wavelet Transform, *Proc. International Conference on Advances in Pattern Recognition*, pp. 232-235, 2009.

45. R. Singh, M. Vatsa, and **A. Noore**, Multiclass $m\nu$-Granular Soft Support Vector Machine: A Case Study in Dynamic Classifier Selection for Multispectral Face Recognition, *Proc. IEEE International Conference on Pattern Recognition*, pp. 1-4, 2008.

46. M. Vatsa, R. Singh, and **A. Noore**, Quality Induced Fingerprint Identification using Extended Feature Set, *Proc. IEEE Conference on Biometrics: Theory, Applications and Systems*, pp. 1-6, 2008.

47. M. Vatsa, R. Singh, A. Ross, and **A. Noore**, Likelihood Ratio in a SVM Framework: Fusing Linear and Non-Linear Classifiers, *Proc. IEEE Computer Society Workshop on Biometrics at Computer Vision and Pattern Recognition Conference*, pp. 1-6, 2008.

48. R. Singh, M. Vatsa, **A. Noore**, and S. K. Singh, Age Transformation for Improving Face Recognition Performance, *Proc. Second International Conference on Pattern Recognition and Machine Intelligence*, LNCS 4815, pp.576-583, 2007.

49. M. Vatsa, R. Singh, and **A. Noore**, Unification of Evidence Theoretic Fusion Algorithms: A case study in Level-2 and level-3 Fingerprint Features, Proc. *IEEE Conference on Biometrics: Theory, Applications and Systems*, 2007. **Received Best Paper Award**.

50. R. Singh, M. Vatsa, **A. Noore** and S. K. Singh, Dempster Shafer Theory based Classifier Fusion for Improved Fingerprint Verification Performance, *Computer Vision, Graphics and Image Processing Conference*, LNCS 4338, pp. 941-949, 2006.

51. R. Singh, M. Vatsa, A. Ross, and **A. Noore**, Performance Enhancement of 2D Face Recognition via Mosaicking, Proc. *Fourth IEEE Workshop on Automatic Identification Advanced Technologies* (*AUTOID*), pp. 63-68, 2005. **Received Best Paper Award**.

52. R. Singh, M. Vatsa, and **A. Noore**, Recognition of Faces with Variations in Disguise, Proc. *Summer School on Biometric Authentication: Multimodality and System Integration*, Italy, June 2005. **Received Best Paper Award**.

53. M. Vatsa, R. Singh, and **A. Noore**, Enhancing Accuracy and Security of Multi-biometric Template using RDWT Watermarking, Proc. *Summer School on Biometric Authentication: Multimodality and System Integration*, Italy, June 2005. **Received Best Paper Award**.

54. M. Vatsa, R. Singh, P. Mitra and A. **Noore**, Comparing Robustness of Watermarking Algorithms on Biometrics Data, *Workshop on Biometric Challenges from Theory to Practice*, 2004.

55. M. Vatsa, R. Singh, P. Mitra and **A. Noore**, Signature Verification using Static and Dynamic Features, *International Conference on Neural and Information Processing*, LNCS vol. 3316, pp. 350-355, 2004.

56. M. Vatsa, R. Singh, P. Mitra and **A. Noore**, Digital Watermarking based Secure Multimodal Biometric System, *IEEE International Conference on Systems, Man and Cybernetics*, October 10-13, 2004, The Hague, Netherlands.

57. L. Tian and **A. Noore**, Short-term load forecasting using optimized neural network with genetic algorithm, *8th International Conference on Probabilistic Methods Applied to Power Systems,* Ames, IA, Sept. 2004.

58. L. Tian and **A. Noore**, Multistage Software Estimation, Proc. *IEEE Southeastern Symposium on System Theory*, Morgantown, WV, pp. 232-236, March 16-18, 2003.

59. **A. Noore**, A Secure Conditional Access System using Digital Signature and Encryption, Proc. *International Conference on Consumer Electronics*, pp. 220-221, June 17-19, 2003.

60. **A. Noore**, An Improved Digital Watermarking Technique for Protecting JPEG Images, Proc. *International Conference on Consumer Electronics*, pp. 222-223, June 17-19, 2003.

61. N.C. Tungala and **A. Noore**, Elimination of Visual Artifacts in Digital Image Watermarking, Proc. *IEEE Southeastern Symposium on System Theory*, Morgantown, WV, pp. 64-68, March 16-18, 2003.

62. A. Raman and **A. Noore**, Software Metrics for Real-Time Systems Using Fuzzy Sets, Proc. *IEEE Southeastern Symposium on System Theory*, Morgantown, WV, pp. 74-78, March 16-18, 2003.

63. L. Tian and **A. Noore**, Multistage Software Estimation, Proc. *IEEE Southeastern Symposium on System Theory*, Morgantown, WV, pp. 232-236, March 16-18, 2003.

64. **A. Noore**, S. Nestor and M. Lawson, Computer-Based Multimedia Video Conferencing System, *International. Conference on Consumer Electronics*, June 1993.

65. A.B. Pushkin, B.W. Morris, **A. Noore** and M. Lawson, Integrating a Multidisciplinary Project into the Accounting Curriculum *Proc. of the American Accounting Association* Mid-Atlantic Conference, pp. 34-39, April 1993.

66. **A. Noore**, P. Cross, and M. Lawson, Electronic Product Design and Manufacture in a Concurrent Engineering Environment*, International. Conference on Consumer Electronics*, June 1992.

67. **A. Noore**, Microcontroller Compatible Clock Chip Design Using Field Programmable Gate Array, *International Conference on Consumer Electronics,* June 5-7, 1991.

68. **A. Noore** and S. Cambam, Yield Analysis of 2D Hexagonal VLSI/WSI Arrays, *IEEE Southeastern Symposium on System Theory*, Columbia, SC, March 10-12, 1991.

69. **A. Noore** and R.S.Nutter, On Testing Iterated Neural Network Structures*, IEEE Southeastern Symposium on System Theory*, Columbia, SC, March 10-12, 1991.

70. **A. Noore**, W. L. Cooley and R. S Nutter, On detecting and masking transient failures in computers used for critical coal mining operations, 10th WVU *International Mining Electrotechnology Conference*, July 24-27, 1990.

71. **A. Noore** and H. Nariman, Fault Modeling and Reliable Design-for-Testability of CMOS Logic Circuits, *Modeling and Simulation Conference*, Pittsburgh, PA, May 3-4, 1990.

72. B. Weinrich and **A. Noore**, Modeling of Electric Fields Due to Arbitrary Dispersal of Charges in Space, *Modeling and Simulation Conference*, Pittsburgh, PA, May 3-4, 1990.

73. **A. Noore**, Fault-Tolerant Memory Design for Improved Yield and Reliability, Proc. of the *International Symposium on Circuits and Systems,* New Orleans, LA, May 1-3, 1990.

74. **A. Noore** and B. Weinrich, Strategies for Functional Testing of Microprocessors, Proc. of the *IEEE Southeastern Symposium on System Theory*, Cookeville, TN, March 11-13, 1990.

75. **A. Noore**, H. Ramasamy, J. Joseph, P. Klinkhachorn and S. N. Dwivedi, Distributed Processing for Real-Time Control of Robot Manipulators, Proc. of the 4th *International Conference on CAD/CAM, Robotics and Factories of the Future*, December 1989.

76. J. Joseph, S.K. Gupta, **A. Noore** and P. Klinkhachorn, A Neural Net Inference Cell for Rule-Based Expert Systems, Proc. of the 4th *International Conference on CAD/CAM, Robotics and Factories of the Future,* December 1989.

77. P. Klinkhachorn, R. Kothari, H. A. Huber, C. W. McMillin, J. Joseph and **A. Noore**, A Packing Algorithm as Applicable to Computer Aided Remanufacture of Lumber, Proc. of the 4th *International Conference on CAD/CAM, Robotics and Factories of the Future*, December 1989.

78. **A. Noore**, Memory Design to Improve Testability, Proc. of 32nd *Midwest Symposium on Circuits and Systems,* Urbana, IL, August 14-16, 1989.

79. **A. Noore**, Simulation of VLSI Processing Deficiencies in Digital Integrated Circuits, Proc. of *International Conference on Mathematical and Computer Modeling*, Chicago, IL, August 2-5, 1989.

80. **A. Noore** and S. Nestor, Closed Form Reliability Expression of Large Non-Homogeneous Distributed Systems, Proc. *of International Conference on Mathematical and Computer Modeling*, Chicago, IL, August 2-5, 1989.

81. **A. Noore**, R. S Nutter and R. E Swartwout, Creating a Test Knowledge Base for VLSI Testing, Proc. of *IEEE International Conference on Computer Design: VLSI in Computers,* Portchester, NY, Oct 5-8, 1987.

## Research Grants Over $5,000,000

- Creating a STEM Pipeline to Recruit, Retain and Prepare Minority Students for Today's Workforce (PI), Halliburton Foundation, Sept 01, 2021 to August, 31, 2022, $10,000.
- Pathways to Promote Seamless Transitions for Undergraduate Engineering Majors (Co-PI), National Science Foundation, October 1, 2019 to September 30, 2024, $2,392,470.
- Illumination-Invariant Iris Presentation Attack Detection (PI). Federal Bureau of Investigation (FBI), CJIS Division, April 1, 2019 to June 30, 2020, $263,246.
- Detecting Multiple Iris Presentation Attacks (PI). Federal Bureau of Investigation (FBI), CJIS Division, May 1, 2017 to May 31, 2018, $286,478.
- LivDet 2017: Liveness Detection Competition 2017 (PI). NSF-CITeR, January 1, 2017 to December 31, 2017, $29,979.
- Evolutionary Approach to Adaptive Fusion: A Tool for Improving Multimodal Biometric Performance (PI). DoD US Army Research Laboratory, May 15, 2010 to December 31, 2012, $467,800

- Improving Quality Enhanced Biometric Fusion Schemes. (Co-PI), PI - Bojan Cukic
  NSF Center for Identification and Technology (CITeR), June 2008 to Nov 2009, $55,000
- Integrated Control of Next Generation Power Systems. PI - Ali Feliachi
  Software Agents for Monitoring and Control Task (PI)
  US Department of Energy, October 2006 to Feb 28, 2010, $ 56,925 (out of $800,000)
- Friction Ridge Detail Study (PI)
  U.S. Department of Justice, NIJ, Sept 19, 2005 to Sept 30, 2009, $239,990
- Multiple Digital Watermarking of Fingerprint Images (PI)
  U.S. Department of Justice, NIJ, Oct 01, 2003 to Sept 30, 2008, $251,314
- NBSP Standards, Research, Education
  National Biometric Security Project, Oct 01, 04 to Sept 30, 05, $20,000 (out of $461,699)
- DOE EPSCoR State Implementation Plan (Co-PI). Short Term Load Forecasting
  U.S. Department of Energy, Oct 01, 2004 to Sept 30, 2005, $43,063 (out of $775,002)
- NBSP Standards, Research, Education
  National Biometric Security Project, Oct 01, 03 to Aug 13, 04, $43,804 (out of $450,000)
- DOE EPSCoR State Implementation Plan (Co-PI), PI - Ali Feliachi.
  Reliability and Failure Analysis of Power Systems
  U.S. Department of Energy, EPSCoR, Jul 2003 to Oct 2004, $43,739 (out of $775,002)
- Validation Study of 3D Fingerprints PI
  Limbic Systems, Research Corp, Jul 2003 to Jun 2004, $37,000
- Validation of Limbic Systems Software (Co-PI), PI - George Trapp
  Limbic Systems and WV Development Office, Nov 2002 to Dec 2003, $199,999
- Advanced Power Engineering & Electricity Research Center
  Program to Stimulate Interdisciplinary Research (C0-PI), PI – Ali Feliachi
  West Virginia University Research Corp**,** Oct 2003 to Sept 2004**,** $225,000
- GK-12 Teams of Interdisciplinary Graduate Fellows Engaged to Reinvigorate Students (TIGERS) about SMET – (Co-PI), PI – Fred King
  NSF, Jan 2000 to Dec 2003, $1,516,164
- Developing and Validating Metrics for Real-time Fault-Tolerant Software (PI)
  NASA, Oct 2000 to Oct 2001, $52,341
- NASA-WVU Educational Collaboration (Co-PI), PI- Ester Gottlieb
  NASA, May 1997 to Apr 1998, $147,000
- A Collaborative Concurrent Environment for Independent Verification and Validation (IV&V)
  PI – Task 1.0, NASA, Nov 1994 to Nov 1995, $39,450
- A Collaborative Concurrent Environment for Independent Verification and Validation (IV&V), PI – Task 1.0, NASA, Nov 1993 to Nov 1994, $82,074
- A Collaborative Concurrent Environment for Independent Verification and Validation (IV&V), PI – Task 1.0, NASA, Nov 1992 to Nov 1993, $69,021
- Collaborative Decision Making and Problem Solving in a Multidisciplinary Environment (PI)

National Consortium for Technology in Business, ASEE, and Auburn University
Nov 1992 to Nov 1994, $57,033 ($37,033 cost share)

- Design of Electronic Product in a Concurrent Engineering Environment (PI)
  DARPA/Concurrent Engineering Research Center, WVU, Aug 1992 to Dec 1992, $26,000
- Design of Electronic Product in a Concurrent Engineering Environment (PI)
  DARPA/Concurrent Engineering Research Center, WVU, Aug 1991 to July 1992, $34,000
- Using Field Programmable Gate Arrays in Senior Design Courses (PI)
  NSF, MIPS Division CISE Directorate, Sept 1990 - May 1991, $20,000
- Real Time Fault Tolerant Control of Robot Manipulators (PI)
  GE Development Grant, Nov 1989 - Dec 1990, $7,500
- Redundancy Management in Distributed Fault-Tolerant Computers for Coal Mining Environment (PI), Electric Power Research Institute, Jan 1990 - Dec 1991, $30,000
- Redundancy Management in Distributed Fault-Tolerant Computers for Coal Mining Environment (PI), Energy and Water Research Center, WVU, Aug 89 - May 1991, $30,000
- Rapid Prototyping for Semi Custom VLSI Design (PI)
  DuPont Young Faculty Grant, Jul 1989 - Dec 1990, $10,000
- Computer Aided Digital Logic Design (PI)
  Westinghouse Education Grant, Aug 1987 – Aug 1988, $10,000

# SERVICE

## National

| | |
|---|---|
| ABET Engineering Program Evaluator | 2022 - |
| ATMAE Technology Program Evaluator | 2023 - |
| Guest Editors (M. Vatsa, R. Singh, and Afzel Noore) Journal of Information Fusion Special issue on *Deep Learning for Information Fusion* | 2018 |
| Guest Editors (S. Lian, G. L. Heileman, and A. Noore), Intl. Journal of Soft Computing Special Issue on *Soft Computing for Digital Information Forensics* | 2009 |
| Editorial Board of Intl Journal of Multimedia Intelligence and Security | 2009 - 17 |
| Editorial Board, Recent Patents on Engineering Journal | 2007 - 15 |
| Associate Editor, Intl Journal of Advanced Pervasive & Ubiquitous Computing | 2012 - 13 |
| Editorial Board, Open Nanoscience Journal | 2007 - 14 |
| Founding Editor, IEEE Consumer Electronics Newsletter | 1993 - 94 |

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| Program Committee, IEEE Intl. Conf, Recent Trends in Image Processing & Pat Recog | 2022 |
| Program Committee, IEEE Intl. Conf Biometrics, Theory, Appl & Systems (BTAS) | 2016 |
| Program Committee, IEEE Intl. Conf Biometrics, Theory, Appl & Systems (BTAS) | 2015 |

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| Program Committee, IAPR International Conference on Biometrics (ICB) | 2015 |
| Program Committee, IEEE/IAPR International Conference on Biometrics (ICB) | 2014 |
| Program Committee, IEEE Intl Symposium on Biometrics & Security Technologies | 2014 |
| Program Committee, IEEE/IAPR International Conference on Biometrics | 2013 |
| Program Committee, IEEE Intl. Conf Biometrics, Theory, Appl & Systems (BTAS) | 2013 |
| Program Committee, IEEE Intl. Conf Biometrics, Theory, Appl & Systems (BTAS) | 2012 |

Reviewer, Multimedia Systems
Reviewer, BTAS, CIBEC, ICB, IJCB
Reviewer, IEEE Transactions on Information Forensics & Security
Reviewer, Pattern Recognition
Reviewer, IEEE Transactions on Pattern Analysis and Machine Intelligence
Reviewer, Optics Express
Reviewer, Journal of Information Fusion
Reviewer, IEE Electronics Letters
Reviewer, International Journal of Imaging Systems and Technology
Reviewer, Journal of Information Sciences
Reviewer, Journal of Reliability Engineering and Systems Safety
Reviewer, International Journal of Electric Power and Energy Systems
Reviewer, Optics Letters
Reviewer, IEEE Transactions on Systems, Man and Cybernetics
Reviewer, Journal of Zhejiang University of Science
Reviewer, Probabilistic Methods Applied to Power System Conference

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| US VISIT Program, Testing new Biometric Passports | 2004 |
| Organizing Committee, Southeastern Symposium on System Theory | 2003 |
| Chairman, Technical Session at Southeastern Symposium on System Theory | 2003 |
| Reviewer, IEEE Press Book on Digital Video | 1994 |
| Ex-Officio Member, Admin. Committee, IEEE Consumer Electronics Society | 1994 |
| Member, Technical Program Comm., International Conf. on Consumer Electronics | 1994 |
| Co-Chair, Technical Session at the International Conf. on Consumer Electronics | 1994 |
| Member, Steering Committee, 12th WVU Intl. Mining Electrotechnology Conf. | 1994 |
| Ex-Officio Member, Admin. Committee, IEEE Consumer Electronics Society | 1993 |
| Member, Technical Program Comm., International Conf. on Consumer Electronics | 1993 |
| Co-Chair, Emerging Technologies Session, Intl. Conf. on Consumer Electronics | 1993 |
| Reviewer, IEEE Computers | 1992 |
| Member, Steering Committee, 11th WVU Intl. Mining Electrotechnology Conf. | 1992 |
| Member, Technical Program Comm., International Conf. on Consumer Electronics | 1992 |
| Chairman, Technical Session at Southeastern Symposium on System Theory | 1990 |
| Member, Steering Committee of Southeastern Symposium on System Theory | 1990 |
| Member, Steering Committee, 10th WVU Intl. Mining Electrotechnology Conf. | 1990 |

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| Reviewer, IEEE Transactions on Industry Applications | 1987 |
| Reviewer, IEEE Transactions on Circuits and Systems | 1987 |

## State

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| West Virginia Engineering Science and Technology Scholarship Committee | 2000 - 2010 |
| Chairman, IEEE Upper Monongahela Subsection | 1990 - 1991 |
| Secretary/Treasurer, IEEE Upper Monongahela Subsection | 1989 - 1990 |
| Delegate-at-Large, IEEE Upper Monongahela Subsection | 1988 - 1989 |

## University

### Texas A&M University, Kingsville

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|---|---|
| Ruffalo Noel Levitz – TAMUK, Recruitment and Enrollment Working Group | 2022 - present |
| President Task Force on Enrollment Management | 2019 - 2020 |
| President Task Force on Marketing and Communications | 2019 - 2020 |
| Program Committee, High-Impact Practices in Higher Education Conference | 2020 |
| Program Committee, High-Impact Practices in Higher Education Conference | 2019 |
| Chair, Undergraduate Program Review Subcommittee - Criminology | 2020 |
| Chair, Undergraduate Program Review Subcommittee - Physics | 2019 |
| Chair, Undergraduate Program Review Subcommittee - Geology | 2019 |

### West Virginia University

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|---|---|
| Phi Kappa Phi Honor Society, President | 2015 - 2017 |
| Heebink Award Committee | 2017 - 2017 |
| Phi Kappa Phi Honor Society, Secretary | 2008 - 2014 |
| Senate Research Integrity Committee | 2012 - 2014 |
| Heebink Award Committee | 2011 - 2013 |
| Bucklew and Foundation Scholars Selection Committee | 2009 - 2011 |
| West Virginia University Foundation Scholars Selection Committee | 2007 |
| Phi Kappa Phi, Executive Committee | 2006 - 2017 |
| Swiger Graduate Fellowship Selection Committee | 2000 - 2007 |
| Academic Integrity Committee | 2005 - 2007 |
| Affirmative Action Representative: Search for Program Coordinator at NRCCE | 2004 |
| Affirmative Action Rep: Search for Coordinator of the Africana Studies Program | 2001 |
| Co-chairman, WVU Student Employment Center Task Force | 2000 - 2001 |
| WVU Foundation Outstanding Teaching Award Selection Committee | 1998 2000 |
| Forensic Identification Admissions and Curriculum Committee | 1999 - 2003 |
| West Virginia University Faculty Class Advocate | 1998 - 2002 |
| West Virginia University Placement Exam Subcommittee | 1998 |
| West Virginia University Catalog Committee | 1998 |
| West Virginia University Strategic Enrollment Management Council | 1998 - 2000 |

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| West Virginia University New Student Orientation Planning Committee | 1997 - 1999 |
| West Virginia University Retention and Advising Improvement Task Force | 1996 - 1997 |
| Board of Trustees Program Review Committee | 1997 |
| Co-coordinator, West Virginia University Instructional Improvement Network | 1994 - 1997 |
| Member, Academic Computing Advisory Committee | 1995 - 2003 |
| Faculty Development Workshop, 7th West Virginia University Faculty Academy | 1995 |
| West Virginia University – WVUIT Merger Task Force | 1995 |
| West Virginia University Foundation Scholars Selection Committee | 1995 - 1996 |
| Faculty Grants Committee for Instructional Technology and Improvement | 1995 - 1999 |
| Faculty Development Workshop, 6th West Virginia University Faculty Academy | 1994 |
| Advisor, West Virginia University Chess Club | 1994 - 1998 |
| WVU Faculty Development on Instructional Improvement Network | 1994 |
| WVU Foundation Outstanding Teaching Award Selection Committee | 1990 - 1992 |

## College

### Texas A&M University, Kingsville

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|---|---|
| College Strategic Planning Committee, Undergraduate Studies | 2022 - present |
| Undergraduate Academic Affairs Committee (Ex-Officio) | 2018 - present |
| Resources Management Committee (Ex-Officio) | 2018 - present |

### West Virginia University

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|---|---|
| College Undergraduate Academic Affairs Committee | 2008 - 2017 |
| ABET Leadership Committee | 2007 - 2017 |
| Outstanding Teachers Selection Committee | 2012 |
| Chairman, College Scholarship Committee | 2006 - 2007 |
| Outstanding Teachers Selection Committee | 2005 - 2006 |
| College Scholarship Committee | 2003 - 2007 |
| College Undergraduate Academic Affairs Committee (Ex-Officio) | 1996 - 2003 |
| College Academic Standards Committee (Ex-Officio) | 1996 - 2003 |
| College Scholarship Committee (Ex-Officio) | 1996 - 2003 |
| College Ad hoc ABET Readiness Committee (Ex-Officio) | 2000 - 2003 |
| Chairman, College Undergraduate Academic Affairs Committee | 1994 - 1995 |
| Committee on Collaboration between ECE & Computer Science Departments | 1994 - 1995 |
| College Undergraduate Academic Affairs Committee | 1990 - 1993 |
| College Academic Standards Committee | 1987 - 1996 |
| College Scholarship Committee | 1993 - 1994 |

## Department

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|---|---|
| Associate Department Chair for Academic Affairs | 2009 - 2017 |
| ABET Computer Engineering Planning and Self-Study Preparation | 2014 - 2015 |
| Chair, Computer Engineering Undergraduate Curriculum Committee | 2009 - 2017 |

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| Chair, Computer Systems Graduate Curriculum Committee | 2008 - 2017 |
| Member, Graduate Program Committee | 2009 - 2017 |
| ABET Computer Engineering Planning and Self-Study Preparation | 2008 - 2009 |
| Coordinator, CS101 Course and Lab | 2004 - 2008 |
| Chairman, Scholarship Committee | 2002 – 2007 |
| ABET Computer Science Planning and Preparation | 2005 - 2006 |
| Member, Computer Engineering Curriculum Committee | 2004 - 2007 |
| Member, Faculty Search Committee | 2007 |
| Orientation, New Graduate Students | 2005 - 2007 |
| Recruiting, Freshman Engineering and High School Visitation | 2004 - 2005 |
| Chairman, Computer Engineering Curriculum Committee | 1994 - 1995 |
| Chairman, Department Academic Standards Committee | 1991 - 1994 |
| Chairman, Promotion and Tenure Committee for Assistant Professors | 1992 - 1994 |
| Chairman, Scholarship Committee | 1993, 1994 |
| Advisor for Transfer and Second Degree students | 1993 - 1995 |
| Advisor for University Exchange students | 1993 - 1995 |
| Advisor for Probation students | 1987 - 1995 |
| Faculty Advisor for Eta Kappa Nu | 1994 |
| Department Chairman Search Committee | 1990 |
| Faculty Advisor for Eta Kappa Nu | 1988 - 1990 |
| Outstanding Graduate Teaching Assistant Evaluation Committee | 1990 - 1991 |
| Department Academic Standards Committee | 1988 - 1990 |
| Coordinated Computer Engineering Freshman Student Orientation | 1988 - 1990 |
| Promotion and Tenure Criteria Task Force | 1988 |
| Coordinator, Electrical and Computer Engineering Graduate Handbook Task Force | 1989 |