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RESEARCH INTERESTS

Signal Processing: Machine learning, statistical signal processing, nonlinear and sparse signal processing, sensor network, digital image and video signal processing. **Human Computer Interaction**: Access methods for individuals with disabilities, tactile, haptic, sonification and multimodal systems.

PROFESSIONAL EXPERIENCE

Charles B. Evans Professor	Department of Electrical and Computer Engineering, University of Delaware 2017–Present (Joint faculty appointment with Biomedical Engineering)
Professor & Chair	Department of Electrical and Computer Engineering, University of Delaware 2009–2020 (Joint faculty appointment with Biomedical Engineering)
Professor	Department of Electrical and Computer Engineering, University of Delaware 2005–2009
Associate Professor	Department of Electrical and Computer Engineering, University of Delaware 2000–2005
Assistant Professor	Department of Electrical and Computer Engineering, University of Delaware 1998–2000
Adjunct Assistant Professor	Department of Electrical and Computer Engineering, University of Delaware 1993–1998
Scientist	Center for Applied Science and Engineering, University of Delaware 1994–1998
Research Engineer	Department of Applied Science and Engineering, du Pont Hospital for Children 1993–1998
Visiting Lecturer	Department of Electrical Engineering, University of Delaware 1992

EDUCATION

Doctor of Philosophy **Electrical Engineering**	University of Delaware, May 1992 Dissertation: *Permutation Filters: A Group Theoretic Class of Non-Linear Filters* Honors: The *Allan P. Colburn Prize in Mathematical Sciences and Engineering* for the most outstanding dissertation in the engineering and mathematical disciplines
Master of Electrical Engineering	University of Delaware, December 1989 Thesis: *Optimal Detection Schemes for the Restoration of Images with Signal Dependent Noise*
Bachelor of Science Electrical Engineering	Lehigh University, May 1987 Honors: Degree received *Magna Cum Laude*

AWARDS AND PROFESSIONAL RECOGNITION

- Fellow of the IEEE, *for contributions in nonlinear signal processing* (2016)
- Best Session Paper Award, 4^{th} International Conference on Medical Imaging and Computer-Aided Diagnosis (MICAD2023), Springer, for the paper *A Data Augmentation Approach to Enhance Breast Cancer Segmentation*, Abdalrahman Alblwi, Noaman Mehmood, Justin Labombard, and Kenneth E. Barner, (2023)
- First place in the Group-level Emotion Recognition sub-challenge, in the 6th Emotion Recognition in the Wild (EmotiW 2018) Challenge, ACM International Conference on Multimodal Interaction (2018)
- Ninth place in the *IEEE Geoscience and Remote Sensing Society (GRSS) International Data Fusion Contest*; Only US team to finish in the top 10 (2013)
- Best Student Paper Award Finalist, IEEE International Conference on Acoustics and Signal Processing (ICASSP), for the paper *Robust Meridian Filtering*, Tuncer Can Aysal, student co–author, (2007)
- Best Student Paper Award, ACM SIGACCESS, ASSETS Conference, for the paper *Automatic Production of Tactile Graphics from Scalable Vector Graphics*, Stephen Krufka, student co–author, (2005)
- Senior Member, IEEE (2000)
- Who's Who in Engineering Education (2000)
- NSF CAREER award (1999)
- Best Scientific Paper Award, Whitaker Foundation and Rehabilitation Engineering Society of North America (RESNA), Juan Gonzalez, student co–author, (1997)
- Allan P. Colburn Prize in Mathematical Sciences and Engineering for the most outstanding dissertation in the engineering and mathematical disciplines (1992)
- Du Pont Teaching Fellowship (1991)
- IEEE Communications Society ComSoc Scholarship (1989)
- Electrical Engineering Departmental Fellowship (1989–91)
- Alfred I. duPont Research Fellowship (1988)
- Certificate of Commendation from the Army for outstanding technical support to PIVADS (1987)
- Member Tau Beta Pi and Eta Kappa Nu (1986)

PROFESSIONAL ACTIVITIES

- Associate Editor, *IEEE Signal Processing Letters* (2009-2012)
- Associate Editor, *EURASIP Journal of Applied Signal Processing* (2003–2011)
- Founding Editor-in-Chief, *Advances in Human-Computer Interaction* (2007–2010)
- Associate Editor, *IEEE Transactions on Signal Processing* (2002–2006)
- Associate Editor, *IEEE Signal Processing Magazine* (2003–2005)
- Associate Editor, *IEEE Transactions on Neural Systems and Rehabilitation Engineering* (2002–2005)

- Associate Editor, *IEEE Transactions on Rehabilitation Engineering* (1999–2002)
- Guest Editor, *EURASIP Journal of Applied Signal Processing,* Special Issue on the Empirical Mode Decomposition and the Hilbert-Huang Transform (2008)
- Guest Editor, *EURASIP Journal of Applied Signal Processing,* Special Issue on Super–Resolution Enhancement of Digital Video (2007)
- Guest Editor, *EURASIP Journal of Applied Signal Processing,* Special Issues on Nonlinear Signal and Image Processing (December 2001 and January 2002)
- Invited Speaker, *2011 AAAS Annual Meeting, Career Workshop Panelist*
- Committee member, *IEEE Signal Processing Theory and Methods (SPTM) Technical Committee* (2003–2009)
- Charter committee member, *IEEE Bio–Imaging and Signal Processing (BISP) Technical Committee* (2004-2010)
- Panelist, *NSF Engineering Research Vision Alliance, Leveraging Biology to Power Engineering Impact, Impossible Thing: Your bathroom mirror performs hospital-grade diagnosis* (2022)
- Panelist, *SB^{3}C (Summer Biomechanics, Bioengineering and Biotransport Organizing Committee) Workshop on Engineers with Disability* (2021)
- Committee member, *United Spinal Association, Greater Philadelphia Chapter, Education Committee* (2020–Present)
- Co–Vice Chair (Technical Program Co–Chair), *2005 IEEE International Conference on Acoustics and Signal Processing (ICASSP)*
- Co–Chair, *2001 IEEE Workshop on Nonlinear Signal and Image Processing (NSIP)*
- Board Member, *Nonlinear Signal and Image Processing (NSIP) Board* (2001–Present)
- Editorial Board Member, *ReviewCentral* (2006–Present)
- International Fellow,*Collaborative International Research Centre for Universal Access (CIRCUA)* (2007–Present)
- Member, *American Society for Engineering Education (ASEE)* (2002–Present)
- Member, *Communications Multirate Digital Signal Processing and Bioengineering Research Group* Dpt. Teoría de la Señal y Comunicaciones Universidad de Alcalá Alcalá de Henares, Madrid Spain (2006–Present)
- Technical Program Committee member, *2014 IEEE International Conference on Image Processing (ICIP 2014)*
- International Program Committee member, *2012 IEEE International Conference on Bioinformatics and Biomedicine (BIBM 12)*
- International Program Committee member, *2012 IASTED International Conference on Signal Processing, Pattern Recognition and Applications (SPPRA 2012)*
- International Program Committee member, *2011 International Conference on Signal and Image Processing (SIP 2011)*
- International Program Committee member, *2011 IEEE International Conference on Bioinformatics and Biomedicine (BIBM 11)*

- International Program Committee member, *2011 Imaging and Signal Processing in Health care and Technology (ISPHT 2011) Conference*
- Technical Program Committee member, *2010 IEEE International Conference on Signal Processing (ICSP 2010)*
- International Program Committee member, *2010 International Conference on Signal and Image Processing (SIP 2010)*
- International Program Committee member, *2010 IEEE International Conference on Bioinformatics and Biomedicine (BIBM 10)*
- Technical Program Committee member, *2009 IEEE Statistical Signal Processing (SSP) Workshop*
- Technical Program Committee member, *2009 IEEE Digital Signal Processing & Signal Processing Education Workshop*
- International Program Committee member, *2009 IEEE International Conference on Bioinformatics and Biomedicine (BIBM 09)*
- International Program Committee member, *2009 International Conference on Computer Vision Theory and Applications (VISAPP 2009)*
- International Program Committee member, *2009 IASTED International Conference on Signal Processing, Pattern Recognition and Applications (SPPRA 2009)*
- Technical Program Committee member, *2009 EURASIP–IEEE Symposium on Advanced Concepts for Intelligent Vision Systems (ACIVS 2009)*
- Technical Program Committee member, *2009 International Conference on Imaging Theory and Applications (IMAGAPP 2009)*
- Technical Program Committee member, *2009 International Conference on Signal Processing, Image Processing and Pattern Recognition (SIP 2009)*
- Technical Program Committee member, *The Eleventh International ACM SIGACCESS Conference on Computers and Accessibility (ASSETS 2009)*
- Technical Program Committee member, *2009 IASTED International Conference on Telehealth and Assistive Technology (TAT 2009)*
- Technical Program Committee member, *2008 IEEE International Conference on Signal Processing (ICSP2008)*
- Technical Program Committee member, *2008 EURASIP–IEEE Symposium on Advanced Concepts for Intelligent Vision Systems (ACIVS)*
- International Program Committee member, *2008 IASTED International Conference on Telehealth and Assistive Technologies (Telehealth/AT 2008)*
- Technical Program Committee member, *2008 International Conference on Signal Processing, Image Processing and Pattern Recognition (SIP 2008)*
- Technical Program Committee member, *2008 EURASIP–IEEE Symposium on Advanced Concepts for Intelligent Vision Systems (ACIVS 200)*
- Technical Program Committee member, *2007 IEEE Statistical Signal Processor (SSP) Workshop*
- Technical Program Committee member, *2007 IEEE Workshop on Genomic Signal Processing and Statistics (GENSIPS'07)*

- Technical Program Committee member, *2007 EURASIP–IEEE Symposium on Advanced Concepts for Intelligent Vision Systems (ACIVS)*
- Panel member, *Interagency Committee on Disability Research Interagency Subcommittee on Technology; Technologies and Strategies for Physical Transfer of Individuals with Motor Impairments 2007 State of the Art Conference*
- Technical Program Committee member, *2007 IEEE–EURASIP Workshop on Nonlinear Signal and Image Processing (NSIP)*
- Technical Program Committee member, *2003 IEEE–EURASIP Workshop on Nonlinear Signal and Image Processing (NSIP)*
- Technical Program Committee member, *2003 IEEE International Conference on Multimedia & Expo (ICME)*
- Committee member, *Governor's Committee on Delaware Assistive Technology Policy* (2002–2003)
- Committee member, *NSF Committee on Equal Opportunities in Science and Engineering (CEOSE)* (1999–2003)
- Committee member, *CEOSE liaison to NSF Directorate for Computer and Information Science and Engineering Advisory Committee (CISE AC)* (2000-2003)
- Committee member, *NSF CAREER Program Committee of Visitors (COV)* (2001)
- Session Chair, "Image Coding," *1998 Conference on Information Sciences and Systems*, Princeton University
- Co-Chair, special session on "Nonlinear Techniques in Digital Video Signal Processing," *1995 IEEE Workshop on Nonlinear Signal and Image Processing*, Halkidiki, Greece
- Technical reviewer (1992–Present):
  - *IEEE Transactions on Image Processing*
  - *IEEE Transactions on Signal Processing*
  - *IEEE Transactions on Circuits and Systems*
  - *IEEE Transactions on Rehabilitation Engineering*
  - *IEEE Transactions on Neural Systems & Rehabilitation Engineering*
  - *IEEE Transactions on Systems, Man and Cybernetics*
  - *IEEE Transactions on Wireless Communications*
  - *IEEE Transactions on Fuzzy Systems*
  - *IEEE Signal Processing Letters*
  - *Optical Engineering, The International Society for Optical Engineering*
  - *Journal of Electronic Imaging, The International Society for Optical Engineering*
  - *Applied Optics Journal, Optical Society of America*
  - *Signal Processing Journal, Elsevier Science*
  - *Ultrasonics, Elsevier Science*
  - *Chemical Engineering Science, Elsevier Science*
  - *Springer Neural Computing and Applications*
  - *Image Processing Journal, Institution of Engineering and Technology (IET)*

  - *Biomedical Signal Processing and Control Journal, Elsevier Science*
  - *Haptics-e, The Electronic Journal of Haptics Research (www.haptics-e.org)*
  - *European Conference on Signal Processing (EUSIPCO)*
  - *EURASIP Journal of Applied Signal Processing*
  - *Computational and Mathematical Methods in Medicine, Hindawi Publishing*
  - *IEEE International Conference on Image Processing (ICIP)*
  - *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*
  - *IEEE–EURASIP Workshop on Nonlinear Signal and Image Processing (NSIP)*
  - *IEEE Statistical Signal Processor (SSP) Workshop*
  - *IEEE International Conference on Multimedia & Expo (ICME)*
  - *IEEE International Symposium on Biomedical Imaging (ISBI)*
  - *IEEE International Symposium on Communications, Control and Signal Processing (ISCCSP)*
  - *IEEE Digital Signal Processing (DSP) Workshop*
  - *IEEE Workshop on Genomic Signal Processing and Statistics (GENSIPS)*
  - *IEEE Virtual Reality Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems*
  - *IEEE Biomedical Circuit & Systems Conference (BIOCAS)*
  - *EURASIP–IEEE Symposium on Advanced Concepts for Intelligent Vision Systems" (ACIVS)*
  - *International Conference on Computer Graphics and Interactive Techniques (SIGGRAPH)*
  - *IASTED International Conference on Assistive Technologies*

- Panel reviewer, the *National Science Foundation* (1996, 1998, 2000, 2001, 2004, 2007)
- Panel reviewer, the *National Institute on Disability and Rehabilitation Research* (2007)
- Textbook reviewer, *McGraw Hill* (1999)
- Committee member, *President's Advisory Committee on Program and Facility Accessibility for Persons with Disabilities* (1996)

UNIVERSITY, COLLEGE, AND DEPARTMENT SERVICE

- Director, *Center for Cybersecurity, Assurance and Privacy (CCAP), Department of Electrical and Computer Engineering* (2020–Present)
- Member, *AAUP-UD Executive Council At-Large Member, American Association of University Professors (AAUP-UD)*, (2024–Present)
- Senator, *University of Delaware Faculty Senate*, (2024–Present)
- Member, *Steering Committee, American Association of University Professors (AAUP-UD)*, (2007–2009, 2021–Present)
- Member, *Bargaining Advisory Subcommittee, American Association of University Professors (AAUP-UD)*, (2022–Present)
- Member, *Membership Subcommittee, American Association of University Professors (AAUP-UD)*, (2021–Present)

- Member, *College of Engineering Dean Search Committee* (2023–2024)
- Member, *Department of Electrical and Computer Engineering Faculty Search Committee* (2024–2025)
- Member, *Department of Electrical and Computer Engineering Faculty Search Committee* (2022–2023)
- Chair, *College of Engineering Named Professors Committee* (2022–2024)
- Chair, *Department of Electrical and Computer Engineering Faculty Awards Committee* (2022–2024)
- Member, *Department of Electrical and Computer Engineering Faculty Awards Committee* (2022–Present)
- Academic Advisor, *Saudi Student Association (SSA)* (2022–Present)
- Member, *Computer Science Everywhere Task Force* (2022–2023)
- Member, *Department of Electrical and Computer Engineering Strategic Planning Committee* (2020–2021)
- Chair, *Department of Electrical and Computer Engineering* (2009–2020)
- Graduate Program Director, *Online ECE Degree, Department of Electrical and Computer Engineering* (2015–2021)
- Chair, *Mechanical Engineering Department Chair Search Committee* (2016–2017)
- Chair, *Computer and Information Sciences Department Chair Search Committee* (2014–2015)
- Chair, *University of Delaware Chairs Caucus* (2013–2014)
- Member, *University of Delaware Responsibility Based Budget (RBB) Review Committee* (2013–2015)
- Member, *University of Delaware Managing Faculty Data Task Force* (2013–2014)
- Member, *Director of Cybersecurity Initiative Search Committee* (2013–2014)
- Member, *Biomedical Engineering Executive Committee* (2011–Present)
- Chair, *Department of Electrical and Computer Engineering Graduate Committee* (2000–2008)
- Chair, *Department of Electrical and Computer Engineering Promotion and Tenure Committee* (2007–2008)
- Member, *Department of Electrical and Computer Engineering Faculty Search Committee* (2002–2003)
- Member, *College of Engineering ABET Committee*, (2007–2010)
- Faculty Member, *Center for Biomedical Engineering (CBER)*, (2005–Present)
- Panel member, *University of Delaware Graduate Program Improvement and Innovation Awards Program*, (2008)
- Member, *College of Engineering eCALC Classroom Development Committee*, (2003)
- Chair, *Department of Electrical and Computer Engineering Faculty Search Committee* (2001–2002)
- Member, *College of Engineering Educational Activities Committee*, (2000–2002)
- Co–founder and coordinator, *University of Delaware, Esslingen University, Graduate Student Exchange Program* (1999–Present)

- Member, *Department of Electrical and Computer Engineering Chair Search Committee* (1999–2000)
- Member, *Department of Electrical and Computer Engineering Undergraduate Curriculum Revision Committee* (1999–2001)
- Lecturer, *Engineering Outreach* program on "Engineering Concepts to Enhance High School Math & Science Curriculum" (1995, 1999)
- Technical presenter, *Delaware Decision Days, Delaware Days, Discovery Days*, and *University of Delaware Legacy Day* (1996–Present)
- Technical presenter, *Governor's School for Excellence* (2005)

COURSES TAUGHT

[1] ELEG–167: Introduction to electrical and computer engineering, 1998F. (Team taught.).

DESCRIPTION: This course presents an overview of the main sub–fields within electrical and computer engineering. The course featured lectures and demonstrations covering the three major areas of concentration within the ECE Department: (1) Computer Engineering, (2) Signals and Systems Engineering, and (3) Devices and Materials Engineering.

[2] ELEG–202: Introduction to digital systems, 1992F, 1993F, 1994F.

DESCRIPTION: Analysis and design of logic circuits. Topics include: Boolean algebra and itsapplication to switching circuits, simplification of switching functions, design of logic circuits at the gate level and with MSI and LSI components. Analysis and design of synchronous and asynchronous sequential state machines.

[3] ELEG–212: Signals and communications, 2003S, 2004F, 2005F, 2006F.

DESCRIPTION: Introduction to signals, systems and communications. Covers discrete and continuous time systems, sampling, and conversion between analog and digital signals. Example systems studied may include voice coding, telephony, television and digital audio.

[4] ELEG–305: Signal processing I, 2008F.

DESCRIPTION: Discrete time signal processing theory and methods. The course covers several transform methods, including Z–transforms, Fourier transforms, and Fast Fourier Transforms (FFTs). Filter design, including Butterworth, Chebyshev, and Elliptic filters, and multirate signal processing methods are also covered.

[5] ELEG–306: Signal processing II, 1995S, 1998S, 1999S, 2000S, 2002S, 2012F.

DESCRIPTION: Discrete time signal processing theory and methods. The course covers several transform methods, including Z–transforms, Fourier transforms, and Fast Fourier Transforms (FFTs). Filter design, including Butterworth, Chebyshev, and Elliptic filters, and multirate signal processing methods are also covered.

[6] ELEG–403: Communications systems engineering, 1998F, 1999F, 2000F, 2001F, 2002F.

DESCRIPTION: Review of signal theory, Fourier transforms, linear and time–invariant systems; review of probability and random signals; information theory, source entropy, channel capacity; basedband data transmission, modulation, noise in analog systems and digital carrier modulation.

[7] ELEG–487–016: VIP Drone FLIE —– Flying Labs employing Intelligent Engineering, 2018F, 2019S, 2019F, 2020S, 2020F, 2021S, 2022F, 2023S, 2023F, 2024S, 2024F.

DESCRIPTION: Autonomous control of a single drone as well as cooperative control of a drone swarm; methods for collecting multispectral images as well as other appropriate remote environment sensors; fusion of sensor collected data and intelligent data processing, volume reconstruction, feature detection, and object tracking; visualization, defect detection, and security applications.

[8] ELEG–405, ELEG–605: Engineering machine learning system, 2022F, 2023F, 2024F.

DESCRIPTION: Engineering Machine Learning Systems are applied in an array of real-world applications. This course focuses on their conceptualization, estimation, computational implementation, and optimization. Topics supervised and unsupervised learning, linear and logistic regression, dimensionality reduction, regularization, neural networks, convolution neural networks, decision trees, and select additional deep learning topics.

[9] CPEG–406, CPEG–606: Career and success development, 2024F. (Team taught.).

DESCRIPTION: This course is designed to help students develop the skills and strategies necessary for achieving academic and career success. The course will cover topics such as self-awareness, goal setting, time management, communication, teamwork, networking, resume writing, interviewing, and ethics. The course will also provide opportunities for students to explore their interests, values, strengths, and career options.

[10] CISC–485 (cross–listed in ECE): Mechatronics, 1997S. (Team taught.).

DESCRIPTION: Mechatronics is the intersection set of computers, electronics and mechanical engineering. This course covers practical and theoretical aspects of mechatronic design, including human/machine interfacing, haptic systems, procedures in mechatronic design, reverse engineering, machine behaviors, and mechatronic control systems.

[11] ELEG–636: Statistical signal processing, 1999S, 200S, 2001S, 2003S, 2008S, 2009S, 2012S.

DESCRIPTION: Introduction to random vectors and random processes and second-order moment and spectral characterizations. Linear transformations of stationaryp rocesses. Parameter estimation. Orthogonality principle and optimal linear filtering. Levison recursion and lattice prediction filters. AR and ARMA models and their Yule–Walker characterizations. Classical and modern spectrum estimation.

[12] ELEG–675: Image processing with biomedical applications, 2005S.

DESCRIPTION: Fundamentals of digital image processing, including image formation, acquisition, transforms, enhancement, restoration, coding, and reconstruction from projections. Attention will be given to biomedical imaging modalities, including X-ray, computed tomography (CT), magnetic resonance (MR) imaging, and ultrasound.

[13] ELEG–833: Nonlinear signal processing, 2006S, 2009S.

DESCRIPTION: Fundamental theory and applications of nonlinear signal processing. Topicsinclude stable random processes, order statistics, fractional lower orderstatistics, maximum likelihood estimation and the filtering problem, weightedorder-statistic filters, medianization of linear FIR filters, myriad filtersand adaptive optimization of nonlinear filters. Applications of nonlinearsignal processing include digital imaging and video, digital communicationsand time-frequency analysis.

[14] ELEG–845: Modern machine learning, 2017SII, 2018SII, 2019SII, 2020SII, 2021SII, 2022SII, 2023SII, 2024SII.
(Online Course).

DESCRIPTION: Modern machine learning methodologies are covered and concepts are reinforced through implementations focusing on array of contemporary classification problems. Fundamental methods covered may include linear and logistic regression, neural networks, support vector machines, clustering, dimensionality reduction, and deep learning.

[15] ELEG–867: Advanced topics in signal processing, 2011F. (Co–Taught with G. R. Arce.).

DESCRIPTION: Course covers contemporary problems in signal processing (SP). Specific topics vary, but may include parametric signal modeling, spectral estimation, multirate SP, nonlinear SP, compressive sensing, adaptive SP and image/video/multidimensional SP.

CONTRACTS AND GRANTS (TOTAL: $14.0M; $11.9M AS PI)

[1] K. E. Barner and N. G. Tsoutsos, "Active learning in microelectronics: A community approach," *National Science Foundation, supplement for (2336586)*, 2024–2025. $336,979.

[2] K. E. Barner, S. K. Bohacek, A. P. Novocin, and N. G. Tsoutsos, "CyberCorps Scholarship for Service: Defending cyberspace through active learning," *National Science Foundation (2336586)*, 2024–2029. $3,435,151.

[3] K. E. Barner, J. Garcia-Frias, and X.-G. Xia, "Vehicle data compression," *Daimler Truck AG*, 2023–2026. $272,301.

[4] K. E. Barner, S. K. Bohacek, C. J. Cotton, A. P. Novocin, and N. G. Tsoutsos, "Cybersecurity certificate," *JPMorganChase*, 2021–2023. $450,000.

[5] K. E. Barner, G. Arce, and M. Badiey, "Graph signal processing and underwater acoustic modeling techniques to assist automation of through the sensor (TTS) for statistical inference module (SIM).," *Office of Naval Research*, 2018–2021. $383,007.

[6] K. E. Barner, "Cybersecurity," *Unidel Foundation*, 2014. $475,000.

[7] K. E. Barner and J. Yu., "HCC: Small: Head activated technology for off-the-shelf mobile devices," *National Science Foundation*, 2013–2016. $496,020.

[8] K. E. Barner, C. Cotton, E. L. Lloyd, C.-C. Shen, and S. K. Bohacek, "Collaborative Project: A regional cybersecurity education initiative," *National Science Foundation*, 2012–2015. $416,102.

[9] D. M. Swany, R. S. Sacher, B. D. Saunders, K. E. Barner, and K. V. Steiner, "CITADel – CyberInfrastructure Technology Advancement for Delaware," *National Science Foundation*, 2010–2011. $1,354,827.

[10] K. E. Barner and K. Steiner, "Three dimensional projection environment for molecular design and surgical simulation," *U.S. Army Telemedicine & Advanced Technology Research Center (TATRC)*, 2009–2011. $93,205 (Subcontract from Thomas Jefferson University, Eric Wickstrom, PI, total budget: $849,000).

[11] K. E. Barner and T. Buma, "REU SITE: Nature InSpired Engineering Research Experiences for Undergraduates — NISE–REU," *National Science Foundation*, 2009–2012. $380,092 (with matching).

[12] K. E. Barner, F. Kaimilev, and K. Manal, "HCC-Small: High-resolution RFID tracking with applications in gesture recognition and human-computer interaction," *National Science Foundation*, 2008–2011. $449,983.

[13] K. E. Barner, M. S. Carberry, S. Elzer, K. F. McCoy, and B. M. Mollica, "Multimodal access to information graphics," *The National Institute on Disability and Rehabilitation Research, Department of Education*, 2008–2011. $599,385.

[14] K. E. Barner and T. C. Aysal, "Generalized Cauchy distribution theory for statistical signal processing, communications and networking applications," *National Science Foundation*, 2007-2008. $112,388.

[15] K. E. Barner, "Nature inspired engineering research experiences for teachers," *National Science Foundation*, 2008-2011. $499,938.

[16] K. E. Barner and M. Ianetta, "English and technical writing instruction for the college of engineering graduate students," *University of Delaware, Graduate Program Improvement and Innovation Grant program*, 2008-2010. $151,328.

[17] K. E. Barner and G. Elias, "Multi–touch 2–D tactile human computer interface design and optimization for individuals with physical disabilities," *National Science Foundation*, 2003–2006. $658,000.

[18] K. E. Barner, "Automatic generation of optimal tactile graphics," *The National Institute on Disability and Rehabilitation Research, Department of Education*, 2002–2005. $450,000.

[19] K. E. Barner and G. R. Arce, "New methods for improved noise reduction, contrast enhancement, and volume rendering of directray images," *Direct Radiography Corp.*, 2000–2001. $46,000.

[20] K. E. Barner and G. R. Arce, "New methods for improved noise reduction, contrast enhancement, and volume rendering of directray images," *Delaware Research Partnership*, 2000–2001. $46,000.

[21] K. E. Barner, "CAREER – rendering algorithms for tactile and haptic display of multidimensional data," *National Science Foundation*, 1999–2003. $300,000.

[22] K. E. Barner, "Research experiences for undergraduates," *National Science Foundation*, 1999–2003. $10,000.

[23] K. E. Barner and R. A. Foulds, "Information access – education, opportunities, and technology," *National Science Foundation*, 1998–2001. $893,967.

[24] K. E. Barner, "Optimal filtering of bioelectronic signals," *University of Delaware Research Foundation*, 1999–2000. $30,000.

[25] K. E. Barner, "Investigation of nonlinear filters in direct radiography," *Direct Radiography Corp.*, 1999. $5,000.

[26] K. E. Barner, "Interference cancellation for non–invasive extraction of transabdominal fetal electroencephalography," *University of Delaware Research Foundation*, 1998–1999. $29,000.

[27] K. E. Barner, "Interference cancellation for non–invasive extraction of transabdominal fetal electroencephalography," *Nemours Foundation*, 1998–1999. $16,000.

[28] J. Kolodzey, P. Berger, K. E. Barner, N. Gallagher, and D. van der Weide, "An on–line laboratory for solid state instruction," *Unidel Foundation*, 1998. $225,000.

[29] K. E. Barner and R. A. Foulds, "Experimental projects for persons with disabilities," *National Science Foundation*, 1994–1997. $1,409,641 and $20,000 in UD matching funds.

[30] K. E. Barner and R. A. Foulds, "Research experiences for undergraduates," *National Science Foundation*, 1997. $8,500.

[31] K. E. Barner, "Educational computer equipment," *Hewlett–Packard*, 1995. $24,000.

[32] G. R. Arce, N. Gallagher, K. E. Barner, and C. G. Boncelet, "Multimedia equipment for instruction and research," *Silicon Graphics Corporation*, 1995–1996. $420,000.

PH.D. DISSERTATIONS SUPERVISED

[1] A. H. Z. Alblwi, *Deep Learning Algorithms for Biomedical Segmentation in Low-Data Scenarios*. PhD thesis, University of Delaware, Newark, Delaware 19716, May 2025. (Currently with Knight Cancer Institute, Organ Health & Science University (OHSU)).

[2] X. Lan, *Information theoretic analysis of deep learning based on a probabilistic representation*. PhD thesis, University of Delaware, Newark, Delaware 19716, May 2022. (Currently with Rice University.).

[3] X. Guo, *Deep Learning Algorithms for Image Understanding Based on Multiple Cues*. PhD thesis, University of Delaware, Newark, Delaware 19716, May 2020. (Currently with JPMC.).

[4] S. M. Romero, *Conformal Prediction Based Active Learning*. PhD thesis, University of Delaware, Newark, Delaware 19716, May 2019. (Currently with MathWorks.).

[5] S. M. Mathews, *Dictionary and Deep Learning Algorithms with Applications to Remote Health Monitoring Systems*. PhD thesis, University of Delaware, Newark, Delaware 19716, Jan. 2017. (Currently with Intel.).

[6] L. F. P. Cabrera, *Exploiting Prior Knowledge in Compressed Sensing Wireless ECG Systems*. PhD thesis, University of Delaware, Newark, Delaware 19716, 2015. (Currently with Depaul University).

[7] Y. Zhou, *Sparse Signal Processing for Machine Learning and Computer Vision*. PhD thesis, University of Delaware, Newark, Delaware 19716, 2015. (Currently with Waymo.).

[8] R. Hu, *Toward a Realistic Virtual Surgical Simulation Environment: Real-Time Deformation, Haptic Feedback and Visualization Algorithms*. PhD thesis, University of Delaware, Newark, Delaware 19716, Dec. 2012. (Currently with Qualcomm; Co–advised with K. Steiner).

[9] J. Gao, *Information Graphic Classification, Decomposition and Alternative Representation*. PhD thesis, University of Delaware, Newark, Delaware 19716, Dec. 2012. (Currently with Amazon.).

[10] R. Carrillo, *Robust Methods for Sensing and Reconstructing Sparse Signals*. PhD thesis, University of Delaware, Newark, Delaware 19716, Dec. 2011. (Currently with the Swiss Center for Electronics and Microtechnology.).

[11] Y. Yuan, *Image–Based Gesture Recognition with Support Vector Machines*. PhD thesis, University of Delaware, Newark, Delaware 19716, May 2008. (Currently with Research in Motion).

[12] T. Aysal, *Filtering and Estimation Theory: First-Order, Polynomial and Decentralized Signal Processing*. PhD thesis, University of Delaware, Newark, Delaware 19716, Feb. 2007. (Currently with Cornell University.).

[13] B. Weng, *Topics on Selected Nonlinear Problems in Signal and Image Processing*. PhD thesis, University of Delaware, Newark, Delaware 19716, Dec. 2006. (Currently with Philips Medical Systems).

[14] P. Chen, *Volumetric Reconstruction and Real–Time Deformation Modeling of Biomedical Images*. PhD thesis, University of Delaware, Newark, Delaware 19716, Aug. 2006. (Co–advised with K. Steiner. Currently with Radiology Imaging Associates).

[15] I. R. Kim, *Wavelet Domain Partion–Based Processing with Applications to Image Denoising and Compression*. PhD thesis, University of Delaware, Newark, Delaware 19716, May 2006. (Currently with the South Korean Armed Forces).

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