BIOGRAPHICAL SKETCH

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NAME: Kevin D. Donohue

eRA COMMONS USER NAME (credential, e.g., agency login): kevin.donohue

POSITION TITLE: Professor

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Northeastern Illinois University	B.A.	04/1981	Mathematics
Illinois Institute of Technology	B.S.	05/1984	Electrical Engineering
Illinois Institute of Technology	M.S.	05/1985	Electrical Engineering
Illinois Institute of Technology	Ph.D.	12/1987	Electrical Engineering

A. Personal Statement

I have extensive experience with signal analysis and the design of classification/detection of complex phenomena in applications such as medical ultrasound, computational auditory scene analysis, radar and behavior/motion tracking. My career focuses on sensor and information develop for improving monitoring applications in science, healthcare, agriculture, and defense.

B. Positions and Honors

2/09 to present	Co-foundered and Technical Director of Signal Solutions, LLC, Lexington, Kentucky.
7/06 to present	Databeam Professor of Electrical and Computer Engineering, Electrical and Computer Engineering Department, University of Kentucky, Lexington, Kentucky
2/07 to 6/07	Interim Department Chair, Electrical and Computer Engineering Department, University of Kentucky, Lexington, Kentucky
7/97 to 12/99	Interim Department Chair, Electrical Engineering Department, University of Kentucky, Lexington, Kentucky
7/94 to 7/06	Associate Professor, Electrical Engineering Department, University of Kentucky, Lexington, Kentucky
5/91 to 6/94	Assistant Professor, Electrical Engineering Department, University of Kentucky, Lexington, Kentucky
9/88 to 5/91	Visiting Assistant Professor, Electrical and Computer Engineering Department, Drexel University, Philadelphia, Pennsylvania

C. Contribution to Science

1. In the engineering area of detection and classification systems, I developed an **analysis and design methodology for order statistic filters**. This resulted in detection systems that have the flexibility of non-

parametric methods (when distributions/signal models cannot be used) and the efficiency of model based system by partitioning statistical distribution over the quantile axes. This has been applied in radar and ultrasound systems for flexible design and improved performance:

a) "Analysis of OS Filters Applied to Ultrasonic Flaw Detection Using Split-Spectrum Processing," J. Saniie, D.T. Nagle, and K.D. Donohue, *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control*, Vol. 38, No. 2, pp. 133-140, Mar. 1991. http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=68470

b) "Detection of breast lesion regions in ultrasound images using wavelets and order statistics," K.V. Mogatadakala, K.D. Donohue, C.W. Piccoli, and F. Forsberg, *Medical Physics*, 23, (4), pp. 840-849, Apr. 2006. http://www.ncbi.nlm.nih.gov/pubmed/16696459

2. In the engineering area of spectral analysis, I developed **an analysis for spectral correlation relative to signal structure and introduced its use in classification systems for medical and industrial ultrasound**. The use of these provided a stable feature that has enhance the ability to discriminate between different types of tissue and material based on its small-scale structure:

a) "Tissue Classification with Generalized Spectrum Parameters," K.D. Donohue, L. Huang, T. Burks, F. Forsberg, and C.W. Piccoli, *Ultrasound in Medicine and Biology,* Vol. 27, No. 11, pp. 1505-1514, 2001. http://www.ncbi.nlm.nih.gov/pubmed/11750750

b) "ROC Analysis Of Classifiers Based On Ultrasonic Tissue Characterization Features," S. Gefen, O.J. Tretiak, , C.W. Piccoli, K.D. Donohue, A.P. Petropulu, P.M. Shankar, V.A. Dumane, L. Huang, M.A. Kutay, V. Genis, F. Forsberg, J.M. Reid, B.B. Goldberg, *IEEE Trans. on Medical Imaging*, Vol. 22, No. 2, pp. 170-177, Feb. 2003. http://www.ncbi.nlm.nih.gov/pubmed/12715993

3. In the engineering area of **audio array signal** processing I founded the Distributed Audio Laboratory in the Visualization center at the University of Kentucky. Through this **I developed new signal processing algorithms for acoustic arrays, including creating virtual sound fields, new detection algorithms for sound source location in immersive/near-field arrays, methods for analyzing irregular distributions of array elements configured arrays for relating performance, and a masking algorithm for improved intelligibility in cocktail party problems based on computational auditory scene analysis**. The Audio Array Toolbox and data archive from our lab is used by researchers all over the world (http://vis.uky.edu/distributed-audio-lab/) for distributed audio systems. Our masking algorithm is being considered for integration in to commercial arrays and use by law enforcement agencies.

a) "Performance for Phase Transform for Detecting Sound Sources in Reverberant and Noisy Environments," K.D. Donohue, J. Hannemann, and H.G. Dietz, *Signal Processing*, Vol. 87, no. 7, pp. 1677-1691, July 2007. https://www.researchgate.net/profile/Kevin_Donohue/publications?sorting=newest&page=3

b) "Constant False Alarm Rate Sound Source Detection with Distributed Microphones," K.D. Donohue, S.M. SaghaianNejadEsfahani, and J. Yu, *EURASIP Journal on Advances in Signal Processing*, Volume 2011, Article ID 656494, 12 pages doi:10.1155/2011/656494, Mar. 2011 http://asp.eurasipjournals.com/content/2011/1/656494/abstract

4. In the engineering area of **signal processing and sensor systems for automatic tracking and characterizing animal behavior**, I have helped developed electronics and signal processing for tracking sleep and wake in mice. This work has resulted in a commercial product that is used in research labs in Europe and America. A high-throughput system is currently being used In the KOMP2 phenotyping project at The Jackson Laboratory: http://jaxmice.jax.org/news/2013/KOMP_article_3.html . This is the first time a sleep phenotype has been included. It has also been applied to study the relationship of sleep to several diseases and injuries.

a) "Assessment of a non-invasive high-throughput classifier for behaviours associated with sleep and wake in mice," K.D. Donohue, D.C. Medonza, E.R. Crane, and B.F. O'Hara, *Biomedical Engineering Online,* 7:14, April 2008. http://www.biomedical-engineering-online.com/content/7/1/14/

b) "Increased fragmentation of sleep-wake cycles in the 5XFAD mouse model of Alzheimer's disease," M. Sethi, S.S. Joshi, R.L. Webb, T.L. Beckett, K.D. Donohue, M.P. Murphy, B.F. O'Hara, M.J. Duncan, Neuroscience, Vol 290, 2 April 2015, Pages 80-89 http://dx.doi.org/10.1016/j.neuroscience.2015.01.035

My publications appear in several engineering (IEEE) and biomedical (Pub Med) databases. A list of most of them together can be found at: http://www.researchgate.net/profile/Kevin_Donohue/publications