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David V. Anderson

March 1, 2023

Earned Degrees

1999 **Ph.D. in Electrical and Computer Engineering**.
Georgia Institute of Technology

1994 **M.S. in Electrical Engineering**.
Brigham Young University

1993 **B.S. in Electrical Engineering**.
Brigham Young University

II. Employment History

2012-present **Professor**, *School of Electrical & Computer Engineering*, Georgia Institute of Technology, Atlanta, Georgia.

2011–present **Partner**, *Ratrix Technologies, LLC*, Atlanta, Georgia.
High-tech start-up with NSF SBIR funding to develop wireless data receivers

2005-2012 **Associate Professor**, *School of Electrical & Computer Engineering*, Georgia Institute of Technology, Atlanta, Georgia.

2009 **Visiting Professor**, *Department of Computer Science*, Korea University, Seoul, South Korea.

1999-2005 **Assistant Professor**, *School of Electrical & Computer Engineering*, Georgia Institute of Technology, Atlanta, Georgia.

1999 **Education Specialist**, *Texas Instruments, Inc.*, Dallas, Texas.

III. Honors and Awards (selected)

2004 Presidential Early Career Award for Scientists and Engineers (PECASE)

2004 NSF Faculty Early Career Development (CAREER) Award

2006 US Frontiers of Engineering Fellow, National Academy of Engineering

2006 Frontiers of Science Fellow, National Academy of Science

2009 Nominated by the School of Electrical and Computer Engineering for the Institute 2009 Outstanding Faculty Leadership Award for the Development of Graduate Research Assistants

2022-2024 Georgia Tech Provost Teaching and Learning Fellow

IV. Research, Scholarship, and Creative Activities

A. Published Books, Book Chapters, and Edited Volumes

GOOGLE EXHIBIT 1018

A.1. Published Books

[1] Wayne T. Padgett and David V. Anderson. *Fixed-point Signal Processing.* Synthesis Lectures on Signal Processing. Morgan & Claypool Publishers, 2009.

A.2. Published Parts of Books

[1] J. H. McClellan, R. W. Schafer, and M. A. Yoder. *DSP First: A Multimedia Approach.* Prentice Hall, 1998. Assisted in the preparation of the multi-media CD-ROM that accompanies the text. Wrote and revised the laboratory projects included in the text.

[2] Sheng-Yu Peng, Paul E. Hasler, and David Anderson. An analog programmable multi-dimensional radial basis function based classifier. In *IFIP WG 10.5 International Conference on Very Large Scale Integration of System-on-Chip*, pages 13–18, Atlanta, GA, October 2007.

[3] Jorge Marin-Hurtado and David V. Anderson. *Independent Component Analysis for Audio and Biosignal applications*, chapter Preservation of Localization Cues in BSS-Based Noise Reduction: Application in Binaural Hearing Aids. InTech, 2012. Ganesh R Naik, ed.

B. Refereed Publications and Submitted Articles

B.1. Refereed Journal Publications

[1] Paul Hasler, Abhishek Bandyopadhyay, and David V. Anderson. High fill–factor imagers for neuromorphic processing enabled by floating–gate circuits. *EURASIP Journal on Applied Signal Processing*, 2003(7):676–689, June 2003. Invited paper for special issue on neuromorphic signal processing and implementation.

[2] Venkatesh Krishnan and David V. Anderson. Joint design of channel–optimized multistage vector quantizer. *IEEE Signal Processing Letters*, 11(1):5–7, January 2004.

[3] Venkatesh Krishnan, David V. Anderson, and Kwan Truong. Optimal multistage vector quantization of LPC parameters over noisy channels. *IEEE Transactions on Speech and Audio Processing*, 12(1):1–8, January 2004.

[4] Paul S. Hong, David V. Anderson, Doug B. Williams, Thomas P. Barnwell III Joel R. Jackson, Monson H. Hayes III, Ronald W. Schafer, and John D. Echard. "DSP for practicing engineers:" A case study in internet course delivery. *IEEE Transactions on Education*, 47(3):301–310, August 2004.

[5] Abhishek Bandyopadhyay, Paul Hasler, and David V. Anderson. A CMOS floating–gate matrix transform imager. *IEEE Sensors*, 5(3):455–462, 2005.

[6] Paul Hasler, Paul D. Smith, Rich Ellis, David Graham, and David Anderson. Analog floating–gate, on–chip auditory sensing system interfaces. *IEEE Sensors*, 5:1027–1034, October 2005.

[7] Sourabh Ravindran, Kristopher Schlemmer, and David V. Anderson. A physiologically inspired method for audio classification. *EURASIP Journal on Applied Signal Processing*, 2005(9):1374–1381, 2005.

[8] Tyson S. Hall, Christopher M. Twigg, Paul Hasler, and David V. Anderson. Developing large–scale field–programmable analog arrays for rapid prototyping. *International Journal for Embedded Systems*, 1(3/4):179–192, 2005.

[9] Sourabh Ravindran, Paul Smith, David Graham, Varinthira Duangudom, David Anderson, and Paul Hasler. Towards biologically inspired on–chip auditory processing. *EURASIP Journal on Applied Signal Processing*, 2005(7):1082–1092, 2005.

[10] Daniel J. Allred, David V. Anderson, Walter Huang, Venkatesh Krishnan, and Heejong Yoo. LMS adaptive filters using distributed arithmetic for high throughput. *IEEE Transactions on Circuits and Systems*, 52(7):1327–1337, July 2005.

[11] Tyson S. Hall and David V. Anderson. A framework for teaching real-time digital signal processing with field-programmable gate arrays. *IEEE Transactions on Education*, 48(3):551 – 558, August 2005.

[12] Tyson S. Hall, Christopher M. Twigg, Jordan D. Gray, Paul Hasler, and David V. Anderson. Large–scale field–programmable analog arrays for analog signal processing. *IEEE Transactions on Circuits and Systems*, 52(11):2298 – 2307, November 2005.

[13] Faik Baskaya, Sasank Reddy, Sung Kyu Lim, and David V. Anderson. Placement for large-scale floating-gate field programable analog arrays. *IEEE Transactions on Very Large Scale Integration Systems*, 14(8):906–910, August 2006.

[14] Sheng-Yu Peng, Paul Hasler, and David V. Anderson. An analog programmable multi-dimensional radial basis function based classifier. *IEEE Transactions on Circuits and Systems I*, 54(10):2148–2158, October 2007.

[15] Erhan Ozalevli, Walter Huang, Paul E. Hasler, and David V. Anderson. A reconfigurable mixed-signal VLSI implementation of distributed arithmetic used for finite-impulse response filtering. *IEEE Transactions on Circuits and Systems I*, 55(2):510–521, March 2008.

[16] Kofi M. Odame, David V. Anderson, and Paul Hasler. A bandpass filter for inherent gain adaptation for hearing applications. *IEEE Transactions on Circuits and Systems I*, 55(3):786–795, April 2008.

[17] Wei Zhang, Xiaoli Ma, Brian Gestner, and David V. Anderson. Designing low-complexity equalizers for wireless systems. *IEEE Communications Magazine*, 47(1):56–62, January 2009.

[18] Faik Baskaya, David V. Anderson, and Sung Kyu Lim. Net sensitivity based optimization of large-scale field programmable analog array (FPAA) placement

and routing. *IEEE Transactions on Circuits and Systems II*, 56(7):565–569, July 2009.

[19] L.J. Karam, I. Alkamal, A. Gatherer, G.A. Frantz, D.V. Anderson, and B.L. Evans. Trends in multicore DSP platforms. *IEEE Signal Processing Magazine*, 26(6):38–49, November 2009.

[20] Bo Marr, Jason George, Brian Degnan, David V. Anderson, and Paul E. Hasler. Error immune logic for low power probabilistic computing. *VLSI Design*, 2010. doi:10.1155/2010/460312.

[21] Walter Huang and David V. Anderson. Modified sliding-block distributed arithmetic with offset binary coding for adaptive filters. *Journal of Signal Processing Systems*, April 2010. Available: http://dx.doi.org/10.1007/s11265-010-0479-4.

[22] David V. Anderson. Storytelling—the missing art in engineering presentations. *IEEE Signal Processing Magazine*, 28(2):109–111, March 2011.

[23] Brian Gestner, Wei Zhang, Xiaoli Ma, and David V. Anderson. Lattice reduction for MIMO detection: From theoretical analysis to hardware realization. *IEEE Transactions on Circuits and Systems I*, 58(4):813 –826, April 2011.

[24] J. Marin Hurtado and David V. Anderson. FFT-based block processing in speech enhancement: Potential artifacts and solutions. *IEEE Transactions on Audio, Speech and Language Processing*, 19(8):2527–2537, November 2011.

[25] Brian Gestner, Xiaoli Ma, and David V. Anderson. Incremental lattice reduction: Motivation, theory, and practical implementation. *IEEE Transactions on Wireless Communications*, 11(1):188 –198, January 2012.

[26] Bo Marr, Brian Degnan, Paul Hasler, and David V. Anderson. Scaling energy per operation via an asynchronous pipeline. *IEEE Transactions on VLSI*, PP(99):1 –5, 2012.

[27] J.I. Marin-Hurtado, D.N. Parikh, and D.V. Anderson. Perceptually inspired noise-reduction method for binaural hearing aids. *Audio, Speech, and Language Processing, IEEE Transactions on*, 20(4):1372–1382, May 2012.

[28] B. Gestner, Xiaoli Ma, and D.V. Anderson. Incremental lattice reduction: Motivation, theory, and practical implementation. *Wireless Communications, IEEE Transactions on*, 11(1):188–198, January 2012.

[29] A.A. Kressner, D.V. Anderson, and C.J. Rozell. Evaluating the generalization of the hearing aid speech quality index (hasqi). *Audio, Speech, and Language Processing, IEEE Transactions on*, 21(2):407–415, February 2013.

[30] S. Ramakrishnan, A. Basu, Leung Kin Chiu, J. Hasler, D. Anderson, and S. Brink. Speech processing on a reconfigurable analog platform. *Very Large*

Scale Integration (VLSI) Systems, IEEE Transactions on, 22(2):430–433, Feb 2014.

[31] Nashlie H Sephus, Aaron D Lanterman, and David V Anderson. Modulation spectral features: In pursuit of invariant representations of music with application to unsupervised source identification. *Journal of New Music Research*, 44(1):58–70, 2015.

[32] Jinwoo Kang, David V. Anderson, and Monson H. Hayes. Face recognition for vehicle personalization with near infrared frame differencing. *IEEE Transactions on Consumer Electronics*, 62(3):316–324, August 2016.

[33] B. T. Carroll, B. M. Whitaker, W. Dayley, and D. V. Anderson. Outlier learning via augmented frozen dictionaries. *IEEE/ACM Transactions on Audio, Speech, and Language Processing*, 25(6):1207–1215, June 2017.

[34] Muhammad Rizwan and David V. Anderson. A weighted accent classification using multiple words. *Neurocomput.*, 277(C):120–128, February 2018.

[35] Chieh-Feng Cheng, Abbas Rashidi, Mark A. Davenport, and David V. Anderson. Activity analysis of construction equipment using audio signals and support vector machines. *Automation in Construction*, June 2017.

[36] Bradley M Whitaker, Pradyumna Byappanahalli Suresha, Chengyu Liu, Gari D Clifford, and David V Anderson. Combining sparse coding and time-domain features for heart sound classification. *Physiological Measurement*, 38:1701–1729, 08 2017.

[37] Chris Sabillon, Abbas Rashidi, Biswanath Samanta, Mark A. Davenport, and David V. Anderson. An audio-based Bayesian model for productivity estimation of construction cyclic activities. *Journal of Computing in Civil Engineering*, 34(1), 2020.

[38] Muhammed Rizwan, Bradley M Whitaker, and David V Anderson. AF detection from ECG recordings using feature selection, sparse coding, and ensemble learning. *Physiological measurement*, 39(12), December 2018.

[39] M. N. Sahadat, N. Sebkhi, D. Anderson, and M. Ghovanloo. Optimization of tongue gesture processing algorithm for standalone multimodal tongue drive system. *IEEE Sensors Journal*, 19(7):2704–2712, April 2019.

[40] Kaitlin L. Fair, Daniel R. Mendat, Andreas G. Andreou, Christopher J. Rozell, Justin Romberg, and David V. Anderson. Sparse coding using the locally competitive algorithm on the truenorth neurosynaptic system. *Frontiers in Neuroscience*, 13:754, 2019.

[41] Chris Sabillon, Abbas Rashidi, Biswanath Samanta, Mark Davenport, and David Anderson. Audio-based bayesian model for productivity estimation of cyclic construction activities. *Journal of Computing in Civil Engineering*, 34:04019048, 01 2020.

[42] N. Sebkhi, A. Bhavsar, D. V. Anderson, J. Wang, and O. T. Inan. Inertial measurements for tongue motion tracking based on magnetic localization with orientation compensation. *IEEE Sensors Journal*, 21(6):7964–7971, March 2021.

[43] Nordine Sebkhi, Arpan Bhavsar, Md NAZMUS Sahadat, Jesse Baldwin, Erica Walling, Amber Biniker, Michelle Hoefnagel, Geneva Tonuzi, Raine Osborne, David V. Anderson, and Omer Inan. Evaluation of a head-tongue controller for power wheelchair driving by people with quadriplegia. *IEEE Transactions on Biomedical Engineering*, 2021.

[44] Mohammad M. Salut and David V. Anderson. Online tensor robust principal component analysis. *IEEE Access*, 10:69354–69363, 2022.

[45] Mohammad M. Salut and David V. Anderson. Randomized tensor robust pca for noisy hyperspectral image classification. *IEEE Geoscience and Remote Sensing Letters*, pages 1–1, 2023.

B.2. Conference Presentations with Proceedings (Refereed)

[1] David V. Anderson, Richard W. Harris, and Douglas M. Chabries. Evaluation of a hearing compensation algorithm. In *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing*, volume 5, pages 3531–3533, Detroit, May 1995.

[2] Douglas M. Chabries, David V. Anderson, Thomas G. Stockham, Jr., and Richard W. Christiansen. Application of a human auditory model to loudness perception and hearing compensation. In *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing*, volume 5, pages 3527–3530, Detroit, May 1995.

[3] David V. Anderson. Speech analysis and coding using a multi–resolution sinusoidal transform. In *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing*, volume 2, pages 1037–1040, Atlanta, May 1996.

[4] David V. Anderson, James H. McClellan, Ronald W. Schafer, Jeffrey B. Schodorf, and Mark A. Yoder. DSP First - a first course in ECE. In *Proceedings of the 1996 Asilomar Conference on Circuits, Systems, and Computers*, volume 1, pages 226–230, Pacific Grove, CA, May 1996.

[5] David V. Anderson and Mark A. Clements. Audio signal noise reduction using multi-resolution sinusoidal modeling. In *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing*, pages 805–808, Phoenix, May 1999.

[6] David V. Anderson, Lonnie Harvel, Monson H. Hayes III, Y. Ishiguro, Joel R. Jackson, and Maria Pimentel. Internet course delivery-making it easier and

more effective. In *Proceedings of the IEEE International Conference on Multimedia and Expo*, volume 1, pages 84–87, New York, July 2000.

[7] David V. Anderson, Thomas P. Barnwell, Monson H. Hayes III, and Joel R. Jackson. Effective and efficient distance learning over the internet: Implementation of an on-line DSP course. In *Proc. International Conference on Engineering Education*, Taiwan, August 2000.

[8] Joel R. Jackson, David V. Anderson, and Monson H. Hayes III. Effective and efficient distance learning over the internet: Tools and techniques. In *Proc. International Conference on Engineering Education*, Taiwan, August 2000.

[9] Monson H. Hayes III, Joel R. Jackson, and David V. Anderson. Producing effective internet courses with *in*Fusion. In *Proceedings Learning '00*, Madrid, Spain, October 2000.

[10] David V. Anderson, Thomas P. Barnwell, John Echard, Monson H. Hayes III, Joel R. Jackson, Ronald W. Schafer, and Douglas B. Williams. An on-line DSP course for practicing engineers. In *Signal Processing Education Workshop*, Hunt, TX, October 2000. Web Proceedings: `http://spib.ece.rice.edu/SPTM/DSP2000/`.

[11] David V. Anderson and Paul Hasler. Cooperative analog/digital signal processing. In *World Conference on Systemics, Cybernetics, and Informatics*, Orlando, FL, July 2001. *Invited Paper, Best Paper Award*.

[12] Matt Kucic, Paul Hasler, Jeff Dugger, and David V. Anderson. Programmable and adaptive analog filters using arrays of floating-gate circuits. In Erik Brunvand and Chris Myers, editors, *2001 Conference on Advanced Research in VLSI*, pages 148–162, Salt Lake City, March 2001. IEEE Computer Society.

[13] Joel R. Jackson, Thomas P. Barnwell, Douglas B. Williams, Monson H. Hayes III, David V. Anderson, and Ronald W. Schafer. DSP for practicing engineers: an online continuing DSP education course. In *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing*, volume V, pages 2721–2724, Salt Lake City, UT, May 2001.

[14] Joel R. Jackson, Thomas P. Barnwell, Douglas B. Williams, Monson H. Hayes III, David V. Anderson, and Ronald W. Schafer. Online DSP education: DSP for practicing engineers. In *American Society for Engineering Education Annual Conference*, Albuquerque, NM, June 2001.

[15] Joel R. Jackson, Thomas P. Barnwell, David V. Anderson, and Monson H. Hayes III. *in*Fusion: Simplifying online course creation. In *American Society for Engineering Education Annual Conference*, Albuquerque, NM, June 2001.

[16] Paul Smith, Matt Kucic, Rich Ellis, Paul Hasler, and David V. Anderson. Cepstrum frequency encoding in analog floating-gate circuitry. In *Proceedings of the IEEE International Symposium on Circuits and Systems*, volume IV, pages 671–674, Phoenix, AZ, May 2002.

[17] Paul Hasler and David V. Anderson. Cooperative analog-digital signal processing. In *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing*, volume IV, pages 3972–3975, Orlando, FL, May 2002.

[18] Heejong Yoo, David V. Anderson, and Paul Hasler. Continuous–time audio noise suppression and real-time implementation. In *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing*, volume IV, pages 3980–3983, Orlando, FL, May 2002.

[19] Richard Ellis, Heejong Yoo, and David V. Anderson. An analog floating-gate IC for audio noise suppression. In *Proceedings of the International Symposium on Circuits and Systems*, volume II, pages 728–31, Phoenix, AZ, May 2002. Invited Paper.

[20] Paul Hasler, Paul Smith, Richard Ellis, David Graham, and David V. Anderson. Biologically inspired auditory sensing system interfaces on a chip. In *2002 IEEE Sensors Conference*, Orlando, FL, June 2002. *Invited Paper, nominated for Best Paper of Conference.*

[21] Paul Hasler, Abhishek Bandyopadhyay, and David V. Anderson. Low–power analog image processing using transform imagers. In *IEEE Midwest Circuits and Systems*, Tulsa, OK, August 2002.

[22] Paul Hasler, Paul Smith, Chris Duffy, Christal Gordon, Jeff Dugger, and David Anderson. A floating-gate vector-quantizer. In *IEEE Midwest Circuits and Systems*, Tulsa, OK, August 2002.

[23] Tyson S. Hall, Paul Hasler, and David V. Anderson. Field-programmable analog arrays: A floating-gate approach. In *12th International Conference on Field Programmable Logic and Applications*, Montpellier, France, September 2002.

[24] Paul Hasler, Abhishek Bandyopadhyay, and David Anderson. Low-power analog image processing using transform imagers. In *Digital Signal Processing Workshop*, pages 333–338, Pine Mountain, Georgia, October 2002.

[25] David Anderson, Paul Hasler, Rich Ellis, Heejong Yoo, David Graham, and Mat Hans. A low–power, continuous–time system for audio noise suppression and a VLSI implementation. In *Digital Signal Processing Workshop*, pages 327–332, Pine Mountain, Georgia, October 2002.

[26] Tyson S. Hall and David V. Anderson. From algorithms to gates: Developing a pedagogical framework for teaching DSP hardware design. In *Signal Processing Education Workshop*, pages 157–161, Pine Mountain, Georgia, October 2002.

[27] P. Spencer Whitehead, David V. Anderson, and Mark A. Clements. Adaptive acoustic noise suppression for speech enhancement. In *Proceedings 2003 International Conference on Multimedia and Expo*, volume 1, pages 565–568, Baltimore, MD, June 2003.

[28] Cenk Demiroglu and David V. Anderson. Noise robust digit recognition with missing frames. In *8th European Conference on Speech Communication and Technology*, pages 2165–2168, Geneva, Switzerland, September 2003.

[29] Venkatesh Krishnan and David V. Anderson. Robust jointly optimized multistage vector quantization for speech coding. In *8th European Conference on Speech Communication and Technology*, pages 1093–1096, Geneva, Switzerland, September 2003.

[30] Sunil D. Kamath and David V. Anderson. Signal processing in digital and floating-gate analog circuits; design trade-offs. In *Proceedings of the Asilomar Conference on Circuits, Systems, and Computers*, Pacific Grove, CA, November 2003.

[31] Heejong Yoo, David V. Anderson, and Paul Hasler. On delay structures for the analog adaptive filters with long filter taps. In *Proceedings of the Asilomar Conference on Circuits, Systems, and Computers*, Pacific Grove, CA, November 2003.

[32] Daniel Allred, Venkatesh Krishnan, Walter Huang, and David V. Anderson. Implementation of an LMS adaptive filter on an FPGA employing multiplexed multiplier architecture. In *Proceedings of the Asilomar Conference on Circuits, Systems, and Computers*, Pacific Grove, CA, November 2003.

[33] Sourabh Ravindran, Cenk Demiroglu, and David V. Anderson. Speech recognition using filter bank features. In *Proceedings of the Asilomar Conference on Circuits, Systems, and Computers*, Pacific Grove, CA, November 2003.

[34] Thomas Barnwell III, Mark Clements, David Anderson, Elliot Moore, Matthew Lee, Erdem Ertan, Venkatesh Krishnan, Woosuk Choi, James Hu, Cenk Demiroglu, Spencer Whitehead, and Adriane Durey. Low bit-rate coding of speech in harsh conditions using non-acoustic auxiliary devices. In *Special Workshop in Maui: Lectures by the Masters in Signal Processing*, Maui, HI, January 2004.

[35] Michael Healy, Sourabh Ravindran, and David V. Anderson. Effects of varying parameters in asymmetric adaboost on the accuracy of a cascade audio classifier. In *IEEE SoutheastCon 2004*, Greensboro, NC, March 2004.

[36] Tyson S. Hall, Christopher M. Twigg, Paul Hasler, and David V. Anderson. Developing large-scale field-programmable analog arrays. In *11th Reconfigurable Architectures Workshop (RAW 2004), 18th International Parallel and Distributed Processing Symposium*, pages 142–147, Santa Fé, NM, April 2004.

[37] Tyson S. Hall, Christopher M. Twigg, Paul Hasler, and David V. Anderson. Application performance of elements in a floating-gate FPAA. In *Proceedings of the International Symposium on Circuits and Systems*, Vancouver, Canada, May 2004.

[38] Heejong Yoo, David Graham, David V. Anderson, and Paul Hasler. C4 band-pass delay filter for continuous-time subband adaptive tapped-delay filter.

In *Proceedings of the International Symposium on Circuits and Systems*, Vancouver, Canada, May 2004.

[39] Sourabh Ravindran and David V. Anderson. Boosting as a dimensionality reduction tool for audio classification. In *Proceedings of the International Symposium on Circuits and Systems*, Vancouver, Canada, May 2004.

[40] Cenk Demiroglu and David V. Anderson. Two-sensor noise-robust ASR with missing frames for Aurora2 task. In *Proceedings of the International Symposium on Circuits and Systems*, Vancouver, Canada, May 2004.

[41] Shyam Subramanian, David V. Anderson, and Paul Hasler. Synthesis of static multiple input multiple output MITE networks. In *Proceedings of the International Symposium on Circuits and Systems*, Vancouver, Canada, May 2004.

[42] Haw-Jing Lo, Guillermo Serrano, Paul Hasler, David Anderson, and Bradley Minch. Programmable multiple input translinear elements. In *Proceedings of the International Symposium on Circuits and Systems*, Vancouver, Canada, May 2004.

[43] Sourabh Ravindran, David V. Anderson, and Malcolm Slaney. Low-power audio classification for ubiquitous sensor networks. In *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing*, Montreal, Canada, May 2004.

[44] Daniel J. Allred, Heejong Yoo, Venkatesh Krishnan, and David V. Anderson. A novel high performance distributed arithmetic adaptive filter implementation on an FPGA. In *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing*, Montreal, Canada, May 2004.

[45] Daniel J. Allred, Walter Huang, Venkatesh Krishnan, Heejong Yoo, and David V. Anderson. An FPGA implementation for a high throughput adaptive filter using distributed arithmetic. In *FCCM*, pages 324–325, 2004.

[46] Tyson S. Hall and David V. Anderson. Merging theory and implementation: A framework for teaching DSP hardware design. In *2004 ASEE Annual Conference*, Salt Lake City, UT, June 2004.

[47] Rongqiang Hu and David V. Anderson. Audio noise suppression based on neuromorphic saliency and phoneme adaptive filtering. In *IEEE Digital Signal Processing Workshop*, Taos, NM, August 2004.

[48] Sunil Kamath, Sourabh Ravindran, and David V. Anderson. Independent component analysis for audio classification. In *IEEE Digital Signal Processing Workshop*, Taos, NM, August 2004.

[49] Sourabh Ravindran and David V. Anderson. Cascade classifiers for audio classification. In *IEEE Digital Signal Processing Workshop*, Taos, NM, August 2004.

[50] Cenk Demiroglu and David V. Anderson. Noise robust digit recognition using a glottal radar sensor for voicing detection. In *International Conference on Spoken Language Processing*, Jeju, Korea, October 2004.

[51] Rongqiang (James) Hu and David V. Anderson. Single acoustic channel speech enhancement based on glottal correlation using non-acoustic sensors. In *International Conference on Spoken Language Processing*, Jeju, Korea, October 2004.

[52] Cenk Demiroglu and David V. Anderson. A soft decision MMSE amplitude estimator as a noise preprocessor to speech coders using a glottal sensor. In *International Conference on Spoken Language Processing*, Jeju, Korea, October 2004.

[53] Venkatesh Krishnan, Christopher Duffy, David V. Anderson, and Paul Hasler. Optimal quantization employing programmable flash analog to digital converters. In *Proceedings of the Asilomar Conference on Circuits, Systems, and Computers*, Pacific Grove, CA, November 2004. Invited paper.

[54] Rongqiang Hu and David V. Anderson. Improved perceptually inspired speech enhancement using a psychoacoustic model. In *Proceedings of the Asilomar Conference on Circuits, Systems, and Computers*, Pacific Grove, CA, November 2004.

[55] Cenk Demiroglu, Sunil Kamath, David V. Anderson, Mark A. Clements, and Thomas P. Barnwell III. Segmentation based speech enhancement using auxiliary sensors. In *Proceedings of the Asilomar Conference on Circuits, Systems, and Computers*, Pacific Grove, CA, November 2004.

[56] Teahyung Lee and David V. Anderson. The behavioral simulation results of the optical flow estimation algorithm for CADSP system design. In *Proceedings of the Asilomar Conference on Circuits, Systems, and Computers*, Pacific Grove, CA, November 2004.

[57] Heejong Yoo and David V. Anderson. Hardware-efficient distributed arithmetic architecture for high-order digital filters. In *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing*, volume 5, pages 125–128, Philadelphia, Pennsylvania, March 2005.

[58] Cenk Demiroglu, Sunil Kamath, and David V. Anderson. Segmentation-based speech enhancement for intelligibility improvement in MELP coders using auxiliary sensors. In *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing*, volume 1, pages 797–800, Philadelphia, Pennsylvania, March 2005.

[59] Faik Baskaya, Sasank Reddy, Sung Kyu Lim, Tyson Hall, and David V. Anderson. Mapping algorithm for large-scale field programmable analog array. In *ACM International Workshop on Physical Design*, pages 152–158, San Francisco, April 2005. ACM Press.

[60] Sourabh Ravindran and David V. Anderson. Audio classification and scene recognition for hearing aids. In *Proceedings of the International Symposium on Circuits and Systems*, volume 2, pages 830–863, Kobe, Japan, May 2005.

[61] Shyam Subramanian, David V. Anderson, Paul Hasler, and Bradley A. Minch. Synthesis of MITE log-domain filters with unique operating points. In *Proceedings of the International Symposium on Circuits and Systems*, volume 2, pages 996–999, Kobe, Japan, May 2005.

[62] I. Faik Baskaya, Sasank Reddy, Sung Kyu Lim, and David Anderson. Hierarchical placement for large-scale FPAA. In *International Conference on Field Programmable Logic and Applications*, pages 421–426, Tampere, Finland, August 2005.

[63] Sourabh Ravindran, David Anderson, and James Rehg. Cascade jump support vector machine classifiers. In *Machine Learning in Signal Processing 2005*, pages 135–139, Mystic, Connecticut, September 2005.

[64] Rongqiang Hu, Venkatesh Krishnan, and David V. Anderson. Speech bandwidth extension by improved codebook mapping towards increased phonetic classification. In *Interspeech 2005*, pages 1501–1504, Lisbon, Portugal, September 2005.

[65] Rongqiang Hu, Sunil Kamath, and David V. Anderson. Speech enhancement using non-acoustic sensors. In *Interspeech 2005*, pages 2305–2308, Lisbon, Portugal, September 2005.

[66] Venkatesh Krishnan, Thomas P. Barnwell-III, and David V. Anderson. Using dynamic codebook re-ordering to exploit inter-frame correlation in MELP coders. In *Interspeech 2005*, pages 2717–2720, Lisbon, Portugal, September 2005.

[67] Venkatesh Krishnan, Phil S. Whitehead, David V. Anderson, and Mark A. Clements. A framework for estimation of clean speech by fusion of outputs from multiple speech enhancement systems. In *Interspeech 2005*, pages 2317–2320, Lisbon, Portugal, September 2005.

[68] Sourabh Ravindran, Sunil Kamath, and David Anderson. Implementation of low-power automatic audio classification for hearing-aids on TI c5510. In *Texas Instruments Developers Conference*, Dallas, Texas, February 2006.

[69] Venkatesh Krishnan, Sabat M. Siniscalchi, David V. Anderson, and Mark A. Clements. Noise robust Aurora-2 speech recognition employing a codebook-constrained Kalman filter preprocessor. In *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing*, volume I, pages 781–784, Toulouse, France, May 2006.

[70] Teahyung Lee and David V. Anderson. Architecture for hierarchical block motion estimation using variable block sizes. In *Proceedings of the IEEE*

International Conference on Acoustics, Speech, and Signal Processing, volume III, pages 960–963, Toulouse, France, May 2006.

[71] Teahyung Lee and David V. Anderson. Performance analysis of a correlation-based optical flow algorithm under noisy environments. In *Proceedings of the International Symposium on Circuits and Systems*, pages 4699–4702, Kos, Greece, May 2006.

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C. Other Publications and Creative Products

C.1. Technical Reports

[1] Heejong Yoo, Rich Ellis, David V. Anderson, Paul Hasler, David W. Graham, and Mat Hans. Continuous–time audio noise suppression and real–time implementation. Technical Report HPL-2002-311, HP Labs, November 2002. available at http://www.hpl.hp.com/techreports.

[2] André van Schaik, David Anderson, Steven Greenberg, Malcom Slaney, et al. Final report—chapter on audio projects. Technical report, Telluride Workshop on Neuromorphic Engineering, Telluride, CO, July 2003.

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[4] Nordine Sebkhi, Md Nazmus Sahadat, Erica Walling, Michelle Hoefnagel, Fulcher Chris, Fanpeng Kong, Geneva Tonuzi, Raine Osborne, Maysam Ghovanloo, and David Anderson. Evaluation of Multimodal Tongue Drive System by People with Tetraplegia for Computer Access. *IEEE TechRXiv*, April 2021.

D. Presentations

D.1. Conference Presentations without Proceedings

[1] David V. Anderson and Mark A. Clements. Noise suppression in speech using multi-resolution sinusoidal modeling. presented at the Fall 1998 Meeting of the Acoustical Society of America, Norfolk, VA.

[2] David V. Anderson, Douglas Chabries, and Richard W. Christiansen. Time constants in multi-band compressive gain hearing aids. In *International Hearing Aid Research Conference*, Lake Tahoe, CA, August 2000.

[3] David V. Anderson, Phil Spencer Whitehead, and Mark A. Clements. Acoustic noise suppression for speech enhancement. presented at the Fall 2001 Meeting of the Acoustical Society of America, Ft. Lauderdale, FL, October 2001.

[4] David V. Anderson. Fast dynamic range compression method for multichannel hearing aids. presented at the 143rd Meeting of the Acoustical Society of America, Pittsburgh, Pennsylvania, June 2002.

[5] I. Faik Baskaya, Sasank Reddy, Tyson Hall, David V. Anderson, Paul Hasler, and Sung Kyu Lim. Analog circuit modeling and clustering for large scale FPAA. presented at the Design Automation and Test Conference, May 2004.

[6] Abbas Rashidi, Mark A. Davenport, David V. Anderson, Chieh-Feng Cheng, and Chris A. Sabillon. Achievements and challenges in audio-based modeling of construction job sites. *The Meeting of the Acoustical Society of America*, 141:3917–3917, May 2017.

D.2. Seminar Presentations

[1] David V. Anderson, Monson H. Hayes III, and Joel Jackson. Streaming multimedia course development. Invited seminar at Virginia Tech, December 2000.

[2] David V. Anderson. Cooperative analog/digital signal processing. Georgia Tech Analog Consortium Industry Review, March 2001.

[3] David V. Anderson. Analog signal processing in a digital world. Georgia Tech Analog Consortium Industry Review, March 2002.

[4] David V. Anderson. Analog and signal processing. Georgia Tech Analog Consortium Industry Review, October 2003.

[5] David V. Anderson. Cooperative analog/digital signal processing. Invited speaker: IEEE Georgia Tech Student Chapter meeting, March 2000.

[6] Mat Hans and David V. Anderson. Sensor inputs for portable devices. Invited speaker: IEEE Georgia Tech Student Chapter meeting, February 2002.

[7] David V. Anderson. Bucking the trend. Keynote speaker at HKN Honor Society induction, April 2002.

[8] David V. Anderson. Prototyping cooperative analog-digital signal processing for auditory applications. Telluride Workshop on Neuromorphic Engineering, July 2003.

[9] David V. Anderson. Neuro-inspired audio processing. Telluride Workshop on Neuromorphic Engineering, July 2004.

[10] David V. Anderson. Signal processing trends. Invited speaker: Korea University, May 2005.

[11] David V. Anderson. Low-power signal processing trends. Invited speaker: Johns Hopkins University, November 2005.

[12] David V. Anderson. Signal processing with analog VLSI. Invited speaker: State University of New York – Stony Brook, January 2006.

[13] David V. Anderson. Neuro-inspired signal processing. Telluride Workshop on Neuromorphic Engineering, July 2005.

[14] David V. Anderson. Audio signal enhancement. Telluride Workshop on Neuromorphic Engineering, July 2006.

[15] David V. Anderson. Human perception and signal processing. Telluride Workshop on Neuromorphic Engineering, July 2008.

[16] David V. Anderson. Bayesian probability in everyday life. Presentation to Autry Mill Middle School Math Classes, May 2009.

[17] David V. Anderson. Multimedia signal processing. Invited speaker: Korea University, July 2009.

E. Grants and Contracts

E.1. & E.2. As Principal and Co-Principal Investigator

	Sponsor	Title	Dates	$ Funded	Contribution
1.	NSF	High Density Analog Computing Arrays	2000-04	$443,000	Co-PI – 40%
2.	GTBI	Blind Source Separation for Audio	2001-02	$26,000	PI – 100%
3.	GTBI	Audio Classification	2002-03	$26,000	PI – 100%
4.	GTBI	Audio Classification	2003-04	$20,000	PI – 100%
5.	GVU	Auditory Scene Analysis	2002-03	$16,170	PI – 100%
6.	DARPA	Focal–Plane Image Enhancement	2002-04	$375,000	Co-PI – 40%
7.	DARPA	Focal–Plane Image Processing	2004-06	$900,000	Co-PI – 40%
8.	DARPA	Improved Speech Analysis, Coding, and Enhancement using Microradars	2002-06	$2,275,955	Co-PI – 40%
9.	NSF	CAREER: Ultra-Low Power Programmable Analog Signal Processing Systems	2004-09	$400,000	PI – 100%
10.	CIA	Low–power Array Processing	2004-05	$383,200	PI – 100%
11.	NSF	Bringing Low Power Reconfigurable Analog Signal Processing to Embedded Systems	2004-07	$240,000	Co-PI – 20%
12.	NSF	Probabilistic CMOS Computing and Applications	2007-10	$762,000	PI – 100%

	Sponsor	Title	Dates	$ Funded	Contribution
13.	Raytheon	Machine Learning of Visual Features	2009-10	$85,000	Co-PI – 50%
14.	National Semiconductor	Hearing Aid Audio Processing	2009-12	$150,000	PI – 100%
15.	National Semiconductor	Speaker Driver Sound Enhancement	2009-10	$50,000	PI – 100%
16.	Army Research Office	Realizing Lattice-Reduction-Based Detectors for High-Rate Wireless Communications	2011-12	$50,000	Co-PI – 50%
17.	NSF	I-CORPS	2012-13	$50,000	PI – 100%
18.	Walmart Foundation	Craft with Pride: Development and Deployment of Disruptive Manufacturing	2014-16	$2,959,656	CoI – 10%
19.	NSF	I-Corps: Automated Audio Monitoring	2018-19	$50,000	PI – 100%
20.	NSF	I-Corps	2019-21	$50,000	PI – 100%
21.	NSF	PFI-TT: Continuous Livestock Monitoring Using Audio and Machine Learning	2019-21	$249,999	PI – 100%
22.	Georgia CTSA	GACTSA I-Vector Based Voice Quality	2018-19	$33,892	PI – 100%
23.	GRA	Georgia Research Alliance Phase 1A (Ergense)	2020	$30,000	PI – 100%
24.	GRA	AudioT	2020-2021	$50,000	PI – 100%
25.	GRA	Phase IIA grant – AudioT	2022-2023	$59,750	PI – 100%

	Sponsor	Title	Dates	$ Funded	Contribution
26.	NSF	Collaborative Research: An Audio-based Spatio-temporal System for Automated Monitoring of Construction Operations	2015-18	$208,909	Co-PI – 50%
27.	BMW Corp	Audio Analysis of Motor Sounds for Quality Control	2017-20	$225,000	PI – 100%
28.	Brooks Foundation	Evaluation of a Multimodal Assistive System for Mobility by Combining Tongue	2019-20	$30,064	PI – 100%
29.	NIH/GSU	Analysis of Voice Exercises Using Signal Processing	2017-18	$11,700	PI – 100%
30.	GVU/IPAT	Acoustic Sensor Deployment in the EcoCommons	2019-20	$20,000	Co-PI – 50%
31.	Blue Sky Research Grants	Parkinsons speech	2021-22	$40,000	PI – 50%
32.	Cisco	Smart Homes for Effective and Safe Remote Work During a Pandemic and Beyond	2021-22	$171,653	Co-PI – 50%
33.	GTRI	Facial Emotion Detection	2021-22	$15,000	PI – 100%

Foundation Gifts

	Sponsor	Title	Dates	$ Funded
1.	Google	Fast Analysis of High-dimensional Data	10/07	$75,000
		With Alex Gray in CoC		
2.	Google	Audio Saliency	10/07	$100,000
		With Alex Gray in CoC		
3.	National Semiconductor	Sound Classification Circuits Research	9/05–	$125,000
4.	IDT Corporation	FFT Circuits Research	10/06	$30,000

E.5. Proposals Submitted but Not Funded (Last Two Years)

	Sponsor	Title	Year	Budget	Contribution
1.	NSF	SCH: INT: Exploiting on-body measurements of physiological and contextual signatures for personalized anxiety trigger detection	2020	$1,198,178	Co-PI – 33%
2.	NSF	SCH: INT: Improving the Patient Healing Process in the Hospital Setting via Transformational Sound and Light Sensing	2019	$1,200,000	PI – 25%
3.	NSF	PFI-TT: Monitoring of Acoustic Scenes using Spatiotemporal Audio Circuits at near zero-power	2019	$250,000	PI – 100%
4.	Imlay Foundation	Sound and Light Monitoring Device for Use in Improving Sleep in ICUs	2019	$125,000	PI – 60%
5.	Simons Foundation	Integrating Novel Video and Acoustic Home-Based Outcome Measures in Autism	2019	$207,826	PI – 100%

	Sponsor	Title	Year	Budget	Contribution
6.	NSF-NIFA	AI-Driven Risk Management in Agriculture and Food Systems: Resiliency from Cells to Watersheds	2020	$3,771,681	Co-PI – 33%
7.	NSF	Next Generation Smart Microphone with Automated Monitoring	2020	$250,000	PI – 100%
8.	NIH	Optimizing voice therapy efficacy and efficiency through conversation training and app support	2019	$2,960,352	Co-PI – 15%
9.	NIH	Individualized Automated Voice Quality Assessment for Voice Therapy Adherence Feedback	2021	$424,114	PI – 60%
10.	NSF-NIFA	AI Institute: Multiscale sustainable intensification through AI-enabled agriculture	2020	$1,940,771	GT PI – 33%
11.	NBMC	Long-Term Wearable, Multimodal E-Tattoos for Real-Time Cognitive State Assessment of Pilots	2020	$855,851	GT Co-PI – 16%

F. Other Scholarly and Creative Accomplishments

2011–2020 Co-founder of Ratrix Technologies with Xiaoli Ma (GT-ECE) and Drayt Avera. Ratrix Technologies develops high–throughput wireless data solutions. Received NSF SBIR Phase I and Phase II funding

2018–present Co-founder of AudioT with Brandon Carroll (GT PhD grad) and Tom Darbonne. AudioT develops audio surveillance systems for use in livestock operations. Received FFAR Phase I and Phase II funding

F.1. Patents

[1] David V. Anderson, Kwan Truong, and Stephen McGrath. Adaptive filter featuring spectral gain smoothing and variable noise multiplier for noise

reduction, and methods therefor. U.S. Patent no. 6,351,731, July 1999. Issued 2002.

[2] David V. Anderson, Kwan Truong, and Stephen McGrath. Speech activity detector for use in noise reduction system, and methods therefor. U.S. Patent no. 6,453,285, July 1999. Issued 2002.

[3] Jeffery Dugger, Tyson S. Hall, Paul Hasler, David V. Anderson, Paul D. Smith, Matthew R. Kucic, and Abhishek Bandyopadhyay. Floating-gate analog circuit. U.S. Patent no. 6,898.097, May 2005.

[4] Daniel J. Allred, David V. Anderson, Walter G. Huang, Venkatesh Krishnan, and Heejong Yoo. Distributed arithmetic adaptive filter and method. U.S. Patent application no. 20050201457, September 2005.

[5] Philomena Cleopha Brady, Haw-Jing Lo, Guillermo Jose Serrano, Farhan Adil, Matthew R. Kucic, Paul Hasler, David V. Anderson, and Angelo Pereira. Floating-gate reference circuit. U.S. Patent no. 7,034,603, April 2006.

[6] Erhan Ozalevli, Paul Hasler, David V. Anderson, and Walter G. Huang. Reconfigurable mixed-signal VLSI implementation of distributed arithmetic. U.S. Patent no. 7,348,909, March 2008.

[7] Richard T. Ellis, Heejong Yoo, David W. Graham, Paul E. Hasler, and David V. Anderson. Analog audio signal enhancement system using a noise suppression algorithm. U.S. Patent no. 7,590,250, September 2009.

[8] David Verl Anderson, Brian Gestner, and Xiaoli Ma. Incremental lattice reduction systems and methods. U.S. Patent no. 8,948,318 B2, February 2015.

G. Societal and Policy Impacts

2022–present Expert witness for *undisclosed*, represented by Alston & Bird in *pending*

2022–present Expert witness for Google LLC, represented by Quinn Emanuel Urquhart & Sullivan, LLP in Google LLC v. Sonos, Inc., Nos. 22-cv-04552 & -04553 (Northern District of California)

2022–present Expert witness for Google LLC, represented by Quinn Emanuel Urquhart & Sullivan, LLP in Certain Audio Players and Components Thereof; and Certain Audio Players and Components Thereof II, Nos. 337-TA-1329 & 337-TA-1330 (USITC)

2022–present Expert witness for Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc., represented by Kirkland & Ellis LLP in Staton Techiya, LLC and Synergy IP Corp. v. Samsung Elecs. Co. et al. , Nos. 2:21-cv-413-JRG, 2:22-cv-00053-JRG-RSP (Eastern District of Texas)

2022–present Expert witness for TVision, represented by Keker, Van Nest & Peters LLP in The Nielsen Company (US), LLC v. TVision Insights, Inc., No. 1:21-cv-01592-CJB and No. 1:22-cv-00057-CJB (Delaware)

2022–present Expert witness for Promptu Systems Corporation, represented by Finnegan, Henderson, Farabow, Farrett & Dunner LLP in Promptu Systems Corporation v. Comcast Corporation and Comcast Cable Communications, LLC, No. 2:16-cv-06516-LDD (Eastern District of Pennsylvania)

2022–present Expert witness for Google, represented by Keker, Van Nest & Peters LLP in *Jawbone Innovations, LLC v. Google LLC*, No. 6:21-cv-00985 (Western District of Texas)

2022–present Expert witness for Google, represented by Finnegan, Henderson, Farabow, Farrett & Dunner LLP in Google LLC, v. Jawbone Innovations, LLC, Cases IPR2022-01027, IPR2022-00649, IPR2022-00623 (deposed three times)

2021–present Expert witness for Zentian, LTD, represented by Bartlit & Beck, LLP in *Zentian Ltd. v. Apple Inc.; and Zentian Ltd. v. Amazon.com Inc.* (Western District of Texas)

2020 Expert witness for St. Lawrence Communications LLC, represented by AZA Law LLC in *Saint Lawrence Communications LCC v. Amazon.com, Inc.*, No. 2:19-cv-00027-JRG (Eastern District of Texas) (deposed)

2020 Expert witness for Advanced Voice Recognition Systems, Inc., represented by Buether Joe & Carpenter, LLC in *IPR2019-01352* (deposed)

2020–2020 Expert witness for Motorola Solutions, Inc, represented by Kirkland and Ellis, LLC in *Motorola Solutions, Inc. v. Hytera Communications Corp. Ltd. et al.*, No. 1:17-CV-01972 (Northern District of Illinois, Eastern Division) (deposed)

2018–2020 Expert witness for Motorola Solutions, Inc, represented by Kirkland and Ellis, LLC in *Hytera Communications Corp. Ltd. v. Motorola Solutions, Inc.*, No. 1:17-CV-1794 (Northern District of Ohio, Eastern Division) (deposed twice)

2018–2021 Expert witness for MModal Services Ltd., represented by Latham & Watkins LLP in *MModal Services Ltd. v. Nuance Communications, Inc.*, No. 1:18-cv-00901-WMR (Northern District of Georgia Atlanta Division) (deposed)

2017–2018 Expert witness for Analytics for Life, Inc., represented by Meunier Carlin & Curfman LLC in IPR2017-01742 (deposed)

2017–2018 Expert witness for III Holdings, represented by Posinelli LLP in IPR2017-00930 (K/S HIMPP et al. v. III Holdings) (deposed)

2017–2018 Expert witness for Motorola Solutions, Inc, represented by Kirkland and Ellis, LLC in *In the Matter of Certain Two-Way Radio Equipment and Systems, Related Software and Components Thereof* before the International Trade Commission, Investigation No. 337-TA-1053 (deposed)

2017–2018 Expert witness for St. Lawrence Communications LLC, represented by AZA Law LLC in *Saint Lawrence Communications LCC v. Apple Inc., AT&T Mobility, and Cellco Partnership D/B/A Verizon Wireless Civil Action No. 2:16-cv-00082-JRG (Eastern District of Texas)* (deposed)

2016–2017 Expert witness for Samsung Corporation, represented by Covington Burlington, LLP in *In the Matter of Certain Audio Processing Hardware, Software, and Products Containing the Same* before the International Trade Commission, Investigation No. 337-TA-1026 (deposed)

2016–2017 Expert consultant for Alston and Bird, LLC on behalf of Nokia.

2015–2016 Expert witness for Acer, Inc.; Acer America Corp.; ASUS TeK Computer Inc.; ASUS Computer International; Dell Inc.; Hewlett Packard Co.; Lenovo Holding Co., Inc.; Lenovo (United States) Inc.; Toshiba Corp.; and Toshiba America Information Systems, Inc. in *In the matter of certain audio processing hardware and software products contain same* before the International Trade Commission, case 337-TA-949 (deposed)

2015 Expert witness for Realtek Semiconductor Corporation, represented by Steptoe & Johnson, LLP in *Realtek Semiconductor Corporation v. Andrea Electronics Corporation before the United States Patent and Trademark Office Patent Trial and Appeal Board*, Case Numbers IPR2015-01392, IPR2015-01393, IPR2015-01394, IPR2015-01395, IPR2015-01396 (deposed)

2015 Expert witness for Realtek Semiconductor Corporation, represented by Chen Malin, LLP in *In the matter of certain audio processing hardware and software products contain same* before the International Trade Commission, case 337-TA-949

2012–2013 Expert witness for MobileMedia Ideas, LLC, represented by Proskauer in *MobileMedia Ideas LLC, v. Research in Motion Limited and Research in Motion Corporation, Civil Action No. 3:11-cv-02353-N (Northern District of Texas)* (deposed)

2009-2013 Expert witness for Oticon, LLC, represented by Birch, Steward, Kolasch, & Birch, L.L.P. in *Oticon, Inc. v. Sebotek Hearing systems, LLC, et al., Civil Action No. 3:08-cv-05489-FLW (District of New Jersey)* and *Sound Design Technologies, Ltd. v Oticon, Inc., Civil Action No. 2:11-cv-01375-SRB (District of Arizona)* (deposed twice, testified in Markman hearing)

2007-2011 Expert Consultant, Alston and Bird, LLC performing internal analysis for various Nokia Patents

2011 Expert consultant for Alston and Bird, LLC on behalf of Nokia in *Nokia Corporation v. Apple Inc., Civil Action No. 1:09-cv-00791-GMS (District of Delaware)*

2011 Expert witness for Flightcom Corporation, represented by Alston and Bird, LLC in *TechnoFirst S.A. v. Flightcom Corp., Civil Action No. 2:05-cv-00411-HCM-FBS (Eastern District of Virginia)*

2011 Expert consultant for Alston and Bird, LLC on behalf of Nokia in *Nokia Corporation v. Apple Inc., Civil Action No. 1:09-cv-00791-GMS (District of Delaware)* (patent analysis)

2008 Technical Consultant, Sound Innovations, Inc., White River Junction, Vermont

2007-2008 Expert witness for Oticon, LLC and Bernafon, represented by Finnegan and Henderson in *Energy Transportation Group, Inc, v. Sonic Innovations, Inc., et al, Case 1:05-cv-00422-GMS (District of Delaware)* (non-infringement expert, deposed, testified before jury)

2007–2008 Technical Consultant, Personics Labs, Boca Raton, Florida

2005–2008 Technical Consulant and Technical Advisory Board member, GTronix, Inc., Fremont, California

1997–2000 Technical Consultant, ASPI, Inc., Atlanta, Georgia

H. Other Professional Activities

2008 Technical Consultant, Sound Innovations, Inc., White River Junction, Vermont

2007–2008 Technical Consultant, Personics Labs, Boca Raton, Florida

2005–2008 Technical Consulant and Technical Advisory Board member, GTronix, Inc., Fremont, California

1998–2000 Technical Consultant, ASPI, Inc., Atlanta, Georgia

V. Teaching

A. Courses Taught

Semester/year	Course	enrollment
Fall 2022	ECE 4872- Create-X Capstone Design	15
Summer 2022	ECE 6250- Adv Digital Signal Proc	35
Spring 2022	ECE 6250- Adv Digital Signal Proc	60
Spring 2022	ECE 2026- Intro to Signal Proc (advisor)	—
Spring 2022	ECE 4872- Create-X Capstone Design	15
Summer 2021	ECE 6250 - Adv Digital Signal Proc	52
Spring 2021	ECE 4270 - Fund-Digital Signal Proc	30
Spring 2021	ECE 4872 - Special Topics: Capstone Design 2	6
Spring 2021	ECE 6254 - Stat Machine Learning	86
Summer 2020	ECE 6250 - Adv Digital Signal Proc: Advanced Digital Signal P	9
Spring 2020	ECE 4271- DSP Applications	36
Spring 2020	ECE 4270- Fund-Digital Signal Proc	38
Summer 2019	ECE 3057 - Arch, Sys, Conc & Engy Comp	20
Spring 2019	ECE 2026 - Intro Signal Processing	95
Spring 2019	ECE 4012 - ECE Culminating Design 2	9
Fall 2018	ECE 4270 - Fund-Digital Signal Proc	44
Fall 2018	ECE 6250 - Adv Digital Signal Proc	37
Summer 2018	ECE 3077 - Prob/Stats for ECE	26
Summer 2018	ECE 6271 - Adaptive Filtering	33
Spring 2018	ECE 2026 - Intro Signal Processing	98
Spring 2018	ECE 6254 - Stat Machine Learning	132
Fall 2017	ECE 4012 - ECE Culminating Design 2	16
Spring 2017	ECE 2036 - Engr Software Design	13
Spring 2017	ECE 6250 - Adv Digital Signal Proc	13
Spring 2016	ECE 2036 - Engr Software Design	10
Spring 2016	ECE 6271 - Adaptive Filtering	11
Fall 2016	ECE 4270 - Fund-Digital Signal Proc	63
Fall 2016	ECE 6273 - Pattern Recognit-Speech	59

B. Individual Student Guidance

B.1.a. Ph.D. Students Graduated

2004 **Tyson S. Hall, Ph.D.**

Thesis: Field–Programmable Analog Arrays: A Floating–Gate Approach

Current: Professor at Southern Adventist University

2005 **Heejong Yoo, Ph.D.**

Thesis: Low–Power Audio Input Enhancements for Portable Devices

Current: IP department at Qualcomm, Inc.

2005 **Venkatesh Krishnan, Ph.D.**

Thesis: A framework for low bit-rate speech coding in noisy environments

Current: Multimedia research group at Qualcomm, Inc.

2006 **Cenk Demiroglu, Ph.D.**

Thesis: Multisensor Segmentation-based Noise Suppression for Intelligibility Improvement in MELP Coders

Current: Assistant Professor at Özyeğin University (Turkey)

2006 **Rongqiang (James) Hu, Ph.D.**

Thesis: Multi-Sensor Noise Suppression and Bandwidth Extension for Enhancement of Speech

Current: Nintendo

2007 **Sourabh Ravindran, Ph.D.**

Thesis: Physiologically Motivated Methods for Audio Pattern Classification

Current: Director, Mobile Processor Innovation Lab at Samsung

2007 **Shyam Subramanian, Ph.D.**

Thesis: Methods for Synthesis of Multiple-Input Translinear Element Networks

Current: Senior Principal Design Engineer at Cadence Design Systems

2007 **Teahyung Lee, Ph.D.**

Thesis: Algorithm-based Efficient Approaches for Motion Estimation Systems

Current: Intel Research

2009 **Nikolaos Vasiloglou, Ph.D.**

Thesis: Isometry and Convexity in Dimensionality Reduction

Current: Entreprenuer and Consultant in Machine Learning

2009 **Haw Jing (Michael) Lo, Ph.D.**

Thesis: Design of a Reusable Distributed Arithmetic Filter and its Application to the Affine Projection Algorithm

Current: Qualcomm, Inc.

2009 **Ismail Faik Baskaya, Ph.D.**

Thesis: Physical Design Automation for Large Scale Field Programmable Analog Arrays

Current: Assistant Professor at Boğaziçi University, Istanbul (Turkey)

2009 **Walter Huang, Ph.D.**

Thesis: Implementation of Adaptive Digital FIR and Reprogrammable Mixed-Signal Filters using Distributed Arithmetic

Current: Qualcomm, Inc.

2009 **Jungwon Lee, Ph.D.**

Thesis: Efficient Image Compression System with a CMOS Transform Imager

Current: Senior Engineer, Samsung Electronics, Korea

2009 **Harry (Bo) Marr, Ph.D.**

Co-advisor: Jennifer Hasler

Thesis: Learning, Probabilistic, and Asynchronous Technologies for an Ultra Efficient Datapath

Current: Director of Low Power Computing Group Raytheon at Raytheon, Inc.

2011 **Brian Gestner, Ph.D.**

Thesis: Lattice Reduction for MIMO Detection: From Theoretical Analysis to Hardware Realization

Current: Chief Technology Officer at Soneter

2012 **Jason George, Ph.D.**

Thesis: Harnessing Resilience: Biased Voltage Overscaling for Probabilistic Signal Processing

Current: Entrepreneur

2012 **Leung Kin Chui, Ph.D.**

Thesis: Efficient audio signal processing for embedded systems

Current: Design Engineer at Texas Instruments

2012 **Jorge Marin, Ph.D.**

Thesis: Robust binaural noise-reduction strategies with binaural-hearing-aid constraints: design, analysis and practical considerations

Current: Professor at Universidad del Quindío

2012 **Devangi Parikh, Ph.D.**

Thesis: Improving the quality of speech in noisy environments

Current: Biomedical Research Lab at Texas Instruments

2012 **Varinthira Duangudom, Ph.D.**

Thesis: Computational auditory saliency

Current: Homemaker

2013 **Irteza Syed, Ph.D.**

Thesis: Classifiation using Residual Vector Quantization

Current: Aero, Inc, Pakistan

2014 **Syed Hussain Raza, Ph.D.**

Thesis: Temporally Consistent Semantic Segmentation in Videos

Current: NVIDIA

2014 **Nashie Sephus, Ph.D.**

Thesis: A Framework for Exploiting Modulation Spectral Features in Music Data Mining and Other Applicaitons

Current: CTO at Partpic, Inc.

2015 **Ryan Curtin, Ph.D.**

Thesis: Improving Dual-Tree Algorithms

Current: relational.ai

2015 **Chu Meh Chu, Ph.D.**

Thesis: Exploiting Temporal and Spatial Redundancies for Vector Quantization of Speech and Images

Current: Luxoft

2016 **Jinwoo Kang, Ph.D.**

Thesis: Face Recognition for Vehicle Personalization

2017 **Kaitlin Fair, Ph.D.**

Thesis: A Biologically Plausible Sparse Approximation Solver on Neuromorphic Hardware

Current: Air Force Research Lab

2017 **Muhammad Rizwan, Ph.D.**

Thesis: Adaptation of Hybrid Deep Neural Network–Hidden Markov Model Speech Recognition System using a Sub-space Approach

Current: Assistant Professor in Pakistan

2018 **Nathan Parrish, Ph.D.**

Thesis: System Configuration for Proportional Control of an Assistive Technology for Patients with Cervical Spinal Cord Injuries

2018 **Brandon Carroll**

Thesis: Characterizing Acoustic Environments with OLAF and ELSA

Current: Georgia Tech (post-doc)

2018 **Bradley Whitaker**

Thesis: Modifying Sparse Coding for Imbalanced Classification

Current: Assistant Professor at Montana State University

2018 **Babafemi Odelowo**

Thesis: Development of a Neural Network-Based Speech Enhancement System

Current: Georgia Tech Research Institute

2019 **Md Nazmus Sahadat**

Thesis: Design and Evaluation of a Multimodal Assistive Technology using Tongue Commands, Head Movements, and Speech Recognition for People with Tetraplegia

Current: Starkey Corporation

2019 **Chieh-Feng Cheng**

Thesis: Audio Classification for Small-sized and Weakly Labelled Data

2021 **Devon Janke**

Thesis: Overcoming Process Variations and Noise in Analog Neural Networks

Current: IBM Corporation

2021 **Lee Richert**

Thesis: Multi-Layer Dictionary Learning Using Low-Rank Updates

Current: Army Research Lab

2022 **You Wang**

Thesis: Attention-based Convolutional Neural Network Model and Its Combination with Few-Shot Learning for Audio Classification

Current: Qualcomm

2022 **Chuyao Feng**

Thesis: Intra-Speaker Voice Quality Recognition for Voice Therapy

Current: Pearson

2022 **Desmond Caulley**

Thesis: Improved Automatic Analysis Methods for Lena-Obtained Audio Recordings of Children with Autism Spectrum Disorder

Current: TQ Intelligence

B.1.b. Ph.D. Students in Progress

2019–present **Mohamad Salut**—Passed Proposal 2021. Thesis title: Randomized Online Tensor Robust Principal Component Analysis

2019–present **Nicolas Shu**—Passed Prelim Exam 2021. (co-advised) Thesis title: Generalized Real-Time Indoor Monitoring System via Audio applied to Interaction Analysis

2020–present **Daniel Dicheck**. Thesis area: System Performance Analysis based on Anomaly Detection

2021–present **Shuvo Newaz**. Thesis area: Emotion recognition in video

B.2.a. M.S. Students Graduated (with Thesis)

2002 **Hyung K. Choi**
Thesis: Blind Source Separation of the Audio Signals in a Real World

2003 **Paul Hultz**
Thesis: Backward Masking in the Human Auditory System

2006 **Daniel Allred**
Thesis: Evaluation and Comparison of Beamforming Algorithms for Microphone Array Speech Processing

2012 **Ailar Javadi**
Thesis: Bio-inspired noise robust auditory features

2012 **Guillermo Colón**
Thesis: Avian musing feature space analysis

2016 **Tushar Supe**
Thesis: Super–CORDIC: Low Delay CORDIC Architectures for Computing Complex Functions

2019 **Harish K Haresamudram**
Thesis: The Role of Representations in Human Activity Recognition

2020 **Maham Tanveer**
Thesis: Learning Distance Metrics for High-Dimensional Data

2020 **Yufeng Yeng**
Thesis: Speaker Recognition and Diarization

2020 **Hua Wang**
Thesis: Noise Suppression in Speech

B.3. Undergraduate Research Students Supervised

- Supervised over 100 undergraduate research projects.

B.5. Mentorship of Postdoctoral Fellows or Visiting Scholars

2018–2021 Brandon Carroll: Audio machine learning for livestock monitoring

C. Other Teaching Activities

Graduate Course Development

- Human Perception and Signal Processing: Advanced Topics in Signal Processing, ECE 7252. The objective of this course is to explore human-centric applications of signal processing. Students learn about compression standards such as MPEG audio and video, perceptually relevant error measures, subjective and objective quality measures, hearing impairments and compensation, signal enhancement, and current research topics in signal processing and human perception.

Short Course Development

- "Digital Signal Processing for Practicing Engineers" - a 12-week on-line course delivered: February 2000, ongoing approximately twice per year.
- "Streaming Multi-Media Production" One-day course delivered: May 2000
- "Finite-Precision Signal Processing" Four-day course delivered: Spring 2007, Summer 2007, Spring 2009.
- "Applications of Psychoacoustics to Signal Processing" One-day tutorial delivered: Spring 2009

VI. Service

A. Professional Contributions

A.1. Society Offices, Activities, and Membership

1991–present Senior Member IEEE (Institute of Electrical and Electronics Engineers)
Member IEEE Signal Processing Society
Member IEEE Education Society
Member IEEE Communications Society

1994–2016 Member ASA (Acoustical Society of America)

A.2. Organization and Chairmanship of Technical Sessions, Workshops, and Conferences

2014 Treasurer, IEEE Global Conference on Signal and Information Processing (GlobalSIP)

2010 Technical Area Chair for the Asilomar Conference on Signals, Systems, and Computers

2003 Co-Chair for the NSF Symposium on Next Generation Automatic Speech Recognition

2002 Local Arrangements Chair for the DSP Workshop

2002 Local Arrangements Chair for the Signal Processing Education Workshop

2002 Special Session Co-Chair at ICASSP 2002, Orlando, FL, May 2002. Session Title: "Cooperative Analog-Digital Signal Processing"

2000 Technical Co-Chair for Signal Processing Education Workshop

A.3 Other

2011–2019 ECE Advisory Board, Rose-Hulman Institute of Technology

1999–present Reviewer for numerous journals and conference publications

B. Public Community Service

2006–2015 Judge for the Georgia FIRST Lego League State Championships robotics competition for middle school students

C. Institute Contributions

C.1. Institute Service

2018–2021 Member, Georgia Tech Institute Research Faculty Promotions Committee

2018–present Member, Georgia Tech Faculty Senate

2016–present Faculty Advisor for Eagles @ GT student club

2011–2014 Chair, Institute Faculty Status Grievance Committee, Georgia Institute of Technology

2010–2016 Member, Institute Faculty Status Grievance Committee, Georgia Institute of Technology

2005–2008 Member, Institute Graduate Committee, Georgia Institute of Technology

2005-2008 Member, Georgia Tech Faculty Senate, Georgia Institute of Technology

C.2. School Service

2022–present Member, ECE Statutory Advisory Committee

2020–present Chair, ECE Graduate Committee

2017–2020 Member, ECE Graduate Student Recruiting Committee, Georgia Institute of Technology

2015–present Member, ECE Graduate Committee

2020–2022 Associate Member, ECE Statutory Advisory Committee

2015–2019 Member, ECE Statutory Advisory Committee

2014–2015 Chair, Computer Systems and Software area in Electrical and Computer Engineering, Georgia Institute of Technology

2009–2014 Member, ECE Graduate Student Recruiting Committee, Georgia Institute of Technology

2006–2007 Associate Director, Center for Research in Embedded Systems Technology

2004–2007 Associate Director over Education Outreach for the Center for Research on Embedded Systems (CREST)

2001–2009 Member, ECE Graduate Committee, Georgia Institute of Technology

1999–2001 Member, ECE Computing Committee, Georgia Institute of Technology