Eun Sok Kim

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Education:

University of California, Berkeley, California
Ph.D. EECS, Solid State Devices (Integrated Sensors), 11/90

University of California, Berkeley, California
M.S. EECS, Solid State Devices (IC-Processed Piezoelectric Microphone), 5/87

University of California, Berkeley, California
B.S. EECS with High Honors, Electronics Specialization, 6/82

Experience:

9/99-Present Ming Hsieh Department of Electrical and Computer Engineering, Univ. of Southern California, Los Angeles, CA

William M. Hogue Professor in Electrical and Computer Engineering: Research interests include microelectromechanical systems (MEMS) technology, acoustic and piezoelectric MEMS, electromagnetic vibration-energy harvesting, inertial sensing, resonant mass sensing, and their applications to biomedicine and information technology. Typically teaches a graduate-level course on MEMS and a senior-undergraduate-level course on analog integrated circuits.

Department Co-Chair (from 7/09 to 6/18): Chaired the Electrophysics division of the department, and oversaw a net tenure-track-faculty growth of 2.5 (from 15.25 to 17.75), 6.5 new tenure-track-faculty hires, a net non-tenure-track-faculty growth of 4 (from 4 to 8), a net Budget-Analysts growth of 2 (from 3 to 5), and lab space growth of 4,206 sq. ft. (from 26,833 to 31,039 sq. ft.). Additionally, made 4 new tenure-track-faculty offers and got 3 acceptances in the last year as the chair. During his tenure as the chair, US News' ranking raw score on USC EE's Graduate Program rose from 3.9 to 4.2 (out of 5.0). Faculty's anonymous evaluations on his overall chair performance in 2015 and 2018 were 4.58 and 4.60 (out of 5.00), respectively.

1/91-1/01 Electrical Engineering Department, University of Hawaii, Honolulu, Hawaii

Associate Professor (from 7/95): Taught Advanced Solid State Devices I and II (EE621 & EE625), Microsensors/Microactuators I and II (EE624 & EE626), Linear Electronics (EE326), Device Physics for IC (EE324), Field and Waves I (EE371), and Microfabrication Processing Technology (EE328). Proposed and developed two new graduate courses on microsensors and microactuators. Developed and established a well-funded research program on acoustic and piezoelectric MEMS.

8/84-12/90 University of California, Berkeley, California

Research Assistant: Developed and fabricated a miniature microphone using IC processes, which was reported in various news media including The Wall Street Journal and Business Week in 1987. Designed, laid out, fabricated, and demonstrated integrated microphones with CMOS amplifiers on a single chip for the first time.

Summer 1984 — Xicor, Inc., Milpitas, California
CMOS Device Engineer: Characterized newly developed CMOS devices.

8/83-5/84 — University of California, Berkeley, California
Teaching Assistant: Taught discussion sessions for Integrated-Circuit Devices course and laboratory sessions for Digital Integrated Circuits course.

7/82-8/83 — NCR Corp., San Diego, California
Associate Engineer-Design: Designed a control, monitor and maintenance panel for a fault-tolerant power system of a mainframe computer.

7/81-12/81 — IBM Research Lab., San Jose, California
College Student Engineer: Characterized experimental magnetic bubble memory chips and documented the measurement results.

Honors and Awards:

Fellow of the National Academy of Inventors (NAI), 2023

Fellow of the Institute of Electrical and Electronics Engineers (IEEE), 2011

Fellow of the Institute of Physics (IOP), 1996

IEEE Transactions on Automation Science and Engineering 2006 Best New Application Paper Award on "In-situ DNA Synthesis on Glass Substrate for Microarray Fabrication Using Self-Focusing Acoustic Transducer," by J.W. Kwon, S. Kamal-Bahl and E.S. Kim, April 2006, pp. 152-158.

Outstanding EE Faculty of the Year Award (voted by UH IEEE student chapter), 1996

Faculty Early Career Development (CAREER) Award from National Science Foundation (NSF), 1995

Research Initiation Award from National Science Foundation, 1991

Research & Training Revolving Fund Award from UH, 1991

University of California, Berkeley, California
B.S. EECS with High Honors, Electronics Specialization, 6/82

Member of Tau Beta Pi (Engineering Honor Society) and Eta Kappa Nu (Electrical Engineering Honor Society)

Editorial and Review:

Editor for Journal of Semiconductor Technology and Science (from 2000)

Editor for IEEE/ASME Journal of Microelectromechanical Systems (2011 - 2024)

Editorial Board for Journal of Micromechanics and Microengineering (1995 - 2016)

Associate Editor for IEEE Transactions on Automation Science and Engineering (2006 – 2011)

Editorial Board for Micro and Nano Systems Letters (from 2013)

Reviewer of National Institute of Health, National Science Foundation, IEEE/ASME Journal of Microelectromechanical Systems, Sensors and Actuators, Applied Physics Letters, IEEE Transactions on Electron Devices, Applied Surface Science, Journal of Materials Research, and IEEE Trans. on Circuits and Systems II.

Guest Editor for Special Issue on Automation for the Life Sciences in IEEE Transactions on Automation Science and Engineering

Issued Patents:

[IP21] *Pick and Placement of Semiconductor Chips Based on Nozzleless Self-Focusing Acoustic Droplet Ejector*, E.S. Kim and Y. Tang, U.S. Patent Number 12,362,205.

[IP20] *Contactless, Damage-Free, High-Precision Cell Extraction and Transfer through Acoustic Droplet Ejection*, E.S. Kim and Y. Tang, X. Chen and J.F. Zhong, U.S. Patent Number 12,017,210.

[IP19] *Focused Ultrasound Transducer with Electrically Controllable Focal Length*, E.S. Kim and L. Zhao, U.S. Patent Number 11,623,248.

[IP18] *Wearable Respiratory Monitoring System Based on Resonant Microphone Array*, E.S. Kim and A. Shkel, U.S. Patent Number 11,547,381.

[IP17] *Ferrofluid Liquid Spring with Magnets between Coils Inside an Enclosed Chamber for Vibration Energy Harvesting*, E.S. Kim and Y. Wang, U.S. Patent Number 10,720,823

[IP16] *Energy Harvester with Magnets and Self-assembled Ferrofluid Liquid Bearing*, E.S. Kim and Y. Wang, U.S. Patent Number 10,418,890

[IP15] *Acoustic Tweezers*, E.S. Kim, Y. Choe, J.W. Kim and K.K. Shung, U.S. Patent Number 10,106,397

[IP14] *Electromagnetic Energy Conversion through Coil and Magnet Arrays*, E.S. Kim and Q. Zhang, U.S. Patent Number 9.231.461.

[IP13] *Self Focusing Acoustic Transducers with Fresnel Reflector/Absorber Lens,* E.S. Kim, H. Yu and C. Lee, U.S. Patent Number 7,719,170.

[IP12] *MEMS Vascular Sensor,* T. K. Hsiai, G. Soundararajan, E. S. Kim, H. Yu, M. Rouhanizadeh, and T. Lin, U.S. Patent Number 8,216,434.

[IP11] *MEMS Vascular Sensor,* T. K. Hsiai, G. Soundararajan, E. S. Kim, H. Yu, M. Rouhanizadeh, and T. Lin, U.S. Patent Number 7,367,237.

[IP10] *Silicon Inertial Sensors Formed Using MEMS*, E.S. Kim and Q. Zou, U.S. Patent Number 7,481,112 B2.

[IP9] *Silicon Inertial Sensors Formed Using MEMS*, A. Madni, Q. Zou, E.S. Kim, L. Costlow, J. Voung, and R. Wells, U.S. Patent Number 7,360,422.

[IP8] *DNA Probe Synthesis on Chip on Demand by MEMS Ejector Array*, E.S. Kim and J.W. Kwon, U.S. Patent Number 7,332,127.

[IP7] *Method for Fabricating a Micromachined Piezoelectric Microspeaker*, S.H. Yi and E.S. Kim, U.S. Patent 7,089,638.

[IP6] *Micromachined Piezoelectric Microspeaker and Fabrication Method Thereof*, S.H. Yi and E.S. Kim, U.S. Patent Number 7,003,125.

[IP5] *Method of Forming Parylene-diaphragm Piezoelectric Acoustic Transducers*, C.H. Han and E.S. Kim, U.S. Patent Number 6,857,501.

[IP4] *Acoustic Wave Micromixer Using Fresnel Annular Sector Actuators,* V. Vivek, E.S. Kim and Y. Zeng, U.S. Patent Number 6,682,214.

[IP3] *Self-limiting Isotropic Wet Etching Process*, E.S. Kim and C.H. Han, U.S. Patent Number 6,379,573.

[IP2] *IC Processed Piezoelectric Microphone*, R.S. Muller and E.S. Kim, U.S. Patent Number 4,816,125.

[IP1] *IC Processed Piezoelectric Microphone*, R.S. Muller and E.S. Kim, U.S. Patent Number 4,783,821.

Pending Patents:

[PP4] *Linear Magnetic Gear for Vibrational Energy Harvesters*, E.S. Kim and J. Wang, U.S. Patent Pending.

[PP3] *Vortex-Beam Acoustic Transducer*, E.S. Kim, J. Lee and K. Sadeghian Esfahani, U.S. Patent Pending.

[PP2] *Ultrasound Transducer with Electrically Controllable Focal-Point Location*, E.S. Kim and L. Zhao, U.S. Patent Pending.

[PP1] *Electrical Tuning of Focal Size with Single-Element Planar Focused Ultrasonic Transducer*, E.S. Kim and Y. Tang, U.S. Patent Pending.

Publications:

Textbook

"Fundamentals of Microelectromechanical Systems (MEMS)," E.S. Kim, Published April 2021 by McGraw Hill, Edition: 1, ISBN: 9781264257584, Format: Print, Pages: 416.

"Look inside" with the table of contents, preface, introduction, substantial part of Ch. 1, last five pages of Ch. 10, and index is available through the following site.
https://www.amazon.com/Fundamentals-Microelectromechanical-Systems-MEMS-Eun/dp/1264257589

Errata and instructor resources are available through the following site.
https://www.mhprofessional.com/fundamentals-of-microelectromechanical-systems-mems-9781264257584-usa-group

Book Chapter

E.S. Kim and S.Y. Chang (2022). Patch Clamp Technology for Focused Ultrasonic (FUS) Neuromodulation. In: Ossandon, M.R., Baker, H., Rasooly, A. (eds) Biomedical Engineering Technologies. Methods in Molecular Biology, vol 2393. Humana, New York, NY. https://doi.org/10.1007/978-1-0716-1803-5_35. PMID: 34837205.

Refereed Journal Papers

99

[J99] M. Barekatain, J. Lee, A. Sengupta, K. Sadeghian Esfahani, A. Roy, and E.S. Kim, "*PREATS: Passive RFID-Based Embedded Anti-Tampering Sensor for Authentication in Semiconductor Supply Chain*," IEEE Sensors Journal, Vol. 25, no. 20, pp. 38949-38956, Oct.15, 2025, doi: 10.1109/JSEN.2025.3605555.

[J98] J. Lee, Y. Tang, A. Roy, K. Sadeghian Esfahani, S.Y. Chang, and E.S. Kim, "*Patch Clamp Recordings of Action Potentials from Pyramidal Neuron in Hippocampus CA1 Under Focused Ultrasound Neurostimulation with MEMS Self-Focusing Acoustic Transducer*," Journal of Neural Engineering, Vol. 22, No. 4, 046004, July 2025, doi: 10.1088/1741-2552/ade7ae.

[J97] K. Sadeghian Esfahani, B. Neff, A. Roy, M. Barekatain, and E.S. Kim, "*Acoustic Tweezers for Microscopy of Living Organisms*," IEEE Transactions on Biomedical Engineering, Vol. 72, No. 9, pp. 2656-2662, Sept. 2025, doi:10.1109/TBME.2025.3548557.

[J96] J. Lee, Y. Tang, X. Chen, J.F. Zhong and E.S. Kim, "*Contactless Single Cell Extraction from Monolayer Cell Culture Using A MEMS Acoustic Droplet Ejector*," IEEE Transactions on Biomedical Engineering, Vol. 72, No. 1, pp. 249-255, Jan. 2025, doi: 10.1109/TBME.2024.3447715.

[J95] H. Liu, M. Barekatain, A. Roy, S. Liu, Y. Cao, Y. Tang, A. Shkel and E.S. Kim, "*MEMS Piezoelectric Resonant Microphone Array for Lung Sound Classification*," Journal of Micromechanics and Microengineering, Vol. 33, No. 4, 044003, 2023.

[J94] Y. Tang and E.S. Kim, "*Simple Sacrificial-Layer-Free Microfabrication Processes for Air-Cavity Fresnel Acoustic Lenses (ACFALS) With Improved Focusing Performance*," Microsystems & Nanoengineering, vol. 8, Article number 75, 2022. https://doi.org/10.1038/s41378-022-00407-w

[J93] M. Barekatain, H. Liu, and E.S. Kim, "*Wireless and Battery-less Tamper Detection with Pyroelectric Energy Converter and High-overtone Bulk Acoustic Resonator*," IEEE Sensors Journal, vol. 22, no. 14, pp. 14639-14646, 2022. doi: 10.1109/JSEN.2022.3182940.

[J92] Y. Tang, L.-Y. Chen, A. Zhang, C.-P. Liao, M.E. Gross, and E.S. Kim, "*In Vivo Non-Thermal, Selective Cancer Treatment with High-Frequency Medium-Intensity Focused Ultrasound*," IEEE Access, vol. 9, pp. 122051-122066, 2021.

[J91] Y. Tang and E.S. Kim, "*Nozzleless Acoustic Droplet Ejector with Electrically Tunable Droplet Size for Picking and Placing Semiconductor Chips*," IEEE/ASME Journal of Microelectromechanical Systems, vol. 30, no. 2, pp. 262-270, 2021.

[J90] H. Liu, S. Liu, A.A. Shkel and E.S. Kim, "*Active Noise Cancellation with MEMS Resonant Microphone Array*," IEEE/ASME Journal of Microelectromechanical Systems, vol. 29, no. 5, pp. 839-845, 2020.

[J89] Y. Tang and E.S. Kim, "*Ring-Focusing Fresnel Acoustic Lens for Long Depth-of-Focus Focused Ultrasound and Multiple Trapping Acoustic Beams*," IEEE/ASME Journal of Microelectromechanical Systems, vol. 29, no. 5, pp. 692-698, 2020.

[J88] L. Zhao and E.S. Kim, "*Analytical Dual-Charged-Surfaces Model for Permanent Magnet and Its Application in Magnetic Spring*," IEEE Transactions on Magnetics, vol. 56, no. 9, pp. 1 – 7, 2020.

[J87] A. Shkel and E.S. Kim, "*Continuous Health Monitoring with Resonant-Microphone-Array-Based Wearable Stethoscope*," IEEE Sensors Journal, vol. 19, no. 12, pp. 4629-4638, 2019.

[J86] L. Wang, A. Lin and E.S. Kim, "*Miniature Sensing System with FBAR-based Oscillators and Frequency Shift*," IEEE Sensors Journal, vol. 18, no. 18, pp. 7633 – 7637, 2018.

[J85] Y. Wang, Q. Zhang, L. Zhao and E.S. Kim, "*Non-Resonant, Electromagnetic Broad-Band Vibration-Energy Harvester Based on Self-Assembled Ferrofluid Liquid Bearing*," IEEE/ASME Journal of Microelectromechanical Systems, vol. 26, no. 4, pp. 809 – 819, 2017.

[J84] Y. Wang, Q. Zhang, L. Zhao, Y. Tang, A. Shkel and E.S. Kim, "*Vibration Energy Harvester with Low Resonant Frequency Based on Flexible Coil and Liquid Spring*," Applied Physics Letter, 109, 203901 (2016); doi: 10.1063/1.4967498.

[J83] S. Cong, Y. Cao, X. Fang, Y. Wang, Q. Liu, H. Gui, C. Shen, X. Cao, E.S. Kim, and C. Zhou, "*Carbon Nanotube Macroelectronics for Active Matrix Polymer-Dispersed Liquid Crystal Displays*," ACS Nano, 10 (11), pp. 10068–10074, 2016.

[J82] Q. Zhang, Y. Wang, L. Zhao and E.S. Kim, "*Integration of Microfabricated Low Resistance and Thousand-turn Coils for Vibration Energy Harvesting*," Journal of Micromechanics and Microengineering, vol. 26, no. 2, 025019 (10pp), 2016.

[J81] Q. Zhang and E.S. Kim, "*Microfabricated Electromagnetic Energy Harvesters with Magnet and Coil Arrays Suspended by Silicon Springs*," IEEE Sensors Journal, vol. 16, no. 3, pp. 634 - 641, 2016.

[J80] D.A. Thomas, L. Wang, B. Goh, E.S. Kim, J. L. Beauchamp, "*Mass Spectrometric Sampling of a Liquid Surface by Nanoliter Droplet Generation from Bursting Bubbles and Focused Acoustic Pulses: Application to Studies of Interfacial Chemistry*," Analytical Chemistry, vol. 87, no. 6, pp 3336–3344, 2015.

[J79] Q. Zhang, Y. Wang and E.S. Kim, "*Electromagnetic Energy Harvester with Flexible Coils and Magnetic Spring for 1 – 10 Hz Resonance*," IEEE/ASME Journal of Microelectromechanical Systems, vol. 24, no. 4, pp. 1193 - 1206, 2015.

[J78] Q. Zhang and E.S. Kim, "*Micromachined Energy-Harvester Stack with Enhanced Electromagnetic Induction through Vertical Integration of Magnets*," IEEE/ASME Journal of Microelectromechanical Systems, vol. 24, no. 2, pp. 384 - 394, 2015.

[J77] Q. Zhang and E.S. Kim, "*Vibration Energy Harvesting Based on Magnet and Coil Arrays for Watt-Level Handheld Power Source*," Proceedings of the IEEE, vol. 102, no. 11, pp. 1747 – 1761, 2014.

[J76] Q. Zhang, Y. Wang, and E.S. Kim, "*Power Generation from Human Body Motion through Magnet and Coil Arrays With Magnetic Spring*," Journal of Applied Physics, vol. 115064908 (5pp), 2014.

[J75] Y. Choe, S.-J. Chen and E.S. Kim, "*Peptide Synthesis on Glass Substrate Using Acoustic Droplet Ejector*," IEEE Transactions on Biomedical Engineering, vol. 61, no. 3, pp. 705-710, March 2014. Selected to be one of the journal's three featured articles in March 2014

[J74] Y. Choe and E.S. Kim, "*Valveless Micropump Driven by Acoustic Streaming*," Journal of Micromechanics and Microengineering, vol. 23, 045005 (8pp), 2013.

[J73] L. Wang, Y.-J. Li, A. Lin, Y. Choe, M.E. Gross, and E.S. Kim, "*A Self Focusing Acoustic Transducer that Exploits Cytoskeletal Differences for Selective Cytolysis of Cancer Cells*," IEEE/ASME Journal of Microelectromechanical Systems, vol. 22, no. 3, pp. 542-552, 2013.

[J72] K.H. Lam, H.-S. Hsu, Y.Li, C. Lee, A. Lin, Q. Zhou, E.S. Kim, K.K. Shung, "*Ultrahigh Frequency Lensless Ultrasonic Transducers for Acoustic Tweezers Application*," Biotechnology and Bioengineering, vol. 110, no. 3, pp. 881-886, 2013.

[J71] L. Baumgartel, A. Vafanejad, S.-J. Chen, and E.S. Kim, "*Resonance Enhanced Piezoelectric Microphone Array for Broadband or Pre-filtered Acoustic Sensing*," IEEE/ASME Journal of Microelectromechanical Systems, vol. 22, pp. 107-114, 2013.

[J70] S.C. Ur, E.S. Kim, and S.H. Yi, "*The Effects of Residual Stresses in the Composite Diaphragm on the Performance of Piezoelectric Microspeakers*," Electronic Materials Letters, vol. 9, no. 1, pp. 119-123, 2013.

[J69] F. Yu, J. Lee, N. Jen, X. Li, Q. Zhang, R.Tang, Q.Zhou, E.S. Kim, T.K.Hsiai, "*Elevated Electrochemical Impedance in the Endoluminal Regions with High Shear Stress: Implication for Assessing Lipid-rich Atherosclerotic Lesions*," Biosensors and Bioelectronics, vol. 43, pp. 237-244, 2013

[J68] S.-J. Chen, Y. Choe, L. Baumgartel, A. Lin, and E.S. Kim, "*Edge-released, Piezoelectric MEMS Acoustic Transducers in Array Configuration*," Journal of Micromechanics and Microengineering, vol. 22, 025005 (2012).

[J67] W. Pang, H. Zhao, E.S. Kim, H. Zhang, and H. Yu, "*Piezoelectric Microelectromechanical Resonant Sensors for Chemical and Biological Detection*," Lab on a Chip, vol. 12, pp. 29-44, 2012.

[J66] Y. Choe, J.W. Kim, K.K. Shung, and E.S. Kim, "*Microparticle Trapping in An Ultrasonic Bessel Beam*," Applied Physics Letter, vol. 99, 233704 (2011).

[J65] Z. Wang, X. Qiu, J. Zhu, J. Oiler, S.-J. Chen, J. Shi, E.S. Kim, and H. Yu, "*Directional Acoustic Underwater Thruster*," IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency, vol. 58, no. 6, pp. 1114-1117, 2011.

[J64] S.-J. Chen, C.Y. Lee, and E.S. Kim, "*Integration of Piezoelectric Tunable Capacitors and Bonded-wire Inductors for Contactless RF Switch and Tunable Filter*," Sensors and Actuators A: Physical, vol. 165, no. 1, pp. 73-78, 2011.

[J63] F. Yu, R. Li, L. Ai, C. Edington, H. Yu, M. Barr, E.S. Kim, and T.K. Hsiai, "Electrochemical Impedance Spectroscopy to Study Vascular Oxidative Stress," Annals of Biomedical Engineering, vol. 39, no. 1, pp. 287-296, 2011.

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[J61] H. Zhang, W. Pang, E. S. Kim and H. Yu, "Micromachined Silicon and Polymer Probes Integrated with Film Bulk Acoustic Resonator Mass Sensors," Journal of Micromechanics and Microengineering, vol. 20, no. 12, pp. 125008 (9pp), 2010.

[J60] W. Pang, H. Zhang, R.C. Ruby, H. Yu, and E.S. Kim, "*Analytical and experimental study on the second harmonic mode of bulk acoustic wave resonator*," Journal of Micromechanics and Microengineering, vol. 20, no. 11, pp. 115015 (10pp), 2010.

[J59] H. Zhang, W. Pang, M.S. Marma, C.Y. Lee, S. Kamal-Bahl, E.S. Kim, and C.E. McKenna, "*Label-Free Detection of Protein-Ligand Interactions in Real Time Using Micromachined Bulk Acoustic Resonators*," Applied Physics Letter, vol. 96, no. 12, 123702, 2010.

[J58] J. Zhu, C. Lee, E.S. Kim, D. Wu, C. Hu, Q. Zhou, K.K. Shung, and H. Yu, "*High-overtone Self-Focusing Acoustic Transducers for High Frequency Ultrasonic Doppler*," Ultrasonics, vol. 50, no. 6, pp. 544-547, 2010.

[J57] J. Lo, P. Butte, Q. Fang, S.-J. Chen, T. Papaioannou, E.S. Kim, M. Gundersen, and L. Marcu, "Multilayered MOEMS Tunable Spectrometer for Fluorescence Lifetime Detection," IEEE Photonics Technology Letters, vol. 22, no. 7, pp. 486 – 488, 2010.

[J56] L. Ai, H. Yu, A. Paraboschi, F. Yu, E.S. Kim, R. Li and T.K. Hsiai, *"Optimization of Intravascular Shear Stress Assessment in Vivo,"* Journal of Biomechanics, vol. 42, no. 10, pp. 1429-1437, 2009.

[J55] J. Lo, S.-J. Chen, Q. Fang, T. Papaioannou, E.S. Kim, M. Gundersen and L. Marcu, "Performance of Diaphragmed Microlens for a Packaged Microspectrometer," Sensors, vol. 9, no. 2, pp. 859-868, 2009.

[J54] H. Yu, C. Lee, W. Pang, H. Zhang, A. Brannon, J. Kitching, and E.S. Kim, "*HBAR-Based 3.6 GHz Oscillator with Low Power Consumption and Low Phase Noise*," IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency, vol. 56, no. 2, pp. 400 – 403, 2009.

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[J51] H. Yu, L. Ai, M. Rouhanizadeh, D. Patel, E.S. Kim, and T.K. Hsiai, "*Flexible Polymer Sensors for In Vivo Intravascular Shear Stress Analysis*," IEEE/ASME Journal of Microelectromechanical Systems, vol. 17, no. 5, pp. 1178 – 1186, 2008.

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[J49] C.Y. Lee, W. Pang, S. Chen, D. Chi, H. Yu, and E.S. Kim, "*Surface Micromachined, Complementary-Metal-Oxide-Semiconductor Compatible Tunable Capacitor with 14:1 Continuous Tuning Range,*" Applied Physics Letters, vol. 92, 044103, 2008.

[J48] C.Y. Lee, H. Yu, and E.S. Kim, "*Droplet-Based Microreactions with Oil Encapsulation*," IEEE/ASME Journal of Microelectromechanical Systems, vol. 17, no. 1, pp. 147 - 156, 2008.

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[J43] C.Y. Lee, S. Kamal-Bahl, H. Yu, J.W. Kwon and E.S. Kim, "*On-Demand DNA Synthesis on Solid Surface by Four Directional Ejectors on a Chip*," IEEE/ASME Journal of Microelectromechanical Systems, vol. 16, no. 5, pp. 1130-1139, 2007.

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[J37] W. Pang, L. Yan, H. Zhang, H. Yu, E.S. Kim and W.C. Tang, "*Femtogam Mass Sensing Platform Based on Lateral-extensional-mode (LEM) Piezoelectric Resonator*," Applied Physics Letters, vol. 88, 243503, 2006.

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[C181] Y. Zhang, A. Sengupta, K. Sadeghian Esfahani, A. Roy, and E.S. Kim, "*Piezoelectric Microspeaker on Corrugated Parylene Diaphragm*," The 39th IEEE International Conference on Micro Electro Mechanical Systems (MEMS 2026), Salzburg, Austria, January 25 - 29, 2026, Accepted. Outstanding Student Paper Award Finalist.

[C180] D. Mandal, H. Gao, A. Roy, and E.S. Kim, "*Nanoliter Droplet Merging through DC Electrocoalescence*," The 39th IEEE International Conference on Micro Electro Mechanical Systems (MEMS 2026), Salzburg, Austria, January 25 - 29, 2026, Accepted.

[C179] E.S. Kim, "Acoustic Droplet Ejectors for Semiconductor Chip Ejection," Invited Talk at the 71st Annual IEEE International Electron Devices Meeting, San Francisco, CA, December 6-10, 2025, Invited.

[C178] Y. Zhang and E.S. Kim, "*Microspeaker Based on PMN-PT Bimorph Suspended by Corrugated Parylene*," The 2025 IEEE International Ultrasonics Symposium, Utrecht, Netherlands, September 15 – 18, 2025, Presented.

[C177] A. Roy, K. Sadeghian Esfahani, A. Sengupta, Y. Zhang, and E.S. Kim, "*Linear Self-Focusing Acoustic Transducer*," Transducers '25, The 23rd International Conference on Solid-State Sensors, Actuators and Microsystems, Orlando, FL, June 29 – July 3, 2025, pp. 542 - 545.

[C176] K. Sadeghian Esfahani, B. Neff, A. Roy, A. Sengupta, and E.S. Kim, "*Single Cell Ejection from Peripheral Blood Mononuclear Cells (PBMC) into Oil-Coated 96-Well Plate*," The 38th IEEE International Conference on Micro Electro Mechanical Systems (MEMS 2025), Kaohsiung, Taiwan, January 19 - 23, 2025, pp. 363 - 366.

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[C172] J. Wang, A. Zhang, D. Cantini, and E.S. Kim, "*Non-Resonant Vibration Energy Harvester for Sub-Hertz and Sub-G Vibration*," Hilton Head Workshop 2024: A Solid-State Sensors, Actuators and Microsystems Workshop, Hilton Head Island, SC, June 2 - 6, 2024, pp. 386 - 389.

[C171] A. Sengupta, A. Roy, H. Gao, M. Barekatain, H. Liu, and E.S. Kim, "*Wearable Stethoscope Based on Resonant Microphone Array with Wireless Data Transfer*," The 37th IEEE International Conference on Micro Electro Mechanical Systems (MEMS 2024), Austin, TX, January 21-25, 2024, pp. 101 - 104. Outstanding Student Paper Award Finalist.

[C170] B. Neff, A. Roy, K. Esfahani, and E.S. Kim, "*Mixing, Trapping, and Ejection of Single Microparticle with Size and Material Selectivity Using Acoustic Tweezers*," The 37th IEEE International Conference on Micro Electro Mechanical Systems (MEMS 2024), Austin, TX, January 21-25, 2024, pp. 340 - 343.

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[C162] K. Sadeghian Esfahani, Y. Tang, J. Lee, M. Barekatain, and E.S. Kim, "Underwater Acoustic Tweezers Capable of Trapping Large and Heavy Particles," Hilton Head Workshop 2022: A Solid-State Sensors, Actuators and Microsystems Workshop, Hilton Head Island, SC, June 5 - 9, 2022, pp. 43 - 46.

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[C151] L. Zhao and E.S. Kim, "*Acoustic Tweezers with Electrical Controllability on Rotation of Trapped Particle*," IEEE International Ultrasonics Symposium, Glasgow, UK, October 6 - 9, 2019, pp. 663-666.

[C150] Y. Tang and E.S. Kim, "*Acoustic Propeller Based on Air Jets from Acoustic Streaming*," Transducers '19, The 20th International Conference on Solid-State Sensors, Actuators and Microsystems, Berlin, Germany, June 23 - 27, 2019, pp. 2068 - 2071.

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[C141] A. Shkel and E.S. Kim, "*Wearable Low-Power Wireless Lung Sound Detection Enhanced by Resonant Transducer Array for Pre-Filtered Signal Acquisition*," Transducers '17, The 19th

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[C138] Y. Wang, L. Zhao, A. Shkel, Y. Tang and E.S. Kim, "*Vibration Energy Harvester Based on Floating Magnet for Generating Power from Human Movement*," Solid-State Sensor and Actuator Workshop, Hilton Head Island, SC, June 5 -9, 2016, pp. 404 - 407.

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[C125] Y. Choe, L. Wang, and E.S. Kim, "*In Situ Protein Synthesis on Glass Substrate with Acoustic Microdroplet Ejector with Air-Cavity Lens Formed by Micromachined Silicon*," Transducers '13, The 17th International Conference on Solid-State Sensors, Actuators and Microsystems, Barcelona, Spain, June 16 - 20, 2013, pp. 325 - 328.

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[C123] L. Wang, Y. Li, A. Lin, Y. Choe, M. Gross, and E.S. Kim, "*Combinatory Localized Cytolysis with Micron Precision by Acoustic Transducer Array for Fast Screening of Drug Induced Cytoskeleton Alteration*," IEEE International Micro Electro Mechanical Systems Conference, Paris, France, Jan. 29 – Feb. 2, 2012, pp. 800 - 803.

[C122] E.S. Kim, "*Piezoelectric microspeakers built on various diaphragms*," 162nd Meeting: Acoustical Society of America, San Diego, CA, Oct. 31 – Nov. 4, 2011, Invited.

[C121] L. Wang, Y. Li, A. Lin, Y. Choe, M. Gross, and E.S. Kim, "*Micro-localized Cell Lysis by Low Power Focused Acoustic Transducer*," IEEE International Ultrasonics Symposium, Orlando, FL, October 18-21, 2011, pp. 1123 - 1126.

[C120] A. Lin, Y. Li, L. Wang, S.J. Chen, M. Gross, and E.S. Kim, " *Label-Free Detection of Prostate-Specific Antigen with FBAR-Based Sensor with Oriented Antibody Immobilization*," IEEE International Ultrasonics Symposium, Orlando, FL, October 18-21, 2011, pp. 797 - 800.

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[C13] F. von Preissig, H. Zeng and E.S. Kim, "*New Methods of Measuring Key Elastic-Piezoelectric Constant of Thin Films,*" ASME Winter Annual Meeting, Symposium on Mechanics in Micro-Electro-Mechanical Systems (Atlanta, GA), November 17-22, 1996, DSC-Vol. 59, pp. 307-312.

[C12] W.W. Lau, Y. Song and E.S. Kim, "*Lateral-Field-Excitation Acoustic Resonators for Monolithic Oscillators and Filters*," IEEE International Frequency Control Symposium, Honolulu, HI, June 5 - 7, 1996, pp. 558-562.

[C11] Y.L. Huang, H. Zhang, E.S. Kim, S.G. Kim and Y.B. Jeon, "*Piezoelectrically Actuated Microcantilever for Actuated Mirror Array Application*," Solid-State Sensor and Actuator Workshop, Hilton Head Island, SC, June 2 - 6, 1996, pp. 191-195.

[C10] X. Zhu, E. Tran, W. Wang, E.S. Kim and S.Y. Lee, "*Micromachined Acoustic-Wave Liquid Ejector*," Solid-State Sensor and Actuator Workshop, Hilton Head Island, SC, June 2 - 6, 1996, pp. 280-282.

[C9] S.Y. Lee, Y.K. Kwong, E.S. Kim and E. Tran, "*Local Thermal Decoupling Using Silicon Micromachining*," The 1995 March Meeting of American Physical Society (San Jose, CA), March 20-24, 1995.

[C8] H. Zhang and E.S. Kim, "*Dome-Shaped Diaphragm Microtransducers*," MEMS '95, IEEE International Workshop on Micro Electro Mechanical Systems (Amsterdam, Netherlands), Jan. 29 - Feb. 2, 1995, pp. 256-260.

[C7] Y. Huang and E.S. Kim, "*Ultrasonic Agitation During Sputter Deposition of Thin Film*," ASME Winter Annual Meeting, Symposium on Mechanics of Materials Processing and Manufacturing (Chicago, IL), November 6-11, 1994, AMD-Vol. 194, pp. 13-18.

[C6] A.D. Sathe and E.S. Kim, "*Techniques to Control Residual Stress in ZnO Thin Films*," Transducers '93, IEEE International Conference on Solid-State Sensors and Actuators (Yokohama, Japan), June 7-10, 1993, pp. 158-161.

[C5] R.P. Ried, E.S. Kim, D.M. Hong and R.S. Muller, "*Residual-Stress Compensation in Clamped-Clamped Micromachined Plates*," ASME Winter Annual Meeting, Symposium on Micro-Mechanical Systems (Anaheim, CA), November 8-13, 1992, DSC-Vol. 40, pp. 23 - 32.

[C4] E.S. Kim, J.R. Kim and R.S. Muller, "*Improved IC-Compatible Piezoelectric Microphone and CMOS Process*," Transducers '91, IEEE International Conference on Solid-State Sensors and Actuators (San Francisco, CA), June 23-27, 1991, pp. 270-273.

[C3] E.S. Kim, R.S. Muller and P.R. Gray, "*Integrated Microphone with CMOS Circuits on A Single Chip*," IEEE International Electron Devices Meeting (Washington, D.C.), Dec. 3-6, 1989, pp. 880-883.

[C2] E.S. Kim and R.S. Muller, "*Piezoelectric Readout Miniature Microphone*," Proc. International Symposium on Microelectronics (Minneapolis, MN), Sept. 28-30, 1987, pp. 290-295.

[C1] E.S. Kim and R.S. Muller, "*Micromachined ZnO on Silicon Nitride Pressure Sensor*," IEEE International Electron Devices Meeting (Los Angeles, CA), Dec. 7-10, 1986, pp. 807-808.

Invited Talks Since 1999

E.S. Kim, "*Acoustic Droplet Ejectors for Semiconductor Chip Ejection*," Invited Talk at the 71st Annual IEEE International Electron Devices Meeting, San Francisco, CA, December 6-10, 2025.

E.S. Kim, "*Acoustic Tweezing and Propulsion*," The EECS Colloquium, UC Irvine, May 16, 2025.

E.S. Kim, "*Selective Cancer Treatment with High-Frequency Medium-Intensity Focused Ultrasound*," Invited Talk at the 15th International Conference on Ultrasound Engineering for Biomedical Applications, Torrance, CA, July 19 – 21, 2023.

E.S. Kim, "*Wearable and Wireless Respiratory Monitoring System*," Keynote Lecture at the 2021 IEEE International Symposium on Next-Generation Electronics (ISNE 2020), Changsha, China, July 10 – 11, 2021.

E.S. Kim, "*Acoustic Tweezing, Droplet Ejection and Propulsion*," University of Michigan, Dearborn, April 22, 2021.

E.S. Kim, "*MEMS-Based Vibration-Energy-Harvesting from Human Motion*," National Singapore University, Singapore, September 18, 2019.

E.S. Kim, "*Microtechnology-Enabled Ultrasonics*," University of Texas, Austin, TX, August 1, 2019.

E.S. Kim, "*Ubiquitous Vibration-Energy Harvesting Based on MEMS*," University of California, Riverside, CA, October 9, 2018.

E.S. Kim, "*Electromagnetic Vibration-Energy Harvesters for Wearable Technology*," PowerMEMS School on December 1, The 15th International Conference on Micro and Nanotechnology for Power Generation and Energy Conversion Applications (PowerMEMS 2015), Boston, MA, December 1 - 4, 2015.

E.S. Kim, "*Microtechnology Enabled Ultrasonics*," Leaders & Innovators Seminar Series, Department of Electrical and Computer Engineering, Texas A&M University, College Station, TX, December 4, 2014.

E.S. Kim, "*Microtechnology Enabled Ultrasonics*," Department of Electrical and Computer Engineering, University of Missouri, Columbia, Missouri, December 2, 2014.

E.S. Kim, "*Fresnel Lensed High Frequency Transducers*," 11th Annual Ultrasonic Transducer Engineering Conference, Los Angeles, CA, April 17-19, 2013.

E.S. Kim, "*Selective Cell Lysis and Cell Tweezing with Focused Acoustic Beam*," USC – Physical Sciences in Oncology Center 2nd Annual Symposium, Los Angeles, CA, September 27, 2012.

E.S. Kim, "*Piezoelectric Microspeakers Built On Various Diaphragms*," 162nd Meeting: Acoustical Society of America, San Diego, CA, Oct. 31 – Nov. 4, 2011.

E.S. Kim, "*Acoustic MEMS Transducers for Biomedical Applications*," IEEE International Frequency Control Symposium, Newport Beach, CA, June 2-4, 2010, pp. 71 - 76.

E.S. Kim, "*Piezoelectric MEMS for Audio Signal Transduction, Microfluidic Management, Resonant Mass Sensing, and Movable Surface Micromachined Structures*," IEEE International Ultrasonics Symposium, Beijing, China, November 2-5, 2008.

E.S. Kim, "*Acoustic Microelectromechanical Systems*," Microsoft Research, August 21, 2008, Redmond, WA.

E.S. Kim, "*FBAR-based Tunable Oscillators and Mass Sensors*," DARPA/MTO Workshop on Piezoelectric MEMS, March 11-12, 2008, San Francisco, CA.
E.S. Kim, "*Microreaction Technology Based on Nanoliter Droplets*," July 12, 2007, The fifth Korea-U.S.A. Joint Symposium on MEMS and BioSystems Technology, Daejeon, Republic of Korea.
E.S. Kim, "*Piezoelectric and Acoustic MEMS*," August 11, 2006, National Taiwan University, Taipei, Taiwan.
E.S. Kim, "*MEMS Microspeaker and Microphone*" and "*MEMS Ultrasonic Transducer*," August 10, 2006, Industrial Technology Research Institute, Hsin Chu, Taiwan
E.S. Kim, "*Piezoelectric and Acoustic MEMS*," August 9, 2006, National Cheng Kung University, Tainan, Taiwan.
E.S. Kim, "*Piezoelectric Transducers for Microfluidic Systems*," "*Piezoelectrically Actuated Cantilevers for Mirror Array*," "*Tunable Capacitor and Gyroscope*," "*Microphones and Microspeakers*," and "*Film Bulk Acoustic-wave Resonators for GHz Oscillators and Resonant Mass Sensors*," August 8, 2006, Southern Taiwan University of Technology, Tainan, Taiwan.
E.S. Kim, "*Integration of Film Bulk Acoustic Resonator with MEMS*," June 10, 2005, The third Korea-U.S.A. Joint Symposium on MEMS and BioSystems Technology, Daejeon, Republic of Korea.
E.S. Kim, "*Localized Cooling through Air or Liquid Jets Produced by a Self-Focusing Acoustic Transducer*," DARPA/MTO Workshop on Site-Specific Thermal Management for ICs, MEMS, and Integrated Systems, January 13-14, 2005, San Diego, CA.
E.S. Kim, "*High Q, Electrically Tunable, Temperature-Compensated GHz Film Bulk Acoustic Resonator*," IEEE Orange County EDS/MTT Joint Chapter Meeting, October 28, 2004, Irvine, CA.
E.S. Kim, "*Ultrasonic Microejectors for Nanoparticle Dispensing*," DARPA/MTO Workshop on Nanoparticle Taggants for Military Applications, August 5-6, 2004, San Francisco, CA.
E.S. Kim, "*Pioezoelectric MEMS*," Ultrasonic Transducer Engineering Conference, March 19-21, 2003, Los Angeles, CA.
E.S. Kim, "*Acoustic MEMS for Microfluidic Management and Bioassay*," January 24, 2003, The First Korea-U.S.A. Joint Symposium on MEMS and BioSystems Technology, Daejeon, Republic of Korea.
E.S. Kim, "*Free-Standing Air-Backed FBAR and Measurement Technique for Acoustic Absorption*," May 30, 2002, Intel Corporation, Santa Clara, CA.
E.S. Kim, "*Application of Piezoelectric MEMS to RF Communication*," January 16, 2002, TRW Inc., Redondo Beach, CA.
E.S. Kim, "*Self-Focusing Acoustic Transducers for Microfluidic Management*," August 27-31, 2001, small Talk2001 Conference (Association for Laboratory Automation), San Diego, CA.
E.S. Kim, "*Silicon-Based Miniature Microphone and Microspeaker*," July 23, 2001, ForteMedia Inc., Campbell, CA.
E.S. Kim, "*Microelectromechanical Systems*," April 2, 2001, Engineering Honor Society at USC.
E.S. Kim, "*Overview of MEMS from Systems Perspective*," March 7, 2001, EE-Systems Chair Seminar Series at USC.

E.S. Kim, "*Film Bulk Acoustic-Wave Resonators*," February 7, 2001, Intel Corporation, Santa Clara, CA.
E.S. Kim, "*Acoustic-Wave Liquid Ejector and Mixer*," December 7, 2000, Chemical Engineering Department at USC.
E.S. Kim, "*MEMS Acoustic Transducers*," July 12-13, 2000, SSC-SD MEMS Day 2000 Sponsored by SPAWAR Systems Center, San Diego, CA.
E.S. Kim, "*MEMS, the Enabling Technology for the 21st Century*," April 10, 2000, California State University at Long Beach.
E.S. Kim, "*MEMS Technology for Biomedical Applications*," September 28, 1999, Biomedical Engineering Department at USC.
E.S. Kim, "*CMOS-Compatible Piezoelectric Microphone*," DARPA Air-Coupled Acoustic Microsensors Workshop, August 24-25, 1999, Crystal City, VA.
E.S. Kim, "*Acoustic-wave Liquid Ejector and Mixer*," UKC-1999 (US-Korea Conference on Science, Technology, and Entrepreneurship), August 11-13, 1999, Los Angeles, CA.

Current Research Grants:

NSF ECCS-2509478, $400,000, 10/25–9/28.
PI Name: E.S. Kim, Proposal Title: Non-resonant Electromagnetic Vibration Energy Harvester with Magnetic Gear for Wearable Technology.

NSF CNS-2302182, $600,000, 10/23–9/26.
PI Name: E.S. Kim, Proposal Title: SaTC: Core: Small: Battery-less Tamper Detector for Semiconductor Chip Authenticity.

NIH R01 EY035281 (My portion $1,070,000), $2,154,495, 8/23–2/27.
PI Name: E.S. Kim (Contact PI), Co-PI: J. Zhong, Proposal Title: Damage-Free, Ultrasonic Cell Isolation from Retinal Pigment Epithelium (RPE) Monolayers.

NIH R01 HL165138 (My portion: $2,921,947), $3,510,126, 8/22–7/27.
PI Name: E.S. Kim, Co-I: R. Kato, Proposal Title: Wearable, Always-on Stethoscope for Early Detection of Asthma Attack.

NSF DBI-2129856, $840,208, 2/22–1/27.
PI Name: E.S. Kim, Proposal Title: Microfluidic Cell Sorting and Manipulation Based on Bulk Acoustic Waves.

NSF ECCS-2017926, $389,904, 9/20–8/26.
PI Name: E.S. Kim, Proposal Title: Acoustic Propulsion in Liquid and Air.

NIH R01 GM134352 (My portion: $688,886), $1,351,880, 9/19–8/25.
PI Name: E.S. Kim, Co-I: S. Fraser, M. Gross and L.A. Trinh, Proposal Title: MEMS Acoustic Tweezers for Micromanipulation of Living Cells.

Prior Research Grants:

NSF ECCS-1911369, $347,395, 7/19–6/25.
PI Name: E.S. Kim, Proposal Title: MEMS-Based Power Generation from Human's Walking Motion.

NIH R01 EB026284 (My portion: $896,615), $1,309,247, 7/18–3/24.
PI Name: E.S. Kim, Co-I: S. Chang, Proposal Title: Ultrasonic Neural Stimulation for Neuromodulation Therapeutics.

DoD Congressionally Directed Medical Research Programs (My portion: $309,174), $617,620, 9/17–9/22.
PI Name: E.S. Kim, Co-I: M. Han, Proposal Title: Focused Ultrasound Neural Stimulation for Spinal Cord Injury

NSF CNS-1716953, $300,000, 8/17–7/21.
PI Name: E.S. Kim, Proposal Title: SaTC:STARSS: Small: Wireless, Battery-less, Monolithic Tamper Detector for Semiconductor Chip Authenticity.

NIH R21 DC016468 (My portion: $412,021), $421,013, 5/18–4/21
PI Name: E.S. Kim, Collaborating Faculty: L.S. Eisenberg and M. Winter, Proposal Title: MEMS-Based Active Noise Cancellation for Hearing Aids.

Indo-US Science and Technology Forum (My portion: $68,074), $200,000 (1% Overhead), 1/18–3/21.
PI Name: E.S. Kim, Co-PI: G. Ban-Weiss and B. Krishnamachari, Proposal Title: High Resolution Air Quality Monitoring and Air Pollutant Data Analytics

SRC, $190,000, 10/17–12/20.
PI Name: E.S. Kim, Proposal Title: SaTC:STARSS: Small: Wireless, Battery-less, Monolithic Tamper Detector for Semiconductor Chip Authenticity.

L.K. Whittier Foundation (My portion: $11,764), $50,000 (0% Overhead), 2/18–6/19.
PI Name: R. Kato, Co-Is: E.S. Kim and M. Gross, Proposal Title: Acoustic Spectral Signature of Lung Sounds in Poorly Controlled Asthma Patients

NIH R21 (My portion: $212,514), $439,389, 9/16-7/18
PI Name: E.S. Kim, Co-PI: M. Gross, Proposal Title: Selective Cancer Treatment Based on High Frequency Ultrasonic Beam

NSF ECCS, $359,491, 9/13–8/17.
PI Name: E.S. Kim, Proposal Title: Electromagnetic Vibration-Energy Harvesters.

NIH P41 (My portion: $82,985), $6,141,140, 8/12-7/17
PI Name: K. Shung, Co-Is: E.S. Kim, B. Francis and J. Yen, Proposal Title: A Resource on Medical Ultrasonic Transducer Technology

ONR, $200,000, 6/14–5/16.
PI Name: E.S. Kim, Proposal Title: Ubiquitous Vibration-Energy Harvesting Based on MEMS

DARPA MTO, $156,254, 8/14–8/15.
PI Name: E.S. Kim, Proposal Title: Piezoelectrically Actuated and Sensed Shell Built on Micromachined Dome

ONR, $70,000, 5/14–4/15.
PI Name: E.S. Kim, Proposal Title: Fundamental Study on Energy Harvesting with Piezoelectric and Electromagnetic Miniature Transducers

DARPA MTO, $400,000, 9/13–8/15.
PI Name: E.S. Kim, Proposal Title: Vibration-Induced 1 Watt Power for Microsystems

NSF ECCS, $350,000, 5/11–4/14.
PI Name: E.S. Kim, Proposal Title: Electrical Control of Droplet Direction for Coalescence of Multiple Nano-liter Droplets.

KalScott Engineering Inc., $49,500, 11/10-4/13
PI Name: E.S. Kim, Proposal Title: FBAR-based Oscillator

NIH R21, $437,663, 7/09-6/12
PI Name: E.S. Kim, Proposal Title: On-Chip Protein Synthesis Based on Directional Droplet-Ejector Array.

NSF ECCS, $330,631, 8/08–7/12.
PI Name: E.S. Kim, Proposal Title: Acoustic Transducers for Automatic Speech Recognition.

Zumberge Research and Innovation Fund (My portion: $25,000), $50,000, 7/11-6/12
PI Name: E.S. Kim, Co-PI: M. Gross, Proposal Title: "Integrated Micromechanical Platform for Spatially-Targeted Cancer Diagnosis and Therapeutics

NovaWorks, $30,000, 3/11-9/11
PI Name: E.S. Kim, Proposal Title: High Throughput Micropump

NIH P41 (My portion: $65,000), $5,200,128, 9/06-8/11
PI Name: K. Shung, Co-PIs: E.S. Kim, B. Francis and J. Yen, Proposal Title: A Resource on Medical Ultrasonic Transducer Technology

Robert and May Wright Foundation (My portion: $50,000), $100,000, 7/10-6/11
PI Name: M. Gross, Co-PI: E.S. Kim, Proposal Title: Micromechanical Sensor Platform for Molecular Characterization of Tissue: Progress towards a Sensorized Surgical Device

DARPA MTO, $250,722, 8/08-8/09.
PI Name: E.S. Kim, Proposal Title: Velocity Sensor Based on Ultrasonic MEMS.

NSF ECS, $240,000, 5/06–4/09.
PI Name: E.S. Kim, Proposal Title: Contactless RF MEMS Switches.

NIH R21, $275,000 (My portion: $140,000), 7/05–6/08.
PI Name: L. Marcu, Co-PI: E.S. Kim, Proposal Title: MOEMS Device for Fluorescence Spectroscopy of Tissue and Cells.

DARPA MTO, $1,213,000, 5/02-2/07.
PI Name: E.S. Kim, Proposal Title: Ultra High Q, Electrically Tunable, Micromachined Acoustic Resonators at 1 - 10 GHz.

Northrop Grumman Space Technology, $25,000, 1/06-12/06.
PI Name: E.S. Kim, Proposal Title: Ultrasonic Liquid Jet Propeller

KalScott Engineering Inc., $25,000, 9/06-4/07
PI Name: E.S. Kim, Proposal Title: FBAR-based TNT Sensor

NIH P41, (My portion: $53,000), 9/02-8/06

PI Name: K. Shung, Co-Pis: E.S. Kim, B. Francis and J. Yen, Proposal Title: A Resource on Medical Ultrasonic Transducer Technology

NSF ECCS, $240,000, 8/03–6/06.
PI Name: E.S. Kim, Proposal Title: Portable DNA-Probe-Array Synthesis System Using Acoustic-Wave Ejector and Atomizer Array.

BEI Technologies, Inc., $190,198, 5/04-12/05.
PI Name: E.S. Kim, Proposal Title: MEMS Silicon Inertial Sensors.

ONR, $300,000 (My portion: $100,000), 8/02–7/05.
PI Name: M. Thompson, Co-PIs: M. Baudry, T. Berger, and E.S. Kim, Proposal Title: Direct Wiring and Sensing of Neurons.

Northrop Grumman Space Technology, $150,000, 7/02-1/05.
PI Name: E.S. Kim, Proposal Title: Tunable MEMS Capacitors for the IRFFE Program

DARPA DSO, $600,000, 8/00-1/04.
PI Name: E.S. Kim, Proposal Title: Microfluidic Mixers, Pumps, Transporters and Ejectors Based on SFAT and DSDT

ONR, $130,000 (My portion: $43,000), 5/01–8/02.
PI Name: M. Thompson, Co-PIs: M. Baudry, T. Berger, E.S. Kim and C. McKenna, Proposal Title: Sensing of Neuron Signals Using Microelectromechanical Systems (MEMS).

Naval EOD Technology Division of NOC, $1,300,000, 4/98–6/02.
PI Name: E.S. Kim, Proposal Title: Piezoelectric MEMS for Underwater Applications.

NSF CAREER Program, $310,000, 7/95–6/02.
PI Name: E.S. Kim, Proposal Title: Piezoelectric Microelectromechanical Systems.

DARPA MEMS Program, $480,000, 7/95–12/98.
PI Name: E.S. Kim, Proposal Title: Piezoelectric Micro Systems.

NSF Rapid Prototyping Initiative, $460,000 (My portion: $300,000), 10/94-9/98.
PI Name: E.S. Kim, Co-PIs: M.G. Nejhad, S. Itoga and J. Yuh,
Proposal Title: Virtual Rapid Prototyping System for Piezoelectric Micro Systems

Daewoo Electronics, Co. Ltd., $103,547, 7/94-10/98.
PI Name: E.S. Kim, Proposal Title: Piezoelectrically Actuated Microcantilever for Actuated Mirror Array Application

TRW Inc., $106,000, 7/93-6/98.
PI Name: E.S. Kim, Proposal Title: Lateral Field Excitation (LFE) Semiconductor Bulk Acoustic Resonator (SBAR)

Tektronix Inc., $20,000, 6/94-7/95.
PI Name: E.S. Kim, Proposal Title: Microfluidic System Using MEMS

Tektronix Inc., $9,999, 7/93-5/94.
PI Name: E.S. Kim, Proposal Title: Fabrication of Silicon Structures with Annular Thin Membrane & Polysilicon Thermistor

Tektronix Inc., $4,966, 4/93-6/93.
PI Name: E.S. Kim, Proposal Title: Fabrication and Characterization of Silicon Nitride Membranes

NSF Research Experiences for Undergraduates Supplement, $10,000, 5/92–7/94.
PI Name: E.S. Kim, Proposal Title: Characterization of Low Pressure Chemical Vapor Deposition System.

NSF Research Initiation Awards, $62,700, 8/91–7/94.
PI Name: E.S. Kim, Proposal Title: IC-Processed Diaphragm Transducers.

Current Post Doctoral Research Associates

Dr. Jungmin Lee
Dr. Debdyuti Mandal

Current Ph.D. Students

Name	Start Date	Screening Date	Qualifying Date	Dissertation Topic/Progress
Akash Roy	1/21	12/22	3/25	Microfluidic Systems for Cells
Kianoush Sadeghian Esfahani	5/21	12/22		Acoustic Tweezers and Cell Ejectors
Junyi Wang	8/21	5/23	10/25	Power Generation from Human's Walking Motion
Hongxiang Gao	5/22	12/21	10/25	Wearable Stethoscope
Anik Sengupta	8/22	12/23		Resonant Microphone Array
Yicheng Zhang	8/24			Microspeakers and Microphones
Chirayush Chakraborty	8/25			Piezoelectric Acoustic Sensors
Xiang Zhang	8/25			Focused Acoustic Transducers

Thesis Committee Membership as a Non-chair

More 60 Ph.D. Qualifying Exam and/or Thesis Committees and 9 M.S. Thesis Committees.
(Ph.D. candidates: Jeonmin Ahn, Lisong Ai, Suat Ay, Tim Bakken, Rachel Bitton, Jerry Chiu-Hsien Chan, Jin Ho Chang, Yuanming Deng, Yuliang Du, Emanuel Gottlieb, Xiang Fang, Martin Han, Song Han, Yen-Lin Han, Young Hong, Sushmit Hossain, Ting-Hao Hsu,

Changhong Hu, Jong-Seob Jeong, Fenglai Jiang, Anil Kapila, Sanjana Kerketta, Hyung Ham Kim, Michael Kim, Sang Kwon, Chris Larson, James Lee, Kyongsu Lee, Chao Li, Jun Hee Lim, Xiaolei Liu, Joe Lo, Ronalee Lo, Jiahui Ma, Deming Meng, Eric Miller, Mahsa Rouhanizadeh, Koungmin Ryu, Soheil Sadeghi, Aria Samiei, Kevin Sampson, Chi Hyung Seo, Hsuan-Huei Shih, Qiong Shui, Pingyue Song, Lawrence Stewart, Namkyung Suh, Wei Tan, Tao Tang, Hidehisa Tazawa, Paul Vernier, Xuechun Wang, Yu Yun Wang, Yunxiang Wang, Robert Wodnicki, Dawei Wu, Masashi Yamagata, Qi Yang, James Yoo, Marcus Young, and Daihua Zhang.)

Former Students at the University of Southern California

Name	Degree	Date of Graduation	Current Position and/or Employer
Matin Barekatain	Ph.D.	May 2024	Apple, Inc.
Jaehoon Lee	Ph.D.	December 2023	Precision Neuroscience
Hai Liu	Ph.D.	August 2022	TDK InvenSense
Yongkui Tang	Ph.D.	August 2021	Iota Biosciences
Lurui Zhao	Ph.D.	May 2021	Apple, Inc.
Anton Shkel	Ph.D.	December 2018	Facebook, Inc.
Yufeng Wang	Ph.D.	December 2016	inSync Mirror
Arash Vafanejad	Ph.D.	December 2015	C3.ai
Qian Zhang	Ph.D.	December 2014	Analog Devices, Inc.
Lingtao Wang	Ph.D.	December 2013	Apple, Inc.
Lukas Baumgartel	Ph.D.	December 2013	Intel Corporation
Youngki Choe	Ph.D.	December 2012	Intel Corporation
Anderson Lin	Ph.D.	December 2011	TSMC
Shih-Jui Chen	Ph.D.	May 2011	**Associate Professor** at National Central University (in Taiwan)
Chuang Yuang Lee	Ph.D.	August 2007	Touchdown Technologies, Inc.
Joe Lo (Co-advised with Dr. L. Marcu)	Ph.D.	December 2006	**Associate Professor** at University of Michigan at Dearborn
Wei Pang	Ph.D.	May 2006	**Professor** at Tianjin University
Hao Zhang	Ph.D.	May 2006	**Professor** at Tianjin University
Qiang Zou	Ph.D.	August 2005	Broadcom Inc.
Hongyu Yu	Ph.D.	May 2005	**Associate Professor** at Hong Kong University of Science and Technology (Used to *tenured* Associate Professor at Arizona State University till 2017)
Jae Wan Kwon	Ph.D.	December 2004	**Professor** at University of Missouri-Columbia
Howard Feng	Ph.D.	December 2004	**Professor** at National Tsing Hua University (in Taiwan).

Derrick Chi	M.S.	December 2006	California Institute of Technology
Huisui Zhang	M.S.	August 2006	Micrel Inc.
Sanat Kamal-Bahl	M.S.	May 2006	Intel Corporation
Ru Guo	M.S.	December 2005	O2Micro
Jong Jin Kim	M.S.	May 2005	Samsung Electronics
Yasushi Tomizawa	M.S.	January 2004	Toshiba

Former Post-Graduate Advisees

Name	Start Date	End Date	Current Employer
Kunfeng Wang	9/23	10/24	University of Chinese Academy of Sciences
Dr. Baptiste Neff	7/22	6/24	CEA Leti
Dr. Yunqi Cao	11/19	10/20	**Assistant Professor** at Zhejiang University
Dr. Song Liu	1/19	9/20	**Assistant Professor** at Shanghai Tech University
Dr. Ki-Chan Lee	8/02	12/03	Microsoft Corporation
Dr. Sangwoo Whangbo	3/02	12/03	Samsung Electronics
Dr. Seung Hwan Yi	9/98	1/02	**Professor** at ChungJu National University
Dr. Mengnian Niu	8/97	10/00	Touchdown Technologies, Inc.
Dr. Byung Chae Lee	8/97	8/98	**Professor** at KAIST
Dr. Wei-Chih Wang	3/96	6/97	**Associate Professor** at National Tsing Hua University
Dr. Fred von Preissig	1/95	4/01	Desert Mirage High School

Former Students at the University of Hawaii

Electrical Engineering Department at the University of Hawaii (UH) required a thesis for a M.S. degree, and I had worked extensively with my M.S. graduates for their theses. The following is a list of my former M.S. and Ph.D. students at UH.

Name	Degree	Date of Graduation	Current Employer
Cheol-Hyun Han	Ph.D.	December 2000	Apple, Inc.
Vibhu Vivek	M.S.	August 2000	Microsonic Systems
Vernon Lou	M.S.	May 1998	
Hai Yan	M.S.	May 1998	Micron Technology
Y.K. Kim	M.S.	December 1997	Hansong Hitech Co., Ltd.
Xu Zhu	M.S.	August 1997	Samsung Telecom America
Hong Zhang	M.S.	August 1997	Maxim Semiconductor
Hasnain Lakdawala	M.S.	August 1997	Intel
Woo Wai Lau	M.S.	August 1996	
Yongli Huang	M.S.	May 1996	Kolo Technologies, Inc.
Eddie Tran	M.S.	August 1995	Intel
Yonghua Song	M.S.	August 1995	Marvell

Abhijeet Sathe	M.S.	May 1993	

List of Courses Taught at University of Hawaii

Semester	Course No.	Course Title	Credit Hours	No. of Students	Students' Instructor Rating (Max = 5)
Spring 91	EE 621	Advanced Solid State Device I	3	10	3.78
Fall 91	EE625	Advanced Solid State Device II	3	4	4.75
Spring 92	EE621	Advanced Solid State Device I	3	10	4.70
Fall 92	EE326	Linear Electronics	3	17	4.24
	EE624	Microsensors/Microactuators I	3	8	4.63
Spring 93	EE626	Microsensors/Microactuators II	3	5	4.80
Fall 93	EE324	Physical Electronics	3	27	4.36
	EE624	Microsensors/Microactuators I	3	5	5.00
Spring 94	EE371	Field and Waves I	3	34	4.41
Fall 94	EE624	Microsensors/Microactuators I	3	4	5.00
Spring 95	EE626	Microsensors/Microactuators II	3	6	5.00
Fall 95	EE624	Microsensors/Microactuators I	3	5	5.00
	EE371	Field and Waves I	3	26	4.65
Spring 96	EE626	Microsensors/Microactuators II	3	4	5.00
	EE371	Field and Waves I	3	11	4.27
Fall 96	EE624	Microsensors/Microactuators I	3	10	4.8
Spring 97	EE328	Microfabrication Lab	3	3	4.33
Fall 97	EE624	Microsensors/Microactuators I	3	4	5.00
Spring 98	EE626	Microsensors/Microactuators II	3	4	5.00
	EE224	Physical Electronics	3	20	4.45
Fall 98	EE624	Microsensors/Microactuators I	3	2	5.00

Spring 99	EE626	Microsensors/Microactuators II	3	5	
	EE328	Microfabrication Lab	3	9	

List of Courses Taught at University of Southern California

Semester	Course No.	Course Title	Credit Hours	No. of Students	Students' Instructor Rating (Max = 5)
Spring 00	EE599	Special Topics on MEMS	3	25	4.15
Fall 00	EE599	Special Topics on MEMS	3	12	4.58
Spring 01	EE607	MEMS	3	9	4.67
Fall 01	EE479L	Introduction to IC Design	4	10	3.50
Spring 02	EE607	MEMS	3	34	4.58
Fall 02	EE479L	Introduction to IC Design	4	15	4.25
Spring 03	EE607	MEMS	3	28	4.10
Fall 03	EE479L	Introduction to IC Design	4	18	4.50
Spring 04	EE607	MEMS	3	40	4.30
Fall 04	EE479L	Introduction to IC Design	4	19	4.22
Spring 05	EE607	MEMS	3	20	3.94
Fall 06	EE479	Analog and Non-Linear Integrated Circuit Design	3	18	4.13
Fall 06	EE537	Modern Solid-State Devices	3	49	3.73
Spring 07	EE607	MEMS	3	12	4.27
Fall 07	EE479	Analog and Non-Linear Integrated Circuit Design	3	86	4.00
Spring 08	EE479	Analog and Non-Linear Integrated Circuit Design	3	25	4.18
Spring 08	EE607	MEMS	3	16	4.36
Fall 08	EE479	Analog and Non-Linear Integrated Circuit Design	3	97	3.95
Spring 09	EE607	MEMS	3	7	4.80

Spring 09	EE479	Analog and Non-Linear Integrated Circuit Design	3	26	3.81
Spring 10	EE607	MEMS	3	11	4.30
Spring 11	EE607	MEMS	3	11	4.10
Spring 12	EE607	MEMS	3	9	4.00
Spring 14	EE607	MEMS	3	9	4.00
Spring 15	EE607	MEMS	3	6	5.00
Spring 17	EE607	MEMS	3	11	4.40
Spring 18	EE607	MEMS	3	5	4.67
Fall 19	EE479	Analog Integrated Circuit Design	4	17	4.42
Fall 19	EE479	Analog Integrated Circuit Design (*Distance Education*)	4	7	3.75
Fall 19	EE607	MEMS	3	10	4.29
Fall 20	EE607	MEMS	3	5	5.00
Spring 21	EE576	Integrated Memory Devices and Technologies	3	16	3.33
Fall 21	EE599	Wearable Technology	4	17	4.71
Spring 22	EE607	MEMS	4	10	4.80
Fall 22	EE608	Wearable Technology	4	13	5.00
Spring 23	EE607	MEMS	4	9	4.25
Fall 23	EE608	Wearable Technology	4	15	4.25
Spring 24	EE607	MEMS	4	10	4.67
Fall 24	EE608	Wearable Technology	4	19	4.00
Spring 25	EE607	MEMS	4	9	4.00

New Course Development

- Developed two new graduate-level courses on microsensors and microactuators (EE624 and EE626) at UH and one new graduate-level course on MEMS (EE607) at USC.
  - Generated about 700 pages of lecture notes with many illustrations.
- Proposed a MEMS lab course (EE608) at USC, and developed the lab content and procedures.
- Proposed and developed a new 4-unit graduate-level course on Wearable Technology at USC.

- Taught the course in Fall 2021, up to which point there had been no formal course on wearable technology in the nation, nor any good textbook on it. Developed a total of 592 PowerPoint Slides along with 5 homework problem sets to teach, for the first time, wearable technology with focus on sensing, signal processing (analog and digital), RF communication, power sources, power management, energy harvesting, flexible substrate technology, and wearable algorithms; with the following weekly topics.

Week	Topic
1	Introduction to Wearable Technology (25 Slides)
2 – 4	Wearable Sensors for Acceleration, Angular Velocity, Ambient Pressure, Audio, Magnetic Field, Light, Infrared Imaging, Vapors, etc. (112 Slides)
5 - 6	Sensing Technologies (Capacitive, Piezoresistive, Piezoelectric, etc.), Flexible and Stretchable Substrate Technology, Lab on Skin, RF Communication, etc. (103 Slides)
7	Batteries, Energy Harvesting, and Power Management for Wearable Technology (41 Slides)
8 - 9	Wearable Hardware Platforms, Wearable Algorithms, Feature Extraction, Training and Classification, Minimum-Cost Action Coverage, Dimensionality Reduction, etc. (99 Slides)
10 - 12	Digital Signal Processing, Difference Equation, Convolution, Z Transform, DFT, FFT, Signal Modulation, Rules of Probability, Kalman Filter, Hidden Markov Model, etc. (136 Slides)
13 - 14	Wearable Technology for Healthcare: Heart Rate Sensing, Blood Oxygen Sensing, Electrocardiogram, Body Sensor Network, Algorithms to Mitigate Artifacts, etc. (76 Slides)

Conference Committee and Service

Technical Program Committee for IEEE International Conference on MEMS 2021, 2022.
Technical Program Committee for IEEE International Ultrasonics Symposium 2009 - present.
Technical Program Committee for IEEE Frequency Control Symposium 2010 - 2015.
Technical Program Committee for IEEE International Conference on Solid-State Sensors and Actuators 2005, 2011, 2017, 2019.
UFFC Awards Selection Committee 2014, 2015, 2016, 2018, 2019.
Technical Program Committee for IEEE Sensors Conference 2004-2006.
Technical Program Committee for SPIE International Symposium on Microtechnologies for the New Millennium 2003, 2005.
Session Chair for IEEE International Conference on Solid-State Sensors and Actuators 2001, 2003, 2005, 2011, 2013, 2015.
Session Chair for IEEE International Ultrasonics Symposium 2009, 2010, 2011, 2018.
Session Chair for IEEE International Conference on MEMS 2021.
Technical Program Committee for SPIE International Symposium on Microelectronics, MEMS, and Nanotechnology 2001, 2003, 2005.
Track Chair on Micromachines Program for IEEE International Conference on Emerging Technologies and Factory Automation 1996, 1997.
Session Chair for Commercialization of Microsystems Conference, Kona, HI, October 6 - 10, 1996.
Local Arrangement Chair for IEEE International Frequency Control Symposium 1996.

University Service at USC since 1999

Advisory Committee for the USC Machine Shop; Spring 26
Elected Viterbi School of Engineering (VSoE) Appointments, Promotions, and Tenure (APT) Committee; AY 07-09, AY 23 – 25.
Elected Department Executive Committee; Spring 09, AY 09 - 18, AY 19 – 21, AY 22 - 24.
Department Faculty Promotion Committee (for one faculty member); Spring 23 – Fall 23.
Department Committee on Non-tenure Track Faculty Hire (for one adjunct professor); Spring 23.
Munushian Seminars Committee; AY 21 – 22, Spring 25 and Fall 25 (as the committee chair).
Mentor for Assistant Professor Yasser Khan; Fall 21 – Present.
Organizer of 2-Minute Faculty Presentations at the ECE Faculty Retreat in the Fall 24.
Chair of Elected Department Faculty Evaluation Committee; Spring 20, Spring 22, Spring 25.
Chair of Department Committee on Solid State, Nanotechnology and MEMS Curriculum; AY 20 – 21.
Chair of Department Faculty Promotion Committees (for two faculty members); Spring 20 – Fall 21.
Chair of Department Faculty Recruitment Committee; AY 20 – 21.
Department Faculty Recruitment Committee; AY 07 – 18, AY 23 - 24.
Committee on Department Chair Evaluation; AY 20 – 21, AY 23 – 24.
Department Ph.D. Screening/Affairs Committee; AY 06 – 08, AY 22 - 24.
Department Representative to Engineering Faculty Council; AY 06 - 07.
Member of Department Faculty Evaluation Committee; Spring 05 and Spring 07.
Chair of Department Promotion Committee for a faculty member; Spring 06.
Member of University DRIE Committee; AY 06 - 07.
Organizer for EE-EP Department Seminar Series; AY 00 - 05.

- Managed and ran the department seminar program.
- Hosted the guest speakers from outside -- meeting with them, arranging meetings with our faculty for them, etc.

Member of Planning Committee for MEMS/Nano Lab in Tutor Hall; Summer 02.
Member of VSoE Biomedical Technology Initiative (BTI) Working Group; Fall 01.
Chair of School of Engineering (VSoE) MEMS Curriculum Committee; AY 00 - 01.

Compensated Professional Service

Consulting on CMOS-integrated MEMS for Kairos Venture Investments, 9/19.
Numerous Proposal Reviews for National Science Foundation (from 1991 to present) and National Institute of Health (from 2011 to present).
Proposal Reviews for A*Star (9/19) and Science Foundation of Ireland (10/19).
Technical consultation on pressure sensing, Hydra-Electric Company, 4/14 - 10/14.
Expert Witness on MEMS Microphone, GoerTek, Inc., 8/13 – 5/14.
Expert Witness on FBAR Filters, TriQuint Semiconductor, Inc., 12/09 - 5/12.
Technical consultation on RF MEMS process, WiSpry, 2/08 - 4/08.
Technical consultation on U.S. Army Research Lab's research project titled, "Acoustic Wave Droplet Ejection for Characterization of Particles in a Liquid," 12/05 - 3/07.

Technical consultation on ultrasonic transducers, AMI-USC, 9/00 - 1/05.
Technical consultation on film bulk acoustic resonator, Intel, 2/01 - 5/02.
Technical consultation on MEMS mirror array for a projection display, Daewoo, 9/96 - 8/97.
Expert witness on Laser Detection System, Laser Technology, Inc., 4/93 - 3/95.
Short course on MEMS, Samsung Advanced Institute of Technology, 6/95.
Short course on circuits for Professional Engineer Exam, 2/93.

Community Service

Chair of Parent Committee for Boy Scout Troop 4673 from February 04 to December 06.