DREW A. HALL

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EDUCATION

Stanford University Stanford, CA	Ph.D. in Electrical Engineering Advisors: Shan X. Wang and Boris Murmann	2011
Stanford University Stanford, CA	MS in Electrical Engineering Advisors: Shan X. Wang and Boris Murmann	2008
University of Nevada, Las Vegas Las Vegas, NV	BS in Computer Engineering Minor in Applied Mathematics with honors, *summa cum laude*	2005

RESEARCH INTERESTS

My research interests lie in the design of analog front-ends for sensors, mixed-signal biomedical ICs, and high-performance biochips. I have worked on many life science applications, including *in-vitro* diagnostics, DNA sequencing, proteomics, point-of-care (POC) testing, and wearable sensors. At the core of my research group is deep expertise in designing precision circuits for instrumentation applied to magnetic and electrochemical sensors.

AWARDS AND HONORS

NIH Trailblazer Award	*National Institutes of Health award given to new investigators to pursue high-impact, high-reward research that integrates engineering with the life sciences.*	2019
NSF CAREER Award	*National Science Foundation program designed to support junior faculty in their dual roles as teacher-scholars. CAREER Awards provide recipients the opportunity to enhance their professional career development, better integrate their research and education responsibilities, and build academic leadership abilities*	2015
Undergraduate Teaching Award	*Recipient of the ECE department's annual teaching award for excellence in undergraduate education*	2014
Hellman Fellowship	*Recipient of the Hellman Fellowship for interdisciplinary research*	2014
ARCS Fellowship	*Recipient of the national Achievement Rewards for College Scientists (ARCS) fellowship for someone who will contribute to the nation's scientific and technological strength*	2010
1st place Stanford BASES E-Challenge Business Plan Competition	*Winner of the Business Association of Stanford Entrepreneurial Students (BASES) business plan competition on the nanoLAB, a handheld point-of-care diagnostic device for global health*	2010
1st place in IEEE Change the World Competition	*Winner (Student Humanitarian Supreme) of the inaugural international invention competition for "nanoLAB: A Hand-Held Diagnostic Laboratory."*	2009
1st place in BME-IDEA Invention Competition	*Winner of the national bioengineering invention competition for "Lab-on-a-stick: A Hand-Held Diagnostic Laboratory"*	2009
Tau Beta Pi Fellow	*One of 35 engineering students selected nationally, Fife No. 70*	2005
1st place in IEEE Micromouse Competition	*Winner of the southwest regional (region 6) Micromouse (an autonomous maze-solving robot) competition*	2005

PUBLICATIONS (H-INDEX: 39)

Ph.D. Thesis

Drew A. Hall, "GMR Spin-Valve Biochips and Interface Electronics for Ultrasensitive *in-vitro* Diagnostics," Ph.D. Thesis, Stanford University, 2011.
Committee: Shan X. Wang (Adviser), Boris Murmann (Co-Adviser), Bruce Wooley, Hector Garcia-Molina

Journal Papers (Peer Reviewed)

J69. Aditi Jain, Eric Fogleman, Paul Botros, Ritwik Vatsyayan, Asish Koruprolu, Corentin Pochet, Andrew Bourhis, Zhaoyi Liu, Suhas Chethan, Hanh-Phuc Le, Ian Galton, Shadi Dayeh, and **Drew A. Hall**, "A 2.5-20 kSps in-pixel direct digitization ECoG front-end with sub-millisecond stimulation artifact recovery," *IEEE Journal of Solid-State Circuits (JSSC)*, To Appear. **(Invited paper.)**

J68. Aditi Jain, Saeromi Chung, Eliah Aronoff-Spencer, and **Drew A. Hall**, "An Electrochemical CMOS Biosensor Array Using Phase-Only Modulation With 0.035% Phase Error And In-Pixel Averaging," *IEEE Transactions on Biomedical Circuits and Systems (TBioCAS)*, To Appear.

J67. Tyler Hack, Joel Bisarra, Saeromi Chung, Shekher Kummari, and **Drew A. Hall**, "Mitigating Medication Tampering and Diversion via Real-time Intravenous Opioid Quantification," *IEEE Transactions on Biomedical Circuits and Systems (TBioCAS)*, vol. 18, no. 4, Aug 2024. **(Invited paper.)**

J66. Michael Sveiven, Ana K. Serrano, Joshua Rosenberg, Douglas J. Conrad, **Drew A. Hall**, and Anthony J. O'Donoghue, "A GMR Enzymatic Assay for Quantifying Nuclease and Peptidase Activity," *Frontiers in Bioengineering and Biotechnology*, vol. 12, Mar 2024.

J65. Michael Sveiven, Andrew Gassman, Joshua Rosenberg, Matthew Chan, Jay Boniface, Anthony J. O'Donoghue, Louise C. Laurent, and **Drew A. Hall**, "A Dual-Binding Magnetic Immunoassay to Predict Spontaneous Preterm Birth," *Frontiers in Bioengineering and Biotechnology*, vol. 11, Sep 2023.

J64. Edward Wang, Louise C. Laurent, **Drew A. Hall**, and Yuhwa Lo, "Sample Preconcentration Through Airjet-Induced Liquid Phase Enrichment," *RSC Lab on a Chip (LOC)*, vol. 23, Aug 2023.

J63. Naveen K. Singh, Saeromi Chung, An-Yi Chang, Joseph Wang, and **Drew A. Hall**, "A Non-Invasive Wearable Stress Patch for Real-Time Cortisol Monitoring Using a Pseudoknot-Assisted Aptamer," *Biosensors and Bioelectronics*, vol. 227, no. 115097, Feb. 2023.

J62. **Drew A. Hall**, Nagaraj Ananthapadmanabhan, Chulmin Choi, Le Zheng, Paul P. Pan, Christoph Von Jutrzenka, Thuan Nguyen, Jose Rizo, Macklan Weinstein, Raymond Lobaton, Prem Sinha, Trevor Sauerbrey, Cruz Sigala, Kathryne Bailey, Paul Mudondo, Ashesh Ray Chaudhuri, Simone Severi, Carl W. Fuller, James M. Tour, Sungho Jin, Paul W. Mola, and Barry Merriman, "A Scalable CMOS Molecular Electronics Chip for Single-Molecule Biosensing," *IEEE Transactions on Biomedical Circuits and Systems (TBioCAS)*, vol. 16, no. 6, Dec 2022.

J61. Tom Kalisky, Steven Saggese, Yunting Zhao, Daniel Johnson, Maya Azarova, Lilia Edith Duarte-Vera, Lucila Alejandra Almada-Salazar, Daniel Perales-Gonzalez, Enrique Chacon-Cruz, Jiaxing Wang, Rishi Graham, Alexandra Hubenko, **Drew A. Hall**, and Eliah Aronoff-Spencer, "Biometric recognition of newborns and young children for vaccinations and health care: A non-randomized prospective clinical trial," *Nature Scientific Reports*, vol. 12, no. 22520, Dec. 2022.

J60. Corentin Pochet and **Drew A. Hall**, "A pseudo-virtual ground feedforwarding technique enabling linearization and higher-order noise shaping in VCO-based $\Delta\Sigma$ modulators," *IEEE Journal of Solid-State Circuits (JSSC)*, vol. 57, no. 12, Dec. 2022. **(Invited paper.)**

J59. Saeromi Chung, Naveen Singh, Valentin Gribkoff, and **Drew A. Hall**, "Electrochemical carbamazepine aptasensor for therapeutic drug monitoring at the point of care," *ACS Omega*, vol. 7, no. 43, Nov. 2022.

J58. Patrick P. Mercier, Benton H. Calhoun, Po-Han Peter Wang, Anjana Dissanayake, Linsheng Zhang, **Drew A. Hall**, and Steven M. Bowers, "Low-Power RF Wake-Up Receivers: Analysis, Trade-Offs, and Design," *IEEE Open Journal of the Solid-State Circuits Society (OJ-SSCS)*, vol. 2, Nov. 2022. **(Invited paper.)**

J57. Da Ying, Joshua Rosenberg, Naveen K. Singh, and **Drew A. Hall**, "A 26.5 pArms Neurotransmitter Front-End with Class-AB Background Subtraction," *IEEE Transactions on Biomedical Circuits and Systems (TBioCAS)*, vol. 16, no. 4, Aug. 2022.

J56. Aditi Jain, Haowei Jiang, Corentin Pochet, and **Drew A. Hall**, "A 310 nW Temperature Sensor Achieving 9.8 mK Resolution using a DFLL-based Readout Circuit," *IEEE Transactions on Circuits and Systems II (TCAS2)*, vol. 69, no. 3, Mar. 2022.

J55. Carl W. Fuller, Pius S. Padayatti, Hadi Abderrahim, Lisa Adamiak, Nolan Alagar, Nagaraj Ananthapadmanabhan, Jihye Baek, Sarat Chinni, Chulmin Choi, Kevin J. Delaney, Rich Dubielzig, Julie Frkanec, Chris Garcia, Calvin Gardner, Daniel Gebhardt, Tim Geiser, Zachariah Gutierrez, **Drew A. Hall**, Andrew P. Hodges, Guangyuan Hou, Sonal Jain, Teresa Jones, Raymond Lobaton, Zsolt Majzik, Allen Marte, Prateek Mohan, Paul Mola II, Paul Mudondo, James Mullinix, Thuan Nguyen, Frederick Ollinger, Sarah Orr, Yuxuan Ouyang, Paul Pan, Namseok Park, David Porras, Keshav Prabhu, Cassandra Reese, Travers Ruel, Trevor Sauerbrey, Jaymie R. Sawyer, Prem Sinha, Jacky Tu, A. G. Venkatesh, Sushmitha VijayKumar, Le Zheng, Sungho Jin, James M. Tour, George M. Church, Paul W. Mola, and Barry Merriman, "Molecular electronics sensors on a scalable semiconductor chip: A platform for single-molecule measurement of binding kinetics and enzyme activity," *Proceedings of the National Academy of Sciences (PNAS)*, vol. 119, no. 5, Feb. 2022.

J54. Corentin Pochet, Jason Huang, Patrick Mercier, and **Drew A. Hall**, "A 174.7-dB FoM, 2nd-order VCO-based ExG-to-Digital Front-End Using a Multi-phase Gated-Inverted Ring Oscillator Quantizer," *IEEE Transactions on Biomedical Circuits and Systems (TBioCAS)*, vol. 15, no. 6, Dec 2021. **(Invited)**

J53. Da Ying, Chi-Yang Tseng, Ping-Wei Chen, Yu-Hwa Lo, and **Drew A. Hall**, "A 30.3 fA/√Hz Biosensing Current Front-End with 139 dB Cross-Scale Dynamic Range," *IEEE Transactions on Biomedical Circuits and Systems (TBioCAS)*, In Press.

J52. Saeromi Chung, Lars Bode, and **Drew A. Hall**, "Point-of-care human milk testing for maternal secretor status," *Springer Analytical and Bioanalytical Chemistry (ABC)*, Nov 2021. **(Invited, featured paper.)**

J51. Somok Mondal, Chung-Lun Hsu, Roozbeh Jafari, and **Drew A. Hall**, "A Dynamically Reconfigurable ECG Analog Front-End with a 2.5× Data-Dependent Power Reduction," *IEEE Transactions on Biomedical Circuits and Systems (TBioCAS)*, vol. 15, no. 15, Oct 2021.

J50. Naveen Singh, Saeromi Chung, Michael Sveiven, and **Drew A. Hall**, "Cortisol detection in undiluted human serum using a sensitive electrochemical structure switching aptamer over an antifouling nanocomposite layer," *ACS Omega*, vol. 6, no. 42, Oct 2021.

J49. Aditi Jain, Haowei Jiang, Corentin Pochet, and **Drew A. Hall**, "A 310 nW Temperature Sensor Achieving 9.8 mK Resolution using a DFLL-based Readout Circuit," *IEEE Transactions on Circuits and Systems II (TCAS2)*, In Press.

J48. Naveen K. Singh, Partha Ray, Aaron F. Carlin, Celestine Magallanes, Sydney Morgan, Louise C. Laurent, Eliah S. Aronoff-Spencer, and **Drew A. Hall**, "Dataset on optimization and development of a point-of-care glucometer-based SARS-CoV-2 detection assay using aptamers," *Elsevier Data in Brief*, In Press.

J47. Da Ying and **Drew A. Hall**, "Current Sensing Front-Ends: A Review and Design Guidance," *IEEE Sensors*, vol. 21, no. 20, Oct. 2021.

J46. Xiahan Zhou, Enhan Mai, Michael Sveiven, Corentin Pochet, Haowei Jiang, Chih-Cheng Huang, and **Drew A. Hall**, "A 9.7-nTrms, 704-ms Magnetic Biosensor Front-End for Detecting Magneto-Relaxation," *IEEE Journal of Solid-State Circuits (JSSC)*, vol. 56, no. 7, July 2021.

J45. Libin Sun, Douglas Conrad, **Drew A. Hall**, Kurt D. Benkstein, Steve Semancik, and Mona E. Zaghloul, "Plasmonic Sensing Studies of a Gas-Phase Cystic Fibrosis Marker in Moisture Laden Air," *MDPI Sensors*, vol. 21, no. 3776, May 2021.

J44. Saeromi Chung, Jason K. Sicklick, Partha Ray, and Drew A. Hall, "Development of a Soluble KIT Electrochemical Aptasensor for Cancer Theranostics," ACS Sensors, vol. 6, no. 5, May 2021.

J43. Naveen K. Singh, Partha Ray, Aaron F. Carlin, Celestine Magallanes, Sydney Morgan, Louise C. Laurent, Eliah S. Aronoff-Spencer, and **Drew A. Hall**, "Hitting the diagnostic sweet spot: Point-of-care SARS-CoV-2 salivary antigen testing with an off-the-shelf glucometer," *Biosensors and Bioelectronics*, vol. 180, no. 113111, May 2021.

J42. Bassem Ibrahim, **Drew A. Hall**, and Roozbeh Jafari, "Pulse Wave Modeling using Bio-Impedance Simulation Platform based on a 3D Time-Varying Circuit Model," *IEEE Transactions on Biomedical Circuits (TBioCAS)*, vol. 15, no. 1, Feb. 2021.

J41. Chih-Cheng Huang, Partha Ray, Matthew Chan, Xiahan Zhou, and **Drew A. Hall**, "An aptamer-based magnetic flow cytometer using matched filtering," *Biosensors and Bioelectronics*, vol. 169, no. 112362, Dec. 2020.

J40. Haowei Jiang, Chih-Cheng Huang, Matthew Chan, and **Drew A. Hall**, "A 2-in-1 Temperature and Humidity Sensor with a Single FLL Wheatstone-Bridge Front-End," *IEEE Journal of Solid-State Circuits (JSSC)*, vol. 55, no. 8, Aug. 2020.

J39. Haowei Jiang, Po-Han Peter Wang, Li Gao, Corentin Pochet, Gabriel M. Rebeiz, **Drew A. Hall**, and Patrick P. Mercier, "A 22.3 nW, 4.55 cm2 Temperature-Robust Wake-up Receiver Achieving a Sensitivity of -69.5 dBm at 9 GHz," *IEEE Journal of Solid-State Circuits (JSSC)*, vol. 55, no. 6, Jun. 2020.

J38. Sandeep Adem, Sonal Jain, Michael Sveiven, Xiahan Zhou, Anthony J. O'Donoghue, and **Drew A. Hall**, "Giant magnetoresistive biosensors for real-time quantitative detection of protease activity," *Nature Scientific Reports*, vol. 10, no. 7941, May 2020.

J37. Somok Mondal and **Drew A. Hall**, "A 13.9-nA ECG Amplifier Achieving 0.86/0.99 NEF/PEF Using AC-coupled OTA-Stacking," *IEEE Journal of Solid-State Circuits (JSSC)*, vol. 55, no. 2, Feb. 2020.

J36. Haowei Jiang, Po-Han Peter Wang, Li Gao, Corentin Pochet, Gabriel M. Rebeiz, **Drew A. Hall**, and Patrick P. Mercier, "A 22.3 nW, 4.55 cm2 Temperature-Robust Wake-up Receiver Achieving a Sensitivity of -69.5 dBm at 9 GHz," *IEEE Journal of Solid-State Circuits (JSSC)*, vol. 55, no. 6, Jun. 2020.

J35. Xiahan Zhou, Michael Sveiven, and **Drew A. Hall**, "A CMOS Magnetoresistive Sensor Front-End with Mismatch-Tolerance and Sub-ppm Sensitivity for Magnetic Immunoassays," *IEEE Transactions on Biomedical Circuits (TBioCAS)*, vol. 13, no. 6, pp. 1254-1263, Dec 2019. (**Invited paper**)

J34. Abbas Barfidokht, Rupesh K. Mishra, Rajesh Seenivasan, Shuyang Liu, Lee J. Hubble, Joseph Wang, and **Drew A. Hall**, "Wearable electrochemical glove-based sensor for rapid and on-site detection of fentanyl," *Sensors and Actuators B: Chemical*, vol. 296, pp. 126442.

J33. Alex Sun and **Drew A. Hall**, "Point-of-Care Smartphone-based Electrochemical Biosensing," *Electroanalysis*, vol. 31, no. 1, pp. 2–16, 2019.

J32. Kyunglok Kim, **Drew Hall**, Chengyang Yao, Jung-Rok Lee, Chin Chun Ooi, Daniel Bechstein, Yue Guo, and Shan Wang, "Magnetoresistive biosensors with on-chip pulsed excitation and magnetic correlated double sampling," *Nature Scientific Reports*, vol. 8, no. 1, p. 16493, Nov. 2018.

J31. A.G. Venkatesh, H. Brickner, D. Looney, **D. A. Hall**, E. Aronoff-Spencer, "Clinical Detection of Hepatitis C Viral Infection by Yeast-Secreted HCV-Core:Gold-Binding-Peptide," *Biosensors and Bioelectronics*, vol. 119, pp. 230-236, Nov. 2018.

J30. Po-Han Peter Wang, Haowei Jiang, Li Gao, Pinar Sen, Young-Han Kim, Gabriel M. Rebeiz, Patrick P. Mercier, and **Drew A. Hall**, "A 6.1 nW Wake-Up Receiver Achieving −80.5 dBm Sensitivity via a Passive Pseudo-Balun Envelope Detector," *IEEE Journal of Solid-State Circuits Letters (SSCL)*, vol. 1, no. 5, pp. 134-137, Oct. 2018.

J29. Haowei Jiang, Po-Han Peter Wang, Patrick P. Mercier, and **Drew A. Hall**, "0.4 V 0.93 nW/kHz Relaxation Oscillator Exploiting Comparator Temperature-Dependent Delay to Achieve 94 ppm/°C Stability," *IEEE Journal of Solid-State Circuits (JSSC)*, vol. 53, no. 10, pp. 3004-3011, Oct. 2018.

J28. Xing Su, Noureddine Tayebi, Grace Credo, Kai Wu, Oguz Elibol, David Liu, Jonathan Daniels, Handong Li, **Drew Hall**, and Madoo Varma, "Scalable Nanogap Sensors for Non-redox Enzyme Assays," *ACS Sensors*, vol. 3, no. 9, pp. 1773-1781, Aug. 2018.

J27. Po-Han Peter Wang, Haowei Jiang, Li Gao, Pinar Sen, Young-Han Kim, Gabriel M. Rebeiz, Patrick P. Mercier, and **Drew A. Hall**, "A 6.1 nW Wake-Up Receiver Achieving −80.5 dBm Sensitivity via a Passive Pseudo-Balun Envelope Detector," *IEEE Journal of Solid-State Circuits Letters (SSCL)*, vol. 1, no. 5, pp. 134-137, Oct. 2018.

J26. A.G. Venkatesh, H. Brickner, D. Looney, **D. A. Hall**, E. Aronoff-Spencer, "Clinical Detection of Hepatitis C Viral Infection by Yeast-Secreted HCV-Core:Gold-Binding-Peptide," *Biosensors and Bioelectronics*, vol. 119, pp. 230-236.

J25. Haowei Jiang, Po-Han Peter Wang, Patrick P. Mercier, and **Drew A. Hall**, "0.4 V 0.93 nW/kHz Relaxation Oscillator Exploiting Comparator Temperature-Dependent Delay to Achieve 94 ppm/°C Stability," *IEEE Journal of Solid-State Circuits (JSSC)*, vol. 53, no. 10, pp. 3004-3011, Oct. 2018.

J24. Alexander C. Sun, Enrique Alvarez-Fontecilla, A. G. Venkatesh, Eliah Aronoff-Spencer, and **Drew A. Hall**, "High-Density Redox Amplified Coulostatic Discharge-Based Biosensor Array," *IEEE Journal of Solid-State Circuits (JSSC)*, vol. 53, no. 7, pp. 2054-2064, July 2018. (**Invited paper**)

J23. Po-Han Peter Wang, Haowei Jiang, Li Gao, Pinar Sen, Young-Han Kim, Gabriel M. Rebeiz, Patrick P. Mercier, and **Drew A. Hall**, "A Near-Zero-Power Wake-up Receiver Achieving −69 dBm Sensitivity," *IEEE Journal of Solid-State Circuits (JSSC)*, vol. 53, no. 6, pp. 1640-1652, Jun. 2018.

J22. Xiahan Zhou, Chih-Cheng Huang, and **Drew A. Hall**, "Giant Magnetoresistive Biosensor Array for Detecting Magnetorelaxation," *IEEE Transactions on Biomedical Circuits and Systems (TBioCAS)*, vol. 11, no. 4, pp. 755-764, Aug. 2017.

J21. Alexander Sun, Tom Phelps, Chengyang Yao, A. G. Venkatesh, Douglas Conrad, and **Drew A. Hall**, "Smartphone-based pH Sensor for at Home Monitoring of Pulmonary Exacerbations in Cystic Fibrosis," *Sensors*, vol. 17, no. 6, p. 1245, May 2017.

J20. Chih-Cheng Huang, Xiahan Zhou, and **Drew A. Hall**, "Giant Magnetoresistive Biosensors for Time-Domain Magnetorelaxometry: A Theoretical Investigation and Progress Toward an Immunoassay," *Scientific Reports*, vol. 17, p. 45493, Apr 2017.

J19. Christoph Carter, Kevan Akrami, **Drew Hall**, Davey Smith, and Eliah Aronoff-Spencer, "Lyophilized Visually Readable Loop-Mediated Isothermal Reverse Transcriptase Nucleic Acid Amplification Test for Detection Ebola Zaire RNA," *Journal of Virological Methods*, vol. 244, pp. 32-38, Jun. 2017.

J18. Haowei Jiang, Alex Sun, A. G. Venkatesh, and **Drew A. Hall**, "An Audio Jack-Based Electrochemical Impedance Spectroscopy Sensor for Point-of-Care Diagnostics," *IEEE Sensors Journal*, vol. 17, no. 3, pp. 589-597, Feb. 2017.

J17. E. Aronoff-Spencer, A.G. Venkatesh, A. Sun, H. Brickner, D. Looney, and **D. A. Hall**, "Detection of Hepatitis C core antibody by dual-affinity yeast chimera and smartphone-based electrochemical sensing," *Biosensors and Bioelectronics*, vol. 86, pp. 690–696, Dec. 2016.

J16. A. Sun, A.G. Venkatesh, and **D. A. Hall**, "A Multi-Technique Reconfigurable Electrochemical Biosensor: Enabling Personal Health Monitoring in Mobile Devices," *IEEE Transactions on Biomedical Circuits and Systems (TBioCAS)*, vol. 10, no. 5, pp. 945–954, Oct. 2016. **(Invited paper.)**

J15. Jung-Rok Lee, D. James Haddon, Nidhi Gupta, Jordan V. Price, Grace M. Credo, Vivian K. Diep, Kyunglok Kim, **Drew A Hall**, Emily C. Baechler, Michelle Petri, Madoo Varma, Paul J. Utz, and Shan X. Wang, "High Resolution Analysis of Antibodies to Post-Translational Modifications Using Peptide Nanosensor Microarrays," *ACS Nano*, vol 10, no. 12, pp. 10652-10660, Sep. 2016.

J14. Jung-Rok Lee, Noriyuki Sato, Daniel Bechstein, Sebastian Osterfeld, Junyi Wang, Adi Gani, **Drew Hall**, and Shan Wang, "Experimental and theoretical investigation of the precise transduction mechanism in giant magnetoresistive biosensors," *Scientific Reports*, vol. 6, p. 18692, Jan. 2016.

J13. Chung-Lun Hsu, A. G. Venkatesh, Howie Jiang, and **Drew A. Hall**, "A Hybrid Semi-Digital Transimpedance Amplifier with Noise-Cancellation Technique for Nanopore-Based DNA Sequencing," *Transaction on Biomedical Circuits and Systems (TBioCAS)*, vol. 9, no. 5, pp. 652–661, Nov 2015. **(Invited paper.)**

J12. Brandon Hong, Alexander Sun, Lin Pang, A.G. Venkatesh, **Drew Hall**, and Yeshaiahu Fainman, "Integration of Faradaic electrochemical impedance spectroscopy into a scalable surface plasmon biosensor for in tandem detection," *Optics Express,* vol. 23, no. 23, pp. 30237–30249, Nov. 2015.

J11. Daniel J. B. Bechstein, Elaine Ng, Jung-Rok Lee, Stephanie G. Cone, Richard S. Gaster, Sebastian J. Osterfeld, **Drew A. Hall**, James A. Weaver, Robert J. Wilson, and Shan X. Wang, "Microfluidic multiplexed partitioning enables flexible and effective utilization of magnetic sensor arrays," *Lab on a Chip*, vol. 15, no. 22, pp. 4273–4276, Oct. 2015.

J10. A.G. Venkatesh, Alex Sun, Howard Brickner, David Looney, **Drew A. Hall**, and Eliah Aronoff-Spencer, "Yeast Dual-Affinity BioBricks: Progress Towards Renewable Whole-Cell Biosensors," *Biosensors and Bioelectronics*, vol. 70, pp. 462–468, Aug. 2015.

J9. Dokyoon Kim, Francesco Marchetti, Zuxiong Chen, Sasa Zaric, Robert J. Wilson, **Drew A. Hall**, Richard S. Gaster, Jung-Rok Lee, Junyi Wang, Sebastian J. Osterfeld, Heng Yu, Robert M. White, William F. Blakely, Leif Peterson, Sandhya Bhatnagar, Brandon Manion, Serena Tseng, Kristen Roth, Matthew Coleman, Antoine Snijders, Andrew J. Wyrobek, Francesco Marchetti, and Shan X. Wang, "Nanosensor dosimetry of mouse blood proteins after exposure to ionizing radiation," *Scientific Reports*, 3, 2013.

J8. **Drew A. Hall**, Richard S. Gaster, Kofi Makinwa, Shan X. Wang, and Boris Murmann, "A 256 pixel magnetoresistive biosensor microarray in 0.18μm CMOS," *Journal of Solid State Circuits*, 48, 1290-1301, 2013.

J7. Richard S. Gaster, Liang Xu, Shu-Jen Han, Robert J. Wilson, **Drew A. Hall**, Sebastian J. Osterfeld, Heng Yu, and Shan X. Wang, "Quantification of Protein Interactions and Solution Transport Using High-Density GMR Sensor Arrays," *Nature Nanotechnology*, 6, 314-320, 2011.*
This paper is highlighted in **Nature Nanotechnology – 6, 266-267 (2011).*

J6. R.S. Gaster,‡ **D.A. Hall**,‡ Shan X. Wang, "nanoLAB: An ultraportable, hand-held diagnostic laboratory for global health," *Lab on a Chip*, 11, 950-956, 2011.**
‡*These authors contributed equally to this work.*
***This article was one of the top ten accessed articles in February 2011.*

J5. Richard S. Gaster, **Drew A. Hall**, Shan X. Wang, "Autoassembly Protein Arrays for Analyzing Antibody Cross-Reactivity," *Nano Letters*,* 11, 2579-2583, 2011.
**Selected for June 2011 cover art.*

J4. **D.A. Hall**, R.S. Gaster, T. Lin, S.J. Osterfeld, S. Han, B. Murmann, and S.X. Wang, "GMR biosensor arrays: a system perspective," *Biosensors and Bioelectronics*, 25, 2051-2057, 2010.

J3. **D.A. Hall**, R.S. Gaster, S.J. Osterfeld, B. Murmann, and S.X. Wang, "GMR biosensor arrays: correction techniques for reproducibility and enhanced sensitivity," *Biosensors and Bioelectronics*, 25, 2177-2181, 2010.

J2. Richard S. Gaster,‡ **Drew A. Hall**,‡ Carsten Neilson, Sebastian J. Osterfeld, Heng Yu, Kathleen Mach, Robert J. Wilson, Boris Murmann, Joseph C Liao, Sanjiv S. Gambhir, Shan X. Wang, "Matrix-insensitive protein assays push the limits of biosensors in medicine," *Nature Medicine*, 15, 1327-1332, 2009.**
‡*These authors contributed equally to this work.*
***This paper is highlighted in **Nature** – 461, 890-891 (2009).*

J1. S. J. Osterfeld, H. Yu, R. S. Gaster, S. Caramuta, L. Xu, S.-J. Han, **D. A. Hall**, R. J. Wilson, S. Sun, R. L. White, R. W. Davis, N. Pourmand, and S. X. Wang, "Multiplex Protein Assays Based on Real-Time Magnetic Nanotag Sensing," *PNAS*, 105, 20637-20640, 2008.

Conference Papers (Peer Reviewed)

C43. Aditi Jain, Eric Fogleman, Paul Botros, Ritwik Vatsyayan, Corentin Pochet, Andrew Bourhis, Zhaoyi Liu, Suhas Chethan, Hanh-Phuc Le, Ian Galton, Shadi Dayeh, and **Drew A. Hall**, "A 2.5-20kSps in-pixel direct digitization front-end for ECoG with in-stimulation recording," *IEEE Custom Integrated Circuits Conference (CICC)*, Denver, CO, Apr. 21-24, 2024. **(Outstanding Student Paper Award.)**

C42. Zhaoyi Liu, Sang Heon Lee, Omid Ghadami, and **Drew A. Hall**, "The price for integrated bioelectronics: Quantifying the impact of e-beam post-processing," *IEEE Biomedical Circuits and Systems (BioCAS) Conference*, Toronto, CA, Oct 19-21, 2023.

C41. Tyler Hack, Joel Bisarra, Saeromi Chung, and **Drew A. Hall**, "Ensuring pain medication dosage- A real-time intravenous opioid monitoring system," IEEE Biomedical Circuits and Systems (BioCAS) Conference, Toronto, CA, Oct 19-21, 2023.

C40. Riya Varma, Asish Koruprolu, and **Drew A. Hall**, "Impedance-Based Detection of Blood Clotting Time," *IEEE Biomedical Circuits and Systems (BioCAS) Conference*, Toronto, CA, Oct 19-21, 2023.

C39. Ashesh Ray Chaudhuri, Chulmin Choi, Raymond Lobaton, **Drew A. Hall**, Prem Sinha, Manoj Jaysankar, Philippe Helin, Carl W. Fuller, Paul W. Mola, Barry Merriman, and Simone Severi, "Monolithic Fabrication of Nano Gap Electrodes for Single-Molecule Biosensing," *IEEE Transducers*, Kyoto, Japan, Jun 25-29, 2023.

C38. **Drew A. Hall**, Kofi Makinwa, and Taekwang Jang, "Quantifying Biomedical Amplifier Efficiency – The Noise Efficiency Factor," *IEEE Solid-State Circuits Magazine (SSCM)*, vol. 15, no. 2, Jun 2023. **(Invited paper.)**

C37. Peter Asbeck, Dinesh Bharadia, Ian Galton, **Drew A. Hall**, Hanh-Phuc Le, Patrick Mercier, and Gabriel Rebeiz, "Integrated circuits for wireless communications: research activities at UCSD," *IEEE Microwave Magazine*, vol. 24, no. 5, May 2023. **(Invited paper.)**

C36. Omid Ghadami, Hongyu Lu, Matthew Chan, Mila Tan, Saeromi Chung, Sang Heon Lee, Matthew T. Holden, Ryan de Ridder, Barry Merriman, and **Drew A. Hall**, "Helix: An Electrochemical CMOS DNA Synthesizer," *IEEE Symp. on VLSI Circuits (VLSI)*, Honolulu, HI, Jun. 14-16, 2022.

C35. **Drew A. Hall**, Nagaraj Ananthapadmanabhan, Chulmin Choi, Le Zhang, Paul P. Pan, Carl W. Fuller, Pius P. Padayatti, Calvin Gardner, Daniel Gebhardt, Zsolt Majzik, Prem Sinha, Paul W. Mola, and Barry Merriman, "A CMOS Molecular Electronics Chip for Single-Molecule Biosensing," *IEEE International Solid-State Circuits Conference (ISSCC)*, San Francisco, CA, Feb. 20-24, 2022.

C34. Corentin Pochet and **Drew A. Hall**, "A 4.4μW, 2.5kHz-BW, 92.1dB-SNDR 3rd-Order VCO-based ADC with Pseudo Virtual Ground Feedforward Linearization," *IEEE International Solid-State Circuits Conference (ISSCC)*, San Francisco, CA, Feb. 20-24, 2022.

C33. Corentin Pochet, Haowei Jiang, and **Drew A. Hall**, "Ultra-Low Leakage ESD Protection Achieving 10.5 fA Leakage," *IEEE International Symposium on Circuits and Systems (ISCAS)*, Daegu, South Korea, May 22-28, 2021.

C32. Somok Mondal, Omid Ghadami, and **Drew A. Hall**, "A 139μW 104.8dB-DR 24kHz-BW CTΔΣM with Chopped AC-coupled OTA-Stacking and FIR DACs," *IEEE International Solid-State Circuits Conference (ISSCC)*, San Francisco, CA, Feb. 13-22, 2021.

C31. Corentin Pochet, Jason Huang, Patrick Mercier, and **Drew A. Hall**, "A 400mVpp, 92.3dB-SNDR, 1kHz-BW, 2nd-order VCO-based ExG-to-Digital Front-End Using a Multiphase Gated-Inverted Ring-Oscillator Quantizer," *IEEE International Solid-State Circuits Conference (ISSCC)*, San Francisco, CA, Feb. 13-22, 2021.

C30. Somok Mondal and **Drew A. Hall**, "A 67-μW Ultra-Low Power PVT-Robust MedRadio Transmitter," *IEEE Radio Frequency Integrated Circuits Symposium (RFIC)*, Los Angeles, CA, June 21-26, 2020.

C29. Bassem Ibrahim, **Drew. A. Hall**, and Roozbeh Jafari, "Bio-Impedance Simulation Platform Using 3D Time-Varying Impedance Grid for Arterial Pulse Wave Modeling," *IEEE Biomedical Circuits and Systems Conference (BioCAS)*, Nara, Japan, Oct. 17-19, 2019. (**Best student poster award.**)

C28. Da Ying, Ping-Wei Chen, Chi Tseng, Yu-Hwa Lo, and **Drew A. Hall**, "A Sub-pA Current Sensing Front-End for Transient Induced Molecular Spectroscopy," *IEEE Symp. on VLSI Circuits*, Kyoto, Japan, Jun. 11-13, 2019.

C27. Haowei Jiang, Chih-Cheng Huang, Matthew Chan, and **Drew A. Hall**, "A 2-in-1 Temperature and Humidity Sensor Achieving 62 fJ·K^2 and 0.83 pJ·(%RH)^2," *IEEE Custom Integrated Circuits Conference (CICC)*, Austin, TX, Apr. 14-17, 2019.

C26. Somok Mondal and **Drew A. Hall**, "A 107 µW MedRadio Injection-Locked Clock Multiplier with a CTAT-biased 126 ppm/°C Ring Oscillator," *IEEE Custom Integrated Circuits Conference (CICC)*, Austin, TX, Apr. 14-17, 2019.

C25. Xiahan Zhou, Michael Sveiven, and **Drew A. Hall**, "A Fast-Readout, Mismatch-Insensitive Magnetoresistive Biosensor Front-End Achieving Sub-ppm Sensitivity," *IEEE International Solid-State Circuits Conference (ISSCC)*, San Francisco, CA Feb. 17-21, 2019.

C24. Haowei Jiang,[‡] Xiahan Zhou,[‡] Saurabh Kulkarni, Michael Uranian, Rajesh Seenivasan, and **Drew A. Hall**, "A Sub-1 µW Multiparameter Injectable BioMote for Continuous Alcohol Monitoring," *IEEE Custom Integrated Circuits Conference (CICC)*, San Diego, CA, Apr. 9-11, 2018. [**]
[‡]*These authors contributed equally to this work.*
[**]*This paper was nominated for the Outstanding Student Paper Award.*

C23. Chung-Lun Hsu, Alexander Sun, Yunting Zhao, Eliah Aronoff-Spencer, and **Drew A. Hall**, "A 16×20 Electrochemical CMOS Biosensor Array with In-Pixel Averaging Using Polar Modulation," *IEEE Custom Integrated Circuits Conference (CICC)*, San Diego, CA, Apr. 9-11, 2018.

C22. Chung Lun Hsu and **Drew A. Hall**, "A Current Measurement Front-end with 160dB Dynamic Range and 7 ppm INL," *IEEE International Solid-State Circuits Conference (ISSCC)*, San Francisco, CA, Feb. 12-14, 2018.

C21. Chih-Cheng Huang, Xiahan Zhou, Da Ying, and **Drew A. Hall**, "A GMR-Based Magnetic Flow Cytometer Using Matched Filtering," *Proceedings of IEEE Sensors*, Glasgow, Scotland, Oct. 30 – Nov. 1, 2017. (**Invited.**)

C20. Bassem Ibrahim, **Drew A. Hall**, and Roozbeh Jafari, "Bio-Impedance Spectroscopy (BIS) Measurement System for Wearable Devices," *IEEE Biomedical Circuits and Systems Conference (BioCAS)*, Turin, Italy, Oct. 19-21, 2017.

C19. Xiahan Zhou, Chih-Cheng Huang, and **Drew A. Hall**, "Magnetoresistive Biosensors for Quantitative Proteomics," *Proceedings of SPIE Optics + Photonics*, San Diego, CA, Aug. 6-10, 2017.

C18. Po-Han Peter Wang, Haowei Jiang, Li Gao, Pinar Sen, Young-Han Kim, Gabriel M. Rebeiz, Patrick P. Mercier, and **Drew A. Hall**, "A 400 MHz 4.5 nW -63.8 dBm Sensitivity Wake-Up Receiver Employing an Active Pseudo-Balun Envelope Detector," *IEEE European Solid-State Circuits Conference (ESSCIRC)*, Leuven, Belgium, Sep. 12-14, 2017.

C17. Alexander Sun, Enrique Alvarez, A. G. Venkatesh, Eliah Aronoff-Spencer, and **Drew A. Hall**, "A 64×64 High-Density Redox Amplified Coulostatic Discharge-Based Biosensor Array in 180nm CMOS," *IEEE European Solid-State Circuits Conference (ESSCIRC)*, Leuven, Belgium, Sep. 12-14, 2017.

C16. Tom Phelps, Haowei Jiang, and **Drew A. Hall**, "Development of a Smartphone-Based Pulse Oximeter with Adaptive SNR/Power Balancing," *IEEE Engineering in Medicine and Biology Conference (EMBC)*, Jeju Island, Korea, July 11-15, 2017.

C15. Somok Mondal and **Drew A. Hall**, "An ECG Chopper Amplifier Achieving 0.92 NEF and 0.85 PEF with AC-Coupled Inverter-Stacking for Noise Efficiency Enhancement," *International Symposium on Circuits and Systems (ISCAS)*, Baltimore, MD, May 29-31, 2017.

C14. Somok Mondal, Chung-Lun Hsu, Roozbeh Jafari, and **Drew Hall**, "A Dynamically Reconfigurable ECG Analog Front-End with a 2.5× Data-Dependent Power Reduction," *Custom Integrated Circuits Conference (CICC)*, Austin, TX, May 1-3, 2017.

C13. Haowei Jiang, Po-Han Peter Wang, Li Gao, Pinar Sen, Young-Han Kim, Gabriel M Rebeiz, **Drew A Hall**, and Patrick P Mercier, "A 4.5nW Wake-Up Radio with -69dBm Sensitivity," *International Solid-State Circuits Conference (ISSCC)*, San Francisco, CA, February 6-8, 2017.

C12. B. Hong, A. Sun, L. Pang, A. G. Venkatesh, **D. Hall**, and Y. Fainman, "Integrated biosensor for simultaneous detection by surface plasmon resonance and Faradaic electrochemical impedance spectroscopy," *Conference on Lasers and Electro-Optics*, San Jose, CA, June 10, 2016.

C11. **Drew A. Hall**, Jonathan S. Daniels, Bibiche Geuskens, Noureddine Tayebi, Grace M. Credo, David J. Liu, Handong Li, Kai Wu, Xing Su, Madoo Varma, and Oguz H. Elibol, "A nanogap transducer array on 32 nm CMOS for electrochemical DNA sequencing," *International Solid-State Circuit Conference (ISSCC)*, San Francisco, CA, January 31st – February 4th, 2016.

C10. Chung-Lun Hsu, Tiantian Zhang, Yu-Hwa Lo, and **Drew A. Hall**, "A Low-Noise Gain-Enhanced Readout Amplifier for Induced Molecular Electronic Signal," *Biomedical Circuits and Systems Conference (BioCAS)*, Atlanta, Ga, October 22-24, 2015.

C9. Alex Sun, Travis Wambach, A. G. Venkatesh, and **Drew A. Hall**, "A Multitechnique Reconfigurable Electrochemical Biosensor for Integration into Mobile Technologies," Biomedical Circuits and Systems Conference (BioCAS), Atlanta, Ga, October 22-24, 2015.

C8. Qingxue Zhang, **Drew A. Hall**, and Roozbeh Jafari, "An ECG Dataset Representing Real-world Signal Characteristics for Wearable Computers," *Biomedical Circuits and Systems Conference (BioCAS)*, Atlanta, Ga, October 22-24, 2015.

C7. Alex Sun, Anthony Au, A. G. Venkatesh, Vikash Gilja, and Drew A. Hall, "A Scalable High-Density Electrochemical Biosensor Array for Parallelized Point-of-Care Diagnostics," *Biomedical Circuits and Systems Conference (BioCAS)*, Atlanta, Ga, October 22-24, 2015.

C6. Chengyang Yao, Alexander Sun, and **Drew A. Hall**, "Efficient Power Harvesting from the Mobile Phone Audio Jack for mHealth Peripherals", *Global Humanitarian Technology Conference (GHTC)*, Seattle, WA, October 8-11, 2015.

C5. Chengzhi Zong, Somok Mondal, **Drew Hall**, and Roozbeh Jafari, "Digitally Assisted Analog Front-end Power Management Strategy via Dynamic Reconfigurability for Robust Heart Rate Monitoring," *7th Workshop on Adaptive and Reconfigurable Embedded Systems (APRES)*, Seattle, WA, April 13-17, 2015.

C4. Chung-Lun Hsu, A. G. Venkatesh, Howie Jiang, and **Drew A. Hall**, "Hybrid Semi-Digital Transimpedance Amplifier for Nanopore-Based DNA Sequencing," *Biomedical Circuits and Systems Conference* (BioCAS), Lausanne, Switzerland, October 22-24, 2014.

C3. Alexander Sun, Travis Wambach, A. G. Venkatesh, and **Drew A. Hall**, "A Low-Cost Smartphone-Based Electrochemical Biosensor for Point-of-Care Diagnostics," *Biomedical Circuits and Systems Conference* (BioCAS) 2014, Lausanne, Switzerland, October 22-24, 2014. **Included live demonstration at BioCAS.*

C2. **Drew A. Hall**, Richard S. Gaster, Sebastian J. Osterfeld, Kofi Makinwa, Shan X. Wang, Boris Murmann, "A 256 Channel Magnetoresistive Biosensor Microarray for Quantitative Proteomics," Symp. VLSI Circuits Dig., Kyoto, Japan, July 15-17, 2011.

C1. **Drew A. Hall**, Richard S. Gaster, Shan X. Wang, Boris Murmann, "Portable biomarker detection with magnetic nanotags," *IEEE International Symposium on Circuits and Systems (ISCAS)*, Paris, France, June 3rd, 2010.

Conference Talks

CT15. **Drew A. Hall**, "Injectable Biosensors: Is there a future?" *IEEE Symp. on VLSI Circuits (VLSI)*, Workshop, Honolulu, HI, June 16-20, 2024.

CT14. **Drew A. Hall**, "A CMOS Molecular Electronics Chip for Single-Molecule Biosensing," *IEEE Advances in Analog Circuit Design (AACD) Workshop*, Pavia, Italy, April 9-11, 2024.

CT13. **Drew A. Hall**, Daniel Beriault, and Dan Werb, "Development and validation of a novel point-of-care technology for rapid non-targeted identification of emerging threats in North American drug markets," *American Chemical Society Fall Meeting*, San Francisco, CA, Aug. 15, 2023

CT12. **Drew A. Hall**, "A CMOS Molecular Electronics Chip for Single Molecule Biosensing," *IEEE Sensor Interface Meeting (SIM)*, Veldhoven, Netherlands, May 8-9, 2023.

CT11. **Drew A. Hall**, "Point-of-care human milk testing," *Human Milk Institute (HMI) Point-of-Care Milk Testing*, San Diego, CA, Mar. 30, 2023.

CT10. Corentin Pochet and **Drew A. Hall**, "VCO-based ADCs for direct digitization of ExG signals," *IEEE Advances in Analog Circuit Design (AACD) Workshop*, Cork, Ireland, Oct. 4-6, 2022.

CT9. Michael Sveiven, Kavya Balaji, **Drew A. Hall**, Anthony J. O'Donoghue, "Giant magnetoresistive biosensors for real-time quantitative detection of protease and endonuclease activity," *Pacific Coast Protease Spring School*, Borrego Springs, CA, April 24-27, 2022.

CT8. **Drew A. Hall**, "Hitting the diagnostic sweet spot: Point-of-care SARS-CoV-2 salivary antigen testing with an off-the-shelf glucometer," *Springer Next Generation of Sensors*, Mar. 24, 2021.

CT7. **Drew A. Hall**, "Getting the Most Out of a Little: Ultra-low Power Circuit Techniques for the IoT," *IEEE Symp. on VLSI Circuits (VLSI)*, Short Course, June 13-19, 2021.

CT6. **Drew A. Hall**, "The Internet-of-Medical Things (IoMT): An opportunity for ubiquitous health monitoring," *IEEE Custom Integrated Circuits Conference (CICC)*, Education Session, April 25-30, 2021.

CT5. **Drew A. Hall**, "Magnetoresistive Biosensors for Quantitative Proteomics," *CMOS ETR*, Grenoble, France, July 6-8, 2014.

CT4. S.X. Wang, R.S. Gaster, **D.A. Hall**, "Wash-free multiplex protein assay based on magnetic nanotechnology and its applications in cancer research," *Digest of International Magnetics Conf.,* * Taipei, Taiwan, April 25-29, 2011.
**Invited talk.*

CT3. **Drew A. Hall**, Calvin Chu, Andrew Dotey, Jr., Richard S. Gaster, Kofi Makinwa, Boris Murmann, Shan X. Wang, "A GMR Spin-Valve Integrated into a Continuous Time ΣΔ Modulator for Quantitative, Real-Time Biosensing," *Digest of International Magnetics Conf.,* Taipei, Taiwan, April 25-29, 2011.

CT2. **D. A. Hall**, R. S. Gaster, H. Yu, S. J. Osterfeld, B. Murmann, S. X. Wang, "Multiplexed GMR Biosensor Arrays," *Digest of International Magnetics Conf.*, Sacramento, CA, May 5-8, 2009.

CT1. **Drew A. Hall**, Tondra De, "A New Approach to Maze Searching and Solving Techniques for Small Autonomous Mobile Robots," *IEEE Southwest Region Meeting*,* Los Angeles, CA, September 9-10, 2005.
**Best Student Paper Award Winner.*

Books and Book Chapters

B3. Corentin Pochet and **Drew A. Hall**, "VCO-based ADCs for direct digitization of ExG signals," invited book chapter in *Biomedical Electronics, Noise Shaping ADCs, and Frequency References* (Edited by Pieter Harpe, Andrea Baschirotto, Kofi A.A. Makinwa), 2023.

B2. Richard S. Gaster, **Drew A. Hall**, and Shan X. Wang, "Magnetic Nanoparticle Diagnostic Chips," invited book chapter in *Point of Care Diagnostics on a Chip*, Springer (Edited by Robert Westervelt and David Issadore), 2013.

B1. **Drew A. Hall**, Richard S. Gaster, and Shan X. Wang, "GMR Biosensors," invited book chapter in *Handbook of Spin Transport and Magnetism*, Taylor & Francis (Edited by Evgeny Tsymbal and Igor Žurić), 2011.

Patents

P6. Saurabh Kulkarni and **Drew A. Hall**, "Implantable Biosensor," United States Utility Patent No 16,620,337.

P5. Chung-Lun Hsu and **Drew A. Hall**, "Wide Dynamic Range Current Measurement Front-End," United States Utility Patent No. 11,320,468.

P4. Kyunglok Kim, **Drew A. Hall**, Shan X. Wang, "Correlated double sampling for noise reduction in magnetoresistive sensors and sensor arrays," United States Utility Patent No. 9,989,597, International Patent No. 20,160,054,397.

P3. Oguz H Elibol, Grace M Credo, Xing Su, Madoo Varma, Jonathan S Daniels, **Drew Hall**, Handong Li, Noureddine Tayebi, Kai Wu, "High throughput biochemical detection using single molecule fingerprinting arrays," United States Utility Patent No. 9,551,682.

P2. Richard Gaster, Shan X. Wang, and **Drew A. Hall**, "Methods and devices for detecting the presence of an analyte in a sample," United States Utility Patent No. 9,506,919, International Patent No. 20,110,027,901.

P1. **Drew A. Hall**, Richard Gaster, Sebastian J. Osterfeld, and Shan X. Wang, "Temperature and Drift Compensation in Magnetoresistive Sensors," United States Utility Patent No. 8,405,385, International Patent No. 2,010,104,589 and 2,406,649

PROFESSIONAL EXPERIENCE

Tau Beta Pi Faculty Mentor (2014-Present)
Served on NSF review panels (2015-Present)
Served on UCSD Academic Integrity Review Board (2013-2015)
Served on NSF CAREER review panel (2013-2017)
Served on UCSD ECE Undergraduate Affairs Committee (2012-2014)
Served as a student representative on Stanford's Faculty Search Committee (2010-2011)
Conducted paper reviews for: JSSC, JSSC-L, CICC, InterMag, JAP, AnalChem, Biosensors, ISCAS, TBioCAS, Sensors, Biosensors and Bioelectronics, Lab on a Chip
Associate editor of IEEE Transactions on Biomedical Circuits and Systems (TBioCAS) (2015-Present)
Guest editor of IEEE Transactions on Biomedical Circuits and Systems (TBioCAS) Special Issue (2017)
Guest editor of IEEE Sensors Special Issue (2017)
Technical program committee member for the Custom Integrated Circuits Conference (CICC) (2017-2024)
Technical program committee member for the IEEE International Solid-State Circuits Conference (ISSCC) (2020-Present)
Associate editor of IEEE Solid-State Circuits Letters (SSC-L) (2021-2024)