JOSHUA R. SMITH

Curriculum Vitæ

Computer Science & Engineering
Office Number 556
Paul G. Allen Center for Computer Science & Engineering
Box 352350
Seattle, WA 98195

Phone: 206-685-2094
Fax: 206-543-2969
Email: jrs @ cs.washington.edu

EDUCATIONAL HISTORY

Massachusetts Institute of Technology, Cambridge, MA
PhD, Media Arts and Sciences
1999
Electric Field Imaging (advised by Neil Gershenfeld) Citations: 144

Massachusetts Institute of Technology, Cambridge, MA
MS, Media Arts and Sciences
1995
Toward Electric Field Tomography (advised by Neil Gershenfeld)

University of Cambridge, Cambridge, UK
MA, Natural Sciences (Physics and Theoretical Physics)
1997 (originally conferred as BA Hons. 1993)
Information Processing in Fraunhoffer Diffraction: A Case Study in the Physics of Information (advised by David MacKay)

Williams College, Williamstown, MA
BA, Magna Cum Laude, Computer Science, Philosophy
1991
Evolving Dynamical Systems with the Genetic Algorithm (advised by Donald House); independent study with William Wootters

EMPLOYMENT HISTORY

University of Washington, Seattle, WA
Professor, Allen School of Computer Science and Engineering, 9/17–

Milton and Delia Zeutschel Professor in Entrepreneurial Excellence, 9/17–
Associate Chair, Professional Programs, 9/23–
Department of Electrical and Computer Engineering, 9/17–

University of Washington
Associate Professor (with tenure)
Department of Computer Science and Engineering & Electrical Engineering, 9/14 – 9/17

University of Washington
Associate Professor without tenure (tenure track)
Department of Computer Science and Engineering & Electrical Engineering, 2/11 – 9/14

Intel Research Seattle
Seattle, WA
Principal Engineer, 4/08 – 1/11
Senior Research Scientist, 7/05 - 4/08
Research Scientist, 7/04 – 7/05

Tiax LLC (formerly Arthur D. Little)
Cambridge, MA
Senior Technologist, 1/04 – 7/04

Escher Group LTD.
Cambridge, MA
Chief Scientist & Director, Escher Labs, 4/01 – 12/03
Vice President & Director, Escher Labs, 4/00 – 4/01
Founding Director, Escher Labs 11/98 – 4/00

Other Research Experience

- **Santa Fe Institute**, Santa Fe, NM & **Los Alamos National Laboratory**, Los Alamos, NM. *Research student*, 6/92-9/92, 7/93-8/93. Created Lattice Gas Automata model of polymer dynamics, with application to origin of life studies.
- **Yale University**, New Haven, CT. *NECUSE Undergraduate research fellow in department of Computer Science*, 6/89 - 8/89. Implemented multigrid method for fast modeling of Hopfield Neural Networks; implemented 3d visualization code. Advised by Eric Mjolsness.
- **SMALL Geometry Research Group,** Williams College, Williamstown, MA. 6/88 – 8/88. *Undergraduate researcher*. Worked on Art Gallery theorems in computational geometry; wrote interactive graph editor.
- **School for Field Studies,** Marine Biology program, St. John, USVI. *Student.* 9/86 – 12/86. Devised and tested underwater method for experimental measurement of fractal dimension of coral.
- **NASA Goddard Institute for Space Studies**, New York, NY. *Graphics Programmer for Global Climate Modeling project*, 6/85-8/85. Wrote visualization software for output of global climate model.

AWARDS AND HONORS

Best Paper Awards

Distinguished Paper (12), "RF Bandaid: A Fully-Analog and Passive Wireless Interface for Wearable Sensors," ACM IMWUT Vol 2, Distinguished paper (8 out of 202 papers), 2018.
Distinguished Paper (11), "LoRa Backscatter: Enabling the Vision of Ubiquitous Connectivity," ACM IMWUT Vol 1, Distinguished paper, 2017.
Best Paper (10), "Inter-Technology Backscatter: Towards Internet Connectivity for Implanted Devices," ACM SIGCOMM, Best Paper, August 2016
Best Paper (9), "Passive Wi-Fi: Bringing Low Power to Wi-Fi Transmissions," USENIX NSDI, Best Paper, March 2016
Best Paper (8), "Sifting Through the Airwaves: Efficient and Scalable Multiband RF Harvesting," IEEE RFID, April 2014
Best Paper (7), "Ambient Backscatter: Wireless Communication Out of Thin Air," ACM SIGCOMM, August 2013.

Best student paper award (6), for "Hybrid Analog-Digital Backscatter Platform for High Data Rate, Battery-Free Sensing," WiSNet 2013, January 2013.
Best Paper award (5), for "An Ultra-Low-Power Human Body Motion Sensor Using Static Electric Field Sensing," ACM Ubicomp 2012, September 2012.
Sezai Innovation Award (4), for "Promise of unrestricted mobility and freedom with wireless powering of a Ventricular Assist Device (VAD)," at the 19th congress of the International Society of Rotary Blood Pumps, Louisville, KY September 8th to 10th, 2011.
Willem Kolff/Donald B. Olsen Award (3), for most promising research in the development of artificial hearts, for paper "Innovative Free-Range Resonant Electrical Energy Delivery System (Free-D System) for a Ventricular Assist Device Using Wireless Power," presented at American Society for Artificial Internal Organs (ASAIO), *June 2011*.
Best Paper (2), "A Capacitive Touch Interface for Passive RFID Tags," *May 2009*, IEEE RFID 2009
Best Demo (1), "RFID Sensor Networks with the Intel WISP," *Nov. 2008,* ACM Sensys 08

General awards

Fellow of the National Academy of Inventors (NAI), 2021
Fellow of the Institute of Electrical and Electronics Engineers (IEEE), "for contributions to far- and near-field wireless power, backscatter communication, and electric field sensing," **2020**.
Milton and Delia Zeutschel Professorship, 2017-2022; Renewed 2023-2027
Amazon Catalyst Fellow, 2017
Ambient Backscatter and **Interscatter** two of the Top 10 Technological Inventions of 2016 by Money Inc.
GeekWire Seattle 10, WiBotic, a company I co-founded with graduated PhD student Ben Waters, named one of Seattle's 10 hottest startups for 2016.
Madrona Prize, for "The Next Big Leap in Backscatter Communication," awarded to research project with most commercial potential at UW CSE Industrial Affiliates Day 2016.
GlaxoSmithKline (GSK) Bioelectronics Innovation Challenge, won $1.2M ($200K for Phase I, $1.0M for Phase II) in world-wide competition to develop a fully wireless platform for neuro-modulation. Currently competing for an additional $1M. 2016.
MIT Technology Review "Ten Breakthrough Technologies," for Passive Wi-Fi and Power Over Wi-Fi, 2016
Popular Science "Best of What's New, for WiFi powered camera, 2015
University of Washington CoMotion Presidential Innovation Fellow, 2015
Allen Distinguished Investigator, for project "A brain-computer interface to re-animate the limbs following spinal injury: Development of a Brain-Computer-Spinal Interface (BCSI)," 2013
Madrona Prize, for "Ambient Backscatter," awarded to research project with most commercial potential at UW CSE Industrial Affiliates Day 2013.
First Prize, UW Inventor of the Year Poster Contest, for FREE-D, 2013.
Senior Member, IEEE. January 2013.
CIF Postdoctoral Fellow Supervision award, CRA/CCC, 2010-2011
Motorola Fellow, MIT Media Laboratory, 1995 – 1997
Herchel Smith Scholar, Full funding for two years' tuition, room and board at Emmanuel College, University of Cambridge, 1991 – 1993
Phi Beta Kappa, Williams College, 1991
Sigma Xi, Williams College, 1991

Intel awards

Divisional Recognition Award, *Q4 2009,* **Intel Labs,**
"For rapid resolution of key technical challenges to mobile platform intercept of WREL technology leading to JPF definition with PCCG"

Divisional Recognition Award, *Q2 2009,* **Intel Labs,**
"For a team effort on the WISP Challenge that exceeded expectations in creating a thriving WISP Community"

Special Intel Employee Retention Award, *Oct. 2008*

Divisional Recognition Award, *Q4 2008,* **Corporate Technology Group**
"For delivering first-rate results on aggressive and risky targets to provide three captivating IR technology demonstrations for Justin's stage demos at IDF"

Divisional Recognition Award, *Q3 2008,* **Corporate Technology Group**,
"For leading the formation of a new Personal Robotics community by organizing the inaugural Workshop on Personal Robotics, thereby establishing Intel as a leader in this important emerging field"

Divisional Recognition Award, *Q3 2008,* **Corporate Technology Group**
"For innovation in wireless power with a circuit-based theory that enabled the transmission of 21 watts over 2 feet at 70% efficiency"

Divisional Recognition Award, *Q4 2007,* **Corporate Technology Group**
"For role modeling customer orientation in developing the first Phase Change Memory prototype that could be read, written, and powered wirelessly with no external antenna"

Divisional Recognition Award, *Q2 2007,* **Corporate Technology Group**
"For developing a wireless read-write capability for flash memory that led to joint pathfinding with FMG and could lead to wireless capabilities for our future PCM products"

Best Poster, *June 2007,* **Intel Research Symposium**,
Award for "Electric Field Pretouch for Robotic Grasping"

Best Short Talk, *Dec. 2006,* Intel Fellows Mini-Conference on Power
Award for short talk "RF Power Harvesting for Power Efficiency"

AFFILIATIONS AND OTHER APPOINTMENTS

Affiliate Associate Professor, Computer Science & Engineering and Electrical Engineering, *University of Washington, 7/10-2/11*
Affiliate Assistant Professor, Computer Science & Engineering and Electrical Engineering, University of Washington, 6/06 – 7/10 (CSE), 7/05 – 7/10 (EE)
Graduate Faculty Member, University of Washington, 7/08 – 7/13

PUBLICATIONS

Citations: Total Citations: 26683. H-index: 79. i10-index: 208. Source: Google Scholar, 6/10/2025. Citations listed when 100 or more. Citation counts for individual papers updated 1/28/2025.

Co-Author Key
1: Graduate students under my supervision
2: Postdoctoral scholars under my supervision
3: Undergraduate students under my supervision
4: Graduate student interns under my supervision (mostly at Intel)
5: Employees under my supervision
6: Graduate students visiting my lab

Refereed archival journal publications

J52 **Electrostatic brakes enable individual joint control of underactuated, highly articulated robots**, Patrick Lancaster,[1] Christoforos Mavrogiannis, Siddhartha Srinivasa, Joshua R. Smith, International Journal of Robotics Research, June 5, 2024

J51 **Wirelessly Powered Visible Light-Emitting Implant for Surgical Guidance during Lumpectomy,** S Rho, RA Stillwell, K Yan,[1] AFB de Almeida Barreto, JR Smith, P Fay, AM Police, TD O'Sullivan, Sensors 24 (17), 5639, 2024

J50 **Carrier-Free RFID: Using Modulated Noise Communication to Read UHF RFID Tags**, Shanti M Garman,[1] Ali Saffari, [1] Daisuke Kobuchi,[6] Dara Stotland,[3] Joshua R Smith, Zerina Kapetanovic, IEEE Journal of Radio Frequency Identification, March 20, 2024

J49 **Mechanisms of octopus arm search behavior without visual feedback,** DM Sivitilli, T Strong, W Weertman, J Ullmann, J R Smith, DH Gire, Bioinspiration & Biomimetics, 18 (6), 066017, October 30, 2023

J48 **Magnetic field coupling with lunar soil simulants**, Shanti M Garman,[1] Melissa C Roth, Vincent G Roux, Joshua R. Smith, Scientific Reports, Vol. 13, No. 1, pp 1-13, June 6, 2023

J47 **Communication by means of modulated Johnson noise**, Zerina Kapetanvic,[1] Miguel Morales, Joshua R. Smith, Proceedings of the National Academy of Sciences, Vol. 119, No. 49, e2201337119, November 1, 2022

J46 **A ±0.5-mV-Minimum-Input DC-DC Converter With Stepwise Adiabatic Gate-Drive and Efficient Timing Control for Thermoelectric Energy Harvesting,** EJ Carlson,[1] JR Smith, IEEE Transactions on Circuits and Systems I: Regular Papers doi: 10.1109/TCSI.2022.3219402, 2022

J45 **Acoustic Balance: Weighing in Ultrasonic Non-Contact Manipulators**, Jared Nakahara[1], Joshua R. Smith, IEEE Robotics and Automation Letters 7 (4), 9145-9150, 2022

J44 **Lessons for robotics from the control architecture of the octopus,** Dominic M. Sivitilli, Joshua R. Smith, David H. Gire, Frontiers in Robotics and AI, 131, 2022

J43 **Adaptive Wireless Power Transfer and Backscatter Communication for Perpetual Operation of Wireless Brain-Computer Interfaces**, Gregory E. Moore[1], James D. Rosenthal, Joshua R. Smith, Matthew S. Reynolds, Proceedings of the IEEE, December 10, 2021

J42 **Proximity Perception in Human-centered Robotics: A Survey on Sensing Systems and Applications**, Stefan Escaida Navarro, Stephan Mühlbacher-Karrer, Hosam Alagi, Hubert Zangl, Keisuke Koyama, Björn Hein, Christian Duriez, Joshua R. Smith, IEEE Transactions on Robotics, November 1, 2021 **Citations: 109**

J41 **Brain-Computer-Spinal Interface Restores Upper Limb Function After Spinal Cord Injury,** Soshi Samejima, Abed Khorasani, Vaishnavi Ranganathan[1], Jared Nakahara[3], Nicholas M Tolley, Adrien Boissenin, Vahid Shalchyan, Mohammad Reza Daliri, Joshua R Smith, Chet T Moritz, IEEE Transactions on Neural Systems and Rehabilitation Engineering, Vol 29, pp 1233-1242, June 17, 2021

J40 **Advances and Open Problems in Backscatter Networking,** Vamsi Talla[5], Joshua Smith, Shyamnath Gollakota, GetMobile: Mobile Computing and Communications Vol 24 Issue 4, pp 32-38, December 2020

J39 **Relacks: Reliable Backscatter Communication in Indoor Environments,** Mohamad Katanbaf,[1] Vivek Jain, Joshua R. Smith, Proceedings of the ACM on Interactive, Mobile, Wearable, and Ubiquitous Technologies, Vol 4 Issue 2, Article 48, pp 1-24, June 2020

J38 **Benchmarking Robot Manipulation with the Rubik's Cube,** Boling Yang, [1] Patrick Lancaster, [1] Siddhartha Srinivasa, Joshua R Smith, IEEE Robotics and Automation Letters, Vol 5, No 2, pp. 2094-2099, April 2020.

J37 **Glaze: Overlaying Occupied Spectrum with Downlink IoT Transmissions,** Zerina Kapetanovic,[1] Ali Saffari, [1] Ranveer Chandra, Joshua R Smith, Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, Vol 3, No 4, pp. 1-21, December 11, 2019.

J36 **Low-cost wireless power efficiency optimization of the NFC tag through switchable receiver antenna,** Yi Zhao, [1] Huaye Li, [3] Saman Naderiparizi, [1] Aaron Parks, [1] Joshua R Smith, Wireless Power Transfer, Vol 5, Issue 2, pp. 87-96, September 2018.

J35 **Electrical power to run ventricular assist devices using the Free-range Resonant Electrical Energy Delivery system,** Benjamin H Waters, [1] Jiheum Park, J Christopher Bouwmeester, John Valdovinos, Arnar Geirsson, Alanson P Sample, [2] Joshua R Smith, Pramod Bonde, The Journal of Heart and Lung Transplantation, August 11, 2018, https://doi.org/10.1016/j.healun.2018.08.007.

J34 **IoT communications with M-PSK modulated ambient backscatter: Algorithm, analysis, and implementation**, J Qian, [1] AN Parks, [1] JR Smith, F Gao, S Jin, IEEE Internet of Things Journal, July 31, 2018. **Citations: 110**

J33 **RF Bandaid: A Fully-Analog and Passive Wireless Interface for Wearable Sensors,** V Ranganathan, [1] S Gupta, J Lester, JR Smith, D Tan, Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, Vol 2, No 1, pp. 79, July 5, 2018. ***Distinguished Paper award winner*** (given to 8 out of 202 papers)

J32 **LoRa Backscatter: Enabling the Vision of Ubiquitous Connectivity,** Vamsi Talla,[2] Mehrdad Hessar, Bryce Kellogg, Ali Najafi, Joshua R. Smith, Shyamnath Gollakota, Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), September 15, 2017. ***Distinguished Paper award winner*** **Citations: 513**

J31 **Battery-Free Cellphone**, Vamsi Talla,[2] Bryce Kellogg, Shyamnath Gollakota, Joshua R. Smith, Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), September 15, 2017. **Citations: 221**

J30 **Powering the Next Billion Devices with Wi-Fi,** Communications of the ACM, Vamsi Talla,[2] Bryce Kellogg, Benjamin Ransford, [2] Saman Naderiparizi, [1] Joshua R. Smith, Shyamnath Gollakota, Volume 60 No. 3, pp. 83-91, 10.1145/3041059, March 2017.

J29 **Design and Analysis of a High Bandwidth Rectifying Regulator with PWM and PFM modes**, V Talla,[2] JR Smith, IEEE Transactions on Circuits and Systems II: Express Briefs 63 (12), pp. 1121-1125, November, 2016

J28 **Passive Wi-Fi: Bringing Low Power to Wi-Fi Transmissions**, Bryce Kellogg, Vamsi Talla, [2] Joshua R. Smith, Shyamnath Gollakota, GetMobile: Mobile Computing and Communications: Volume 20 Issue 3, July 2016.

J27 **Unpowering the Internet of Things**, Joshua R. Smith, IQT Quarterly, Special Issue on Internet of Things, (invited) Vol. 8, No. 1, pp. 25-28, Summer 2016.

J26 **A Reconfigurable Resonant Coil for Range Adaptation Wireless Power Transfer**, G Lee,[6] BH Waters,[1] YG Shin, JR Smith, WS Park, IEEE Transactions on Microwave Theory and Techniques, Vol. 64, Issue 2, pp. 624-632, Feb 2016

J25 **Battery-Free Connected Machine Vision with WISPCam**, Saman Naderiparizi,[1] Zerina Kapetanovic,[1] Joshua Smith, GetMobile Quarterly Magazine, Vol. 20, No, 1, Jan 2016

J24 **Power Delivery and Leakage Field Control Using and Adaptive Phased Array Wireless Power System**, Benjamin Waters,[1] Brody Mahoney,[1] Vaishnavi Ranganathan,[1] Joshua R. Smith, IEEE Transactions on Power Electronics, Special Issue on Wireless Power Transfer, Vol 30, No 11, pp. 6298-6309, February 2015. **Citations: 112**

J23 **Energy transmission and power sources for mechanical circulatory support devices to achieve total implantability**http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=6494255, JX Wang, JR Smith, P Bonde The Annals of thoracic surgery, Vol 97, Issue 4, pp. 1467-1474, Feb 2014.

J22 **Innovative Free-Range Resonant Electrical Energy Delivery System (FREE-D System) for a Ventricular Assist Device Using Wireless**

Powerhttp://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=6494255, Benjamin H. Waters[1], Joshua R. Smith, Pramod Bonde, ASAIO Journal Vol. 60, No. 1, pp. 31-37. 2014.

J21 **The Emergence of RF-Powered Computing**, S. Gollakota, M. Reynolds, J.R. Smith, D. Wetherall, IEEE Computer, Vol. 47, No. 1, pp. 32-39, Jan 2014. **Citations: 143**

J20 **Enabling Seamless Wireless Power Delivery in Dynamic Environments**, Alanson P. Sample[2], Benjamin H. Waters,[1] Scott Wisdom,[1] Joshua R. Smith, (Invited) Proceedings of the IEEE, Vol 101, Issue 6, pp. 1343-1358, June 2013. **Citations: 315**

J19 **Evaluation of Wireless Resonant Power Transfer Systems with Human Electromagnetic Exposure Limits**, Andreas Christ, Mark G. Douglas, John Roman, Emily B. Cooper, Alanson P. Sample[1], Benjamin H. Waters[1], Joshua R. Smith, Niels Kuster, IEEE Transactions on Electromagnetic Compatibility, Vol. 55, Issue 2, pp. 265-275. April 2013. **Citations: 292**

J18 **Physical Human Interactive Guidance: Identifying Grasping Principles From Human-Planned Grasps**, Ravi Balasubramanian[2], Ling Xu[4], Peter Brook[3], Joshua R. Smith, Yoky Matsuoka, IEEE Transactions on Robotics (T-RO), Vol. 28 No. 4, pp. 899-910, Aug. 2012. **Citations: 146**

J17 **Powering a Ventricular Assist Device (VAD) with the Free-range Resonant Electrical Energy Delivery (FREE-D) System,** B. H. Waters[1], A. P. Sample[1], P. Bonde, J.R. Smith. (Invited) Proceedings of the IEEE, vol. 100, No. 1, pp. 138-149, January 2012. **Citations: 219**

J16 **Toward Total Implantability Using Free-Range Resonant Electrical Energy Delivery System: Achieving Untethered Ventricular Assist Device Operation Over Large Distances**, Benjamin Waters[1], Alanson Sample[1], Joshua Smith, and Pramod Bonde, Cardiology Clinics, Volume 29, Number 4, pp. 609-625. November 2011.

J15 **Wireless strain measurement for structural testing and health monitoring of carbon fiber composites**, Federico Gasco, Paolo Feraboli, Jeff Braun[1], Joshua Smith, Patrick Stickler, Luciano DeOto, Composites: Part A 42, pp. 1263–1274, 2011.

J14 **Analysis, Experimental Results, and Range Adaptation of Magnetically Coupled Resonators for Wireless Power Transfer,** Alanson P. Sample[1], David T. Meyer[3], Joshua R. Smith, IEEE Transactions on Industrial Electronics, Vol. 58, No. 2, pp 544-554, Feb 2011. **Citations: 2275**

J13 **RFID: From Supply Chains to Sensor Nets**, S. Roy, V. Jandhyala, J.R. Smith, D.J. Wetherall, B.P. Otis, R. Chakraborty, M. Buettner[1], D.J. Yeager[1], Y.-C. Ko, A.P. Sample[1], Proceedings of the IEEE, vol.98, no.9, pp.1583-1592, Sept. 2010. **Citations: 124**

J12 **NeuralWISP: A Wirelessly Powered Neural Interface with 1-m Range,** Daniel J. Yeager[1], Jeremy Holleman, Richa Prasad, Joshua R. Smith, and Brian Otis, IEEE Transactions on Biomedical Circuits and Systems, Volume 3, Issue 6, pp. 379-387, Oct 2009. **Citations: 116**

J11 **Design of an RFID-Based Battery-Free Programmable Sensing Platform**. A.P. Sample[1], D.J. Yeager[1], P.S. Powledge, A.V. Mamishev, J.R. Smith. IEEE Transactions on Instrumentation and Measurement, Vol. 57, No. 11, Nov. 2008, pp. 2608-2615. **Citations: 1123**

J10 **RFID MAC Performance Evaluation Based on ISO/IEC 18000-6 Type C.** You-Chang Ko, Sumit Roy, Joshua R. Smith, Hyong-Woo Lee, and Choong-Ho Cho, IEEE Communications Letters, Vol. 12, No. 6, June 2008.

J9 **Energy scavenging for inductively coupled passive RFID systems.** B. Jiang[4], J. R. Smith, M. Philipose, S. Roy, K. Sundara-Rajan[4], and A. Mamishev. IEEE Transactions on Instrumentation and Measurement, February 2007, Vol. 56, No. 1, pp. 118-125. **Citations: 200**

J8 **RFID-Based Techniques for Human Activity Detection.** Joshua R. Smith, Kenneth P. Fishkin, Bing Jiang[4], Alexander Mamishev, Matthai Philipose, Adam Rea, Sumit Roy, Kishore Sundara-Rajan[4]. Communications of the ACM, v48, no. 9, Sep 2005, pp. 39-44. **Citations: 303**

J7 **Battery-Free Wireless Identification and Sensing.** Matthai Philipose, Joshua R. Smith, Bing Jiang[4], Kishore Sundara-Rajan[4], Alexander Mamishev, Sumit Roy. IEEE Pervasive Computing, Vol. 4, No. 1, January-March 2005, pp. 37-45. **Citations: 401**

J6 **Imperceptible Sensory Channels.** Joshua R. Smith, (Invited) IEEE Computer, Vol. 37, No. 6, pp. 84-85, June 2004.

J5 **Code Division Multiplexing of a Sensor Channel: A Software Implementation**. Joshua R. Smith, Christopher Salthouse[3], and Neil Gershenfeld. IEEE Journal on Selected Areas in Communications, Vol. 17, No. 4, April 1999, pp 725-731.

J4 **Distributing Identity**. Joshua R. Smith. IEEE Robotics and Automation Magazine, Vol. 6, No. 1, March 1999, pp 49-56.

J3 **Electric Field Sensing for Graphical Interfaces**. Joshua R. Smith, Tom White, Christopher Dodge, David Allport, Joseph Paradiso, and Neil Gershenfeld. Computer Graphics and Applications, Vol. 18, No. 3, 1998, pp 54-61. **Citations: 229**

J2 **Field Mice: Extracting Hand Geometry From Electric Field Measurements**. Joshua R. Smith. IBM Systems Journal, Vol. 35, No. 3&4, 1996, pp 587-608. **Citations: 132**

J1 **Lattice Polymer Automata** Steen Rasmussen and Joshua R. Smith. Berichte der BunsenGesellschaft fur Physikalische Chemie 98, No. 9., pp. 1185-1193. 1994, pp 1185-1193.

Conference proceedings and other non-journal articles

C124 Johnsen-Rahbek Capstan Clutch: A High Torque Electrostatic Clutch, TE Amish,[1] JT Auletta, CC Kessens, JR Smith, JI Lipton, 2024 IEEE International Conference on Robotics and Automation (ICRA), 148-154, May 13, 2024

C123 Dynamo-grasp: Dynamics-aware optimization for grasp point detection in suction grippers, B Yang,[1] S Atar,[1] M Grotz,[2] B Boots, J Smith, Conference on Robot Learning, 2096-2112, December 2, 2023

C122 Cosmic Backscatter: New Ways to Communicate via Modulated Noise, Z Kapetanovic, S Garman,[1] D Stotland,[3] JR Smith, Proceedings of the 22nd ACM Workshop on Hot Topics in Networks, 165-171, November 28, 2023

C121 NeuriCam: Key-Frame Video Super-Resolution and Colorization for IoT Cameras, B Veluri, C Pernu, A Saffari,[1] J Smith, M Taylor, S Gollakota, Proceedings of the 29th Annual International Conference on Mobile Computing and Networking, October 2, 2023

C120 Roaming DTN: Integrating Unscheduled Nodes into Contact Plan Based DTN Networks, D Ta,[1] R Menon,[3] J Taggart,[3] A Tettamanti,[3] S Feaser, P Torrado,[1] J Smith, 2023 IEEE Cognitive Communications for Aerospace Applications Workshop (CCAAW), June 20, 2023

C119 Modulated Noise Communication: Reading UHF RFID tags without a carrier, S Garman,[1] A Saffari,[1] D Kobuchi,[6] JR Smith, Z Kapetanovic, 2023 IEEE International Conference on RFID (RFID 2023), pp 19-23, June 13, 2023

C118 Harvesting Watts at Ultra-High Frequencies, S Garman,[1] V Affandy,[3] JR Smith, 2023 IEEE Wireless Power Transfer Conference and Expo (WPTCE 2023), pp 19-23, June 4-8, 2023

C117 Suppression of Receiver Harmonic Currents in Wireless Power Transfer Systems, D Kobuchi,[6] G Moore,[1] Yoshiaki Narusue, Joshua R Smith, 2023 IEEE Wireless Power Transfer Conference and Expo (WPTCE 2023), June 4-8, 2023

C116 Stackelberg Games for Learning Emergent Behaviors During Competitive Autocurricula, Boling Yang,[1] Liyuan Zheng, Lillian J. Ratliff, Byron Boots, Joshua R. Smith, 2023 IEEE International Conference on Robotics and Automation, ICRA 2023

C115 Wireless Identification and Sensing Platform Version 6.0, Rohan Menon,[3] Rohit Gujarathi,[3] Ali Saffari,[1] Joshua R. Smith, 10th International Workshop on Energy Harvesting & Energy-Neutral Sensing Systems (EnSys, in conjunction with ACM SenSys) November 6, 2022

C114 Optical Proximity Sensing for Pose Estimation During In-Hand Manipulation, Patrick Lancaster,[1] Pratik Gyawali,[1] Christoforos Mavrogiannis, Siddhartha S. Srinivasa, Joshua R. Smith, 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), October 23, 2022

C113 Analysis and Design of a Multi-hop Resonant Wireless Power Transfer System: Optimal Intermediate Coil Size and Location, Kedi Yan,[1] Gregory E. Moore,[1] Joshua R. Smith, Wireless Power Week (WPW), 454-459, July 5-9, 2022

C112 Smart breast clip: A wireless implant for continuous molecular sensing of breast masses, Alicia Y. Wei, Gregory Moore,[1] Kedi Yan,[1] Brody Mahoney,[1] Joshua R. Smith, Thomas D. O'Sullivan, Label-free Biomedical Imaging and Sensing (LBIS) 2022, PC1197215, 2022

C111 Motivating Physical Activity via Competitive Human-Robot Interaction, Boling Yang,[1] Golnaz Habibi, Patrick Lancaster,[1] Byron Boots, Joshua R. Smith Smith, Conference on Robot Learning, 839-849, 2022

C110 Stackelberg MADDPG: Learning Emergent Behaviors via Information Asymmetry in Competitive Games, Boling Yang,[1] L Zheng, LJ Ratliff, B Boots, JR Smith, AAAI Reinforcement Learning in Games Workshop, 2022

C109 Battery-Free Camera Occupancy Detection System, Ali Saffari,[1] Sin Yong Tan, Mohamad Katanbaf,[1] Homagni Saha, Joshua Smith, Soumik Sarkar, 5th International Workshop on Embedded and Mobile Deep Learning Workshop (EMDL21) co-located with ACM MobiSys 2021, June 25, 2021

C108 A Low-Cost, Open-Sourced Platform for High-Fidelity Characterization of Large WPT Coils, Gregory E Moore,[1] Usman M Khan,[3] Timmy Yang,[3] Kedi Yan,[1] Tri Nguyen,[3] Shi Ming Kuang,[3] Chase Whyte,[3] Vaishnavi Ranganathan, Joshua R Smith, 2021 IEEE Wireless Power Transfer Conference (WPTC), pp 1-4, June 1, 2021

C107 Competitive Physical Human-Robot Game Play, Boling Yang,[1] Golnaz Habibi, Xiangyu Xie,[3] Joshua R Smith, HRI '21 Companion: Companion of the 2021 ACM/IEEE International Conference on Human-Robot Interaction, pp 242-246, March 2021

C106 Contact-less Manipulation of Millimeter-scale Objects via Ultrasonic Levitation, Jared Nakahara,[1] Boling Yang,[1] Joshua R Smith, Proceedings of the 8th IEEE RAS/EMBS International Conference on Biomedical Robotics and Biomechatronics (BioRob 2020), November 29, 2020

C105 Receiver Selectivity Limits on Bistatic Backscatter Range, Mohamad Katanbaf,[1] Ali Saffari,[1] Joshua R Smith, 2020 IEEE International Conference on RFID (RFID 2020), September 28, 2020

C104 Classifying WLAN Packets from the RF Envelope: Towards More Efficient Wireless Network Performance, Zerina Kapetanovic,[1] Gregory E Moore,[1] Shanti Garman,[1] Joshua R. Smith, In EMDL'20: Proceedings of the 4th International Workshop on Embedded and Mobile Deep Learning, (Co-Located with Mobicom) pp.13-18, London, 9/25/2020

C103 Appliqué: A Computationally Efficient Modeling Tool for MultiLayer Printed Inductors, for near Field Wireless Power Transfer, Brody Mahoney,[1] Joshua R. Smith, European Conference on Antennas and Propagation (EuCAP 2020, March 15-20, 2020.

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X1 **An analytical model for stepwise adiabatic driver energy consumption,** Eric Carlson, Joshua R. Smith, TechRxiv, 2022

Workshop papers (not published elsewhere)

W1 **Hierarchical Control Strategy for Moving a Robot Manipulator Between Small Containers,** Paolo Torrado[1], Boling Yang[1], Joshua R. Smith, Workshop on "The role of uncertainty and how it is tackled in robotic grasping and manipulation," at the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Kyoto, October 27, 2022

U.S. Patents awarded (last updated 6/10/2025)

All licenses are exclusive unless specified otherwise. Citations listed when 100 or more.

	Patent number and date	Title	Inventors	Assignee	# Cites	Licensee
P56	12,294,228 5/6/2025	Systems including resonator circuits and methods for wireless charging using same	JR Smith, X Shi	UW		
P55	12,178,403 12/31/2024	Light field capture and rendering for head-mounted displays	JR Smith, SR Browd, RG Nicoll, JA Youngquist	UW		Proprio
P54	11,722,017 8/8/2023	Wireless power delivery in dynamic environments	JR Smith, BH Waters, S Wisdom, AP Sample	UW	177	Wibotic
P53	11,621,583 4/4/2023	Distributed control adaptive wireless power transfer system	JR Smith, B Waters	UW		Wibotic
P52	11,612,307 3/28/2023	LIGHT FIELD CAPTURE AND RENDERING FOR HEAD-MOUNTED DISPLAYS	JR Smith, SR Browd, RG Nicoll, JA Youngquist	UW		Proprio
P51	11,475,392 10/18/2022	SYSTEM FOR PERSONAL MAIL PIECE TRACKING AND TRACING FROM MULTIPLE SOURCES BY USER IDENTIFIER	JR Smith, PM Yarin, MJ Murphy, AV Sutherland II, E Metois	EGL		EGL
P50	11,212,479 12/28/2021	Image and/or video transmission using backscatter devices	S Gollakota, S Naderiparizi, M Hessar, V Talla, JR Smith	UW		Jeeva
P49	11,090,481 8/17/2021	Wireless power delivery in dynamic environments	JR Smith, BH Waters, S Wisdom, AP Sample	UW		Wibotic
P48	10,951,446 3/16/2021	Backscatter devices including examples of single sideband operation	B Kellogg, JR Smith, S Gollakota, V Talla, VS Iyer	UW		Jeeva
P47	10,873,363 12/22/2020	Backscatter devices and network systems incorporating backscatter devices	S Gollakota, B Kellogg, V Talla, JR Smith	UW		Jeeva
P46	10,812,130 10/20/2020	Backscatter systems, devices, and techniques utilizing CSS modulation and/or higher order harmonic cancellation	V Talla, M Hessar, JR Smith, S Gollakota, A Najafi, B Kellogg	UW		Jeeva

P45	10,652,073 5/12/2020	Backscatter devices and systems providing backscattered signals including OFDM packets	V Talla, JR Smith, S Gollakota, N Kellogg	UW		Jeeva
P44	10,587,445 3/10/2020	Apparatuses, systems, and methods for communicating using MIMO and spread spectrum coding in backscatter of ambient signals	S Gollakota, JR Smith, AN Parks, A Liu	UW		Jeeva
P43	10,447,331 10/15/2019	Ambient backscatter transceivers, apparatuses, systems, and methods for communicating using backscatter of ambient RF signals	S Gollakota, JR Smith, V Liu, AN Parks, V Talla	UW		Jeeva
P42	10,383,126 8/13/2019	Power transmission using wireless communication signals	S Gollakota, V Talla, B Kellogg, B Ransford, S Naderiparizi, JR Smith	UW		Jeeva
P41	10,382,161 8/13/2019	Wireless networking communication methods, systems, and devices operable using harvested power	S Gollakota, JR Smith, D Wetherall, B Kellogg, AN Parks	UW		Jeeva
P40	10,304,026 5/28/2019	System for personal mail piece tracking and tracing from multiple sources by user identifier	JR Smith, PM Yarin, MJ Murphy, AV Sutherland II, E Metois	EGL		
P39	10,270,639 4/23/2019	Apparatuses, systems, and methods for communicating using MIMO and spread spectrum coding in backscatter of ambient signals	S Gollakota, JR Smith, AN Parks, A Liu	UW		Jeeva
P38	10,033,424 7/24/2018	Ambient backscatter transceivers, apparatuses, systems, and methods for communicating using backscatter of ambient RF signals	S Gollakota, JR Smith, V Liu; AN Parks, V Talla	UW		Jeeva
P37	9,979,240 5/22/2018	Multiband harvesting systems and methods including switching networks	AN Parks, JR Smith	UW		Jeeva
P36	9,973,367 5/15/2018	Apparatuses, systems, and methods for communicating using MIMO and spread spectrum coding in backscatter of ambient signals	S Gollakota, JR Smith, AN Parks, A Liu	UW		Jeeva
P35	9,919,088 3/20/2018	Implantable heart pump controller	P Bonde, S Asgari, JR Smith, B Waters	Yale, UW	112	Wibotic, CoRISMA
P34	9,969,260 6/27/2017	Dynamic wireless power control	J Walsh, JR. Smith, I Kipnis, GA Cain	Intel		
P33	9,680,520 6/13/2017	Ambient backscatter tranceivers, apparatuses, systems, and methods for communicating using backscatter of ambient RF signals	S Gollakota JR Smith, V Liu, AN Parks, V Talla	UW		Jeeva
P32	9,537,346 1/3/2017	Extendable wireless power delivery for small devices	EB Cooper, Joshua Smith, A Sample, JC Neuman	Intel		
P31	9,473,209 10/18/16	Wireless power transfer apparatus and method thereof	Emily B. Cooper, Joshua R. Smith, Alanson P. Sample	Intel	381	

P30	9,461,478 10/4/16	Wireless power transfer apparatus and method thereof	Joshua R. Smith, Alanson P. Sample	Intel		
P29	9,199,380 12/1/15	Acoustic proximity sensing	Joshua R Smith, LT Jiang	UW		
P28	8,952,571 2/10/2015	Extendable wireless power delivery for small devices	EB Cooper, Joshua Smith, A Sample, JC Neuman	Intel		
P27	8,937,530 1/20/2015	Radio frequency identification tags adapted for localization and state indication	Joshua R. Smith, Daniel Yeager Ali Rahimi	Intel		
P26	8,874,451 10/28/2014	Personal mail piece and electronic mail tracking system	Joshua R. Smith, Paul M. Yarin, Michael J. Murphy, Andrew V. Sutherland II, Eric Metois	EGL		
P25	8,827,889 9/9/2014	Method and system for powering implantable devices	Joshua R. Smith, Pramod Bonde, Benjamin H. Waters, Alanson P. Sample	UW, Yale		Wibotic, CoRISMA
P24	8,643,475 2/4/2014	Radio frequency identification secret handshakes	Tadayoshi Kohno, Alexei Czeskis, Karl Koscher, Joshua R Smith	UW, Intel		
P23	8,527,284 9/3/2013	System for personal mail piece tracking and tracing from multiple sources by user identifier	Joshua R. Smith, Paul M. Yarin, Michael J. Murphy, Andrew V. Sutherland, Eric Metois	EGL		
P22	8,502,650 8/6/2013	Temporary non-responsive state for RFID tags	Joshua D. Posamentier, Joshua R. Smith	Intel		
P21	8,446,045 5/21/2013	Flat, asymmetric, and E-field confined wireless power transfer apparatus and method thereof	Joshua R. Smith, Alanson P. Sample, Emily B. Cooper	Intel	225	
P20	8,299,652 10/30/2012	Wireless power transfer apparatus and method thereof	Alanson P. Sample, Joshua R. Smith	Intel	397	
P19	8,222,996 7/17/2012	Radio frequency identification tags adapted for localization and state indication	Joshua R. Smith, Daniel Yeager, Ali Rahimi	Intel		
P18	8,149,120 4/3/2012	Temporary non-responsive state for RFID tags	Joshua D. Posamentier, Joshua R. Smith	Intel		
P17	7,956,725 6/7/2011	RFID tag with accelerometer	Joshua R. Smith	Intel	101	
P16	7,825,776 11/2/2010	Device configuration with RFID	Joshua R. Smith and Dirk Haehnel	Intel		
P15	7,646,214 1/12/10	Power harvesting signal line termination	Joshua R. Smith	Intel		

P14	7,633,025 12/15/09	Inertial switch using fully released and enclosed conductive contact bridge	Joshua R. Smith, Kishore Sundara-Rajan	Intel		
P13	7,411,505 8/12/08	Switch status and RFID tag	Joshua R. Smith, Anthony Lamarca, Matthai Philipose	Intel		
P12	7,336,184 2/26/08	Inertially controlled switch and RFID tag	Joshua R. Smith, Matthai Philipose	Intel	1472	
P11	7,251,347 7/31/07	System and method for authentication of a workpiece using three dimensional shape recovery	Joshua R. Smith	EGL	145	
P10	7,035,428 4/25/06	Workpiece authentication based upon one or more workpiece images	Joshua R. Smith	EGL		
P9	6,584,214 6/24/03	Identification and verification using complex, three-dimensional structural features	Ravikanth Pappu, Neil Gershenfeld, Joshua R. Smith	MIT		
P8	D450,759 11/20/01	Postal indicia for an envelope	Will Crosby, Michael J. Murphy, Joshua R. Smith, Andrew Sutherland	EGL		
P7	6,210,771 04/03/01	Electrically active textiles and articles made therefrom	E. Rehmi Post, Margaret Orth, Emily Cooper, Joshua R. Smith	MIT	341	
P6	6,066,954 05/23/00	Apparatus for resolving presence and orientation within a defined space	Neil Gershenfeld, Joshua R. Smith	MIT		Elesys
P5	6,051,981 04/18/00	Method and apparatus for characterizing movement of a mass within a defined space	Neil Gershenfeld, Joshua R. Smith	MIT		Elesys
P4	6,025,726 02/15/00	Method and apparatus for determining three-dimensional position, orientation and mass distribution	Neil Gershenfeld, Joshua R. Smith	MIT	138	Elesys
P3	5,936,412 08/10/99	Method for resolving presence, orientation and activity in a defined space	Neil Gershenfeld, Joshua R. Smith	MIT		Elesys
P2	5,914,610 06/22/99	Apparatus and method for characterizing movement of a mass within a defined space	Neil Gershenfeld, Joshua R. Smith	MIT		Elesys
P1	5,844,415 12/01/98	Method for three-dimensional positions, orientation and mass distribution	Neil Gershenfeld, Joshua R. Smith	MIT	105	Elesys

Legend: EGL is Escher Group LTD

International Patents

	Patent number	**Title**	**Inventors**	**Assignee**	**Licensee**
I21	EP3408681B1 1/24/2024	Backscatter devices including examples of single sideband operation	Bryce KELLOGG, Joshua R. Smith, Shyamnath GOLLAKOTA, Vamsi TALLA, Vikram S. IYER	UW	Jeeva
I20	EP3146715B1 3/23/2022	Systems and methods for mediated-reality surgical visualization	Samuel R. Browd, Joshua R. Smith, Rufus Griffin Nicoll	UW	Proprio

I19	EP3529902B1 6/9/2021	BACKSCATTER SYSTEMS, DEVICES, AND TECHNIQUES UTILIZING CSS MODULATION AND/OR HIGHER ORDER HARMONIC CANCELLATION	Vamsi TALLA, Mehrdad HESSAR, Joshua R. Smith, Shyamnath GOLLAKOTA, Ali Najafi, Bryce KELLOGG	UW	Jeeva
I18	EP2976734B1 9/18/19	AMBIENT BACKSCATTER TRANCEIVERS, APPARATUSES, SYSTEMS, AND METHODS FOR COMMUNICATING USING BACKSCATTER OF AMBIENT RF SIGNALS	Shyamnath GOLLAKOTA, Joshua R. Smith, Vincent Liu, Aaron N. PARKS, Vamsi TALLA	UW	Jeeva
I17	EP3189580B1 5/22/2019	POWER TRANSMISSION USING WIRELESS COMMUNICATION SIGNALS	Shyamnath GOLLAKOTA, Vamsi TALLA, Bryce KELLOGG, Ben RANSFORD, Saman NADERIPARIZI, Joshua R. Smith	UW	Jeeva
I16	EP3175531B1 4/3/2019	Adaptive and multi-transmitter wireless power for robots	Joshua R. Smith, Benjamin WATERS	UW	Wibotic
I15	EP2991185B1 2/13/2019	WIRELESS POWER TRANSFER APPARATUS AND METHOD THEREOF	COOPER EMILY, SAMPLE ALANSON, SMITH JOSHUA	Intel	Intel
I14	EP3236558B1 12/19/2018	Wireless power delivery in dynamic environments	Joshua R. Smith, Benjamin WATERS, Scott WISDOM, Alanson P SAMPLE	UW	Wibotic
I13	CN103380561B 9/12/2017	Wireless power transfer apparatus and method thereof	A.P.桑普尔; E.B.库珀; J.R.史密斯	Intel	Intel
I12	EP2853016B1 7/5/2017	Wireless power delivery in dynamic environments	Joshua R. Smith, Benjamin WATERS, Scott WISDOM, Alanson P. SAMPLE	UW	Wibotic
I11	JP6073283B2 2/1/2017	WIRELESS POWER TRANSFER APPARATUS AND METHOD THEREOF	クーパー，エミリー ビー．；サンプル，アランソン ピー．；スミス，ジョシュア アール．	Intel	Intel
I10	EP2137677B1 12/5/2012	Temporary non-responsive state for rfid tags	Joshua D. Posamentier, Joshua R. Smith	Intel	Intel
I9	BR9709753B1 1/13/2009	processos e aparelhos para determinar o posicionamento tridimensional, a orientaÇço e a distribuiÇço de massa.	Neil Gershenfeld, Joshua R. Smith	MIT	Elesys
I8	JP3703850B2 10/5/2005	次元 方位、及び質量分布を決定するための変位電流センサ及	Neil Gershenfeld, Joshua R. Smith	MIT	Elesys
I7	CA2247458C 10/4/2005	Displacement-current method and apparatus for resolving presence, orientation and activity in a defined space	Neil Gershenfeld, Joshua R. Smith	MIT	Elesys
I6	CA2253603C 8/24/2004	DISPLACEMENT-CURRENT SENSOR AND METHOD FOR DETERMINING THREE-DIMENSIONAL POSITION, ORIENTATION AND MASS DISTRIBUTION	Neil Gershenfeld, Joshua R. Smith	MIT	Elesys

I5	KR100421402B1 7/1/2004	변위전류감지기와3차원위치,방향및물체분포를결정하는방법	Neil Gershenfeld, Joshua R. Smith	MIT	Elesys
I4	ES2193373T3 11/1/2003	DETECTOR DE DESPLAZAMIENTO DE CORRIENTE Y METODO PARA DETERMINAR UNA POSICION TRIDIMENSIONAL, UNA ORIENTACION Y UNA DISTRIBUCION DE MESA.	Neil Gershenfeld, Joshua R. Smith	MIT	Elesys
I3	DE69719321T2 10/16/2003	VERSCHIEBUNGSTROMSENSOR UND VERFAHREN ZUM FESTSTELLEN VON POSITION, AUSRICHTUNG UND MASSENVERTEILUNG IN DREI DIMENSIONEN	Neil Gershenfeld, Joshua R. Smith	MIT	Elesys
I2	EP0896678B1 2/26/2003	DISPLACEMENT-CURRENT SENSOR AND METHOD FOR DETERMINING THREE-DIMENSIONAL POSITION, ORIENTATION AND MASS DISTRIBUTION	Neil Gershenfeld, Joshua R. Smith	MIT	Elesys
I1	EP1012530B1 12/18/2002	Displacement-current method and apparatus for resolving presence, orientation and activity in a defined space	Neil Gershenfeld, Joshua R. Smith	MIT	Elesys

Selected Patent Applications: *Not already listed as issued patents, and with more than 100 Citations, or published recently: 2023-*

	Pat App number	**Title**	**Inventors**	**Assignee**	**# Cites**	**Licensee or Owner**
A9	18/763,337 1/9/2025	ACOUSTIC BALANCE: WEIGHING IN ULTRASONIC NON-CONTACT MANIPULATORS	JR Smith, J Nakahara	UW		
A8	18/557,369 7/4/2024	Wireless home identification and sensing platform	GP Henze, JR Smith, S Sarkar, AJ Florita, M Jacoby, MK Nezhad, A Saffari, SY Tan	UW, UC Boulder, ISURF, AfSE		
A7	18/300,097 3/7/2024	Systems and methods for mediated-reality surgical visualization	SR Browd, JR Smith, RG Nicoll	UW		Proprio
A6	18/188,774 1/4/2024	Light field capture and rendering for head-mounted displays	JR Smith, SR Browd, RG Nicoll, JA Youngquist	UW		Proprio
A5	17/905,163 5/11/2023	Systems including resonator circuits and methods for wireless charging using same	JR Smith, X Shi	UW		
A4	17/798,267 2/16/2023	System and method for non-contact manipulation of objects via ultrasonic levitation	JR Smith, J Nakahara, B Yang	UW		
A3	15/311,138 4/6/2017	Systems and methods for mediated-reality surgical visualization	SR Browd, JR Smith, RG Nicoll	UW	136	Proprio

A2	13/976,698 9/11/2014	Presence and range detection of wireless power receiving devices and method thereof	J Walsh, JR Smith, I Kipnis	Intel	268	Intel
A1	12/567,651 4/1/2010	Wirelessly Powered Speaker	EB Cooper, JR Smith, AP Sample	Intel	219	Intel

Abstracts, letters, non-refereed papers, technical reports

- **TetraGrip: Sensor-Driven Multi-Suction Reactive Object Manipulation in Cluttered Scenes**, P Torrado, J Levin, M Grotz, JR Smith, arXiv preprint arXiv:2503.08978, posted 3/12/2025; Submitted to IROS
- **Electrostatic Clutches Enable High-Force Mechanical Multiplexing: Demonstrating Single-Motor Full-Actuation of a 4-DoF Hand**, TE Amish, JT Auletta, CC Kessens, JR Smith, JI Lipton, arXiv preprint arXiv:2501.08469, posted 1/14/2025; Submitted to IEEE Robotics and Automation Letters
- **Exploration of Backscatter Methods for Wireless Avionics**, Aaron Parks, Vamsi Talla, Bryce Kellogg, Joshua Smith, Shyam Gollakota, NASA/CR—2018–219903, June 1, 2018
- **Physical Human-Robot Adversarial Gameplay**, B Yang, P Lancaster, JR Smith, RSS Workshop on Adversarial Robotics, June 30, 2018
- **Prospects for Combining Task and Motion Planning for Bi-Manual Solution of the Rubik's Cube,** B. Yang, P. Lancaster, J.R. Smith Robotics: Science and Systems 2016 Workshop on Task and Motion Planning, (June 2016, Ann Arbor, MI)
- **uMonitor: a Runtime Energy Monitor for Improved Task Scheduling in IPDs**, Saman Naderiparizi,[1] Aaron Parks,[1] Yi Zhao,[1] Joshua R. Smith, HLPC Workshop, ASPLOS, Atlanta, GA, April 2, 2016
- **WISPCam: An RF-Powered Smart Camera for Machine Vision Applications**, Saman Naderiparizi,[1] Zerina Kapetanovic,[1] Joshua R. Smith, HLPC Workshop, ASPLOS, Atlanta, GA, April 2, 2016
- **Printed Low Power Amperometric Gas Sensors Employing RF Energy Harvesting**, M.T. Carter, J.R. Stetter, J.R. Smith, A.N. Parks, Y. Zhao, M.W. Findlay, V. Patel. 221st Electrochemical Society Meeting, 2012, Seattle
- **Physicality: Interacting with the Physical World, From Atoms to Humans**, Joshua R. Smith, Beverly L. Harrison, Xiaofeng Ren, Siddhartha Srinivasa. Intel Technology Journal, Volume 14, Issue 1, pp. 46-61. 2010
- **Sensors, Tags, and Security.** Joshua R. Smith. In Proceedings of the State of Technology Conference on Mobile Wireless Technologies for Persons with Disabilities, Atlanta, GA, May 11-12 2004, pp. 60-66.

Other significant research dissemination (web sites, software, Wikis, etc.)

- Wisp Challenge: Wisp hardware awarded to qualifying academic applicants. Over 200 groups using Wisp. Community website: wisp.wikispaces.com.
- WISP Summit, a workshop on WISP organized in conjunction with Sensys 2009
- BUGSX artificial evolution software was available free online for many years and was downloadable through Ubuntu Linux Software Center.

OTHER SCHOLARLY ACTIVITY

Invited lectures, seminars, and Panels

L117 "Cosmic Backscatter and other ways to communicate by modulating noise," (Virtual) Seminar Series on Future Edge Networks and Distributed Intelligence [joint seminar with Artificial Intelligence of Things (AIoT) Seminar Series], Ohio State University, January 31, 2025, Host: Professor Mi Zhang, Director, AIoT and Machine Learning Systems Lab

L116 "Magnetic Resonance Wireless Power," (Virtual) US Patent and Trademark Office (USPTO) Technology Center 2800 Tech Fair, May 22, 2024 Host: Tulsidas Patel

L115 "Cosmic Backscatter and other ways to communicate by modulating noise," Electrical Engineering Seminar, Columbia University, December 5, 2023, Host: Professor Ioannis Kymissis

L114 "Wibotic: Powering the Universe of Automation," (Virtual) US Patent and Trademark Office (USPTO) Technology Center 2800 Tech Fair, May 16, 2023

L113 Backscatter Communication Without a Carrier, NASA Communications and Intelligent Systems Division, **Distinguished Technical Lecture** (Virtual, hosted at Glenn Research Center), November 10, 2022

L112 Backscatter Communication Without a Carrier, **Invited Keynote**, IEEE RFID-TA, Sardinia, Italy, September 14, 2022

L111 Backscatter Communication Without a Carrier, **Invited Talk**, IEEE Wireless Power Week, Bordeaux, France, July 8, 2022

L110 Technologies for Banishing Batteries, **Invited Keynote** (Virtual), 4th International Conference on Intelligent Circuits and Systems (ICICS), Lovely Professional University, Punjab, India, April 8, 2022

L109 Technologies for Banishing Batteries, **Invited Keynote** (Virtual), Low Power IoT Workshop, New Orleans, LA, March 28, 2022

L108 UW Sensor Systems Lab & Wibotic research on wireless power for space, 2021 UW Space Symposium, Power for Propulsion Panel, November 5, 2021

L107 Technologies for Banishing Batteries, **Invited Keynote** (Virtual), SpliTech 2021, 6th Interntaional Conference on Smart and Sustainable Technologies, Split and Bol, Croatia, September 8-11, 2021

L106 RF Wireless Power: Beyond the Buzz, Virtual Panel Organized by AirFuel Alliance, August 3, 2021

L105 Wireless Power Transfer in the Sensor Systems Lab, International Conference on Wireless Power Transfer (ICWPT'2021), **Invited Keynote** (Virtual), Nanjing, China, June 27, 2021

L104 Proximity Charging in Space, Panel on Commercial Space (along with Satellite Industry Association and Blue Origin), JCATI Annual Symposium (Virtual), April 12, 2021

L103 Perpetual Computing: Technologies for Banishing Batteries, UCSB Institute for Energy Efficiency (Virtual), February 25, 2021

L102 Non-Contact Manipulation, UW CSE Internet of Robotic Things Seminar (Virtual), February 23, 2021

L101 Future of Wireless Charging, Panel at IEEE Consumer Communications and Networking Conference (CCNC), Virtual panel, organized by AirFuel Alliance, January 11, 2021

L100 Perpetual Computing: Technologies for Banishing Batteries, CMU ECE Colloquium (Virtual) , December 4, 2020

L99 Research in the Sensor Systems Lab, Huskies From Home, Virtual presentation to Members of US Congress & staff about impacts of COVID pandemic on research, Virtual, October 27, 2020

L98 A computationally efficient model of octopus sensing & neuro-muscular control, (Invited talk), 3rd Workshop on Proximity Perception in Robotics, ~~Las Vegas~~ Virtual, October 25, 2020

L97 Acoustic Levitation, University of Washington Institute of Neuro-engineering (UWIN) Seminar, Seattle, WA, December 11, 2019

L96 Electric Field Sensing, Pretouch Sensing & Robotics, Class of 1960 Scholars in Computer Science Lecture, Williamstown, MA, September 20, 2019

L95 Perpetual Computing: Technologies for Banishing Batteries, Class of 1960 Scholars in Computer Science Lecture, Williamstown, MA, September 19, 2019

L94 Sensing & Wireless Power for EFRI Project "Muscle-like Cellular Architectures and Compliant, Distributed Sensing and Control for Soft Robots", EFRI Team Meeting, Yale University, New Haven, CT, September 19, 2019

L93 Sensing, Power, and Communication, Madrona Technology Advisory Board Dinner on Intersection of Digital and Physical, Seattle, WA, September 9, 2019

L92 Drawing continuous curves with Turtle geometry: From coil design to Spirograph, UW-MSR Summer Institute on The Future of Fabrication, Semiahoo Resort, Blaine, WA, July 23, 2019

L91 Perpetual Computing: Technologies for Banishing Batteries, presentation to patent examiners participating in US Patent and Trademark Office (USPTO) visit to UW CoMotion Headquarters, Seattle, WA, June 27, 2019

L90 Robotics in the Sensor Systems Lab, UW Robotics Retreat, Seattle, WA, June 7, 2019

L89 Research in the Sensor Systems Lab, UW-Nantes-French-American Chamber of Commerce of the Pacific Northwest, Seattle, WA, May 30, 2019

L88 Sensing, power, and communication for soft robots and living systems, Mobicom TPC Mini-Symposium, Seattle, WA, May 16, 2019

L87 Perpetual Computing: Technologies for Banishing Batteries, Global Innovation Exchange, Bellevue, WA, May 9, 2019

L86 Perpetual Computing: Technologies for Banishing Batteries (Invited talk), ARM Headquarters, Cambridge, UK, February 8, 2019

L85 Perpetual Computing: Technologies for Banishing Batteries, Departmental Seminar & Mobile Systems Center Seminar, Department of Computer Science and Technology, University of Cambridge, Cambridge, UK, Feb 6, 2019 Host: Cecelia Mascolo

L84 Perpetual Computing: Technologies for Banishing Batteries (Invited talk), Fortive Conference on Growth and Innovation, Beaverton, Oregon, October 17, 2018

L83 A Unified Sensor for Pre-Touch, Touch and Post-Touch Force Measurement (Invited talk), 1st Workshop on Proximity Perception in Robotics, IROS 2018, Madrid Spain, October 1, 2018

L82 Ambient backscatter Communication and the Internet of Things (Invited talk), IEEE Wireless Power Transfer Conference / Wireless Power Week, June 5, 2018

L81 Overview of Backscatter (Tutorial), Workshop on Backscattering Techniques, IEEE Wireless Power Transfer Conference / Wireless Power Week, June 3, 2018

L80 Wireless Power and Information Transfer: Enabling Perpetual Computing, Workshop on Energy Harvesting Wireless Communications, IEEE International Conference on Communications, Kansas City, MO, May 20, 2018

L79 Battery free cameras with analog backscatter and interactive compression, Information Theory and Applications (ITA) Workshop, San Diego, CA, February 13, 2018.

L78 Passive Wireless Sensing Workshop, WiSEE 2017 (Wireless Technologies for Space and Extreme Environments), "Passive Radio Technologies from the University of Washington Sensor Systems Lab," Invited Speaker, Montreal Canada, October 10, 2017.

L77 Research in the UW Sensor Systems Lab, presentation to patent examiners participating in US Patent and Trademark Office (USPTO) visit to UW Department of Electrical Engineering, Seattle, WA, July 18, 2017

L76 IEEE Seattle Section, EMC Society Chapter, Advances in Antenna/EMC/Wireless Test and Measurement, "Perpetual Computing: Technologies for Banishing Batteries," Museum of Flight, Seattle, WA, May 17, 2017.

L75 Yale University, Department of Electrical Engineering, "Perpetual Computing: Technologies for Banishing Batteries," New Haven, CT, January 31, 2017. Host: Leandros Tassiulas.

L74 Northwestern University Department of Mechanical Engineering, "Sensor Systems Lab & In-Air Electrosense Update", Evanston, IL, December 15, 2016

L73 Notre Dame Department of Electrical Engineering Seminar, "Toward Battery-Free Sensing, Computing, and Communication," South Bend, IN, December 14, 2016

L72 University of Washington Institute for Neuroengineering (UWIN) Seminar, "Battery-free wireless cameras: A platform for neurally inspired information processing research?" Seattle, WA, November 9, 2016

L71 Allen Frontiers Symposium, "Brain-Controlled Spinal Interface," New York Academy of Sciences, New York, NY, October 25, 2016

L70 Congressional Round Table with Representative Suzan DelBene, "Internet of Things in Healthcare," Seattle, WA, October 17, 2016.

L69 Microsoft Faculty Summit, session "Cameras everywhere! Video Analytics at Scale," Redmond, WA. Host: Ganesh Ananthanarayanan, July 13, 2016.

L68 In-Q-Tel Tech Focus Day on Ulta Low Power Electronics. My talk: "RF-Powered Sensing, Computing, and Communication", Tysons Corner, VA, May 26, 2016

L67 DARPA ISAT Workshop on Bio-Integrated Processing, Sensing, and Storage. My talk: "Thermodynamics of Computation: Past and Future," Seattle, WA, March 21-22, 2016

L66 Tech in Focus: Internet of Things panel, Washington Technology Industry Association, Seattle, WA, March 15, 2016.

L65 International Workshop on Antenna Technology, "Large area wireless power via a planar array of coupled resonators," Cocoa Beach, FL. Invited by Jenshan Lin (U. Florida). March 2, 2016

L64 Neural Engineering Seminar (BIOE 498B/599I), "Power and Communication to implanted neural interface devices", UW CSNE, Feb 3, 2016

L63 Bosch Research Lab, Palo Alto, CA, "Sensor Systems Lab Update," January 19, 2016

L62 Engineering 101 Guest Lecture, "Research in the Sensor Systems Lab", Kane Hall, UW, December 8, 2015

L61 Tsinghua University, Department of Automation, Beijing, China, "Ambient Backscatter: Efficient Communication for RF-Powered Platforms." Host: Prof. Feifei Gao. November 17, 2015

L60 Starbucks HQ, "Zero Power Sensing and Communication for the Internet of Things," Starbucks GTxP Internet of Things Workshop, November 12, 2015

L59 Google Mobile Faculty Summit, "Wireless Power: From Perpetual Sensing To Implanted Electronics, or Abusing RF Signals for Fun and Profit" Google HQ, Mountainview, CA. Host: Matt Welsh, October 9, 2105

L58 Intel Science and Technology Center for Pervasive Computing Retreat, "Overview talk: Low Power / Sensing," Intel Jones Farm, Hillsboro OR, August 12, 2015

L57 Intel Science and Technology Center for Pervasive Computing Retreat, PI Workshop, "Implanted Electronics: The Future of Ubiquitous Computing?" Portland Oregon, August 11, 2015

L56 Engineering 101 Guest Lecture, "Research in the Sensor Systems Lab", Kane Hall, UW, June 3, 2015

L55 Glaxo Smith Kline (GSK) Bioelectronics Challenge Proposers Workshop, "BIONIC: Bidirectional Interface for Organ Nerve Integrated Control" Host: Roy Katso. Los Angeles, CA. May 14, 2015.

L54 CSNE Industrial Advisory Board, "Wireless Power and Energy Efficient Communication for Neural Engineering and Other Applications," UW CSNE, May 4, 2015.

L53 National Academy of Engineering 2015 Regional Meeting and Symposium on Reverse Engineering the Brain. Lecture entitled "Engineering Brain Implants," one of 3 invited lecturers from UW faculty. March 19, 2015

L52 Neural Engineering Seminar (BIOE 498B/599I), "Power and Communication to implanted neural interface devices", UW CSNE, Feb 4, 2015

L51 Allen Distinguished Investigator Life Science Symposium, Scripps Seaside Forum at UC San Diego. "A Brain-Computer Interface to Reanimate the Limbs Following Spinal Injury: Development of a Brain-Computer-Spinal Interface," with Chet Moritz and Adrienne Fairhall, Feb 9, 2015.

L50 UW College of Engineering Lecture Series, Cutting the cord: Wireless power for implanted devices. One of 3 invited lecturers from UW Engineering faculty for 2014. November 18, 2014

L49 UW CSE Industrial Affiliates, **Invited Keynote**, "Powering the Internet of Things: RF-Powered Sensing, Computing, and Communication," Seattle, WA. Host: Hank Levy. October 22, 2014.

L48 IEEE RFID-TA 2014 **Invited Keynote**, "RF-Powered Sensing, Computing and Communication", Tampere, Finland. Host: Leena Ukkonen and Apostolos Georgiadis. Sept 8, 2014

L47 Microsoft Faculty Summit, workshop on Ultra-low Power Computing, "RF-Powered Sensing, Computing, and Communication," July 16, 2014

L46 Microsoft Technical Community Network Talk, "Powering the Internet of Things: RF-Powered Sensing, Computing, and Communication." Host: Matthai Philipose. April 8, 2014.

L45 ASPLOS 2014, Wild and Crazy Ideas session, **Invited Keynote**, "RF-powered computing and communication," Salt Lake City Utah, Mar 1-5, 2014.

L44 PowerMEMS School, "Near field wireless power transfer," London. Hosts: Shad Roundy and Einar Halvorsen. Dec 2-3, 2013.

L43 NASA Jet Propulsion Laboratory, "RF-Powered Sensor-Actuator Systems," Pasadena, CA. Host: Thomas Cwik. June 18, 2013

L42 Stanford University, Electrical Engineering Computer Systems Colloquium (EE380), "Wireless Power Transfer and RF Energy Harvesting: New Options for System Designers," June 5, 2013.

L41 Northeastern University, First International Summer School on Green Communications and Networking, "Mapping the Space of Wirelessly Powered Systems." Host: Wendi Heinzelman (Rochester), May 30, 2013.

L40 Robotics Institute, Carnegie Mellon University, "Pretouch Sensing for Manipulation," Pittsburgh, PA. Host: Matt Mason. May 28, 2013

L39 University of California, Berkeley, Berkeley Institute of Design Seminar, "Mapping the Space of Wirelessly Powered Systems." Host: John Canny. May 21, 2013.

L38 Georgia Institute of Technology, "Mapping the Space of Wirelessly Powered Systems," May 17, 2013.

L37 IEEE RFID 2013, **Invited keynote**, "Wireless power for Left Ventricular Assist Devices," Orlando, Fl. Host: Matt Reynolds. May 2, 2013

L36 University of Notre Dame, Department of Electrical Engineering Systems Seminar, "Mapping the Space of Wirelessly Powered Systems," South Bend, IN. Host: Alan Seabaugh. April 10, 2013.

L35 Yale University, Yale School of Medicine, Presentation, “Mapping the Space of Wirelessly Powered Systems,” March 25, 2013.
L34 International Symposium on Cognitive Neuroscience Robotics, UW Seattle (joint with Osaka University), “Sensor Systems for Robotics,” February 1, 2013.
L33 UW Robotics Colloquium, UW Seattle, “Robotics Research in The Sensor Systems Lab,” Jan 25, 2013
L32 Microhams (Microsoft Ham Radio club), Redmond, WA, “Connecting Physical and Digital with Sensor Systems,” January 14, 2013
L31 IEEE International Conference on RFID-Technology and Applications 2012, **Invited keynote** talk, “Wirelessly powered sensor systems and computational RFID,” Nice, France. Host: Gaetano Marrocco, November 5-7, 2012.
L30 2012 CMOS Emerging Technologies Conference, **Invited plenary** talk, "Wirelessly powered sensing platforms," July 18-20, 2012, in Vancouver, BC, Canada.
L29 Semiconductor Research Corporation (SRC) /Science Foundation Ireland (SFI) / National Science Foundation (NSF) Forum on Integrated Sensors for Cybersystems - FISC 2030, “Wirelessly powered sensor systems” March 22-23, Carton House, Maynooth, Co. Kildare, Ireland. Invitation only workshop.
L28 Western Washington American Society of Mechanical Engineers, “Artificial Hearts,” Feb 16, 2012.
L27 UW EE 592, “Connecting Physical and Digital with Sensor Systems.” November 4, 2011.
L26 Google (Fremont) Colloquium, “Connecting Physical and Digital with Sensor Systems.” Host: Matt Welsh. April 27, 2011.
L25 Northeastern University, Communications and Digital Signal Processing Center (CDSP), Annual CDSP Research Workshop, **Invited keynote** talk: “Connecting Physical and Digital with Sensor Systems”, March 25, 2011. Previous (2010) keynote: Russ Tedrake. Host: Kaushik Chowdhury.
L24 MIT Enterprise Forum, Seattle WA, March 16, 2011. One of 4 invited to participate in panel entitled “The internet of things.” Moderated by Brier Dudley of the Seattle Times.
L23 Georgia Institute of Technology, Robotics and Intelligent Machines (RIM) Seminar, “Connecting Physical and Digital with Sensor Systems”, February 2011.
L22 Columbia University Nanoscale Science and Engineering Center Seminar, “Connecting Physical and Digital with Sensor Systems”, January 2011.
L21 ICySSS conference, Cypress Semiconductor, Lynnwood, WA, **Invited keynote** talk: “Connecting Physical and Digital with Sensor Systems,” September 2010
L20 Google, Mountainview, CA “Connecting Physical and Digital with Sensor Systems,” April 2010
L19 University of Washington, Computer Science and Engineering Colloquium, “Connecting Physical and Digital with Sensor Systems,” April 2010
L18 Seattle Robotics Society, “Wireless Power and Personal Robotics,” March 2010
L17 University of Washington, Electrical Engineering Colloquium, “Mapping the space of wirelessly powered systems,” January 2010
L16 Microsoft Research Colloquium, “Personal Robotics and Wireless Power,” February 2009.
L15 Northwestern University, McCormick Lecture in Mechanical Engineering, “Electric Field Pretouch for Robotic Manipulation,” Nov. 2008.
L14 Seattle Robotics Society, “Personal Robotics at Intel,” November 2008
L13 Semiconductor Research Corporation / National Science Foundation forum on Nanomorphic Systems (invitation only workshop), “Wirelessly-powered platform for sensing and computation: Radiative and resonant-non-radiative wireless power transfer,” November 2007. Stanford University, Palo Alto, CA
L12 University of Washington, Computer Science and Engineering Colloquium, “New Approaches to Identification and Sensing,” May 2005.

L11 Stanford University, "Computational Sensing and Perception," April 2004.
L10 Intel Corporation, "Computational Sensing and Perception," April 2004.
L9 Georgia Institute of Technology, "Computational Sensing and Perception," March 2004.
L8 Olin College, "Computational Sensing and Perception," February 2004.
L7 MediaLabEurope, "Alien Sensing," January 2004.
L6 Massachusetts Institute of Technology, AI Lab Colloquium, "Computational Sensing and Perception," April 2003.
L5 University of Cambridge (UK), Department of Physics, Cavendish Laboratory, Inferential Sciences Colloquium, "Intelligent Documents," May 2001.
L4 Microsoft Research Colloquium, "Electric Field Imaging," June 1998.
L3 IBM Research Colloquium, "Electric Field Imaging," June 1998.
L2 Microsoft Research Colloquium, "Modulation and Information Hiding." April 1998.
L1 University of Cambridge (UK), Department of Physics, Cavendish Laboratory, Inferential Sciences Colloquium, "Toward Electric Field Imaging," 1997.

Other talks, demonstrations, ads, etc. (not already listed as conference publications)

- "Wireless Resonant Energy Link," TED Global, Oxford, UK, July 2010.
- "Range adaptation of the Wireless Resonant Energy Link," student Josh Erickson co-presented demo, Research at Intel Day, Computer Museum, Mountainview, CA, July 2010.
- I am featured by name in several Intel TV ads in Intel's "Sponsors of Tomorrow" ad campaign. In one, I am identified by name: "Joshua Smith, Pretouch Robotics Inventor." The ad references my CeBIT demo (described below). Click here to view Intel television ad referencing my robotics research. (I am played by an actor). Another ad that aired in China features a Chinese actor playing me as an "Intel Rockstar" (this is a version of the popular rockstar ad that was played in the U.S., but localized to China). The text of the ad reads "J. Smith: Pulls power from atmosphere." Click here to see Intel television ad referencing my wireless power research.
- "Sponsors of Tomorrow" I appeared in a press conference with Intel CTO Justin Rattner and Intel Fellow Ajay Bhatt (inventor of USB) to discuss my role as a "rockstar" in Intel's ad campaign, Computer Museum, Mountainview, CA, July 2009.
- "A wirelessly powered speaker," student David Meyer co-presented demo, Research at Intel Day, Computer Museum, Mountainview, CA, July 2009.
- "Launching CeBIT with E-Field Pretouch," robotics demonstration with Chancellor of Germany Angela Merkel, Governor of California Arnold Schwarzenegger, and Intel Chairman Craig Barrett. Our robot "Marvin" helped the VIPs cut the ribbon to launch the CeBIT tradeshow. Click here to view video. Student Brian Mayton participated in demo. CeBIT, Hannover, Germany, March 2009.
- "Robotics: Progress and Prospects," Presentation to Intel CEO Paul Otellini, February 2009.
- "Wireless Resonant Energy Link," Intel Developer Forum, San Francisco, CA, Intel CTO Justin Rattner demos WREL in his keynote, Aug 2008. Student Alanson Sample included in demo.
  IDF Taipei, Demo repeated in research keynote, Oct 2008.

- "Electric Field Pretouch," Intel Developer Forum, San Francisco, CA, Intel CTO Justin Rattner demos E-Field Pretouch in his keynote, Aug 2008.
  IDF Taipei, Demo repeated in research keynote, Oct 2008.
- "Personal Robotics at Intel," Presentation to leading academic roboticists at Intel Personal Robotics workshop, which I organized. Santa Clara, CA, July 2008.
- "Electric Field Pretouch for Robotic Grasping," student Ryan Wistort co-presented his novel robot hand design. Research at Intel Day, Computer Museum, Mountainview, CA, July 2008.
- "E-Field Pretouch Robotic Grasper," demonstrated to Intel CEO and Management Committee as part of Technology Strategic Long Range Plan presentation on Computational Perception. October 2007.
- "Personal Robotics," Corporate Technology Group Strategic Staff , October 2007.
- "Wisp," demonstration at Intel Developer Forum (IDF) San Francisco. Student Dan Yeager co-presented, September 2007.
- "Futures for RFID in Healthcare," Federal Trade Commission's "Protecting Consumers in the Next Tech-ade," Washington, D.C. November 6-8 2006.
- "WISP," U.W. Department of Computer Science and Engineering Industrial Affiliates Day, Oct. 2006.
- "Wisp" Research at Intel Day, Santa Clara, CA June 2006.
- Intel Capital / Intel Corporate Technology Group Oregon Venture Capital Day "WISP," demo. October 2005.
- Intel Country Fair, Jones Farm, OR, "WISP v0: RFID + 1 bit accelerometer," August 2004.
- PostExpo, Hamburg Germany, "New Technologies for postage." October 2001.
- America's Millennium (U.S. National Millennium Celebration), Hirschorn Museum, Smithsonian Institution, "FiberFingerprint technology." December 2000.
- "FiberFingerprint technology," demonstration in keynote of US Postal Service CTO Norm Lorenz, National Postal Forum, Chicago, IL, September 1999.

Presentations given at conferences (not already listed as conference publications).

- **Brian Mayton**, Eric Garcia, Louis LeGrand, Joshua R. Smith, "Electric Field Pretouch: Towards Mobile Manipulation," RSS 2009 Workshop on Mobile Manipulation in Human Environments
- **Joshua R. Smith**, Ryan Wistort, "Controlling a minimal dynamically stable structure." Poster presentation, *Dynamic Walking*, Delft, Netherlands, May 2008.
- **Joshua R. Smith**, Neil Gershenfeld. "Activating Space with Electric Field Sensing," Talk, *Siggraph Technical Sketches*, Los Angeles, August 1995.
- **Joshua R. Smith** and Donald House, "Evolving Models of Dynamical Systems with a Genetic Algorithm." Poster presentation, *Artificial Life 3*, Santa Fe, New Mexico, June 1992.

Professional society memberships.

National Academy of Inventors, Fellow, 2021-
IEEE Fellow, 2020-
IEEE Senior Member, 2013-2019
IEEE Member, 1999-2012
ACM, 2004-Present

Selected Press Coverage

Wall Street Journal, 1/17/2025, How a Little-Known Finnish Company Became One of the World's Hottest Gadget Startups (quoted in story on smart rings)

IEEE Spectrum, 3/18/2021, Foam Sword Fencing With a PR2 Is the Best Kind of Exercise: Adversarial robots could help humans exercise more effectively

Wall Street Journal, 10/3/2020, Your Thumbs are All You Need (quoted in story on Battery-Free perpetual Computers)

Technology Review, 7/29/2016, First Wi-Fi-Enabled Smart Contact Lens Prototype

Wired, 3/5/16, The Future of Wi-Fi Is 10,000 Times More Energy Efficient

Economist, 3/5/16, Passive Voice: Redesigning Wi-Fi may let devices communicate more easily

MIT Technology Review, 2/24/2016, 10 Breakthrough Technologies 2016, Power from the Air

Popular Science, 11/18/15, Best of What's New 2015, A Camera Powered by Wi-Fi

BBC Radio, 9/16/15, UW robotics researchers Dieter Fox, Joshua Smith and Maya Cakmak discuss the future of robotics, AI and teaching a robot how to solve a Rubik's Cube (story begins at 23:46 mark)

Economist, 6/27/15, Wireless Charging: Coiled and ready to strike

Wired, 6/7/15, Wi-Fi that charges your gadgets is closer than you think

BBC News, 6/5/15, Power beamed to camera via ambient wi-fi signals

Technology Review, 6/3/15, First Demonstration of a Surveillance Camera Powered by Ordinary Wi-Fi Broadcasts

Foreign Policy, 5/20/15, Innovations: Are Potholes a Thing of the Past?

New York Times, 2/2/14, Building a Better Battery

Time, 8/15/13, From the Future: Wireless Devices that Don't Require Batteries

NBC News, 8/13/13, No batteries! Wireless tech recycles airborne radio waves

The Register (UK), 8/14/13, Boffins harvest TV, mobile signals for BATTERY-FREE comms

Technology Review, 8/14/13, Devices Connect with Borrowed TV Signals and Need No Power Source

Fox News, 8/17/13, No Battery Required for This Wireless Device

The Discovery Channel, 8/17/13, No Battery Required for This Wireless Device

Wired, 8/18/13, Ambient Backscatter for battery-free object communication, by Bruce Sterling

Scientific American, 8/19/13, Will TV Stations Power the Internet of Things?

Slashdot, 8/14/13, Wireless Devices Go Battery-Free With New Communication Technique

Gizmodo, 8/13/13, Battery-Free Wireless Devices Let You Send Texts After Your Phone Dies

Total 16 National & International Stories, 73 Tech & Specialty Sites from 8/13/2013 – 9/19/2013

International stories include stories in North America, South America, Europe, Africa, Middle East, Asia, and Australia.

Earlier Press Coverage

Daily Disruption, June 2012, Disruptor of the Day: Joshua Smith – A Researcher on The Cutting Edge of Sensor Technology [Q&A].

Technology Review, April 2012, The Computing Trend that Will Change Everything.

GreenBiz, March 2012, What innovations are possible with ultra-efficient sensors?

IEEE Spectrum, March 2012, Is There a Moore's Law for Energy Efficiency?

Technology Review, July 2011, A Heart Pump Without a Cord.

Economist, Print: June 4th 2011, online: April 12, 2011. A wireless heart

New York Times, June 18, 2010. Bye-Bye Batteries: Radio Waves as a Low-Power Source
Economist, June 10, 2010. Power from thin air
New York Times, January 30, 2010. Smart Dust? Not Quite, but We're Getting There
The Times (UK), January 25, 2010. Meet Marvin, the robot that can plug itself in
Technology Review, November 25, 2009. A Battery-Free Implantable Neural Sensor
Seattle Times, June 15, 2009. Intel aims to capture wild electricity
New York Times, August 20, 2008. Intel Moves to Free Gadgets of Their Recharging Cords on WREL & EF Pretouch. Many other press & blog stories were generated along with this one.
TechnologyReview.com, September 17, 2007. Robots That Sense Before They Touch on EF Pretouch Grasping.
CNET News.Com, May 24, 2006. *Sensors: Living off scraps of energy*. Story covers WISP.
TechnologyReview.com, May 15, 2006. *Sensors without batteries*. Story on WISP.
New York Times Magazine, June 11, 2000. *The Document That Can't Be Forged*. Story on FiberFingerprint.
CBS, The Early Show TV coverage of NEC's Occupant Position Detection System.

SERVICE

University service

- Director, Amazon Science Hub, 2022-2025
- Member, Advisory Board, Amazon Science Hub, 2022-2025.
- GIX Master of Science in Technology Innovation (MSTI) Interdisciplinary Faculty Group (IFG). This group of 5 faculty functions as a "Department Chair" for the GIX MSTI program. 2016-
- GIX MSTI Curriculum Committee, 2015
- CoMotion Presidential Innovation Fellow**,** 2015
- Thrust Leader, Communications and Interface, NSF Engineering Research Center for Sensorimotor Neural Engineering (CSNE), 2012 - present
- Leader, Low Power Sensing and Communication theme, Intel Science and Technology Center for Pervasive Computing (ISTC-PC), 2012-2015.

College of Engineering Service

- Robotics Education Visioning Committee, 2024
- Strategic planning committee member, 2020-2021
- IP Committee Member, 2018

Departmental service

- Associate Chair, Professional Programs, ECE, 2014-Present.
- Co-Chair, CSE Faculty Mentorship and Career Development Committee, 2021-present. I organize new faculty on-boarding, as well as reviews for teaching faculty.
- Member, ECE Lecturer Faculty Search Committee, 2021-2022, 2023-2024.
- Member, CSE Graduate Admissions Committee, 2016.
- Member CSE Majors Admission Committee, 2014
- Member CSE 5th year Masters Admissions Committee, 2012-2013
- Member of EE Professional Masters Committee, 2011-Present.
- Member of search committee for EE Department 2010-2011 Molecular Engineering faculty search.
- EE Direct Freshman Admits Committee, 2011-2012
- Engineering Discovery Days: 2011--2016 (April). Demonstrations of robotics and wireless power.

Professional society and other service

- NSF CISE panel, April 7-8, 2025
- NSF ENG/ECCS panel, March 4-5, 2025
- Physical Sciences and Engineering review panel member for the Multicampus Research Programs and Initiatives (MRPI), University of California, Autumn 2024
- IEEE Fellow Selection Committee, IEEE Council on RFID, 2022-2023 (Two year term)
- NSF, Foundational Research in Robotics CAREER panel, November 3-4, 2021
- ACM MobiCom 2021 Technical Program Committee
- ACM Ubicomp 2020, 2021 Sponsorship & Industrial Relationships Co-Chair
- IEEE RFID 2019, General Chair; member of Technical Program Committee

- ACM MobiCom 2020 Technical Program Committee
- ACM MobiCom 2019 Technical Program Committee
- ACM MobiCom 2017 Technical Program Committee
- ACM Sigcomm 2016 Program Committee. Invited by Sachin Katti and Amin Vahdat.
- ACM UIST 2016 Program Committee. Invited by Jake Wobbrock and Daniel Avrahami.
- ACM Sensys 2016 Program Committee. Inivted by Lama Nachman.
- ACM Ubicomp 2013 Program Committee,. Invited by John Canny.
- IEEE RFID 2014, 2013, 2012, Technical Program Committee Chair for Power Harvesting track,
- Editorial Board member, Wireless Power Transfer journal, Cambridge University Press, January 2013 – 2019.
- IEEE RFID Virtual Journal, Associate Editor, 2013 – 2016.
- NSF CISE Computer Systems Research grant panelist, Arlington, VA 4/11/12—4/12/12.
- NIH NHLBI SBIR grant selection panelist (Novel Technologies for Powering Ventricular Assist Devices, Bethesda, MD, 3/8/2012.
- CCC/CRA Study on Robotics (Professional and Service Robotics panel, 7-8 Aug. 2008, San Francisco, CA) panelist, creating 15 year U.S. National roadmap for robotics research, which has been presented to the U.S. Congress in a series of briefings; a photo of my EF Pretouch research appears on the cover of the report. Aug 2012: Member of panel updating Robotics Roadmap. Aug 2016: Invited to join Roadmap update panel again; declined because of schedule conflict.
- Program Committee member for IEEE RFID 2016, 2013, 2012, 2011, 2010, 2009, MedCOMM 2012 (workshop on Medical Communication in conjunction with SigCOMM), Internet of Things (IoT) 2012, RFIDSec 2011, Ubiquitous Computing Systems (UCS) 2010, 2009, RFID Data Management 2008 (RFDM 08), UCS 2007, Pervasive Computing 2006.
- Reviewer for ICRA, IROS, RSS, Ubicomp, IEEE Pervasive Computing Magazine, UIST Conference, CHI conference, IEEE Transactions on Image Processing, Eurasip Journal on Applied Signal Processing, Cambridge University Press (Physics section and Engineering section). Chaired Tactile Sensing Session at IROS in 2008 and in 2007.

International, national or governmental service

- Invited presenter on wireless power at the US Patent and Trademark Office's TC2800 Tech Fair, May 22, 2024.
- Invited presenter on wireless power at the US Patent and Trademark Office's TC2800 Tech Fair, May 16, 2023.
- Quoted in "Sparking Economic Growth: How Fundamental Research Drives Economic Growth and Innovation," a report from The Science Coalition on the economic impact of Federal Research funding. p. 29, Volume IV, April 2021.
- Presented to Members of US Congress and staff in Huskies From Home: Research Challenges During COVID-19, a presentation about the impact of the COVID pandemic on UW Research, October 27, 2020.

- Invited presenter to visiting patent examiners from US Patent and Trademark Office to the UW Comotion, June 27, 2019
- Invited presenter to visiting patent examiners from US Patent and Trademark Office to the UW ECE Department, April 23, 2019
- Federal Trade Commission, "Protecting consumers in the next Techade". Testified on the future of RFID and sensing. Other speakers included Vint Cerf (Google), Eric Horvitz (Microsoft) 2006.
- United States Postal Service, Mail Technology Strategy Council, Member
  2003-2008
- U.S. President's Commission on the Postal Service. My testimony led to new U.S. "Personalized Postage" with custom photographs. Examples of my prototypes are found on pp. 24 and 179 of the report, *2003*
- United States Postal Service, Intelligent Document Task Force, Member, *1999-2003*
- United States Postal Service, Intelligence on Mail for Security Task Force, Industry co-chair for Technology and Infrastructure Sub-Committee, *10/01 – 5/02*
- Smithsonian Institution, National Postal Museum. Appointed Member of the Council of Advisors, National Postal Museum, 2002-2004

Industrial service/Intel Service

Wireless Strategic Patent Team
2007 – *2010*
Sets patent filing targets for the two Intel Corporation IP committees covering wireless technologies. Membership normally restricted to grade P.E. and above.

Wireless Platform Technologies IP Committee
2006 – *2010*
Votes to reject or file patent applications on invention disclosures for Intel Corporation in wireless technology.

Physicality Theme, Intel Research
2006 – *2010*
Leader of one of Intel Research's 5 content themes.

Entrepreneurship

Proprio (formerly eLoupes Inc): Cofounder; Observer, Board of Directors; Member of Technical Advisory Board; Consultant. Co-founders include Ken Denman (serial entrepreneur), Dr. Sam Browd (neurosurgeon and serial entrepreneur) and UW students. Founded 2016. Raised more than $85M of private investment.

Wibotic Inc: Cofounder, member of Board of Directors. Co-founded with former PhD student Ben Waters. Company named one of Seattle's hottest startups in 2016. Founded 2015. Raised more than $15M of revenue, grants, and private investment.

Waveworks (formerly Jeeva Wireless Inc): Cofounder, member of Board of Directors. Jeeva founded 2015. Received more than $10M of revenue, grants, and private investment.