

# JOSHUA R. SMITH

## *Curriculum Vitae*

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Computer Science & Engineering

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## EDUCATIONAL HISTORY

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Massachusetts Institute of Technology, Cambridge, MA

PhD, Media Arts and Sciences

1999

Electric Field Imaging

Massachusetts Institute of Technology, Cambridge, MA

MS, Media Arts and Sciences

1995

Toward Electric Field Tomography

University of Cambridge, Cambridge, UK

MA, Natural Sciences (Physics and Theoretical Physics)

1997

Information Processing in Fraunhofer Diffraction: A Case Study in the Physics of Information

Williams College, Williamstown, MA

BA, Magna Cum Laude, Computer Science, Philosophy

1991

Evolving Dynamical Systems with the Genetic Algorithm

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## EMPLOYMENT HISTORY

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University of Washington

Seattle, WA

Associate Professor (with tenure)

Department of Computer Science and Engineering & Electrical Engineering, 6/14 – Present

University of Washington

Seattle, WA

Associate Professor without tenure (tenure track)

Department of Computer Science and Engineering & Electrical Engineering, 2/11 – 6/14

Intel Research Seattle

Seattle, WA

Principal Engineer, 4/08 – 1/11

Senior Research Scientist, 7/05 - 4/08

Research Scientist, 7/04 – 7/05

TPK 2003

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.
- **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.

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## AWARDS AND HONORS

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### Best Paper Awards

**Best Paper**, “Sifting Through the Airwaves: Efficient and Scalable Multiband RF Harvesting,” IEEE RFID, April 2014

**Honorable Mention award**, for “Wirelessly Powered Bistable Display Tags,” Ubicomp September 2013.

**Best Paper**, “Ambient Backscatter: Wireless Communication Out of Thin Air,” SIGCOMM, August 2013.

**Finalist (one of two) for best paper**, for “Hybrid Analog-Digital Backscatter: A New Approach for Battery-Free Sensing,” IEEE RFID, April 2013.

**Best student paper award**, for “Hybrid Analog-Digital Backscatter Platform for High Data Rate, Battery-Free Sensing,” WiSNet 2013, January 2013.

**Best Paper award**, for “An Ultra-Low-Power Human Body Motion Sensor Using Static Electric Field Sensing,” Ubicomp 2012, September 2012.

**Nominated for best paper**, for “Optical Localization of Passive UHF RFID Tags with Integrated LEDs” at IEEE RFID 2012, April 2012.

**Sezai Innovation Award**, 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**, 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 (ASAIIO), *June 2011*.

**Best Paper**, “A Capacitive Touch Interface for Passive RFID Tags,” *May 2009*, IEEE RFID 2009

**Best Demo**, “RFID Sensor Networks with the Intel WISP,” *Nov. 2008*, Sensys 08

#### General awards

**Allen Distinguished Investigator**, for grant proposal “A brain-computer interface to re-animate the limbs following spinal injury: Development of a Brain-Computer-Spinal Interface (BCSI)”

**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, 2010-2011, CRA/CCC**

**Motorola Fellow, 1995 – 1997**, MIT Media Laboratory

**Herchel Smith Scholar, 1991 – 1993**, Emmanuel College, University of Cambridge

**Phi Beta Kappa, 1991, Williams College**

**Sigma Xi, 1991, Williams College**

**NECUSE summer research fellowship, 1989, Yale University**

#### 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”*



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## AFFILIATIONS AND OTHER APPOINTMENTS

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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

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## PUBLICATIONS

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**Citations:** Total Citations: 3734. H-index: 30. i10-index: 62. [Source: Google Scholar](#) (5/11/2014). Citation statistics include all publications, including patents and non-refereed articles. Statistics also include self-citations. Citations listed when 10 or more. [Source: Google Scholar](#) (9/16/2013).

### 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

### Refereed archival journal publications

- J1. Energy transmission and power sources for mechanical circulatory support devices to achieve total implantability, JX Wang, JR Smith, P Bonde *The Annals of thoracic surgery*, Vol 97, Issue 4, pp. 1467-1474, Feb 2014.
- J2. Innovative Free-Range Resonant Electrical Energy Delivery System (FREE-D System) for a Ventricular Assist Device Using Wireless Power, Benjamin H. Waters<sup>1</sup>, Joshua R. Smith, Pramod Bonde, *ASAIO Journal* Vol. 60, No. 1, pp. 31-37.
- J3. The Emergence of RF-Powered Computing, S. Gollakota, M. Reynolds, J.R. Smith, D. Wetherall, *IEEE Computer*, Vol. 47, No. 1, pp. 32-39.
- J4. [Enabling Seamless Wireless Power Delivery in Dynamic Environments](#), Alanson P. Sample<sup>2</sup>, Benjamin H. Waters<sup>1</sup>, Scott Wisdom, Joshua R. Smith, (Invited) *Proceedings of the IEEE*, Vol 101, Issue 6, pp. 1343-1358, June 2013.
- J5. [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<sup>1</sup>, Benjamin H. Waters<sup>1</sup>, Joshua R. Smith, Niels Kuster, *IEEE Transactions on Electromagnetic Compatibility*, Vol. 55, Issue 2, pp. 265-275. April 2013.
- J6. [Physical Human Interactive Guidance: Identifying Grasping Principles From Human-Planned Grasps](#), Ravi Balasubramanian<sup>2</sup>, Ling Xu<sup>4</sup>, Peter Brook<sup>3</sup>, Joshua R. Smith, Yoky Matsuoka, *IEEE Transactions on Robotics (T-RO)*, Vol. 28 No. 4, pp. 899-910, Aug. 2012.
- J7. [Powering a Ventricular Assist Device \(VAD\) with the Free-range Resonant Electrical Energy Delivery \(FREE-D\) System](#), B. H. Waters<sup>1</sup>, A. P. Sample<sup>1</sup>, P. Bonde, J.R. Smith. (Invited) *Proceedings of the IEEE*, vol. 100, No. 1, pp. 138-149, January 2012. **Citations: 14**
- J8. [Toward Total Implantability Using Free-Range Resonant Electrical Energy Delivery System: Achieving Untethered Ventricular Assist Device Operation Over Large Distances](#),

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