

Stanford



Philip Levis

Associate Professor of Computer Science and of Electrical Engineering

CONTACT INFORMATION

- **Administrator**

Alexis Wing - Administrative Associate

Email alexisw@stanford.edu

Tel (650) 723-3380

Bio

BIO

Professor Levis' research focuses on the design and implementation of efficient software systems for embedded wireless sensor networks; embedded network sensor architecture and design; systems programming and software engineering.

ACADEMIC APPOINTMENTS

- Associate Professor, Computer Science
- Associate Professor, Electrical Engineering
- Affiliate, Precourt Institute for Energy

HONORS AND AWARDS

- Faculty Fellow, Microsoft (2008)

PROFESSIONAL EDUCATION

- PhD, UC Berkeley , Computer Science, Electrical Engineering (2005)

Teaching

COURSES

2017-18

- Computer Systems from the Ground Up: CS 107E (Spr)
- Embedded Systems Workshop: CS 241, EE 285 (Aut)
- Introduction to Computer Networking: CS 144 (Aut)

2016-17

- Computer Systems from the Ground Up: CS 107E (Spr)
- Embedded Systems Workshop: CS 241, EE 285 (Aut)
- Introduction to Computer Networking: CS 144 (Aut)

2015-16

- Computer Systems from the Ground Up: CS 107E (Spr)
- Embedded Systems Workshop: CS 241 (Aut)
- Introduction to Computer Networking: CS 144 (Aut)

STANFORD ADVISEES

Master's Program Advisor

Nihat Inan, Matthew Tan

Doctoral (Program)

Pan Hu, Maxwell Strange

Publications

PUBLICATIONS

- **Ebb: A DSL for Physical Simulation on CPUs and GPUs** *ACM TRANSACTIONS ON GRAPHICS*
Bernstein, G. L., Shah, C., Lemire, C., Devito, Z., Fisher, M., Levis, P., Hanrahan, P.
2016; 35 (2)
- **Deflating link buffers in a wireless mesh network** *AD HOC NETWORKS*
Jamshaid, K., Shihada, B., Showail, A., Levis, P.
2014; 16: 266-280
- **Applications of Self-Interference Cancellation in 5G and Beyond** *IEEE COMMUNICATIONS MAGAZINE*
Hong, S., Brand, J., Il Choi, J., Jain, M., Mehlman, J., Katti, S., Levis, P.
2014; 52 (2): 114-121
- **CTP: An Efficient, Robust, and Reliable Collection Tree Protocol for Wireless Sensor Networks.** *In ACM Transactions on Sensor Networks (TOSN)*
Gnawali, O., Fonseca, R., Jamieson, K., Kazandjieva, M., Moss, D., Levis, P.
2014
- **CTP: An Efficient, Robust, and Reliable Collection Tree Protocol for Wireless Sensor Networks** *ACM TRANSACTIONS ON SENSOR NETWORKS*
Gnawali, O., Fonseca, R., Jamieson, K., Kazandjieva, M., Moss, D., Levis, P.
2013; 10 (1)
- **Measuring and analyzing the energy use of enterprise computing systems** *SUSTAINABLE COMPUTING-INFORMATICS & SYSTEMS*
Kazandjieva, M., Heller, B., Gnawali, O., Levis, P., Kozyrakis, C.
2013; 3 (3): 218-229
- **Long-term modification of cortical synapses improves sensory perception** *NATURE NEUROSCIENCE*
Froemke, R. C., Carcea, I., Barker, A. J., Yuan, K., Seybold, B. A., Martins, A. R., Zaika, N., Bernstein, H., Wachs, M., Levis, P. A., Polley, D. B., Merzenich, M. M., Schreiner, et al
2013; 16 (1): 79-U120
- **Measuring and Analyzing the Energy Use of Enterprise Computing Systems.** *In Journal of Sustainable Computing*
Kazandjieva, M., Gnawali, O., Levis, P., Kozyrakis, C.
2013
- **Green Enterprise Computing Data: Assumptions and Realities** *3rd International Green Computing Conference (IGCC)*
Kazandjieva, M., Heller, B., Gnawali, O., Levis, P., Kozyrakis, C.
IEEE.2012
- **A Scalable Server for 3D Metaverses.**
Cheslack-Postava, E., Azim, T., Mistree, B., Horn, D., Terrace, J., Levis, P.
2012

- **RFC 6719 - The Minimum Rank with Hysteresis Objective Function.** *In Internet Engineering Task Force (IETF), Request for Comments: 6719*
Gnawali, O., Levis, P.
2012
- **Unsupervised Conversion of 3D models for Interactive Metaverses.**
Terrace, J., Cheslack-Postava, E., Levis, P., Freedman, M.
2012
- **Experiences from a Decade of TinyOS Development.**
Levis, P.
2012
- **Beyond Full Duplex Wireless** *46th Asilomar Conference on Signals, Systems and Computers*
Choi, J. I., Hong, S., Jain, M., Katti, S., Levis, P., Mehlman, J.
IEEE.2012: 40–44
- **Connecting Low-Power and Lossy Networks to the Internet** *IEEE COMMUNICATIONS MAGAZINE*
Ko, J., Terzis, A., Dawson-Haggerty, S., Culler, D. E., Hui, J. W., Levis, P.
2011; 49 (4): 96-101
- **Measuring school contact networks using wireless sensor technology**
Jones, J. H., Salathe, M., Feldman, M. W., KAZANDJIEVA, M., Lee, J. W., Levis, P.
WILEY-BLACKWELL.2011: 263–63
- **Energy Management in Mobile Devices with the Cinder Operating System** *6th ACM EuroSys Conference on Computer Systems (EuroSys 2011)*
Roy, A., Rumble, S. M., Stutsman, R., Levis, P., Mazieres, D., Zeldovich, N.
ASSOC COMPUTING MACHINERY.2011: 139–152
- **Emerson: Accessible Scripting for Applications in an Extensible Virtual World.**
Mistree, B., Chandra, B., Cheslack-Potava, E., Levis, P., Gay, D.
2011
- **Practical, Real-time, Full-Duplex Wireless.**
Jain, M., Choi, J. I., Kim, T., Bharadia, D., Seth, S., Srinivasan, K., Levis, P. A.
2011
- **Buffer Sizing in Wireless Mesh Networks.**
Jamshaid, K., Shihada, B., Xia, L., Levis, P.
2011
- **A high-resolution human contact network for infectious disease transmission** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Salathe, M., Kazandjieva, M., Lee, J. W., Levis, P., Feldman, M. W., Jones, J. H.
2010; 107 (51): 22020-22025
- **Physically-based models of low-power wireless links using signal power simulation** *COMPUTER NETWORKS*
Rusak, T., Levis, P.
2010; 54 (4): 658-673
- **An Empirical Study of Low-Power Wireless** *ACM TRANSACTIONS ON SENSOR NETWORKS*
Srinivasan, K., Dutta, P., Tavakoli, A., Levis, P.
2010; 6 (2)
- **Apprehending Joule Thieves with Cinder** *COMPUTER COMMUNICATION REVIEW*
Rumble, S. M., Stutsman, R., Levis, P., Mazieres, D., Zeldovich, N.
2010; 40 (1): 106-111
- **Achieving Single Channel, Full Duplex Wireless Communication** *16th Annual International Conference on Mobile Computing and Networking / 11th ACM International Symposium on Mobile Ad Hoc Networking and Computing (MobiCom/MobiHoc)*
Choi, J. I., Jain, M., Srinivasan, K., Levis, P., Katti, S.

ASSOC COMPUTING MACHINERY.2010: 1–12

- **The kappa Factor: Inferring Protocol Performance Using Inter-link Reception Correlation** *16th Annual International Conference on Mobile Computing and Networking / 11th ACM International Symposium on Mobile Ad Hoc Networking and Computing (MobiCom/MobiHoc)*
Srinivasan, K., Jain, M., Cho, J. I., Azim, T., Kim, E. S., Levis, P., Krishnamachari, B.
ASSOC COMPUTING MACHINERY.2010: 317–328
- **Achieving Single Channel, Full Duplex Wireless Communication.**
Choi, J. I., Jain, M., Srinivasan, K., Levis, P., Katti, S.
2010
- **Emerson: Scripting for Federated Virtual Worlds.**
Chandra, B., Cheslack-Postava, E., Mistree, B., Levis, P., Gay, D.
2010
- **Experiences in Measuring a Human Contact Network for Epidemiology Research.**
Kazandjieva, M., Lee, J. W., Salathe, M., Feldman, M. W., Jones, J. H., Levis, P.
2010
- **A Case for Evaluating Sensor Network Protocols Concurrently.**
Gnawali, O., Guibas, L., Levis, P.
2010
- **Granting Silence to Avoid Wireless Collisions.**
Choi, J. I., Jain, M., Kazandjieva, M. A., Levis, P.
2010
- **Whirlpool Routing for Mobility.**
Lee, J. W., Kusy, B., Azim, T., Levis, P., Shihada, B.
2010
- **The k-factor: Inferring Protocol Performance Using Inter-Link Reception Correlation.**
Srinivasan, K., Jain, M., Choi, J. I., Azim, T., Kim, E. S., Levis, P.
2010
- **Scaling Virtual Worlds with a Physical Metaphor** *IEEE PERVASIVE COMPUTING*
Horn, D., Cheslack-Postava, E., Azim, T., Freedman, M. J., Levis, P.
2009; 8 (3): 50-54
- **Surviving Sensor Network Software Faults** *22nd ACM SIGOPS Symposium on Operating Systems Principles*
Chen, Y., Gnawali, O., Kazandjieva, M., Levis, P., Regehr, J.
ASSOC COMPUTING MACHINERY.2009: 235–246
- **The Case for a Network Protocol Isolation Layer** *7th ACM Conference on Embedded Networked Sensor Systems (SENSYS)*
Choi, J. I., Kazandjieva, M. A., Jain, M., Levis, P.
ASSOC COMPUTING MACHINERY.2009: 267–280
- **Collection Tree Protocol** *7th ACM Conference on Embedded Networked Sensor Systems (SENSYS)*
Gnawali, O., Fonseca, R., Jamieson, K., Moss, D., Levis, P.
ASSOC COMPUTING MACHINERY.2009: 1–14
- **Energy Dumpster Diving.** *In Second Workshop on Power Aware Computing (HotPower)*
Kazandjieva, M., Heller, B., Levis, P., Kozyrakis, C.
2009
- **Burstiness and scaling in the structure of low-power wireless links.** *In ACM SIGMOBILE Mobile Computing and Communications Review*
Rusak, T., Levis, P.
2009
- **TOSThreads: Thread-safe and Non-invasive Preemption in TinyOS** *7th ACM Conference on Embedded Networked Sensor Systems (SENSYS)*
Klues, K., Liang, C. M., Paek, J., Musaloiu-E, R., Levis, P., Terzis, A., Govindan, R.

ASSOC COMPUTING MACHINERY.2009: 127–140

- **The Case for a Network Protocol Isolation Layer.**
Choi, J. I., Kazandjieva, M., Jain, M., Levis, P.
2009
- **TOSThreads: Thread-Safe and Non-Invasive Preemption in TinyOS.**
Klues, K., Liang, C. M., Paek, J., Razvan, M., Levis, P., Terzis, A.
2009
- **Collection Tree Protocol.**
Gnawali, O., Fonseca, R., Jamieson, K., Moss, D., Levis, P.
2009
- **SWAT: Know Your Network** *8th International Symposium on Information Processing Sensor Networks*
Srinivasan, K., Kazandjieva, M. A., Jain, M., Kim, E., Levis, P.
IEEE.2009: 431–432
- **Starburst SSD: An Efficient Protocol for Selective Dissemination** *IEEE International Conference on Communications (ICC 2009)*
Azim, T., Mansoor, Q., Levis, P.
IEEE.2009: 74–79
- **Apprehending Joule Thieves with Cinder** *1st ACM Workshop on Networking, Systems, and Applications for Mobile Handhelds*
Rumble, S. M., Stutsman, R., Levis, P., Mazieres, D., Zeldovich, N.
ASSOC COMPUTING MACHINERY.2009: 49–54
- **Mesh networking - Research and technology for multihop wireless networks** *IEEE INTERNET COMPUTING*
Madden, S., Levis, P.
2008; 12 (4): 9-11
- **The emergence of a networking primitive in wireless sensor networks** *COMMUNICATIONS OF THE ACM*
Levis, P., Brewer, E., Culler, D., Gay, D., Madden, S., Patel, N., Polastre, J., Shenker, S., Szewczyk, R., Woo, A.
2008; 51 (7): 99-106
- **Investigating a Physically-Based Signal Power Model for Robust Low Power Wireless Link Simulation** *11th ACM International Conference on Modeling, Analysis and Simulation of Wireless and Mobile Systems*
Rusak, T., Levis, P.
ASSOC COMPUTING MACHINERY.2008: 37–46
- **Quanto: Tracking Energy in Networked Embedded Systems.**
Fonseca, R., Dutta, P., Levis, P., Stoica, I.
2008
- **SWAT: Enabling Wireless Network Measurements** *6th ACM Conference on Embedded Networked Sensor Systems*
Srinivasan, K., Kazandjieva, M. A., Jain, M., Kim, E., Levis, P.
ASSOC COMPUTING MACHINERY.2008: 395–396
- **The beta-factor: Measuring Wireless Link Burstiness** *6th ACM Conference on Embedded Networked Sensor Systems*
Srinivasan, K., Kazandjieva, M. A., Agarwal, S., Levis, P.
ASSOC COMPUTING MACHINERY.2008: 29–41
- **Data discovery and dissemination with DIP** *7th International Symposium on Information Processing Sensor Networks*
Lin, K., Levis, P.
IEEE COMPUTER SOC.2008: 433–444
- **On the Scaling Properties of Low Power Wireless Links** *6th ACM Conference on Embedded Networked Sensor Systems*
Rusak, T., Levis, P.
ASSOC COMPUTING MACHINERY.2008: 441–442
- **Software design patterns for TinyOS** *Conference on Languages, Compilers and Tools for Embedded Systems*
Gay, D., Levis, P., Culler, D.

ASSOC COMPUTING MACHINERY.2007

- **Four-Bit Wireless Link Estimation.**
Fonseca, R., Gnawali, O., Jamieson, K., Levis, P.
2007
- **Integrating Concurrency Control and Energy Management in Device Drivers.**
Klues, K., Handziski, V., Lu, C., Wolisz, A., Culler, D., Gay, D., Levis, P. A.
2007
- **Opening the Sensornet Black Box.**
Choi, J. I., Lee, J. W., Wachs, M., Levis, P.
2007
- **Flush: A Reliable Bulk Transport Protocol for Multihop Wireless Networks** *5th ACM Conference on Embedded Networked Sensor Systems*
Kim, S., Fonseca, R., Dutta, P., Tavakoli, A., Culler, D., Levis, P., Shenker, S., Stoica, I.
ASSOC COMPUTING MACHINERY.2007: 351–365
- **Visibility: A New Metric For Protocol Design** *5th ACM Conference on Embedded Networked Sensor Systems*
Wachs, M., Il Choi, J., Lee, J. W., Srinivasan, K., Chen, Z., Jain, M., Levis, P.
ASSOC COMPUTING MACHINERY.2007: 73–86
- **The Design and Implementation of a Declarative Sensor Network System** *5th ACM Conference on Embedded Networked Sensor Systems*
Chu, D., Popa, L., Tavakoli, A., Hellerstein, J. M., Levis, P., Shenker, S., Stoica, I.
ASSOC COMPUTING MACHINERY.2007: 175–188
- **Improving wireless simulation through noise modeling** *6th International Symposium on Information Processing Sensor Networks*
Lee, H., Cerpa, A., Levis, P.
ASSOC COMPUTING MACHINERY.2007: 21–30
- **Interface contracts for TinyOS** *6th International Symposium on Information Processing Sensor Networks*
Archer, W., Levis, P., Regehr, J.
ASSOC COMPUTING MACHINERY.2007: 158–165
- **Fair Waiting Protocol: Achieving Isolation in Wireless Sensornets** *5th ACM Conference on Embedded Networked Sensor Systems*
Il Choi, J., Lee, J. W., Chen, Z., Levis, P.
ASSOC COMPUTING MACHINERY.2007: 411–412
- **RSSI Is Under-Appreciated.**
Srinivasan, K., Levis, P.
2006
- **Some Implications of Low-Power Wireless to IP Routing.**
Srinivasan, K., Dutta, P., Tavakoli, A., Levis, P.
2006
- **Software design patterns for TinyOS** *Conference on Languages, Compilers and Tools for Embedded Systems*
Gay, D., Levis, P., Culler, D.
ASSOC COMPUTING MACHINERY.2005: 40–49
- **Active sensor networks** *2nd Symposium on Networked Systems Design and Implementation (NSDI 05)*
Levis, P., Gay, D., Culler, D.
USENIX ASSOC.2005: 343–356
- **A Unifying Link Abstraction for Wireless Sensor Networks.**
Polastre, J., Hui, J., Levis, P., Zhao, J., Culler, D., Shenker, S.
2005
- **Towards a Sensor Network Architecture: Lowering the Waistline.**
Culler, D., Dutta, P., Eee, C. T., Fonseca, R., Hui, J., Levis, P.

2005

- **Trickle: A self-regulating algorithm for code propagation and maintenance in wireless sensor networks** *1st Symposium on Networked Systems Design and Implementation*
Levis, P., Patel, N., Culler, D., Shenker, S.
USENIX ASSOC.2004: 15–28
- **The Firecracker Protocol.**
Levis, P., Culler, D.
2004
- **The emergence of networking abstractions and techniques in TinyOS** *1st Symposium on Networked Systems Design and Implementation*
Levis, P., Madden, S., Gay, D., Polastre, J., Szewczyk, R., Woo, A., Brewer, E., Culler, D.
USENIX ASSOC.2004: 1–14
- **The nesC language: A holistic approach to networked embedded systems** *Conference on Programming Language Design and Implementation*
Gay, D., Levis, P., von Behren, R., Welsh, M., Brewer, E., Culler, D.
ASSOC COMPUTING MACHINERY.2003: 1–11
- **TOSSIM: Accurate and Scalable Simulation of Entire TinyOS Applications.**
Levis, P., Lee, N., Welsh, M., Culler, D.
2003
- **Mate: A tiny virtual machine for sensor networks** *ACM SIGPLAN NOTICES*
Levis, P., Culler, D.
2002; 37 (10): 85-95
- **Mate: A Tiny Virtual Machine for Sensor Networks.**
Levis, P., Culler, D.
2002
- **Policies for Dynamic Clock Scheduling.**
Grunwald, D., Levis, P., Morrey III, Charles, B., Neufeld, M.
2000