

# PAT PANNUTO

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## RESEARCH INTERESTS

Embedded Systems, Computer Architecture, Wireless Communications, Mobile Computing, Operating Systems, and Development Engineering

## EDUCATION

**University of California, Berkeley**, Berkeley, CA (2017–present)  
Ph.D. Student in Electrical Engineering (degree expected 2019)  
Advisor: Prabal Dutta

**University of Michigan**, Ann Arbor, MI (2012–2017)  
M.Eng. in Computer Science  
Advisor: Prabal Dutta

**University of Michigan**, Ann Arbor, MI (2007–2012)  
B.S.Eng. in Computer Engineering

## AWARDS AND HONORS

### FELLOWSHIPS

- 2013** Qualcomm Innovation Fellowship (Honorable Mention), joint with Bradford Campbell, \$50,000
- 2013** National Defense Science & Engineering Graduate Fellowship (NDSEG), \$95,000 plus tuition
- 2013** National Science Foundation Graduate Research Fellowship (NSF GRFP), \$90,000 plus tuition
- 2012** University of Michigan Department of Computer Science First-Year Fellowship

### PUBLICATION AWARDS

- 2018** Best Paper Finalist, The 17th ACM/IEEE International Conference on Information Processing in Sensor Networks
- 2017** David Wessel Best Demo Award, TerraSwarm Annual Review
- 2016** IEEE Micro Top Pick in Computer Architecture
- 2016** Outstanding Poster Award, Twelfth International Nanotechnology Conference on Communication and Cooperation
- 2015** Potential for Test of Time 2025 Award, The 2nd ACM Workshop on Hot Topics in Wireless

## TEACHING HONORS

- 2017** University of Michigan Rackham Graduate School Outstanding Graduate Student Instructor
- 2017** University of Michigan College of Engineering Richard & Eleanor Towner Prize for Outstanding Graduate Student Instructors
- 2012** Best Undergraduate Instructor, University of Michigan, EECS

## ADVISING AND MENTORING

- 2018** [Andreas Biri](#), (M.Sc.; went on to Ph.D. program at ETH Zürich)  
Thesis: “TotTernary: A wearable platform for social interaction tracking”
- 2014** Noah Nuechterlein, (undergraduate independent study): Applied computer vision

## TEACHING EXPERIENCE

- 2016 Fall** **Primary Instructor**, EECS 398: Computing for Computer Scientists
- 2016 Winter** A new class designed and built from scratch. This class attempts to address the experience gap that exists across the spectrum of incoming Computer Science students. While driven by tools (shells, build systems, debuggers, version control), it explores how and why computer scientists interface with computers differently in their day-to-day activities, how to apply principles learned in courses to everyday activities, and ultimately how to be a more efficient user of computing resources.
- This course has been adopted as part of the permanent curriculum at the University of Michigan as EECS 201: Computing Pragmatics, an advised co-requisite for first-year EECS majors.
- <https://c4cs.github.io>
- In 2017, I was awarded the Rackham Graduate School Outstanding Graduate Student Instructor and the College of Engineering Richard & Eleanor Towner Prize for Outstanding Graduate Student Instructors for this course.*
- 2015 Fall** **Graduate Teaching Assistant**, EECS 373: Design of Microprocessor Based Systems
- 2015 Winter**
- 2012 Winter** **Undergraduate Teaching Assistant**, EECS 470: Computer Architecture (W12)
- 2012 Winter** **Undergraduate Teaching Assistant**, EECS 482: Introduction to Operating Systems
- 2011 Fall**
- 2011 Winter**
- 2010 Fall**
- 2011 Fall** **Undergraduate Teaching Assistant**, EECS 373: Design of Microprocessor Based Systems
- 2011 Winter**

## PROFESSIONAL SERVICE

- 2019–present** Recurring reviewer for IEEE/ACM Transactions on Networking (TNET)
- 2018** ACM Workshop on Data Acquisition to Analysis (DATA 18) – TPC Member
- 2014–2016** Recurring reviewer for IEEE Transactions on Mobile Computing (TMC)
- 2015–2016** Computer Science Engineering Student Faculty Representative

<b>2013–2015</b>	Computer Science Engineering Graduate Student Body President
<b>2015</b>	Recurring reviewer for USAID Development Innovation Ventures (DIV)
<b>2014</b>	ACM Workshop on Visible Light Communication Systems – Demo Co-Chair
<b>2013–2014</b>	Recurring reviewer for IEEE Transactions on Circuits and Systems II (TCAS-II)

## INVITED PRESENTATIONS

- 2019 Planes, Trains, Apples, and Oranges: Reproducible Results and Fair Comparisons in Localization Research**  
2nd Workshop on Benchmarking Cyber-Physical Systems and Internet of Things (CPS-IoTBench'19)  
**Invited Talk**
- 2019 A Modular Platform for Nanopower Computing**  
IBM Research; Yorktown Heights, New York  
ETH Zürich; Zürich, Switzerland  
University of Michigan; Ann Arbor, Michigan  
University of California, Los Angeles; Los Angeles, California  
University of Wisconsin-Madison; Madison, Wisconsin  
Cornell University; Ithaca, New York  
Princeton University; Princeton, New Jersey  
Carnegie Mellon University; Pittsburgh, Pennsylvania  
Massachusetts Institute of Technology; Cambridge, Massachusetts  
University of Washington; Seattle, Washington  
University of California, San Diego; San Diego, California  
**Invited Talk**
- 2016 MBus: A power-aware interconnect for ultra-low power micro-scale system design**  
DARPA Near Zero Power RF and Sensor Operations (N-ZERO) Program Review; Santa Barbara, California  
**Invited Talk**
- 2016 Ultra Wideband and Indoor Localization**  
3rd ACM Workshop on Hot Topics in Wireless (HotWireless'16); New York City, New York  
**Invited Talk**
- 2016 The Recent Past and Distant Future of [Micro-Scale] Embedded Systems**  
NextMote: Next Generation Platforms for the Cyber-Physical Internet, part of the International Conference on Embedded Wireless Systems and Networks (EWSN'16); Graz, Austria  
**Keynote Address**
- 2016 PolyPoint and the First Steps Towards Ubiquitous Localization**  
Student Summit on Mobility, Systems, and Networking, Microsoft Research; Petaluma, California
- 2015 Sensor Systems and the Art of Effectively Deploying Sensor Networks**  
TechChange TC111: Technology for Monitoring and Evaluation; Online  
**Invited Guest Speaker**
- 2014 Embedded System Design and the Internet of Things**  
Stanford Internet of Things Industrial Research Program; Stanford, California  
**Invited Talk**
- 2014 Sensing Technologies for Data Collection and Monitoring**  
State of the Science, Development Impact Lab (DIL) and USAID Higher Education Solutions Network (HESN); Washington, D.C.  
**Invited Talk**

2013     **MBus: Enabling the Next Generation of Sensors and Systems**  
TerraSwarm Annual Meeting; Berkeley, California

## REFERENCES

### Prabal Dutta

UC Berkeley  
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### Anthony Rowe

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### David Blaauw

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### Philip Levis

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### Amit Levy

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35 Olden Street  
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## JOURNAL PUBLICATIONS

- [J1] [Harmonium: Ultra Wideband Pulse Generation with Bandstitched Recovery for Fast, Accurate, and Robust Indoor Localization](#)  
**Pat Pannuto**, Benjamin Kempke, Li-Xuan Chuo, David Blaauw, and Prabal Dutta  
*ACM Transactions on Sensor Networks*. TOSN'18 14.2 (June 2018), 11:1–11:29.  
**Invited Paper.**
- [J2] [MBus: A Fully Synthesizable Low-power Portable Interconnect Bus for Millimeter-scale Sensor Systems](#)  
Inhee Lee, Ye-Sheng Kuo, **Pat Pannuto**, Gyouho Kim, ZhiYoong Foo, Ben Kempke, Seokhyeon Jeong, Yejoong Kim, Prabal Dutta, David Blaauw, and Yoonmyung Lee  
*Journal of Semiconductor Technology and Science* 16.6 (Dec. 2016), pp. 745–753.
- [J3] [MBus: A System Integration Bus for the Modular Micro-Scale Computing Class](#)  
**Pat Pannuto**, Yoonmyung Lee, Ye-Sheng Kuo, ZhiYoong Foo, Benjamin Kempke, Gyouho Kim, Ronald G. Dreslinski, David Blaauw, and Prabal Dutta  
*IEEE Micro: Special Issue on Top Picks from Computer Architecture Conferences* 36.3 (May 2016), pp. 60–70.  
**Top Pick in Computer Architecture.**
- [J4] [Harmonia: Wideband Spreading for Accurate Indoor RF Localization](#)  
Benjamin Kempke, **Pat Pannuto**, and Prabal Dutta  
*SIGMOBILE Mobile Computing and Communications Review*. MC<sup>2</sup>R 18.3 (Jan. 2015), pp. 19–25.  
**Invited Paper.**
- [J5] [A Modular 1 mm<sup>3</sup> Die-Stacked Sensing Platform with Low Power I<sup>2</sup>C Inter-die Communication and Multi-Modal Energy Harvesting](#)  
Yoonmyung Lee, Suyoung Bang, Inhee Lee, Yejoong Kim, Gyouho Kim, Mohammad Hassan Ghaed, **Pat Pannuto**, Prabal Dutta, Dennis Sylvester, and David Blaauw  
*IEEE Journal of Solid-State Circuits*. Vol. 48. 2013.

## CONFERENCE PUBLICATIONS

- [C1] [Hardware, Apps, and Surveys at Scale: Insights from Measuring Grid Reliability in Accra, Ghana](#)  
Noah Klugman, Joshua Adkins, Susanna Berkouwer, Kwame Abrokwa, Ivan Bobashev, **Pat Pannuto**, Matthew Podolsky, Aldo Susenot, Revati Thatte, Catherine Wolfram, Jay Taneja, and Prabal Dutta  
*ACM SIGCAS Conference on Computing and Sustainable Societies. COMPASS'19. Accra, Ghana, July 2019.*
- [C2] [IoT2 – the Internet of Tiny Things: Realizing mm-Scale Sensors through 3D Die Stacking](#)  
Sechang Oh, Minchang Cho, Xiao Wu, Yejoong Kim, Li-Xuan Chuo, Wootack Lim, **Pat Pannuto**, Suyoung Bang, Kaiyuan Yang, Hun-Seok Kim, Dennis Sylvester, and David Blaauw  
*2019 Design, Automation Test in Europe Conference Exhibition. DATE'19. Mar. 2019, pp. 686–691.*  
**Invited Paper.**
- [C3] [The Open Incentive Kit \(OINK\): Standardizing the Generation, Comparison, and Deployment of Incentive Systems](#)  
Noah Klugman, Santiago Correa, **Pat Pannuto**, Matthew Podolsky, Jay Taneja, and Prabal Dutta  
*The Tenth International Conference on Information and Communication Technologies and Development. ICTD'19. Ahmedabad, India, Jan. 2019.*  
Acceptance: 22 / 74 (30%).
- [C4] [A Modular and Adaptive Architecture for Building Applications with Connected Devices](#)  
**Pat Pannuto**, Wenpeng Wang, Prabal Dutta, and Bradford Campbell  
*The 1st IEEE International Conference on Industrial Internet. ICII'18. Bellevue, WA, USA, Oct. 2018.*  
**Invited Paper.**
- [C5] [Experience: Android Resists Liberation from Its Primary Use Case](#)  
Noah Klugman, Veronica Jacome, Meghan Clark, Matthew Podolsky, **Pat Pannuto**, Neal Jackson, Aley Soud Nassor, Catherine Wolfram, Duncan Callaway, Jay Taneja, and Prabal Dutta  
*The 24th Annual International Conference on Mobile Computing and Networking. MobiCom'18. New Delhi, India, Oct. 2018.*  
Acceptance: 42 / 187 (22%).
- [C6] [Slocalization: Sub- \$\mu\$ W Ultra Wideband Backscatter Localization](#)  
**Pat Pannuto**, Benjamin Kempke, and Prabal Dutta  
*Proceedings of the 17th ACM/IEEE International Conference on Information Processing in Sensor Networks. IPSN'18. New York, NY, USA, Apr. 2018.*  
Acceptance: 22 / 83 (27%).  
**Best Paper Finalist.**
- [C7] [The Signpost Platform for City-Scale Sensing](#)  
Joshua Adkins, Bradford Campbell, Branden Ghena, Neal Jackson, **Pat Pannuto**, Samuel Rohrer, and Prabal Dutta  
*Proceedings of the 17th ACM/IEEE International Conference on Information Processing in Sensor Networks. IPSN'18. New York, NY, USA, Apr. 2018.*  
Acceptance: 22 / 83 (27%).
- [C8] [Multiprogramming a 64kB Computer Safely and Efficiently](#)  
Amit Levy, Bradford Campbell, Branden Ghena, Daniel B. Giffin, **Pat Pannuto**, Prabal Dutta, and Philip Levis  
*Proceedings of the 26th Symposium on Operating Systems Principles. SOSP'17. Shanghai, China, Oct. 2017, pp. 234–251.*  
Acceptance: 17%.
- [C9] [SurePoint: Exploiting Ultra Wideband Flooding and Diversity to Provide Robust, Scalable, High-Fidelity Indoor Localization](#)  
Benjamin Kempke, **Pat Pannuto**, Bradford Campbell, and Prabal Dutta  
*Proceedings of the 14th ACM Conference on Embedded Networked Sensor Systems. SenSys'16. Stanford, CA, USA, Nov. 2016.*  
Acceptance: 21 / 119 (18%).

- [C10] [Harmonium: Asymmetric, Bandstitched UWB for Fast, Accurate, and Robust Indoor Localization](#)  
Benjamin Kempke, **Pat Pannuto**, and Prabal Dutta  
*Proceedings of the 15th International Conference on Information Processing in Sensor Networks*. IPSN'16. Vienna, Austria, Apr. 2016.  
Acceptance: 23 / 117 (20%).
- [C11] [MBus: An Ultra-Low Power Interconnect Bus for Next Generation Nanopower Systems](#)  
**Pat Pannuto**, Yoonmyung Lee, Ye-Sheng Kuo, ZhiYoong Foo, Benjamin Kempke, Gyouho Kim, Ronald G. Dreslinski, David Blaauw, and Prabal Dutta  
*Proceedings of the 42nd International Symposium on Computer Architecture*. ISCA '15. Portland, Oregon, USA, June 2015.  
Acceptance: 58 / 305 (19%).
- [C12] [Opo: A Wearable Sensor for Capturing High-Fidelity Face-to-Face Interactions](#)  
William Huang, Ye-Sheng Kuo, **Pat Pannuto**, and Prabal Dutta  
*Proceedings of the 12th ACM Conference on Embedded Networked Sensor Systems*. SenSys '14. Memphis, Tennessee, USA, 2014.  
Acceptance: 21 / 117 (18%).
- [C13] [MBus: A 17.5 pJ/bit Portable Interconnect Bus for Millimeter-Scale Sensor Systems with 8 nW Standby Power](#)  
Ye-Sheng Kuo, **Pat Pannuto**, Gyouho Kim, ZhiYoong Foo, Inhee Lee, Benjamin Kempke, Prabal Dutta, David Blaauw, and Yoonmyung Lee  
*CICC '14: IEEE Custom Integrated Circuits Conference*. San Jose, California, USA, Sept. 2014.  
Acceptance: 94 / 266 (35%).
- [C14] [Luxapose: Indoor Positioning with Mobile Phones and Visible Light](#)  
Ye-Sheng Kuo, **Pat Pannuto**, Ko-Jen Hsiao, and Prabal Dutta  
*The 20th Annual International Conference on Mobile Computing and Networking*. MobiCom '14. Maui, Hawaii, USA, Sept. 2014.  
Acceptance: 36 / 220 (16%).
- [C15] [IoT Design Space Challenges: Circuits and Systems](#)  
David Blaauw, Dennis Sylvester, Prabal Dutta, Yoonmyung Lee, Inhee Lee, Sechang Bang, Yejoong Kim, Gyouho Kim, **Pat Pannuto**, Ye-Sheng Kuo, Dongmin Yoon, Wanyeong Jung, ZhiYoong Foo, Yen-Po Chen, Jeong Seok-Hyeon, and Myungjoon Choi  
*Proceedings of the 2014 IEEE Symposium on VLSI Technology (VLSI'14)*. Honolulu, Hawaii, USA, June 2014.  
**Invited Paper.**
- [C16] [A Millimeter-Scale Wireless Imaging System with Continuous Motion Detection and Energy Harvesting](#)  
Gyouho Kim, ZhiYoong Foo, **Pat Pannuto**, Ye-Sheng Kuo, Benjamin Kempke, Mohammad Hassan Ghaed, Suyoung Bang, Inhee Lee, Yejoong Kim, Seokhyeon Jeong, Prabal Dutta, Dennis Sylvester, and David Blaauw  
*VLSI Circuits (VLSIC), 2014 Symposium on*. Honolulu, Hawaii, USA, June 2014.  
Acceptance: 96 / 420 (23%).
- [C17] [Reconfiguring the Software Radio to Improve Power, Price, and Portability](#)  
Ye-Sheng Kuo, **Pat Pannuto**, Thomas Schmid, and Prabal Dutta  
*Proceedings of the 10th ACM Conference on Embedded Networked Sensor Systems*. SenSys '12. Toronto, Canada, 2012.  
Acceptance: 23 / 123 (19%).

## WORKSHOP PUBLICATIONS

- [W1] [Indoor Ultra Wideband Ranging Samples from the DecaWave DW1000 Including Frequency and Polarization Diversity](#)  
**Pat Pannuto**, Benjamin Kempke, Bradford Campbell, and Prabal Dutta  
*Data Acquisition To Analysis*. DATA'18. Nov. 2018.  
Acceptance: 14 / 15 (93%).

- [W2] [Energy Isolation Required for Multi-tenant Energy Harvesting Platforms](#)  
Joshua Adkins, Bradford Campbell, Branden Ghena, Neal Jackson, **Pat Pannuto**, and Prabal Dutta  
*Proceedings of the Fifth ACM International Workshop on Energy Harvesting and Energy-Neutral Sensing Systems.* ENSys'17. Delft, Netherlands, Nov. 2017, pp. 27–30.  
Acceptance: 6 / 18 (33%).
- [W3] [The Case for Writing a Kernel in Rust](#)  
Amit Levy, Bradford Campbell, Branden Ghena, **Pat Pannuto**, Prabal Dutta, and Philip Levis  
*Proceedings of the 8th Asia-Pacific Workshop on Systems.* APSys '17. Mumbai, India, Sept. 2017, 1:1–1:7.
- [W4] [Ownership is Theft: Experiences Building an Embedded OS in Rust](#)  
Amit Levy, Michael P Andersen, Bradford Campbell, David Culler, Prabal Dutta, Branden Ghena, Philip Levis, and **Pat Pannuto**  
*Proceedings of the 8th Workshop on Programming Languages and Operating Systems.* PLOS 2015. Monterey, CA, Oct. 2015.  
Acceptance: 7 / 16 (44%).
- [W5] [PolyPoint: Guiding Indoor Quadrotors with Ultra-Wideband Localization](#)  
Benjamin Kempke, **Pat Pannuto**, and Prabal Dutta  
*2015 ACM Workshop on Hot Topics in Wireless.* HotWireless '15. Paris, France, Sept. 2015.  
**Potential for Test of Time 2025 Award.**
- [W6] [Lessons from Five Years of Making Michigan Micro Motes](#)  
**Pat Pannuto**, Yoonmyung Lee, ZhiYoong Foo, Gyouho Kim, David Blaauw, and Prabal Dutta  
*6th Workshop of Architectural Research Prototyping.* WARP '15. Portland, Oregon, USA, 2015.  
Acceptance: 11 / 20 (55%).
- [W7] [Interfacing the Internet of a Trillion Things](#)  
Bradford Campbell, **Pat Pannuto**, and Prabal Dutta  
*The Second International Workshop on the Swarm at the Edge of the Cloud.* SEC '15. Seattle, Washington, USA, 2015.
- [W8] [Harmonia: Wideband Spreading for Accurate Indoor RF Localization](#)  
Benjamin Kempke, **Pat Pannuto**, and Prabal Dutta  
*2014 ACM Workshop on Hot Topics in Wireless.* HotWireless '14. Maui, Hawaii, USA, Sept. 2014.
- [W9] [System Architecture Directions for a Software-Defined Lighting Infrastructure](#)  
Ye-Sheng Kuo, **Pat Pannuto**, and Prabal Dutta  
*1st ACM Workshop on Visible Light Communication Systems.* VLCS '14. Maui, Hawaii, USA, Sept. 2014.
- [W10] [Grid Watch: Mapping Blackouts with Smart Phones](#)  
Noah Klugman, Javier Rosa, **Pat Pannuto**, Matthew Podolsky, William Huang, and Prabal Dutta  
*Proceedings of the 15th Workshop on Mobile Computing Systems and Applications.* HotMobile '14. Santa Barbara, California, Feb. 2014.
- [W11] [Exploring Powerline Networking for the Smart Building](#)  
**Pat Pannuto** and Prabal Dutta  
*Extending the Internet to Low power and Lossy Networks.* IP+SN '11. Chicago, Illinois, USA, Apr. 2011.

## POSTERS AND DEMOS

- [PD1] [Demo Abstract: Applications on the Signpost Platform for City-Scale Sensing](#)  
Joshua Adkins, Bradford Campbell, Branden Ghena, Neal Jackson, **Pat Pannuto**, Samuel Rohrer, and Prabal Dutta  
*Proceedings of the 17th ACM/IEEE International Conference on Information Processing in Sensor Networks.* IPSN'18. New York, NY, USA, Apr. 2018.  
Acceptance: 28 / 32 (88%).  
**Best Demo Runner Up.**



- [PD2] [The Signpost Platform for City-Scale Sensing](#)  
Joshua Adkins, Bradford Campbell, Branden Ghena, Neal Jackson, **Pat Pannuto**, and Prabal Dutta  
*TerraSwarm 2017 Annual Review*. TerraSwarm'17. Berkeley, CA, USA, Oct. 2017.  
**David Wessel Best Demo Award.**
- [PD3] [SurePoint: Exploiting Ultra Wideband Flooding and Diversity to Provide Robust, Scalable, High-Fidelity Indoor Localization](#)  
Benjamin Kempke, **Pat Pannuto**, Bradford Campbell, and Prabal Dutta  
*Proceedings of the 14th ACM Conference on Embedded Networked Sensor Systems*. SenSys'16. Stanford, CA, USA, Nov. 2016.
- [PD4] [Accessors and the RoboCafé: Interoperability in the Internet of Things](#)  
**Pat Pannuto**  
*Twelfth International Nanotechnology Conference on Communication and Cooperation*. INC12. Leuven, Belgium, May 2016.  
**Outstanding Poster Award.**
- [PD5] [PolyPoint: High-Precision Indoor Localization with UWB](#)  
Benjamin Kempke, **Pat Pannuto**, Bradford Campbell, Joshua Adkins, and Prabal Dutta  
*Proceedings of the 13th ACM Conference on Embedded Networked Sensor Systems*. SenSys'15. Soeul, Republic of Korea, Nov. 2015.
- [PD6] [DecaWave: Exploring State of the Art Commercial Localization](#)  
Bradford Campbell, Prabal Dutta, Benjamin Kempke, Ye-Sheng Kuo, and **Pat Pannuto**  
*Microsoft Indoor Localization Competition*. Seattle, Washington, USA, Apr. 2015.  
**Third Place in Infrastructure-Based Systems.**
- [PD7] [Luxapose: Indoor Positioning with Mobile Phones and Visible Light](#)  
Ye-Sheng Kuo, **Pat Pannuto**, Bradford Campbell, and Prabal Dutta  
*Microsoft Indoor Localization Competition*. Seattle, Washington, USA, Apr. 2015.
- [PD8] [Poster Abstract: A Networked Embedded System Platform for the Post-Mote Era](#)  
**Pat Pannuto**, Michael P Andersen, Tom Bauer, Bradford Campbell, Amit Levy, David Culler, Philip Levis, and Prabal Dutta  
*Proceedings of the 12th ACM Conference on Embedded Networked Sensor Systems*. SenSys '14. Memphis, Tennessee, USA, 2014.
- [PD9] [Demo — Luxapose: Indoor Positioning with Mobile Phones and Visible Light](#)  
Ye-Sheng Kuo, **Pat Pannuto**, and Prabal Dutta  
*The 20th Annual International Conference on Mobile Computing and Networking*. MobiCom '14. Maui, Hawaii, USA, Sept. 2014.
- [PD10] [Demo — Luxapose: Indoor Positioning with Mobile Phones and Visible Light](#)  
Ye-Sheng Kuo, **Pat Pannuto**, and Prabal Dutta  
*1st ACM Workshop on Visible Light Communication Systems*. VLCS '14. Maui, Hawaii, USA, Sept. 2014.
- [PD11] [Demo: M3: A Mm-scale Wireless Energy Harvesting Sensor Platform](#)  
**Pat Pannuto**, Yoonmyung Lee, ZhiYoong Foo, David Blaauw, and Prabal Dutta  
*Proceedings of the 1st International Workshop on Energy Neutral Sensing Systems*. ENSSys '13. Rome, Italy, Nov. 2013, 17:1–17:2.
- [PD12] [GATD: A Robust, Extensible, Versatile Swarm Dataplane](#)  
**Pat Pannuto**, Bradford Campbell, and Prabal Dutta  
*The First International Workshop on the Swarm at the Edge of the Cloud*. SEC '13. Montreal, Quebec, Canada, 2013.
- [PD13] [Demo: Floodcasting, a Data Dissemination Service Supporting Real-time Actuation and Control](#)  
Ye-Sheng Kuo, **Pat Pannuto**, and Prabal Dutta  
*Proceeding of the 11th Annual International Conference on Mobile Systems, Applications, and Services*. MobiSys '13. Taipei, Taiwan, June 2013, pp. 489–490.



- [PD14] [Platforms and Protocols for Emerging Wireless Systems](#)  
**Pat Pannuto**, Prabal Dutta, Bradford Campbell, Samuel DeBruin, Trey Grunnagle, William Huang, Ben Kempke, Ye-Sheng Kuo, Andrew Robinson, Aaron Schulman, Maya Spivak, and Lohit Yerva  
Future of Mobile Computing Workshop. Mountain View, California, 2012.
- [PD15] [Demo: Ultra-constrained sensor platform interfacing](#)  
**Pat Pannuto**, Yoonmyung Lee, Ben Kempke, Dennis Sylvester, David Blaauw, and Prabal Dutta  
*Proceedings of the 11th international conference on Information Processing in Sensor Networks*. IPSN '12. Beijing, China, Apr. 2012, pp. 147–148.