Pat Pannuto

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Computer Science and Engineering
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Research Overview and Interests

My research focuses on solving the "last inch" problem and solving the challenges that stand between the burgeoning Internet of Things and inevitable Internet of Everything. My interests span from low-level details—developing new technology to meet the energy and area demands of millimeter systems—to large-scale global considerations—understanding how our network and infrastructure must scale to support the trillions of impending devices.

Education

University of Michigan, Ann Arbor, MI (2012–present)
Ph.D. Student in Computer Science (degree expected roughly summer 2017)
Advisor: Prabal Dutta

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

Awards and Grants

Qualcomm Innovation Fellowship Honorable Mention, Team Fellowship with Brad Campbell, $50,000 (2013–2014)

National Defense Science & Engineering Graduate Fellowship, $95,000 plus tuition (2013–present)

National Science Foundation Graduate Research Fellowship, $90,000 plus tuition (2013, declined)

University of Michigan Department of Computer Science First-Year Fellowship (2012–2103)

Teaching and Honors

Best Undergraduate Instructor, University of Michigan, EECS (2011–2012)

Undergraduate Teaching Assistant, EECS 470: Computer Architecture (W'12)

Undergraduate Teaching Assistant, EECS 482: Introduction to Operating Systems (W'12, F'11, W'11, F'10)

Undergraduate Teaching Assistant, EECS 373: Design of Microprocessor Based Systems (F'11, W'11)

Professional Service

2014 ACM Workshop on Visible Light Communication Systems – Demo Co-Chair

Reviewer for IEEE Transactions on Circuits and Systems II (TCAS-II)

Journal Publications

[J1] Yoonmyung Lee, Suyoung Bang, Inhee Lee, Yejoong Kim, Gyouho Kim, Mohammed Hassan Ghaed, **Pat Pannuto**, Prabal Dutta, Dennis Sylvester, and David Blaauw. A modular 1 mm^3 die-stacked sensing platform with low power I^2C inter-die communication and multi-modal energy harvesting. In *IEEE Journal of Solid-State Circuits*, volume 48, 2013.

Conference Publications

[C1] Ye-Sheng Kuo, **Pat Pannuto**, Gyouho Kim, Zhi Yoong Foo, Inhee Lee, Ben Kempke, Prabal Dutta, David Blaauw, and Yoonmyung Lee. MBus: A 17.5 pJ/bit portable interconnect bus for millimeter-scale sensor systems with 8 nW standby power. In *CICC '14: IEEE Custom Integrated Circuits Conference*, September 2014.

[C2] Ye-Sheng Kuo, **Pat Pannuto**, Ko-Jen Hsiao, and Prabal Dutta. Luxapose: Indoor positioning with mobile phones and visible light. In *The 20th Annual International Conference on Mobile Computing and Networking*, MobiCom '14, September 2014.

[C3] 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, Zhi Yoong Foo, Yen-Po Chen, Jeong Seok-Hyeon, and Myungjoon Choi. IoT design space challenges: Circuits and systems. In *Proceedings of the 2014 IEEE Symposium on VLSI Technology (VLSI14)*, June 2014.

[C4] Gyouho Kim, Zhi Yoong Foo, **Pat Pannuto**, Ye-Sheng Kuo, Ben Kempke, Mohammad Hassan Ghaed, Suyoung Bang, Inhee Lee, Yejoong Kim, Seokhyeon Jeong, Prabal Dutta, Dennis Sylvester, and David Blaauw. A millimeter-scale wireless imaging system with continuous motion detection and energy harvesting. In *VLSI Circuits (VLSIC), 2014 Symposium on*, June 2014.

[C5] Ye-Sheng Kuo, **Pat Pannuto**, Thomas Schmid, and Prabal Dutta. Reconfiguring the software radio to improve power, price, and portability. In *Proceedings of the 10th ACM Conference on Embedded Networked Sensor Systems*, SenSys '12, New York, NY, USA, 2012. ACM.

Workshop Publications

[W1] Benjamin Kempke, **Pat Pannuto**, and Prabal Dutta. Harmonia: Wideband spreading for accurate indoor RF localization. In *2014 ACM Workshop on Hot Topics in Wireless*, HotWireless '14, September 2014.

[W2] Ye-Sheng Kuo, **Pat Pannuto**, and Prabal Dutta. System architecture directions for a software-defined lighting infrastructure. In *1st ACM Workshop on Visible Light Communication Systems*, VLCS '14, September 2014.

[W3] Noah Klugman, Javier Rosa, **Pat Pannuto**, Matthew Podolsky, William Huang, and Prabal Dutta. Grid Watch: Mapping blackouts with smart phones. In *Proceedings of the 15th Workshop on Mobile Computing Systems and Applications*, HotMobile '14, New York, NY, USA, Feb 2014. ACM.

[W4] **Pat Pannuto** and Prabal Dutta. Exploring powerline networking for the smart building. In *Extending the Internet to Low power and Lossy Networks*, IP+SN '11, April 2011.

Posters and Demos

[PD1] Ye-Sheng Kuo, **Pat Pannuto**, and Prabal Dutta. Demo — Luxapose: Indoor positioning with mobile phones and visible light. In *The 20th Annual International Conference on Mobile Computing and Networking*, MobiCom '14, September 2014.

[PD2] Ye-Sheng Kuo, **Pat Pannuto**, and Prabal Dutta. Demo — Luxapose: Indoor positioning with mobile phones and visible light. In *1st ACM Workshop on Visible Light Communication Systems*, VLCS '14, September 2014.

[PD3] **Pat Pannuto**, Yoonmyung Lee, Zhiyoong Foo, David Blaauw, and Prabal Dutta. Demo: M3: A mm-scale wireless energy harvesting sensor platform. In *Proceedings of the 1st International Workshop on Energy Neutral Sensing Systems*, ENSSys '13, pages 17:1–17:2, New York, NY, USA, Nov 2013. ACM.

[PD4] **Pat Pannuto**, Brad Campbell, and Prabal Dutta. GATD: A robust, extensible, versatile swarm dataplane. In *The First International Workshop on the Swarm at the Edge of the Cloud*, SEC '13, 2013.

[PD5] Ye-Sheng Kuo, **Pat Pannuto**, and Prabal Dutta. Demo: Floodcasting, a data dissemination service supporting real-time actuation and control. In *Proceeding of the 11th Annual International Conference on Mobile Systems, Applications, and Services*, MobiSys '13, pages 489–490, New York, NY, USA, June 2013. ACM.

[PD6] **Pat Pannuto**, Prabal Dutta, Brad Campbell, Sam DeBruin, Trey Grunnagle, William Huang, Ben Kempke, Ye-Sheng Kuo, Andrew Robinson, Aaron Schulman, Maya Spivak, and Lohit Yerva. Platforms and protocols for emerging wireless systems. Future of Mobile Computing Workshop, Mountain View, CA, USA, 2012. Google.

[PD7] **Pat Pannuto**, Yoonmyung Lee, Ben Kempke, Dennis Sylvester, David Blaauw, and Prabal Dutta. Demo: Ultra-constrained sensor platform interfacing. In *Proceedings of the 11th international conference on Information Processing in Sensor Networks*, IPSN '12, pages 147–148, New York, NY, USA, apr 2012. ACM.