Aurojit Panda

Curriculum Vitae

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Research Interests

Computer Systems, Distributed Systems, Networking

Education

2011–2017 **Ph.D. Computer Science**, *University of California*, Berkeley, CA.
Advisor: Scott Shenker

2004–2008 **Sc.B. Math–Computer Science**, *Brown University*, Providence, RI.
Honors in Math–Computer Science
Advisor: Meinolf Sellmann

Professional Employment

Aug 2018– **Assistant Professor**, *Courant Institute, New York University*, New York, NY.
2017–2018 **Researcher**, *International Computer Science Institute*, Berkeley, CA.
2017–2018 **Software Developer**, *Nefeli Networks*, Berkeley, CA.
2011–2017 **Research Assistant**, *UC Berkeley*, Berkeley, CA.
2008–2011 **Software Developer**, *Microsoft*, Redmond, WA.
Summer '07 **Software Engineering Intern**, *Electronic Arts*, Redwood City, CA.
Summer '06 **Software Engineering Intern**, *Bloomberg LP*, New York, NY.

Teaching Experience

Fall '20 **Distributed Systems**, *NYU*, New York, NY.
Spring '20 **Operating Systems**, *NYU*, New York, NY.
Fall '19 **Computer Networks**, *NYU*, New York, NY.
Fall '18 **Distributed Systems**, *NYU*, New York, NY.

Awards

- VMWare Early Career Faculty Grant 2018
- Demetri Angelakos Memorial Achievement Award, Berkeley EECS 2016-17
- Best Student Paper, SIGCOMM 2015
- Best Paper, EuroSys 2013
- Qualcomm Innovation Fellowship 2012

Publications

Conferences

- Emmanuel Amaro, Christopher Branner-Augmon, Zhihong Luo, Amy Ousterhout, Marcos K. Aguilera, Aurojit Panda, Sylvia Ratnasamy, and Scott Shenker. Can Far Memory Improve Job Throughput? In *EuroSys*, 2020.

- Yotam Harchol, D. Bergemann, N. Feamster, E. Friedman, A. Krishnamurthy, Aurojit Panda, S. Ratnasamy, M. Schapira, and S. Shenker. A public option for the core. In *SIGCOMM*, 2020.

- Yotam Harchol, Aisha Mushtaq, Vivian Fang, James McCauley, Aurojit Panda, and Scott Shenker. Making Edge-Computing Resilient . In *SoCC*, 2020.

- Xuan Tang, Teseo Schneider, Shoaib Kamil, Aurojit Panda, Jinyang Li, and Daniele Panozzo. Eggs: Sparsity-specific code generation. In *Symposium on Geometry Processing*, 2020.

- Wen Zhang, Vivian Fang, Aurojit Panda, and Scott Shenker. Kappa: A Programming Framework for Serverless Computing. In *SoCC*, 2020.

- James McCauley, Barath Raghavan, Yotam Harchol, Aurojit Panda, and Scott Shenker. Enabling a Permanent Revolution in Internet Architecture. In *SIGCOMM*, pages 1–14, 2019.

- Kalev Alpernas, Roman Manevich, Aurojit Panda, Mooly Sagiv, Scott Shenker, Sharon Shoham, and Yaron Velner. Abstract interpretation of stateful networks. In *Static Analysis. SAS*, pages 86–106, 2018.

- Michael Alan Chang, Aurojit Panda, Domenic Bottini, Lisa Jian, Pranay Kumar, and Scott Shenker. Network Evolution for DNNs. In *SysML*, 2018.

- Xiaohe Hu, Arpit Gupta, Nick Feamster, Aurojit Panda, and Scott Shenker. Preserving privacy at ixps. In *APNet*, pages 43–49, 2018.

- Radhika Mittal, Alex Shpiner, Aurojit Panda, Eitan Zahavi, Arvind Krishnamurthy, Sylvia Ratnasamy, and Scott Shenker. Revisiting Network Support for RDMA. In *NSDI*, 2018.

- Amin Tootoonchian, Aurojit Panda, Chang Lan, Melvin Walls, Katerina Argyraki, Sylvia Ratnasamy, and Scott Shenker. ResQ: Enabling SLOs in Network Function Virtualization. In *NSDI*, 2018.

- Amin Tootoonchian, Aurojit Panda, Aida Nematzadeh, and Scott Shenker. Distributed Shared Memory for Machine Learning. In *SysML*, 2018.

- Aurojit Panda, Ori Lahav, Katerina Argyraki, Mooly Sagiv, and Scott Shenker. Verifying Reachability in Networks with Mutable Datapaths. In *NSDI*, 2017.

- Aurojit Panda, Wenting Zheng, Xiaohe Hu, Arvind Krishnamurthy, and Scott Shenker. SCL: Simplifying Distributed SDN Control Planes. In *NSDI*, 2017.
- Shivaram Venkataraman, Aurojit Panda, Kay Ousterhout, Ali Ghodsi, Michael J. Franklin, Benjamin Recht, and Ion Stoica. Drizzle: Fast and adaptable stream processing at scale. In *SOSP*, pages 374–389, 2017.
- Marco Chiesa, Ilya Nikolaevskiy, Slobodan Mitrovic, Aurojit Panda, Andrei Gurtov, Aleksander Madry, Michael Schapira, and Scott Shenker. The Quest for Resilient (Static) Forwarding Tables. In *INFOCOM*, pages 1–9, 2016.
- Ethan J Jackson, Melvin Walls, Aurojit Panda, Justin Pettit, Ben Pfaff, Jarno Rajahalme, Teemu Koponen, and Scott Shenker. SoftFlow: A Middlebox Architecture for Open vSwitch. In *USENIX ATC*, 2016.
- Oded Padon, Kenneth McMillan, Aurojit Panda, Mooly Sagiv, and Sharon Shoham. Ivy: Interactive Verification of Parametrized Systems via Effectively Propositional Reasoning. In *PLDI*, pages 614–630, 2016.
- Aurojit Panda, Sangjin Han, Keon Jang, Melvin Walls, Sylvia Ratnasamy, and Scott Shenker. NetBricks: Taking the V out of NFV. In *OSDI*, pages 203–216, 2016.
- Colin Scott, Aurojit Panda, Vjeko Brajkovic, George Necula, Arvind Krishnamurthy, and Scott Shenker. Minimizing Faulty Executions of Distributed Systems. In *NSDI*, 2016.
- Yaron Velner, Kalev Alpernas, Aurojit Panda, Alexander Rabinovich, Mooly Sagiv, Scott Shenker, and Sharon Shoham. Some Complexity Results for Stateful Network Verification. In *Tools and Algorithms for the Construction and Analysis of Systems*, pages 811–830, 2016.
- Shoumik Palkar, Chang Lan, Sangjin Han, Aurojit Panda, Keon Jang, Sylvia Ratnasamy, Luigi Rizzo, and Scott Shenker. E2: A Framework for Network Function Virtualization. In *SOSP*, pages 121–136, 2015.
- Justine Sherry, Peter X. Gao, Soumya Basu, Aurojit Panda, Arvind Krishnamurthy, Christian Maciocco, Maziar Manesh, João Martins, Sylvia Ratnasamy, Luigi Rizzo, and Scott Shenker. Rollback Recovery for Middleboxes. In *SIGCOMM*, pages 227–240, 2015.
- Colin Scott, Andreas Wundsam, Barath Raghavan, Aurojit Panda, Andrew Or, Jefferson Lai, Eugene Huang, Zhi Liu, Ahmed El-Hassany, Sam Whitlock, H.B. Acharya, Kyriakos Zarifis, and Scott Shenker. Troubleshooting Blackbox SDN Control Software with Minimal Causal Sequences. In *SIGCOMM*, pages 395–406, 2014.
- Shivaram Venkatraman, Aurojit Panda, Ganesh Ananthanarayanan, Michael Franklin, and Ion Stoica. The Power of Choice in Data-Aware Cluster Scheduling. In *OSDI*, pages 301–316, 2014.

- Sameer Agarwal, Barzan Mozafari, Aurojit Panda, Henry Milner, Samuel Madden, and Ion Stoica. BlinkDB: Queries with Bounded Errors and Bounded Response Times on Very Large Data. In *EuroSys*, page 29–42, 2013. Best Paper.

- Junda Liu, Aurojit Panda, Ankit Singla, Brighten Godfrey, Michael Schapira, and Scott Shenker. Ensuring Connectivity via Data Plane Mechanisms. In *NSDI*, 2013.

- Joan Feigenbaum, Brighten Godfrey, Aurojit Panda, Michael Schapira, Scott Shenker, and Ankit Singla. Brief Announcement: On the Resilience of Routing Tables. In *Principles of Distributed Computing*, pages 237–238, 2012.

- Daniel Heller, Aurojit Panda, Meinolf Sellmann, and Justin Yip. Model Restarts for Structural Symmetry Breaking. In *Principles and Practice of Constraint Programming*, pages 539–544, 2008.

Journals

- Anirudh Sivaraman, Thomas O Mason, Aurojit Panda, Ravi Netravali, and Sai Anirudh Kondaveeti. Network architecture in the age of programmability. 2020.

- Kalev Alpernas, Aurojit Panda, Alexander Moshe Rabinovich, Shmuel Sagiv, Scott Shenker, Sharon Shoham, and Yaron Velner. Some complexity results for stateful network verification. *Formal Methods in System Design*, pages 1–41, 2019.

- James McCauley, Aurojit Panda, Arvind Krishnamurthy, and Scott Shenker. Thoughts on Load Distribution and the Role of Programmable Switches. *SIGCOMM Computer Communication Review*, 49(1):18–23, 2019.

- James McCauley, Zhi Liu, Aurojit Panda, Teemu Koponen, Barath Raghavan, Jennifer Rexford, and Scott Shenker. Recursive SDN for Carrier Networks. *SIGCOMM Computer Communication Review*, 46(3):1–7, 2016.

- Aurojit Panda, James Murphy McCauley, Amin Tootoonchian, Justine Sherry, Teemu Koponen, Syliva Ratnasamy, and Scott Shenker. Open Network Interfaces for Carrier Networks. *SIGCOMM Computer Communication Review*, 46(1):5–11, 2016.

Workshops

- Emmanuel Amaro, Zhihong Luo, Amy Ousterhout, Arvind Krishnamurthy, Aurojit Panda, Sylvia Ratnasamy, and Scott Shenker. Remote Memory Calls. In *HotNets*, 2020.

- Akshay Narayan, Aurojit Panda, Mohammad Alizadeh, Hari Balakrishnan, Arvind Krishnamurthy, and Scott Shenker. Bertha: Tunneling through the Network API. In *HotNets*, 2020.

- Tao Wang, Hang Zhu, Fabian Ruffy, Xin Jin, Anirudh Sivaraman, Dan RK Ports, and Aurojit Panda. Multitenancy for fast and programmable networks in the cloud. In *HotCloud*, 2020.

- Yotam Harchol, Aisha Mushtaq, James McCauley, Aurojit Panda, and Scott Shenker. CESSNA: Resilient Edge-Computing. In *MECOMM*, pages 1–6, 2018.
- Anand Iyer, Aurojit Panda, Mosharaf Chowdhury, Aditya Akella, Scott Shenker, and Ion Stoica. Monarch: Gaining Command on Geo-Distributed Graph Analytics. In *HotCloud*, 2018.
- Anand Iyer, Aurojit Panda, Shivaram Venkatraman, Mosharaf Chowdhury, Aditya Akella, Scott Shenker, and Ion Stoica. Bridging the GAP: Towards Approximate Graph Analytics. In *GRADES-NDA*, pages 1–5, 2018.
- Marc Körner, Torsten M. Runge, Aurojit Panda, Sylvia Ratnasamy, and Scott Shenker. Open carrier interface: An open source edge computing framework. In *Workshop on Networking for Emerging Applications and Technologies*, pages 27–32, 2018.
- Abhiram Balasubramanian, Marek S. Baranowski, Anton Burtsev, Aurojit Panda, Zvonimir Rakamaric, and Leonid Ryzhyk. System Programming in Rust: Beyond Safety. In *HotOS*, 2017.
- Aurojit Panda, Mooly Sagiv, and Scott Shenker. Verification in the Age of Microservices. In *HotOS*, 2017.
- Ignacio Castro, Aurojit Panda, Barath Raghavan, Scott Shenker, and Sergey Gorinsky. Route Bazaar: Automatic Intedomain Contract Negotiation. In *HotOS*, 2015.
- Aurojit Panda, Katerina Argyraki, Mooly Sagiv, Michael Schapira, and Scott Shenker. New Directions for Network Verification. In *SNAPL*, 2015.
- Wenfei Wu, Li Erran Li, Aurojit Panda, and Scott Shenker. PRAN: Programmable Radio Access Networks. In *HotNets*, pages 1–7, 2014.
- Sangjin Han, Norbert Egi, Aurojit Panda, Sylvia Ratnasamy, Guangyu Shi, and Scott Shenker. Network Support for Resource Disaggregation in Next-Generation Datacenters. In *HotNets*, pages 1–7, 2013.
- James McCauley, Aurojit Panda, Martin Casado, Teemu Koponen, and Scott Shenker. Extending SDN to Large-Scale Networks. In *ONS Research Track*, 2013.
- Kay Ousterhout, Aurojit Panda, Joshua Rosen, Shivaram Venkataraman, Reynold Xin, Sylvia Ratnasamy, Scott Shenker, and Ion Stoica. The Case for Tiny Tasks in Compute Clusters. In *HotOS*, 2013.
- Aurojit Panda, Colin Scott, Ali Ghodsi, Teemu Koponen, and Scott Shenker. CAP for Networks. In *HotSDN*, pages 91–96, 2013.
- Debayan Gupta, Aaron Segal, Aurojit Panda, Gil Segev, Michael Schapira, Joan Feigenbaum, Jenifer Rexford, and Scott Shenker. A New Approach to Interdomain Routing Based on Secure Multi-Party Computation. In *HotNets*, pages 37–42, 2012.

Demos

- Sameer Agarwal, Anand P Iyer, Aurojit Panda, Samuel Madden, Barzan Mozafari, and Ion Stoica. Blink and It's Done: Interactive Queries on Very Large Data. In *VLDB*, pages 1902–1905, 2012.

Technical Reports

- Aurojit Panda. Certifying safety when implementing consensus, 2019.
- Marco Chiesa, Ilya Nikolaevkiy, Aurojit Panda, Andrei Gurtov, Michael Schapira, and Scott Shenker. Exploring the Limits of Static Failover Routing. *arXiv preprint arXiv:1409.0034*, 2014.
- Aurojit Panda, Ori Lahav, Katerina Argyraki, Mooly Sagiv, and Scott Shenker. Verifying Isolation Properties in the Presence of Middleboxes. *arXiv preprint arXiv:1409.7687*, 2014.

Invited Talks

Programming the Edge
- Hebrew University Summer School on Networking. June 2019.
- Akraino Edge Summit. San Diego. August 2019.

A New Approach to Network Function Virtualization
- USC. February 2017.
- NYU. February 2017.
- University of Wisconsin. February 2017.
- University of Chicago. March 2017.
- MPI SWS. March 2017.
- EPFL. March 2017.
- UT Austin. April 2017.
- Microsoft Research. April 2017.
- IETF NFV Research Group. September 2017.

NetBricks: Taking the V out of NFV
- Intel Research. October 2016
- Google Platforms and Networking. October 2016

VMN: Verifying Networks with Mutable Datapaths
- Invited speaker at NetPL. August, 2016.
- Dagstuhl - Formal Foundations for Networking. February 2015.
- Bellairs Seminar on Network Verification. February 2020.

Service

- Reviewer for:
  - SIGCOMM (2019, 2020)
  - NSDI (2019, 2020)
  - EuroSys (2019)
  - USENIX ATC (2019, 2020)

  - CoNext (2018)
  - HotNets (2018)
  - HotCloud (2020)
  - Journal of Applied Logic (2016)
  - SIGCOMM CCR (2017, 2018)
  - ACM/IEEE Transactions on Networking (2017)
  - SOSR (2018, 2020)
  - MobiSys (ERC 2018)
  - ANCS (2018)
  - EuroSys Doctoral Workshop (2018)
  - KBNets (2018)
  - SecSoN (2018)
  - ACM/IEEE Transactions on Networking (2018)
  - EuroP4 (2019)
- External Reviewer for ESOP 2017, POPL 2017, SOSR 2016, PLDI 2015, ICDE 2013.
- Travel Grants chair for ANCS 2018.
- Preview Sessions Chair for NSDI 2019.
- Publication chair for SIGCOMM 2020.

References

Available on request