Balakrishnan Chandrasekaran

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Education

Doctor of Philosophy in Computer Science — Dec. 2016
Duke University, Durham (NC), US

Master of Science in Computer Science — May 2008
Washington University in St. Louis, St. Louis (MO), US

Bachelor of Technology in Information Technology — May 2005
Anna University, S.R.M. Engineering College, Chennai (TN), IN

Employment

Assistant Professor — Nov. 2020 – ⋆
Vrije Universiteit Amsterdam, Amsterdam, NL

Senior Researcher — Aug. 2019 – Oct. 2020
Max-Planck-Institut für Informatik, Saarbrücken, DE

Postdoctoral Scholar — Mar. 2018 – Jul. 2019
Max-Planck-Institut für Informatik, Saarbrücken, DE

Postdoctoral Scholar — Dec. 2016 – Feb. 2018
Technische Universität Berlin, Berlin, DE

Graduate Research Assistant — Aug. 2010 – Dec. 2016
Duke University, Durham (NC), US

Visiting Researcher — Jun. – Sep. 2015
Technische Universität Berlin., Berlin, DE

Intern, Custom Engineering — May – Aug. 2011 & 2012, Jun. – Aug. 2014
Akamai Technologies, Inc., Cambridge (MA), US

Intern, Service Quality Management — Jun. – Aug. 2013
AT&T Research Labs., Florham Park (NJ), US

Sr. Technical Consultant — Jun. 2008 – Jul. 2010
Perficient, Inc., Denver (CO), US

Intern, Premedia Group — May – Aug. 2007
Vertis Communications, Inc., Earth City (MO), US

Associate Software Engineer — Jun. 2005 – Jun. 2006
Torry Harris Business Solutions, Pvt. Ltd., Bangalore (KA), IN

Preprints

§ "Dissecting Latency in the Internet's Fiber Infrastructure," I. N. Bozkurt, W. Aqeel, D. Bhattacherjee, B. Chandrasekaran, P. B. Godfrey, G. Laughlin, B. M. Maggs, and A. Singla, *arXiv:1811.10737; Computing Research Repository (CoRR)*, November 2018.

Refereed Publications

§ "DChannel: Accelerating Mobile Applications With Parallel High-bandwidth and Low-latency Channels," W. Sentosa, B. Chandrasekaran, B. Godfrey, H. Hassanieh, and B. Maggs, *In Proceedings of the 20th USENIX Symposium on Networked Systems Design and Implementation (NSDI)*, April 2023.

§ "Hop-On Hop-Off Routing: A Fast Tour across the Optical Data Center Network for Latency-Sensitive Flows," J. Li, Y. Lei, F. De Marchi, R. Joshi, B. Chandrasekaran, and Y. Xia, *In Proceedings of the 6th Asia-Pacific Workshop on Networking (APNet)*, July 2022.

§ "Calibrating the Performance and Security of Blockchains via Information Propagation Delays," J. Fechner, B. Chandrasekaran, and M. X. Makkes, *In Proceedings of the ACM/SIGAPP Symposium on Applied Computing (SAC)*, April 2022.

§ "cISP: A Speed-of-Light Internet Service Provider," D. Bhattacherjee, W. Aqeel, S. A. Jyothi, I. N. Bozkurt, W. Sentosa, M. Tirmazi, A. Aguirre, B. Chandrasekaran, P. B. Godfrey, G. Laughlin, B. M. Maggs, and A. Singla, *In Proceedings of the 19th USENIX Symposium on Networked Systems Design and Implementation (NSDI)*, April 2022.

§ "VOXEL: Cross-layer Optimization for Video Streaming with Imperfect Transmission," M. Palmer, M. Appel, K. Spiteri, B. Chandrasekaran, A. Feldmann, and R. K. Sitaraman, *In Proceedings of the ACM Conference on emerging Networking EXperiments and Technologies (CoNEXT)*, December 2021.

§ "Selfish & Opaque Transaction Ordering in the Bitcoin Blockchain: The Case for Chain Neutrality," J. Messias, M. Alzayat, B. Chandrasekaran, K. P. Gummadi, P. Loiseau, and A. Mislove, *In Proceedings of the ACM Internet Measurement Conference (IMC)*, November 2021.

§ "Tardis: A fault-tolerant design for network control planes," Zhenyu. Zhou, T. A. Benson, M. Canini, and B. Chandrasekaran, *In Proceedings of the ACM Symposium on SDN Research (SOSR)*, September 2021.

§ "AnyOpt: Predicting and Optimizing IP Anycast Performance," X. Zhang, T. Sen, Z. Zhang, T. April, B. Chandrasekaran, D. Choffnes, B. M. Maggs, H. Shen, R. K. Sitaraman, and X. Yang, *In Proceedings of the Annual Conference of the ACM Special Interest Group on Data Communication on the Applications, Technologies, Architectures, and Protocols for Computer Communication (SIGCOMM)*, August 2021.

§ "Puncturable Pseudorandom Sets and Private Information Retrieval with Near-Optimal Online Bandwidth and Time," E. Shi, W. Aqeel, B. Chandrasekaran, and B. Maggs, *InAdvances in Cryptology – CRYPTO*, August 2021.

§ "Accelerating Mobile Applications With Parallel High-bandwidth and Low-latency Channels," W. Sentosa, B. Chandrasekaran, P. B. Godfrey, H. Hassanieh, B. Maggs, and A. Singla, *In Proceedings of the ACM International Workshop on Mobile Computing Systems and Applications (HotMobile)*, February 2021.

§ "On Landing and Internal Pages: The Strange Case of Jekyll and Hyde in Internet Measurement," W. Aqeel, B. Chandrasekaran, A. Feldmann, and B. M. Maggs, *In Proceedings of the ACM Internet Measurement Conference (IMC)*, October 2020. *Winner of* ***"Community Contribution Award."***

§ "Demystifying the Messaging Platforms' Ecosystem Through the Lens of Twitter," M. Hoseini, P. Melo, M. Júnior, F. Benevenuto, B. Chandrasekaran, A. Feldmann, and S. Zannettou, *In Proceedings of the ACM Internet Measurement Conference (IMC)*, October 2020.

§ "On Blockchain Commit Times: An analysis of how miners choose Bitcoin transactions," J. Messias, M. Alzayat, B. Chandrasekaran, and K. P. Gummadi, *In Proceedings of the Second International Workshop on Smart Data for Blockchain and Distributed Ledger (SDBD)*, August 2020.

§ "A Deeper Look at Web Content Availability and Consistency over HTTP/S," M. T. Paracha, B. Chandrasekaran, D. Choffnes, and D. Levin, *In Proceedings of the International Conference on Traffic Monitoring and Analysis (TMA)*, June 2020.

§ "Untangling Header Bidding Lore: Some myths, some truths, and some hope," W. Aqeel, D. Bhattacherjee, B. Chandrasekaran, P. Brighten Godfrey, G. Laughlin, B. Maggs, and A. Singla, *In Proceedings of the Passive and Active Measurement Conference (PAM)*, March 2020. *Winner of* ***"Best Data Set Award."***

§ "P4-enabled Network-assisted Congestion Feedback: A Case for NACKs," A. Feldmann, B. Chandrasekaran, S. Fathalli, and E. N. Weyulu, *Stanford Workshop on Buffer Sizing (BS)*, December 2019.

§ "On Mapping the Interconnections in Today's Internet," R. Motamedi, B. Yeganeh, B. Chandrasekaran, R. Rejaie, B. M. Maggs, and W. Willinger, *In IEEE/ACM Transactions on Networking (TON), Volume 27, Issue 5*, October 2019.

§ "RPKI is Coming of Age: A Longitudinal Study of RPKI Deployment and Invalid Route Origins," T. Chung, E. Aben, T. Bruijnzeels, B. Chandrasekaran, D. Choffnes, D. Levin and B. M. Maggs, A. Mislove, R. van Rijswik-Deij, J. Rula, and N. Sullivan, *In Proceedings of the ACM Internet Measurement Conference (IMC)*, November 2019.

§ "The QUIC Fix for Optimal Video Streaming," M. Palmer, T. Krüger, B. Chandrasekaran, and A. Feldmann, *In Proceedings of the ACM CoNEXT 2018 Workshop on the Evolution, Performance, and Interoperability of QUIC (EPIQ)*, December 2018.

§ "Gearing up for the 21st century space race," D. Bhattacherjee, W. Aqeel, I. N. Bozkurt; A. Aguirre, B. Chandrasekaran, P. Brighten Godfrey, G. Laughlin, B. Maggs, and A. Singla, *In Proceedings of the Seventeenth ACM Workshop on Hot Topics in Networks (HotNets)*, November 2018.

§ "Is the Web Ready for OCSP Must-Staple?," T. Chung, J. Lok, B. Chandrasekaran, D. Choffnes, D. Levin and B. M. Maggs, A. Mislove, J. Rula, N. Sullivan, and C. Wilson, *In Proceedings of the ACM Internet Measurement Conference (IMC)*, October 2018.

§ "Sounding the Bell for Improving Internet Security," T. Benson and B. Chandrasekaran, *In Proceedings of the First Workshop on Internet of Things Security and Privacy (IoT S&P)*, November 2017.

§ "A Longitudinal, End-to-End View of the DNSSEC Ecosystem," T. Chung, R. van Rijswik-Deij, B. Chandrasekaran, D. Choffnes, D. Levin, B. M. Maggs, A. Mislove, and C. Wilson, *In Proceedings of the 26st USENIX Security Symposium*, August 2017. *Winner of* ***"Distinguished Paper Award."***

§ "Delorean: Using Time Travel to Avoid Bugs and Failures in SDN Applications," Z. Zhou, T. Benson, M. Canini, and B. Chandrasekaran, *In Proceedings of the ACM Symposium on SDN Research (SOSR)*, April 2017. [Poster]

§ "Why is the Internet so slow!?," I. N. Bozkurt, A. Aguirre, B. Chandrasekaran, P. Brighten Godfrey, G. Laughlin, B. Maggs, and A. Singla, *In Proceedings of the Passive and Active Measurement Conference (PAM)*, March 2017. *Winner of* ***"Best Data Set Award."***

§ "Reducing Latency through Page-aware Management of Web Objects by Content Delivery Networks," S. Narayanan, Y. Nam, A. Sivakumar, B. Chandrasekaran, B. Maggs, and S. Rao, *In Proceedings of the ACM SIGMETRICS International Conference on Measurement and Modeling of Computer Science*, June 2016.

§ "Isolating and Tolerating SDN Application Failures with LegoSDN," B. Chandrasekaran, B. Tschaen, and T. Benson, *In Proceedings of the ACM Symposium on SDN Research (SOSR)*, March 2016.

§ "A Server-to-Server View of the Internet," B. Chandrasekaran, G. Smaragdakis, A. Berger, M. Luckie, and K.C. Ng, *In Proceedings of the ACM Conference on emerging Networking EXperiments and Technologies (CoNEXT)*, December 2015.

§ "Back-Office Web Traffic on the Internet," E. Pujol, P. Richter, B. Chandrasekaran, G. Smaragdakis, A. Feldmann, B. M. Maggs, and K.C. Ng, *In Proceedings of the ACM Internet Measurement Conference (IMC)*, November 2014.

§ "The Internet at the Speed of Light," A. Singla, B. Chandrasekaran, P. Brighten Godfrey, and B. Maggs, *In Proceedings of the Thirteenth ACM Workshop on Hot Topics in Networks (HotNets)*, October 2014.

§ "Tolerating SDN Application Failures with LegoSDN," B. Chandrasekaran and T. Benson, *In Proceedings of the Thirteenth ACM Workshop on Hot Topics in Networks (HotNets)*, October 2014.

§ "Tolerating SDN Application Failures with LegoSDN," B. Chandrasekaran and T. Benson, *In Proceedings of the Third ACM Workshop on Hot Topics in Software Defined Networking (HotSDN)*, August 2014. [Poster]

§ "Curing Regular Expressions Matching Algorithms from Insomnia, Amnesia, and Acalculia," S. Kumar, B. Chandrasekaran, J. Turner, and G. Varghese, *In Proceedings of the 3rd ACM/IEEE Symposium on Architectures for Networking and Communications Systems (ANCS)*, November 2007.

Technical Reports

§ "On the geography of X-Connects," R. Motamedi, B. Chandrasekaran, B. Maggs, R. Rejaie, and W. Willinger, *Oregon University, Technical Report CIS-TR-2014-1*, May 2015.

§ "Alidade: IP Geolocation without Active Probing," B. Chandrasekaran, M. Bai, M. Schoenfield, A. Berger, N. Caruso, G. Economou, S. Gilliss, B. Maggs, K. Moses, D. Duff, K.C. Ng, E. G. Sirer, R. Weber, and B. Wong, *Duke University, Technical Report CS-TR-2015-001*, January 2015.

Other Publications

§ "Calibrating the Performance and Security of Blockchains via Information Propagation Delays," J. Fechner, B. Chandrasekaran, and M. X. Makkes, *ICT.OPEN*, April 2022. [Poster]

§ "Understanding the Security Implications of Kubernetes Networking," F. Minna, A. Blaise, F. Rebecchi, B. Chandrasekaran, and F. Massacci, *IEEE Security & Privacy*, September/October 2021.

§ "An End-to-End View of DNSSEC Ecosystem Management," T. Chung, R. van Rijswik-Deij, B. Chandrasekaran, D. Choffnes, D. Levin, B. M. Maggs, A. Mislove, and C. Wilson, *;login: The USENIX Magazine, Winter 2017, Vol. 42, No. 4*, 2017.

§ "A Universal Approach to Data Center Design," A. Akella, T. Benson, B. Chandrasekaran, C. Huang, B. Maggs and D. Maltz, *In Proceedings of the 16th International Conference on Distributed Computing and Networking (ICDCN)*, January 2015. [Invited paper]

In the news

⋆ The *MyAdPrice* extension was identified as one of the best browser extensions to obtain insights into header bidding at headerbidding.co (on Jan. 3, 2020) and bannertag.com (on Jun. 25, 2019).

⋆ The *Internet at the Speed of Light* project was featured on the front page of San Jose Mercury News (on Nov. 30, 2014), and IT World (on May 9, 2015), and subsequently republished in a few other news outlets: Contra Costa Times (on Mar. 17, 2015), The Bulletin (on Dec. 6, 2014), Valley News (On Aug. 12, 2014), and Star Tribune (on Dec. 13, 2014).

Talks

"A Two-Part Tale on Network Congestion"
Mar. 6, 2020 · *Aalto University*, Espoo, FI

"The Server-to-Server Landscape: insights, opportunities, and challenges"
Oct. 22, 2019 · *Chalmers University*, Göteburg, SE
Mar. 14, 2019 · *The University of Edinburgh*, Edinburgh, UK

"Solving the Internet Latency Problem: One Piece at a Time"
Dec. 6, 2017 · *KTH Royal Institute of Technology*, Stockholm, SE

"Fail without fear: On a Novel Fault-Tolerant SDN Controller Architecture"
Apr. 14, 2016 · *IBM T.J. Watson Research Center*, Yorktown Heights (NY), US

"Isolating and Tolerating SDN Application Failures with LegoSDN"
Mar. 14, 2016 · *ACM Symposium on SDN Research (SOSR)*, Santa Clara (CA), US

"A Server-to-Server View of the Internet"
Dec. 3, 2015 · *ACM Conference on emerging Networking EXperiments and Technologies (CoNEXT)*, Heidelberg, DE

"Tolerating SDN Application Failures with LegoSDN"
Oct. 28, 2014 · *Thirteenth ACM Workshop on Hot Topics in Networks (HotNets)*, Los Angeles (CA), US

"Peeling through the Structural Layers of the Internet"
Jun. 13, 2011 · *Internet MRA Reunion Conference II, IPAM, UCLA*, Lake Arrowhead (CA), US

Community Service

Program Committee Member

· *ACM Cloud Computing Security Workshop (CCSW)* 2021
· *ACM Conference on emerging Networking EXperiments and Technologies (CoNEXT)* 2019
· *International Workshop on Edge Systems, Analytics and Networking (EdgeSys)* 2022
· *Global Internet Symposium (GI)* 2020
· *ACM Internet Measurement Conference (IMC)* 2021 & 2022
· *Passive and Active Measurement Conference (PAM)* 2020 & 2021
· *International Symposium on Research in Attacks, Intrusions and Defenses (RAID)* 2021 & 2022
· *ACM Symposium on SDN Research (SOSR)* 2019 & 2022
· *International Conference on Traffic Monitoring and Analysis (TMA)* 2022

Reviewer

· *In ACM Transactions on Internet Technology (TOIT)* 2021
· *In IEEE/ACM Transactions on Networking (TON)* 2019, 2020, & 2021
· *International Federation for Information Processing (IFIP) Networking Conference* 2017
· *Passive and Active Measurement Conference (PAM)* 2022

Teaching

Network Security [Grad. level]
With Herbert Bos
Period 2, 2021-22 · *Vrije Universiteit Amsterdam*, Amsterdam, NL

Data Networks [Grad. level]
With Anja Feldmann & Keon Jang
Summer Semester, 2020 · *Universität des Saarlandes*, Saarbrücken, DE

Data Networks [Grad. level]
With Anja Feldmann
Winter Semester, 2018-19 · *Universität des Saarlandes*, Saarbrücken, DE

Guest lecture on ***Sketches and Sampling***, **Network Algorithms** [Grad. level]
Instructor: Georgios Smaragdakis
Winter Semester, 2017-18 · *Technische Universität Berlin*, Berlin, DE

Internet Measurements [Grad. level]
With Anja Feldmann
Summer Semester, 2017 · *Technische Universität Berlin*, Berlin, DE

Guest lecture on ***Web/HTTP & DNS***, **Network Protocol Architecture** [Grad. level]
Instructor: Anja Feldmann
Winter Semester, 2016-17 · *Technische Universität Berlin*, Berlin, DE

Guest lecture on ***Hadoop***, **Distributed Systems (CPS 512.01)** [Grad. level]
Instructor: Bruce MacDowell Maggs
Spring Semester, 2015, 2014 · *Duke University*, Durham (NC), US

Teaching Assistant, **Operating Systems (CPS 310)** [Undergrad. level]
Instructor: Jeffrey S. Chase
Fall Semester, 2013 · *Duke University*, Durham (NC), US

Teaching Assistant, **Discrete Mathematics (CPS 102.1)** [Undergrad. level]
Instructor: Bruce MacDowell Maggs
Fall Semester, 2011 · *Duke University*, Durham (NC), US

Teaching Assistant, **Programming Design and Analysis II (CPS 100E.2)** [Undergrad. level]
Instructor: Susan Rodger
Spring Semester, 2011 · *Duke University*, Durham (NC), US