Balakrishnan Chandrasekaran

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Education

Doctor of Philosophy in Computer Science — Dec. 2016
Advisor: Bruce MacDowell Maggs
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

Refereed Publications

§ "Promises and Potential of BBRv3," D. Zeynali, E. N. Weyulu, S. Fathalli, B. Chandrasekaran, and A. Feldmann, *[To appear] In Proceedings of the Passive and Active Measurement Conference (PAM)*, March 2024.

§ "Boosting Application Performance using Heterogeneous Virtual Channels: Challenges and Opportunities," T. Touseef, W. Sentosa, M. Vaddiraju, D. Bhattacherjee, B. Chandrasekaran, P. Brighten Godfrey, S. Tiwari, *In Proceedings of the Twenty-Second ACM Workshop on Hot Topics in Networks (HotNets)*, November 2023.

§ "Performance Characterization of NVMe Flash Devices with Zoned Namespaces (ZNS)," K. Doekemeijer, N. Tehrany, B. Chandrasekaran, M. Bjørling, and A. Trivedi, *In Proceedings of the 2023 IEEE International Conference on Cluster Computing (Cluster)*, October 2023.

§ "Dissecting Bitcoin and Ethereum Transactions: On the Lack of Transaction Contention and Prioritization Transparency in Blockchains," J. Messias, V. Pahari, B. Chandrasekaran, K. P. Gummadi, and P. Loiseau, *In Proceedings of the 27th International Conference on Financial Cryptography and Data Security (FC)*, May 2023.

§ "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 26th 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

§ "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]

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.

Community recognition

⋆ Google Networking Research Summit (2023)

⋆ 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).

Community Service

Program Chair

· *European Symposium on Research in Computer Security (ESORICS) · Poster session* 2023
· *Best Cybersecurity Master Thesis (BCMT) Award in the Netherlands* 2022-2023

Program Committee Member

· *Asia-Pacific Workshop on Networking (APNet)* 2024
· *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)* 2021-23
· *IEEE International Conference on Computer Communications (INFOCOM)* 2024
· *USENIX Symposium on Networked Systems Design and Implementation (NSDI)* 2024-25
· *Passive and Active Measurement Conference (PAM)* 2020-21
· *International Symposium on Research in Attacks, Intrusions and Defenses (RAID)* 2021-23
· *ACM Symposium on SDN Research (SOSR)* 2019 & 2022
· *International Conference on Traffic Monitoring and Analysis (TMA)* 2022-24

Reviewer

· *IEEE European Symposium on Security and Privacy (EuroS&P)* 2023
· *ACM Transactions on Internet Technology (TOIT)* 2021
· *IEEE/ACM Transactions on Networking (TON)* 2019-2021
· *International Federation for Information Processing (IFIP) Networking Conference* 2017

· *Passive and Active Measurement Conference (PAM)* 2022
· *ACM SIGCOMM Computer Communication Review (CCR)* 2023

Teaching

Introduction to Computer Science (Undergraduate level)
With Lin Wang
Period 1, 2022-23 · *Vrije Universiteit Amsterdam*, Amsterdam, NL

Network Security (Graduate level)
With Herbert Bos
Period 2, 2021-23 · *Vrije Universiteit Amsterdam*, Amsterdam, NL

Systems Seminar (Graduate level)
With Animesh K. Trivedi
Period 4, 23-24 · *Vrije Universiteit Amsterdam*, Amsterdam, NL

Advanced Network Programming (Undergraduate level)
With Animesh Trivedi
Period 2, 2023 · *Vrije Universiteit Amsterdam*, Amsterdam, NL

Data Networks (Graduate level)
With Anja Feldmann & Keon Jang
Summer Semester, 2020 · *Universität des Saarlandes*, Saarbrücken, DE

Data Networks (Graduate level)
With Anja Feldmann
Winter Semester, 2018-19 · *Universität des Saarlandes*, Saarbrücken, DE

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

Internet Measurements (Graduate level)
With Anja Feldmann
Summer Semester, 2017 · *Technische Universität Berlin*, Berlin, DE

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

Guest lecture on ***Hadoop***, **Distributed Systems (CPS 512.01)** [Graduate level]
Instructor: Bruce MacDowell Maggs
Spring Semester, 2014-15 · *Duke University*, Durham (NC), US