Aleksandar Kuzmanovic

Northwestern University
Computer Science
Seeley Mudd, Room 3519
2233 Tech Drive
Evanston, IL, 60208

akuzma@northwestern.edu
www.cs.northwestern.edu/~akuzma/
(847) 467-5519 (voice)
(847) 491-4455 (fax)

Research Interests

Computer networking with emphasis on design, measurements, analysis, denial-of-service resiliency, and prototype implementation of protocols and algorithms for the Internet, including IoT and blockchains.

Education

Ph.D., Electrical and Computer Engineering   August 2004
Rice University, Houston, TX
Thesis: *Edge-based Inference, Control, and Denial-of-Service Resilience for the Internet*
Thesis Adviser: Dr. Edward W. Knightly

M.S., Electrical Engineering   August 1999
University of Belgrade, Belgrade, Serbia
Thesis: *An Improved Flow Control Algorithm for the ITU-T T.125 Protocol*
Thesis Adviser: Dr. Grozdan Petrovic

B.S., Electrical Engineering   May 1996
University of Belgrade, Belgrade, Serbia

Honors and Awards

Best Paper Award, IEEE/WIC/ACM International Conference on Web Intelligence, 2014.

Associated Student Government (ASG) Faculty Honor Roll, Northwestern University, 2011-2012.

US Frontiers of Engineering (National Academy of Engineering), 2010, 2011.

Lisa Wissner-Slivka and Benjamin Slivka Chair in Computer Science, 2009 - 2012.

NSF CAREER Award, 2008.

Member of the Advisory Board of Narus Inc., 2008 - 2014.

Searle Junior Fellow, Searle Center for Teaching Excellence, Northwestern University, 2007.

Microsoft Research Trustworthy Computing Award, 2006.

ACM SIGCOMM 2003 paper *"Low-Rate TCP-Targeted Denial of Service Attacks (The Shrew vs. the Mice and Elephants),"* selected for forwarding to *IEEE/ACM Transactions on Networking* for fast-track publication, 2003.

Rice University Presidential Fellowship, 1999.

Professional Experience

Northwestern University, Evanston, IL   Jan. 2005-present
Full Professor, Department of Computer Science   Sept. 2018-present
Full Professor, Department of Electrical Engineering and Computer Science   Sept. 2017 - 2018
Associate Professor (tenured), Department of Electrical Engineering and Computer Science   Sept. 2010 - 2017
Assistant Professor, Department of Electrical Engineering and Computer Science   Sept. 2005-Sept. 2010
    Lisa Wissner-Slivka and Benjamin Slivka Chair in Computer Science   Sept. 2009-Sept. 2012
Assistant Professor, Department of Computer Science   Jan. 2005-Sept. 2005

bloXroute Labs Inc., Evanston, IL   June 2017-present
Co-founder

Nanjee Inc., Evanston, IL   Jan. 2011-present
Co-founder
Chief Scientist   Jan. 2011-2015

University of Electronic Science and Technology of China (UESTC), Chengdu, China   Jan. 2009-present
Visiting Professor, School of Computer Science and Engineering

Rice University, Houston, TX   September 1999-December 2004
Research Assistant for Edward Knightly, Department of ECE   December 1999-December 2004
Research in the area of computer networking and network security.

Teaching Assistant, Department of ECE   January 2000-May 2003
Teaching assistant and lecturer-on-call for various courses.

Stanford Linear Accelerator Center (SLAC), Stanford, CA   September 2003-October 2003
Visiting Researcher, SCS-Network Monitoring
Design, implementation, and evaluation of the *high-speed TCP - Low Priority* protocol.

Ericsson Research, Budapest, Hungary   May 2001-August 2001
Intern, Traffic Analysis and Network Performance Laboratory
Development of an active probing scheme for available bandwidth estimation on an Internet path.

Mihajlo Pupin Institute of Technology, Belgrade, Serbia   September 1997-September 1999
Research & Development Engineer, Telecommunications Department
Design and implementation of a High bit-rate Digital Subscriber Line (HDSL) modem.
Design and implementation of a medium size Private Branch Exchange (PBX) switch.

University of Belgrade, Belgrade, Serbia   October 1996-September 1999
Graduate Student, School of Electrical Engineering
Research in the area of reliable multicast.

Algotech, Belgrade, Serbia   June 1996-September 1997
System Engineer
Consulting, installation, and maintenance of digital switching systems.

Teaching

Created EECS 395/495, IoT Networks Seminar, Northwestern University, *Spring 2017, Spring 2018*
   A project-oriented class on wireless networking technologies that enable the Internet of Things.

Created EECS 444, Networking Problems in Cloud Computing, Northwestern University, *Spring 2010, Spring 2011, Spring 2014, Spring 2015, Spring 2016*
   A project-oriented class on networking problems in cloud computing.

Created EECS 395/495, Online Advertising: A Systems Approach, Northwestern University, *Spring 2013*
   A project-oriented class focused on online advertising.

Created EECS 110 (Python), Introduction to Computer Programming (Python), Northwestern University, *Spring 2009, Spring 2010, Spring 2011, Spring 2012, Spring 2013, Spring 2014, Spring 2015, Spring 2016, Spring 2017, Spring 2018*
   Introduction to computer programming for non-majors.

Created EECS 395/495, Measurement and Analysis of Online Social Networks, Northwestern University, *Spring 2009*
   A project-oriented class on measurement and analysis of online social networks.

Created EECS 395/495, Internet Architectures, Northwestern University, *Spring 2007, Spring 2008*
   A project-oriented class on the future Internet design.

Created EECS 440, Advanced Networking, Northwestern University, *Spring 2005, Spring 2006, Fall 2009, Fall 2013*
> A project-oriented advanced networking class.

EECS 340, Introduction to Networking, Northwestern University, *Winter 2005, Winter 2007, Winter 2009, Winter 2011, Winter 2013, Winter 2015, Winter 2016, Winter 2017, Winter 2018*
> A project-oriented (web application/TCP/routing) introduction to networking course.

EECS 213, Introduction to Computer Systems, Northwestern University, *Spring 2006, Spring 2008*
> A project-oriented introduction to computer systems course.

Graduate Students / Visitors / Advising

Ph.D. Students, Northwestern University
> Yash Patel, 2018 -
> Roshan Shyamsunder Anantharamakrishna, 2018 -
> Suman Maroju, 2016 - 2017
> Qurat-Ul-Ann Danyal Akbar, 2015 - 2017 (2017 -, Toronto, Canada)
> Uri Klarman, 2014 -
>> **Co-founder of bloXroute Labs Inc., 2017**
> Marc Anthony Warrior, 2014 -
> Marcel Flores, 2011 - 2016 (2016-, Verizon Digital Media Services)
>> **NU EECS Best Computer Science PhD Dissertation Award 2016**
>> **NU EECS Best Teaching Assistant Award 2013**
> Ning Xia, 2010 - 2015 (2015 -, NEC Labs America)
>> **Best Paper Award, IEEE/WIC/ACM WI 2014**
> Arindam Paul, 2012 - 2014 (2014 -, cntd. Ph.D. at NU Social Media Lab)
> Aaron Ballew (co-advised with C. C. Lee), 2008 - 2013 (2013 -, Level 3 Communications)
> Ionut Trestian, 2007 - 2012 (2012 -, Amazon)
> Ao-Jan Su, 2005 - 2011 (2011 -, TeleNav)
> Amit Mondal, 2005 - 2010, (2010 -, Google)
> Leiwen Deng, 2005 - 2010, (2010 - , Microsoft)

Visiting Ph.D. Students, Northwestern University
> Yihao Jia, from Tsinghua University, China, 2017 - 2018
> Pengfei Wang, from Northeastern University, China, 2016 - 2018
> Juan Bi, from UESTC, China, 2010 - 2012
> Chunjing Xiao, from UESTC, China, 2010 - 2011
> Zhen Qin, from UESTC, China, 2009 - 2011
> Zuo Lin, from UESTC, China, 2009 - 2010
> Yong Wang, from UESTC, China, 2008 - 2010
>> **Co-founder of Nanjee Inc., 2011**
> Gergely Biczok, from Ericsson Research, Fulbright Fellow, 2007-2008.

Visiting Professors, Northwestern University
> Sun Hanlin, from Beijing Post and Telecommunications University (BUPT), China, 2018 - 2019.
> Ruijin Wang, from UESTC, China, 2015 - 2016.
> Yidong Cui, from Beijing Post and Telecommunications University (BUPT), China, 2015 - 2016.
> Guanglu Sun, from Harbin University of Science and Technology, China, 2014 - 2015.
> Michael Luo, from UESTC, China, 2011 - 2012.
> Cristina Nita-Rotaru, from Purdue University, USA, 2009.
> Jin Yuehui, from Beijing Post and Telecommunications University (BUPT), China, 2009 - 2010.
> Gabriel Macia, from University of Granada, Spain, 2008.

Publications

Refereed Publications

1. Y. Jia and A. Kuzmanovic, "Perceiving Internet Anomalies via CDN Replica Shifts," in *Proceedings of IEEE INFOCOM '19*, Paris, France, April/May 2019. (10 pages, acceptance rate 19%, 288/1464)

2. U. Klarman, M. Flores, and A. Kuzmanovic, "Mining the Web with Webcoin," in *Proceedings of Conference on emerging Networking Experiments and Technologies (ACM CoNEXT '18)*, Heraklion, Crete, Greece, December 2018. (14 pages, acceptance rate 17%, 32/185)

3. P. Wang and A. Kuzmanovic, ""What's the Score?": A First Look at Sports Live Data Feed Services," in *Proceedings of the 21st IEEE Global Internet Symposium (co-located with INFOCOM '18)*, Honolulu, Hawai, April 2018.

4. M. Flores, A. Wenzel, K. Chen, and A. Kuzmanovic, "Fury Route: Leveraging CDNs to Remotely Measure Network Distance," in *Proceedings of the 19th International Conference on Passive and Active Measurement (PAM 18)*, Berlin, Germany, March 2018.

5. M. Warrior, U. Klarman, M. Flores, and A. Kuzmanovic, "Drongo: Speeding Up CDNs with Subnet Assimilation from the Client," in *Proceedings of Conference on emerging Networking Experiments and Technologies (ACM CoNEXT17)*, Seoul, South Korea,. December 2017. (14 pages, acceptance rate 18%, 40/222)

6. M. Flores, A. Wenzel, and A. Kuzmanovic, "Oak: User-Targeted Web Performance," in *Proceedings of IEEE ICDCS 2017*, Atlanta, Georgia,. June 2017.

7. M. Flores, A. Wenzel, and A. Kuzmanovic, "Enabling Router-Assisted Congestion Control on the Internet," in *Proceedings of IEEE ICNP 2016*, Singapore, November 2016.

8. C. Xiao, Z. Qin, X. Luo, and A. Kuzmanovic, "Understanding Factors That Affect Web Traffic via Twitter," in *Proceedings of the 17th International Conference on Web Information Systems Engineering, WISE 2016*, Shanghai, China, November 2016.

9. Q. Akbar, M. Flores, and A. Kuzmanovic, "DNS-sly: Avoiding Censorship through Network Complexity," in *Proceedings of the 6th USENIX Workshop on Free and Open Communications on the Internet, FOCI 2016*, Austin, Texas, August 2016. (7 pages, acceptance rate 35%, 7/20)

10. M. Flores, U. Klarman, and A. Kuzmanovic, "Wi-FM: Resolving Neighborhood Wireless Network Affairs by Listening to Music," in *Proceedings of IEEE ICNP 2015*, San Francisco, CA, 2015. (11 pages, acceptance rate 20%, 38/187)

11. N. Xia, S. Miskovic, M. Baldi, A. Kuzmanovic, and A. Nucci, "GeoEcho: Inferring User Interests from Geotag Reports in Network Traffic," in *Proceedings of IEEE/WIC/ACM International Conference on Web Intelligence*, Warsaw, Poland, 2014. **(Best Paper Award)**

12. A.-J. Su, Y. C. Hu, A. Kuzmanovic, and C.-K. Koh, "How to Improve Your Search Enging Ranking: Myths and Reality," *ACM Transactions on the Web*, March, 2014.

13. Z. Qin, C, Xiao, Q. Wang, Y. Jin, and A. Kuzmanovic, "A CDN-Based Domain Name System," *Computer Communications*, Volume 45, pages 11 – 20, June, 2014.

14. M. Flores and A. Kuzmanovic, "Synthoid: Endpoint User Profile Control," in *Proceedings of IEEE/WIC/ACM International Conference on Web Intelligence*, Warsaw, Poland, 2014.

15. N. Xia, H. Song, Y. Liao, M. Iliofotou, A. Nucci, Z. Zhang, and A. Kuzmanovic, "Mosaic: Quantifying Privacy Leakage in Mobile Networks," in *Proceedings of ACM SIGCOMM 2013*, Hong Kong, China, August 2013.

16. A. Ballew, C. C. Lee, and A. Kuzmanovic, "Rayleigh-normalized Gaussian Noise in Blind Signal Fusion," in *Proceedings of FUSION 2013*, Istanbul, Turkey, July 2013.

17. I. Trestian, C. Xiao, and A. Kuzmanovic, "A Glance at an Overlooked Part of the World Wide Web," in *Proceedings of the 1st International Web Observatory Workshop, WOW2013*, Rio De Janerio, Brazil, May 2013.

18. M. Flores and A. Kuzmanovic, "Searching for Spam: Detecting Fraudulent Accounts Via Web Search," in *Proceedings of the 14th International Conference on Passive and Active Measurement*, Hong Kong, China, March 2013.

19. C. Xiao, L. Su, J. Bi, Y. Xue, and A. Kuzmanovic, "Selective Behavior in Online Social Networks," in *Proceedings of IEEE/WIC/ACM International Conference on Web Intelligence*, Macau, China, December 2012. (8 pages, acceptance rate 20%)

20. A. Mondal, I. Trestian, Z. Qin, and A. Kuzmanovic, "P2P as a CDN: A New Service Model for File Sharing," *Journal of Computer Networks*, May, 2012.

21. A. Ballew, S. Srivastava, N. Valtchanov, C.C. Lee, and A. Kuzmanovic, "Characterization of Vision-aided Indoor Localization and Landmark Routing," in *Proceedings of The Sixth International Conference on Innovative Mobile and Internet Services in Ubiquitous Computing (IMIS-2012)*, Palermo, Italy, July 2012. (8 pages, acceptance rate 23%)

22. I. Trestian, K. Huguenin, L. Su, and A. Kuzmanovic, "Understanding Human Movement Semantics: A Point of Interest Based Approach," in *Proceedings of WWW 2012*, Lyon, France, April 2012.

23. I. Trestian, S. Ranjan, A. Kuzmanovic, and A. Nucci, "Taming the Mobile Data Deluge with Drop Zones," *IEEE/ACM Transactions on Networking*, September, 2011.

24. J. Scott Miller, A. Mondal, R. Potharaju, P. Dinda, and A. Kuzmanovic, "Understanding End-User Perception of Network Problems," in *Proceedings of ACM SIGCOMM Workshop on Measurements Up the STack (W-MUST)*, Toronto, CA, August 2011.

25. A. Ballew, A. Kuzmanovic, and C.C. Lee, "Fusion of Live Audio Recordings for Blind Noise Reduction," in *Proceedings of FUSION*, Chicago, IL, July 2011. (7 pages, acceptance rate NA)

26. Y. Wang, D. Burgener, A. Kuzmanovic, and G. Macia, "Understanding the Network and User-Targeting Properties of Web Advertising Networks," in *Proceedings of IEEE ICDCS*, Minneapolis, MN, June 2011. (12 pages, acceptance rate 15%, 15/99)

27. Z. Li, A. Goyal, Y. Chen, and A. Kuzmanovic, "Measurement and Diagnosis of Address-Misconfigured P2P Traffic," *IEEE Network Magazine*, Volume 25, Issue 3, March/April, 2011.

28. Y. Wang, D. Burgener, M. Flores, A. Kuzmanovic, and C. Huang, "Towards Street-Level Client Independent IP Geolocation," in *Proceedings of USENIX NSDI*, Boston, MA, March 2011. (14 pages, acceptance rate 17%, 27/157)

29. I. Trestian, S. Ranjan, A. Kuzmanovic, and A. Nucci, "Taming User-Generated Content in Mobile Networks via Drop Zones," in *Proceedings of IEEE INFOCOM*, Shanghai, China, April 2011. (9 pages, acceptance rate 16%, 291/1823)

30. A.-J. Su, Y. C. Hu, A. Kuzmanovic, and C.-k. Koh, "How to Improve Your Google Ranking: Myths and Reality," in *Proceedings of IEEE/WIC/ACM International Conference on Web Intelligence*, Toronto, Canada, 2010. (8 pages, acceptance rate 16%, 52/313)

31. C. Dovrolis, K. Gummadi, A. Kuzmanovic, and S. Meinrath, "Measurement Lab: Overview and an Invitation to the Research Community," in *ACM SIGCOMM Computer Communication Review*, Volume 40, Number 3, July 2010.

32. A. Mondal, R. Cutler, C. Huang, J. Li, and A. Kuzmanovic, "SureCall: Towards Glitch-Free Real-Time Audio/Video Conferencing," in *Proceedings of IEEE IWQoS*, Beijing, China, 2010. (9 pages, acceptance rate 24%, 33/133)

33. I. Trestian, S. Ranjan, A. Kuzmanovic, and A. Nucci, "Googling the Internet: Profiling Internet Endpoints via the World Wide Web," *IEEE/ACM Transactions on Networking*, 18(2): 666 – 679, April, 2010.

34. A. Mondal and A. Kuzmanovic, "Upgrading Mice to Elephants: Effects and End-Point Solutions," *IEEE/ACM Transactions on Networking*, 18(2): 367 – 378, April, 2010.

35. Y. Wang, D. Burgener, A. Kuzmanovic, and G. Macia, "Analyzing Content-Level Properties of the Web Adversphere," in *Proceedings of WWW 2010*, Raleigh, NC, April 2010.

36. G. Macia, Y. Wang, R. Rodriguez, and A. Kuzmanovic, "ISP-Enabled Behavioral Ad Targeting without Deep Packet Inspection," in *Proceedings of IEEE INFOCOM*, San Diego, CA, 2010. (9 pages, acceptance rate 17%, 276/1575)

37. Z. Li, A. Goyal, Y. Chen, and A. Kuzmanovic, "Measurement and Diagnosis of Address-Misconfigured P2P Traffic," in *Proceedings of IEEE INFOCOM*, San Diego, CA, 2010. (9 pages, acceptance rate 17%, 276/1575)

38. A.-J. Su, D. Choffnes, A. Kuzmanovic, and F. Bustamante, "Drafting Behind Akamai: Inferring Network Conditions Based on CDN Redirections," *IEEE/ACM Transactions on Networking*, February, 2009.

39. I. Trestian, S. Ranjan, A. Kuzmanovic, and A. Nucci, "Measuring Serendipity: Connecting People, Locations and Interests in a Mobile 3G Network," in *Proceedings of ACM SIGCOMM Internet Measurement Conference (IMC)*, Chicago, IL, 2009. (13 pages, acceptance rate 22%, 41/183)

40. A. Mondal, P. Sharma, S. Banerjee, and A. Kuzmanovic, "Supporting Application Network Flows with Multiple QoS Constraints," in *Proceedings of IEEE IWQoS 2009*, Charleston, South Carolina, July 2009. (10 pages, acceptance rate 35%, 28/80)

41. A. Kuzmanovic, A. Mondal, S. Floyd, and K.K. Ramakrishnan "Adding Explicit Congestion Notification (ECN) Capability to TCP's SYN-ACK Packets," RFC 5562, June 2009. (available at: http://www.ietf.org/rfc/rfc5562.txt)

42. A.-J. Su and A. Kuzmanovic, "Thinning Akamai," in *Proceedings of USENIX/ACM SIGCOMM Internet Measurement Conference (IMC)*, Vouliagmeni, Greece, October 2008. (12 pages, 17% acceptance rate, 32/185)

43. A. Mondal and A. Kuzmanovic, "Removing Exponential Backoff from TCP," in *ACM SIGCOMM Computer Communication Review*, Volume 38, Number 5, October 2008.

44. L. Deng and A. Kuzmanovic, "Monitoring Persistently Congested Internet Links," in *Proceedings of IEEE ICNP 2008*, Orlando, FL, October 2008. (10 pages, 16% acceptance rate, 33/202)

45. I. Trestian, S. Ranjan, A. Kuzmanovic, and A. Nucci, "Unconstrained Endpoint Profiling (Googling the Internet)," in *Proceedings of ACM SIGCOMM 2008*, Seattle, WA, August 2008. (12 pages, 12% acceptance rate, 36/288)

46. G. Biczok, W. Young, and A. Kuzmanovic, "Monitoring Network Bias," in *Proceedings of ACM SIGCOMM 2008*, Seattle, WA, August 2008.

47. A.-J. Su, D. Choffnes, F. Bustamante, and A. Kuzmanovic, "Relative Network Positioning via CDN Redirections," in *Proceedings of ICDCS 2008*, Beijing, China, June 2008. (10 pages, 16% acceptance rate, 102/638)

48. L. Deng, Y. Gao, Y. Chen, and A. Kuzmanovic, "Pollution Attacks and Defenses for Internet Caching Systems," in *Journal of Computer Networks*, 52(5): 935-956, April 2008.

49. A. Mondal and A. Kuzmanovic, "A Poisoning-Resilient TCP Stack," in *Proceedings of IEEE ICNP 2007*, Beijing, China, October 2007. (10 pages, 14% acceptance rate, 32/220)

50. A. Kuzmanovic and E. Knightly, "Receiver-Driven Congestion Control with a Misbehaving Receiver: Vulnerabilities and End-Point Solutions," in *Journal of Computer Networks*, 51(10): 2717-2737, July 2007.

51. L. Deng and A. Kuzmanovic, "Pong: Diagnosing Spatio-Temporal Internet Congestion Properties," in *Proceedings of ACM SIGMETRICS 2007*, San Diego, CA, June 2007. (2 pages, 28% acceptance rate, (29 papers + 19 posters)/170)

52. A. Mondal and A. Kuzmanovic, "When TCP Friendliness Becomes Harmful," in *Proceedings of IEEE INFOCOM 2007*, Anchorage, Alaska, May 2007. (9 pages, 18% acceptance rate, 252/1404)

53. Y. Gao, L. Deng, A. Kuzmanovic, and Y. Chen, "Internet Cache Pollution Attacks and Countermeasures," in *Proceedings of IEEE ICNP 2006*, Santa Barbara, CA, November 2006. (10 pages, 14% acceptance rate, 33/232)

54. A.-J. Su, D. Choffnes, A. Kuzmanovic, and F. Bustamante, "Drafting Behind Akamai (Travelocity-Based Detouring)," in *Proceedings of ACM SIGCOMM 2006*, Pisa, Italy, September 2006. (12 pages, 10% acceptance rate, 37/340)

55. A. Kuzmanovic and E. Knightly, "TCP-LP: Low Priority Service via End-Point Congestion Control," in *IEEE/ACM Transactions on Networking, 14(4): 739 – 752, August 2006.*

56. A. Kuzmanovic and E. Knightly, "Low-Rate TCP-Targeted Denial of Service Attacks and Counter Strategies," in *IEEE/ACM Transactions on Networking, 14(4): 683 – 696, August 2006.*

57. A. Kuzmanovic, "The Power of Explicit Congestion Notification," in *Proceedings of ACM SIGCOMM 2005*, Philadelphia, PA, August 2005. (12 pages, 10% acceptance rate, 27/255)

58. D. Dumitriu, E. Knightly, A. Kuzmanovic, I. Stoica, and W. Zwaenepoel, "Denial-of-Service Resilience in Peer-to-Peer File Sharing Systems," in *Proceedings of ACM SIGMETRICS 2005*, Banff, Alberta, Canada, June 2005. (12 pages, 13% acceptance rate, 31/237)

59. A. Kuzmanovic and E. Knightly, "A Performance vs. Trust Perspective in the Design of End-Point Congestion Control Protocols," in *Proceedings of IEEE ICNP 2004*, Berlin, Germany, October 2004. (12 pages, 15% acceptance rate, 33/213)

60. A. Kuzmanovic, E. Knightly, and R. Les Cottrell, "HSTCP-LP: A Protocol for Low-Priority Bulk Data Transfer in High-Speed High-RTT Networks," in *Proceedings of PFLDnet 2004*, Argonne, IL, February 2004.

61. A. Kuzmanovic and E. Knightly, "Low-Rate TCP-Targeted Denial of Service Attacks (the Shrew vs. the Mice and Elephants)," in *Proceedings of ACM SIGCOMM 2003*, Karlsruhe, Germany, August 2003. (12 pages, 10% acceptance rate, 33/319)

62. A. Kuzmanovic and E. Knightly, "Measurement-Based Characterization and Classification of QoS-Enhanced Systems," in *IEEE Transactions on Parallel and Distributed Systems, 14(4), April 2003.*

63. A. Kuzmanovic and E. Knightly, "TCP-LP: A Distributed Algorithm for Low Priority Data Transfer," in *Proceedings of IEEE INFOCOM 2003*, San Francisco, CA, April 2003. (11 pages, 20% acceptance rate, 224/1078)

64. A. Kuzmanovic and E. Knightly, "Measuring Service in Multi-Class Networks," in *Proceedings of IEEE INFOCOM 2001*, Anchorage, Alaska, April 2001. (9 pages, 23% acceptance rate, 192/830)

Un-refereed Publications (not duplicating the above)

65. Y. Wang, H. Wu, W. Zhang, Y. Li, and A. Kuzmanovic, "Towards Application-Level Multi-Homing," *Tech. Report NWU-EECS-15-04, Department of EECS, Northwestern University*, November 2015.
http://networks.cs.northwestern.edu/publications/skynetTR.pdf

66. A.-J. Su and A. Kuzmanovic, "Measuring Web Servers' Popularity from an Endpoint," *Tech. Report NWU-EECS-15-03, Department of EECS, Northwestern University*, October 2015.
http://networks.cs.northwestern.edu/publications/ewmTR.pdf

67. L. Deng and A. Kuzmanovic, "A Feeder-Carrier-Based Internet User Accountability Service," *Tech. Report NWU-EECS- 09-12, Department of EECS, Northwestern University*, May 2009.
http://networks.cs.northwestern.edu/susinet/TR-09-12.pdf

68. L. Deng and A. Kuzmanovic, "Towards Tussle-based Rules in Cyberspace," *Tech. Report NWU-EECS-09-11, Department of EECS, Northwestern University*, April 2009.
http://networks.cs.northwestern.edu/susinet/TR-09-11.pdf

69. L. Deng, A. Kuzmanovic, and B. Davie, "What Lies Beneath: Understanding Internet Congestion," *Tech. Report NWU-EECS-07-12, Department of EECS, Northwestern University*, October 2007.
http://networks.cs.northwestern.edu/publications/TR-07-12.pdf

70. D. Choffnes, J. Lange, S. Rossoff, and A. Kuzmanovic, "On the Use of Parallel Connections in Web Browsers," *Tech. Report NWU-EECS- 06-15, Department of EECS, Northwestern University*, October 2006.
http://networks.cs.northwestern.edu/publications/TR-EECS-06-15.pdf

Patents

71. Y. Wang, D. Burgener, M. Flores, and A. Kuzmanovic, "Geographic Location System and Method," US 9,515,889, December 2016.

72. A. Ballew, A. Kuzmanovic, S. Srivastava, C. C. Lee, and N. Valtchanov, "Indoor Localazation with Wayfinding Techniques," US 8,731,817, December 2015.

73. Y. Wang, D. Burgener, M. Flores, and A. Kuzmanovic, "Geographic Location System and Method," CN 201180034504.X, May 2014.

74. H. Song, Y. Liao, M. Iliofotou, N. Xia, Z.-L. Zhang, A. Kuzmanovic, and A. Nucci, "Quantifying Privacy Leakage in Mobile Networks," US 08862726, April 2014.

75. Y. Wang, D. Burgener, M. Flores, and A. Kuzmanovic, "Geographic Location System and Method," EPO 2569871, March 2013.

76. A. Nucci, S. Ranjan, and A. Kuzmanovic, "System and Method for Internet Endpoint Profiling," US 08392421, March 2013.

77. A. Nucci, S. Ranjan, A. Kuzmanovic, and I. Trestian, "Allocating Drop Zones in a Mobile Communication Network," US 08270986, September 2012.

78. S. Ranjan, A. Nucci, A. Kuzmanovic, and I. Trestian, "Correlating User Interests and Location in a Mobile Network," US 08229470, July 2012.

79. C. Huang, M. Jain, J. Lin, A. Mondal, and A. Kuzmanovic, "Data Communication with Compensation for Packet Loss," US 20110134909, June 2011.

Non-Provisional Patent Applications

80. U. Klarman and A. Kuzmanovic, "Blockchain Distribution Network," September 2018.

81. U. Klarman and A. Kuzmanovic, "System and Method for Reducing Information Volume in a Blockchain Distribution Network," September 2018.

82. U. Klarman and A. Kuzmanovic, "Preventing Service Discrimination in a Blockchain Distribution Network," September 2018.

83. U. Klarman and A. Kuzmanovic, "Blockchain Distribution Network with Service Transparency," September 2018.

84. U. Klarman and A. Kuzmanovic, "Peer Auditing in a Blockchain Distribution Network," September 2018.

85. U. Klarman and A. Kuzmanovic, "On-Chain Fees in a Blockchain Distribution Network," September 2018.

86. U. Klarman and A. Kuzmanovic, "Back-Up Sentinel Network for a Blockchain Distribution Network," September 2018.

87. M. Flores, U. Klarman, and A. Kuzmanovic, "System and Method for Resolving Neighborhood Wireless Network Affairs with Radio Signals," May 2016.

Industrial Impact

Geo Echo (WI '14)
    The GeoEcho system has been deployed by Narus Inc. (now Symantec).

Mosaic (SIGCOMM '13)
    The Mosaic system has been deployed by Narus Inc. (now Symantec).

Measuring Serendipity (IMC '09)
    A user classification scheme has been deployed by Narus, Inc. (now Symantec).

Thinning Akamai (IMC '08)
    This work led to an upgrade of Akamais naming policy.

Googling the Internet (SIGCOMM '08, ToN '10)
    A traffic classification scheme has been deployed within the Narus Semantic Traffic Analyzer by Narus, Inc. (now Symantec).

Drafting behind Akamai and Relative Network Positioning (SIGCOMM '06 and ICDCS '08)
> This work led to the popular ONO BitTorrent plugin, developed and disseminated by our collaborators Fabian Bustamante and David Choffnes.

The Power of Explicit Congestion Notification (SIGCOMM '05, IETF '09)
> ECN extension led to the Internet RFC 562 with Sally Floyd and K.K. Ramakrishnan in 2009.

TCP-LP (INFOCOM '03, ToN '06)
> TCP Low Priority (TCP-LP) has become a part of the Linux operating system and is being distributed for Linux kernel 2.6.14 and above, September, 2006.

Entrepreneurship and Licensing

Blockchain Distribution Network
> This work led to bloXroute Labs, Inc., co-founded in June 2017 by (then PhD student) Uri Klarman and prof. Aleksandar Kuzmanovic.

Wi-FM (ICNP '15)
> The Wi-FM system has been licenced for experimental evaluation.

Street-level IP Geolocation (NSDI '11)
> This work led to Nanjee, Inc., co-founded in 2011 by (then PhD student) Yong Wang and prof. Kuzmanovic, who served as a Chief Scientist 2011 – 2015.

Software Distribution

Kick-Ass, deployable router-assisted congestion control, downloadable from:
`http://networks.cs.northwestern.edu/projects.html`
`http://users.eecs.northwestern.edu/˜mef294/projects/kickass/index.html`
> A deployable router-assisted congestion control for routers and endpoints, January, 2015.

Messup, a privacy-preserving mobile system, downloadable from:
`http://networks.cs.northwestern.edu/messup/`
> A system that protects user identity leakage in mobile traffic, December, 2014.

Pong, a congestion monitoring system, downloadable from:
`http://networks.cs.northwestern.edu/pong/`
> A tool for locating congestion points and tracing congestion status in the Internet, May, 2008.

AE, an anti-pollution engine system, downloadable from:
`http://networks.cs.northwestern.edu/AE/`
> The Anti-pollution Engine (AE) system is an extension for the Squid Web cache to counter cache-target DoS attacks, May, 2007.

TCP Low Priority, downloadable from:
`http://cs.northwestern.edu/˜akuzma/rice/TCP-LP/`
> TCP Low Priority (TCP-LP) has become a part of the Linux operating system and is being distributed for Linux kernel 2.6.14 and above, September, 2006.

Talks

Invited

Princeton University, "Scaling Blockchains. Today." Princeton, NJ, October 2018.

STATS LLC, (*invited, host: Dr. Patrick Lucey*), "Whats the Score?: A First Look at Live Data Feed Services," Chicago, IL, June 2017.

Mihajlo Pupin Institute of Technology, (*invited, host: Dr. Vladimir Krstic*), "(The Lack of) Privacy and a Strive for Faster Wireless Networks," Belgrade, Serbia, August 2016.

Cisco, (*invited, host: Dr. Antonio Nucci*), "Implicit Device Communication for a Faster Internet," Forward-looking Architectures, Services and Technologies (FAST) Seminar Series, San Jose, CA, November 2015.

Dartmouth College, (*invited, host: Prof. Xia Zhou*), "Mosaic: Quantifying Privacy Leakage in Mobile Networks," Hanover, NH, October 2013.

University of California, Irvine (*invited, host: Prof. Gene Tsudik*), "Skynet: A Cloud-Hopping Data Transfer Architecture," Irvine, CA, December 2011.

CCW 2011 (*invited, hosts: Prof. Ibrahim Matta and Lixin Gao*), "Skynet: A Cloud-Hopping Data Transfer Architecture," Hyannis, Cape Cod, MA, October 2011.

Columbia University (*invited, host: Prof. Dan Rubenstein*), "Towards Street-Level Client-Independent IP Geolocation," New York, NY, September 2010.

Indiana University (*invited, host: Prof. Minaxi Gupta*), "User-Driven Indoor Visibility Localization with Wayfinding," Bloomington, IN, March 2010.

University of Toronto (*invited, host: Prof. Jorg Liebeherr*), "ISP-Enabled Behavioral Ad Targeting without User Consent (and Beyond)," Toronto, Canada, September 2009.

Telefonica Research (*invited, host: Dr. Pablo Rodriguez*), "ISP-Enabled Behavioral Ad Targeting without User Consent (and Beyond)," Barcelona, Spain, August 2009.

Microsoft Research (*invited, host: Dr. Jin Li*), "ISP-Enabled Behavioral Ad Targeting without User Consent (and Beyond)," Redmond, WA, June 2009.

University of Massachusetts Amherst (*invited, host: Prof. Lixin Gao*), "Googling the Internet (and Beyond)," Amherst, MA, February 2009.

Boston University (*invited, host: Prof. Ibrahim Matta*), "Googling the Internet (and Beyond)," Boston, MA, February 2009.

Google Inc. (*invited, host: Brian Fitzpatrick*), "Googling the Internet (and Beyond)," Chicago, IL, November 2008.

MIT (*invited, host: Prof. Dina Katabi*), "Googling the Internet (and Beyond)," Cambridge, MA, October 2008.

CCW 2008 (*invited, host: Prof. Christos Papadopoulos*), The IEEE 22st Annual Computer Communications Workshop, "Google-based Traffic Classification," Steamboat Springs, CO, October 2008.

Purdue University (*invited, host: Prof. Y. Charlie Hu*), "Googling the Internet (and Beyond)," West Lafayette, IN, September 2008.

Motorola Inc. (*invited, host: Dr. Ivan Vukovic*), "From TCP to Net Neutrality and Back," Arlington Heights, IL, November 2007.

University of Electronic Science & Technology of China (UESTC), (*invited, host: Prof. Qin Zhinguang, Dean*), "Northwestern Networks Group Research," Chengdu, China, October 2007.

Washington University (*invited, host: Prof. Sergey Gorinsky*), "From TCP to Net Neutrality and Back," St. Louis, MO, September 2007.

HP Labs (*invited, host: Dr. Sujata Banerjee*), "From TCP to Net Neutrality and Back," Palo Alto, CA, August 2007.

Rice University (*invited, host: Prof. Edward W. Knightly*), "Diagnosing Spatio-Temporal Internet Congestion Properties," Houston, TX, May 2007.

University of Granada (*invited, host: Prof. Gabriel Macia*), "Towards Robust Protocol Design: Four Ways to Kill TCP without Much Trouble," Granada, Spain, April 2007.

CCW 2007 (*invited, host: Prof. Taieb Znati*), The IEEE 21st Annual Computer Communications Workshop, "Diagnosing Spatio-Temporal Internet Congestion Properties," Pittsburgh, PA, February 2007.

Georgia Tech (*invited, host: Prof. Constantine Dovrolis*), "Drafting Behind Akamai (Travelocity-Based Detouring)," Atlanta, Georgia, May 2006.

DePaul University (*invited, host: Prof. Ehab Al-Shaer*), "The Power of Explicit Congestion Notification (and More)," Chicago, IL, November 2005.

EPFL (*invited, host: Prof. Edward W. Knightly*), "Low-Rate TCP-Targeted Denial of Service Attacks," Lausanne, Switzerland, August 2003.

SLAC labs (*invited, host: Dr. R. Les Cottrell*), "TCP-LP: A Distributed Protocol for Low-Priority Data Transfer," Palo Alto, CA, April 2003.

Conferences / Seminars

Illinois Ignite 2018, "bloXroute: Scaling Blockchains by 1000X and Beyond," Rosemont, IL, September 2018.

Innovation and New Venture (INVO) Advisory Board Meeting, "bloXroute: Scaling Blockchains by 1000X and Beyond," Evanston, IL, May 2018.

McCormick School of Engineering, Northwestern IBM Summit, "From Clouds to IoT and Back," Northwestern University, Evanston, IL, April 2017.

McCormick School of Engineering, Murphy Fellows Seminar Series, "(The Lack of) Privacy and a Strive for Faster Wireless Networks," Northwestern University, Evanston, IL, April 2017.

EECS Meet the Faculty Seminar Series, "Mosaic: Quantifying Privacy Leakage in Mobile Networks," Northwestern University, Evanston, IL, February 2014.

WI 2011, "Understanding Crowds' Migration on the Web," Lyon, France, August 2011.

NSDI 2011, "Towards Street-Level Client-Independent IP Geolocation," Boston, MA, April 2011.

CUCIS (Center for Ultrascale Computing and Information Security), "User-Driven Indoor Visibility Localization with Wayfinding," Northwestern University, Evanston, IL, April 2010.

NICO (Northwestern Institute on Complex Systems), "The Genesis of Location-Aware Mobile Social Networking," Northwestern University, Evanston, IL, March 2009.

Rutgers University, "What Lies Beneath: Understanding Internet Congestion," DIMACS/DyDAn Workshop on Internet Tomography, Piscataway, NJ, May 2008.

EECS Meet the Faculty Seminar Series, "Stories from the Networks Group," Northwestern University, Evanston, IL, June 2007.

Searle Fellows Program, "Benefiting from Learners' Diversity," (*a joint presentation with Adilson Motter, Dept. of Physics and Astronomy*), Northwestern University, Evanston, IL, May 2007.

Motorola Security Workshop, "Countering Large-Scale Internet Pollution and Poisoning," Northwestern University, Evanston, October 2006.

SIGCOMM 2005, "The Power of Explicit Congestion Notification," Philadelphia, PA, August 2005.

ICNP 2004, "A Performance vs. Trust Perspective in the Design of End-Point Congestion Control Protocols," Berlin, Germany, October 2004.

PFLDnet 2004, "HSTCP-LP: A Protocol for Low-Priority Bulk Data Transfer in High-Speed High-RTT Networks," Argonne, IL, February 2004.

SIGCOMM 2003, "Low-Rate TCP-Targeted Denial of Service Attacks (The Shrew vs. the Mice and Elephants)," Karlsruhe, Germany, September 2003.

INFOCOM 2003, "TCP-LP: A Distributed Protocol for Low-Priority Data Transfer," San Francisco, CA, April 2003.

INFOCOM 2001, "Measuring Service in Multi-Class Networks," Anchorage, Alaska, April 2001.

Grants

PI, "Incentivizing Internet-Scale Web Mining with Webcoin," NSF NeTS Program, Award CNS-1810582, 2018-2021,
$500K.

PI, Measuring Sports Data Feed Services, 2017,
$25K.

PI (with Alan Mislove (Northeastern University)), Leveraging Personalized Internet Services to Combat Online Trolling, NSF NeTS Program, Award CNS-1615837, 2016-2019,
$500K.

PI, "Mashup Content Harvesting for an Open Internet," NSF NeTS Program, Award CNS-1526052, 2015-2018,
$467K.

PI, "GeoEcho: Inferring User Interests from Geotag Reports in Network Traffic," Narus Research Fellows Program, Narus Inc., 2013,
$35K.

PI, "Endpoint User Profile Control," NSF NeTS Program, Award CNS-1319086, 2013-2016,
$478K.

PI, "Mosaic: Quantifying Privacy Leakage in Mobile Networks," Narus Research Fellows Program, Narus Inc., 2012,
$35K.

Co-PI (with Jian Cao and Kornel Ehmann (Northwestern U.)), "Cloud-Computing and High-Speed Internet Enabled Manufacturing," NSF EAGER Program, Award 1148709, 2011-2012,
$100K.

Co-PI (with G. Trajcevski, L. Henschen, Y. Chen, P. Dinda, and P. Scheuermann (Northwestern U.)), "Collaborative Integration of Heterogeneous Sensing, Actuation and Computing Devices (CIHSAC)," Walter P. Murphy Society Grant, Northwestern University, 2011-2014,
$65K.

PI, "Persona: Understanding Mobile User Behavior," Narus Research Fellows Program, Narus Inc., 2011,
$30K.

PI (with Y. Charlie Hu (Purdue U.) and Doug Downey (Northwestern U.)), "Auditing Internet Content for Credibility, Fairness, and Privacy," NSF NetSE Program, Award CNS-1064595, 2011-2016,
$826K.

PI, "Taming User-Generated Content in Mobile Networks via Drop Zones," Narus Research Fellows Program, Narus Inc., 2010,
$25K.

PI, "Serendipitous Location-Based Mobile Services," Narus Research Fellows Program, Narus Inc., 2009,
$25K.

PI, "Internet Audit: A Theory, Toolset, and Applications for a World without Net Neutrality," NSF CAREER Program, Award CNS-0746360, 2008-2013,
$450K.

PI, "Googling the Internet," Narus Research Fellows Program, Narus Inc., 2008,
$25K.

PI, "Diagnosing Spatio-Temporal Internet Congestion Properties," Cisco Collaborative Research Initiative, Cisco Sponsor: Bruce Davie, 2007-2008,
$94K.

PI (with Y. Chen (Northwestern U.)), "Pollution Resilience for Internet Caches," NSF Cyber Trust Program, Award CNS-0627715, 2006-2009,
$350K.

Co-PI (with Y. Chen, F. Bustamante, and P. Dinda (Northwestern U.)), "Integrated Modular Trustworthy Computing Curriculum Development Proposal," Microsoft Research Trustworthy Computing Award, 2006-2007,
$50K.

Co-PI (with F. Bustamante, P. Dinda, B. Dennis, and Y. Chen (Northwestern U.)), "A Virtual Lab for Experimental Systems in Education," Walter P. Murphy Society Grant, Northwestern University, 2005-2006,
$37K.

Collaborators

Northwestern University

Fabian Bustamante (EECS)
Jian Cao (ME)
Yan Chen (EECS)
Alok Choudhary (EECS)
Peter Dinda (EECS)
Doug Downey (EECS)
Kornel Ehmann (ME)
C. C. Lee (EECS)
Goce Trajcevski (EECS)

Worldwide

Mario Baldi (Cisco)
Sujata Banarjee (HP Labs)
R. Les Cottrell (SLAC)
Bruce Davie (VMware)
Constantine Dovrolis (Georgia Tech)
Sally Floyd (ICSI Center for Internet Research)
Krishna Gummadi (MPI-SWS)
Y. Charlie Hu (Purdue University)
Cheng Huang (Microsoft Research)

Marios Iliofotou (Splunk)
Manish Jain (Akamai)
Jin Lin (Microsoft Research)
Yong Liao (Symantec)
Gabriel Macia (University of Granada, Spain)
Stanislav Miskovic (Symantec)
Alan Mislove (Northeastern University)
Antonio Nucci (Cisco)
K.K. Ramakrishnan (UC Riverside)
Supranamaya Ranjan (Yelp)
Puneet Sharma (HP Labs)
Han Song (Cisco)
Ion Stoica (UC Berkeley)
Matteo Varvello (AT&T Research)
Zhi-Li Zhang (University of Minnesota)
Willy Zwaenepoel (EPFL)

Professional Service

Chair

Program Area Chair, IEEE ICNP 2018.

Poster Co-Chair, ACM SIGCOMM 2018.

Program Area Chair, IEEE ICNP 2017.

Program Chair, PAM 2014.

Program Vice-Chair for Web-Based Systems and Applications, ICDCS 2013.

Posters Co-Chair, IEEE ICNP 2012.

Semantic Processing session chair, 2011 U.S. Frontiers of Engineering (National Academy of Engineering).

Data centers and cloud computing session organizer and chair, the IEEE 25th Annual Computer Communications Workshop, CCW 2011.

Workshops Chair, ACM CoNEXT Conference 2010.

Local arrangements co-chair, Internet Measurement Conference 2009.

Track Co-Chair, Track on Internet Services, Systems and Applications (ISSA), IEEE ICCCN 2009.

Publications co-chair, IEEE INFOCOM 2008.

Finance Chair, IEEE IWQoS 2007.

Workshops Co-chair, IEEE INFOCOM 2007.

INFOCOM TPC meeting co-organizer, Evanston, IL, November 2006.

Steering committees

Passive and Active Measurement Conference, `http://pamconf.info`

Measurement Lab, `www.measurementlab.net`

Editorial boards

Associate Editor, IEEE/ACM Transactions on Networking

Program committees

Program Committee member, WWW 2018.

Program Committee member, IEEE INFOCOM 2018.

Program Committee member, ICCCN 2017 CAAME track.

Program Committee member, IEEE INFOCOM 2017.

Program Committee member, CoNEXT 2016.

Program Committee member, PAM 2016.

Program Committee member, IEEE INFOCOM 2016.

Program Committee member, IEEE ICNP 2015.

Program Committee member, IEEE INFOCOM 2015.

Program Committee member, IEEE ICNP 2014.

Program Committee member, IEEE INFOCOM 2014.

Program Committee member, IEEE INFOCOM 2013.

Program Committee member, IEEE ICNP 2012.

Program Committee member, IEEE ICDCS 2012.

Program Committee member, IEEE INFOCOM 2012.

Program Committee member, IEEE ICNP 2011.

Program Committee member, IEEE ICDCS 2011.

Program Committee member, PAM 2011.

Program Committee member, IEEE INFOCOM 2011.

Program Committee member, IEEE ICNP 2010.

Program Committee member, IEEE INFOCOM 2010.

Program Committee member, PFLDNet 2009.

Program Committee member, IEEE ICNP 2009.

Program Committee member, IEEE INFOCOM 2009.

Program Committee member, Secure Network Protocols (NPSec) 2008.

Program Committee member, IEEE ICNP 2008.

Program Committee member, IEEE Broadnets 2008.

Program Committee member, Future Internet Architectures and Protocols Symposium 2008.

Program Committee member, IEEE INFOCOM 2008.

Student Workshop Program Committee member, ACM CoNEXT 2007.

Program Committee member, Secure Network Protocols (NPSec) 2007.

Poster Program Committee member, ACM SIGCOMM 2007.

Program Committee member, Hot Topics in Autonomic Computing (HotAC) 2007.

Program Committee member, IEEE IWQoS 2007.

Program Committee member, IEEE INFOCOM 2007.

Program Committee member, IEEE INFOCOM 2006.

Panels

NSF CISE Panelist and Reviewer 2018.

Garage at Northwestern, "How to Build a Blockchain Startup," (with Sarit Markovich (Kellogg), Mohamad Fouda (zk Capital), and Spencer Huang (Northwestern Blockchain Club)), Evanston, IL, October 2018.

NSF CISE Panelist and Reviewer 2018.

Expert Evaluator, Assistant Professor in Communication Systems,
KTH Royal Institute of Technology, Stockholm, Sweden, 2017.

NSF CISE Panelist and Reviewer 2017.

NSF CISE Panelist and Reviewer 2016.

NSF CISE Panelist and Reviewer 2015.

NSF CISE Panelist and Reviewer 2014.

NSF CISE Panelist and Reviewer 2010.

NSF CISE Panelist and Reviewer 2008.

NSF CISE Panelist and Reviewer 2005.

Refereeing

ACM SIGCOMM

USENIX NSDI

ACM SIGMETRICS

ACM MOBICOM

IEEE/ACM Transactions on Networking

ACM Transactions on Computer Systems

Computer Communication Review

ACM Transactions on Information and System Security

Journal of Communications and Networks

Journal of Computer Networks

IEEE Transactions on Signal Processing

Private

US citizen.