

Srinivasan Keshav

Robert Sansom Professor of Computer Science, University of Cambridge

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SUMMARY

I started my career as a researcher in computer networking in 1988, working on topics such as congestion control, packet scheduling, wireless networking, disconnection tolerant networking, and system architecture. Around 2010, I realized that the most important problems facing humanity aren't about building faster networks, they are about sustainability, especially in the face of climate change. Since then, I've worked on reducing carbon footprints in energy generation, transportation, and buildings. For the past five years, my focus has been on using satellite data and machine learning to understand and protect Earth's ecosystems. My overall vision is to **use computational thinking and computing systems to solve problems that matter.**

EDUCATION

Ph.D., Computer Science , University of California at Berkeley. Awarded the Sakrison Prize for the best dissertation in EECS	<i>August 1991</i>
B.Tech., Computer Science , Indian Institute of Technology, Delhi. Awarded the Director's Gold Medal	<i>May 1986</i>

EMPLOYMENT

University of Cambridge — Robert Sansom Professor; Fellow of Fitzwilliam College	<i>October 2019 –</i>
University of Waterloo — Associate Professor, Professor	<i>July 2003 – September 2019</i>
Cornell University — Associate Professor	<i>August 1996 – June 1999</i>
AT&T Bell Laboratories — Member of Technical Staff	<i>August 1991 – August 1996</i>

Visiting positions

Turing Institute for Data Science , London — Visiting Researcher	<i>June – August 2017</i>
Technicolor Research , Paris — Visiting Researcher	<i>June – August 2010</i>
Intel Research , Cambridge — Visiting Researcher	<i>June – July 2006</i>
Columbia University — Visiting Faculty	<i>September – December 1995</i>
Indian Institute of Technology, Delhi — Visiting Faculty	<i>January – May 1993</i>

Companies co-founded

GreenTag Corp. — Co-founder and Director	<i>November 2023 –</i>
Bee Networkx Corp. — Co-founder and Director	<i>June 2007 –</i>
GreenBorder Technologies Inc. — Co-founder	<i>October 2000 – March 2007</i>
Ensim Corp. — Co-founder, CTO, General Manager, and Director	<i>June 1998 – July 2003</i>

AWARDS AND HONORS

- Fellow of the Royal Society, elected 2026
- ACM SIGENERGY Achievement Award, 2025 — *for pioneering contributions to energy systems and informatics, including seminal research, capacity building, and helping to create SIGENERGY and the eEnergy conference*
- Co-recipient of a Test-of-Time award from ACM SIGENERGY in 2024
- Founding Vice Chair, ACM SIGENERGY, 2021
- Fellow of the Royal Society of Canada, elected 2019
- Distinguished Alumni, Indian Institute of Technology, Delhi, 2019
- Fellow of the Institute of Electrical and Electronics Engineers, elected 2019
- Elected Chair of ACM SIGCOMM, the premier professional organization for computer networking researchers, 2013-2017
- Fellow of the Association for Computing Machinery, elected 2012
- Cisco Systems Research Chair in Smart Grid, 2012-2017
- Tier II Canada Research Chair in Tetherless Computing, 2004-2014 — *1000 such chairs were awarded across all disciplines in Canada*
- Fiona Ip Li '78 and Donald Li '75 Excellence in Teaching Award, Cornell University, 1998
- Alfred P. Sloan Fellow in Computer Science, 1997-1999 — *a total of 112 fellowships are awarded annually in seven fields*
- ACM SIGCOMM selected two of my papers as among the “...most important papers that have appeared in *Computer Communication Review* over the past 25 years,” January 1995. These papers also received Test-of-Time awards in 2006.
- Best Paper Awards at ACM SIGCOMM 1991, ACM MOBICOM 2009, ACM SIGCOMM Green Networking Workshop, 2010, IEEE SmartGridComm 2012, ACM eEnergy 2013, and BuildSys 2013
- Recipient of the Sakrison Prize, awarded annually for a “truly outstanding piece of research,” EECS department, UC Berkeley, 1992
- Director’s Gold Medal for best all-round performance in the graduating class, Indian Institute of Technology, Delhi, May 1986
- National Talent Scholarship, Government of India, 1980-86 — *awarded annually to 100 students selected from over ~100,000 applicants*

SELECTED PUBLICATIONS

Computer networking

1. S. Keshav, *An Engineering Approach to Computer Networking*, Addison-Wesley, 1997.
2. S. Keshav, *Mathematical Foundations of Computer Networking*, Addison-Wesley, 2012. Chinese translation, Tsinghua Press, 2015.
3. A. Demers, S. Keshav, and S. Shenker, “Analysis and Simulation of a Fair Queueing Algorithm,” *Journal of Internetworking Research and Experience*, 1(1):3-26, September 1990. An earlier version appeared in *Proc. ACM SIGCOMM '89*.
4. S. Keshav, “A Control-theoretic Approach to Flow Control,” *Proc. ACM SIGCOMM '91*, September 1991. **Best Student Paper Award.** Republished in the same 25th Anniversary Special Issue.
5. R. Ahuja, S. Keshav, and H. Saran, “Design, Implementation, and Performance of a Native-Mode ATM Transport Protocol,” *Proc. INFOCOM '96*, March 1996. **One of the top ten of approximately 500 papers submitted.**
6. C.R. Kalmanek, S. Keshav, W.T. Marshall, S.P. Morgan, and R.C. Restrick, “Xunet 2: Lessons from an Early Wide Area ATM Testbed,” *IEEE/ACM Transactions on Networking*, 5(1):40-55, April 1997.
7. C. Gorenflo, L. Golab, and S. Keshav, “FastFabric: Scaling Hyperledger Fabric to 20,000 Transactions per Second,” *International Journal of Network Management*, 2020.

Wireless and opportunistic communication systems

8. A. Seth, D. Kroeker, M. Zaharia, S. Guo, and S. Keshav, "Low-cost Communication for Rural Internet Kiosks Using Mechanical Backhaul," *Proc. ACM MOBICOM*, September 2006.
9. D. Hadaller, S. Keshav, T. Brecht, and S. Agarwal, "Vehicular Opportunistic Communication Under the Microscope," *Proc. ACM Mobisys*, June 2007.
10. V. Shrivastava, N. Ahmed, S. Rayanchu, S. Banerjee, S. Keshav, K. Papagiannaki, and A. Mishra, "CENTAUR: Realizing the Full Potential of Centralized WLANs using a Hybrid Data Path," *Proc. ACM MobiCom*, September 2009. **Best Paper Award.**
11. J. Wang, O. Abari, and S. Keshav, "Challenge: RFID Hacking for Fun and Profit," *Proc. ACM MOBICOM*, October 2018. An extended version appeared in *GetMobile: Mobile Computing and Communications*, **23**(1):21-23, July 2019.

Energy informatics

12. S. Keshav and C. Rosenberg, "How Internet Concepts and Technologies Can Help Green and Smarten the Electrical Grid," *Proc. ACM SIGCOMM Green Networking Workshop*, August 2010. **Best Paper Award**; republished in *ACM SIGCOMM CCR*, January 2011.
13. P.X. Gao, A.R. Curtis, B. Wong, and S. Keshav, "It's Not Easy Being Green," *Proc. ACM SIGCOMM*, August 2012.
14. P.X. Gao and S. Keshav, "Optimal Personal Comfort Management Using SPOT+," *Proc. ACM BuildSys*, 2013. **Best Student Paper Award.**
15. O. Ardakanian, C. Rosenberg, and S. Keshav, "Distributed Control of Electric Vehicle Charging," *Proc. ACM e-Energy*, May 2013. **Best Paper Award; ACM SIGENERGY Test-of-Time Award, 2024.**
16. A. Adepetu and S. Keshav, "The Relative Importance of Price and Driving Range on Electric Vehicle Adoption: Los Angeles Case Study," *Transportation*, August 2015, pp. 1-21.
17. E. Liang, M. Chen, and S. Keshav, "Heatwave-induced capacity bottlenecks in European electricity grids," *Nature Energy*, to appear, 2026.

Earth system science

18. A. Balmford, S. Keshav, F. Venmans et al., "Realizing the social value of impermanent carbon credits," *Nature Climate Change*, **13**, October 2023.
19. A. Holcomb, P. Burns, S. Keshav, and D. Coomes, "Repeat GEDI footprints measure moderate-scale tropical forest disturbance," *Remote Sensing of the Environment*, **308**, May 2024.
20. Z. Feng et al., "TESSERA: Temporal Embeddings of Surface Spectra for Earth Representation and Analysis," *Proc. CVPR 2026*, June 2026.

Miscellaneous

21. S. Keshav, "How to Read a Paper," *ACM SIGCOMM Computer Communication Review*, **37**(3):83-84, July 2007.

PUBLICATIONS

Books

- B1.** O. Ardakanian, S. Keshav, C. Rosenberg, "**Integration of Renewable Generation and Elastic Loads into Distribution Grids**," *Springer*, July 2016.
- B2.** S. Keshav, *Mathematical Foundations of Computer Networking*, *Addison-Wesley*, April 2012. (475 pages). Chinese Translation published by Tsinghua Press in 2015. [link](#)
- B3.** S. Keshav, *An Engineering Approach to Computer Networking*, *Addison-Wesley*, May 1997. (660 pages)

Refereed Journals

- J1. E. Liang, M. Chen, and S. Keshav, "Heatwave-induced capacity bottlenecks in European electricity grids," *Nature Energy*, to appear, 2026.
- J2. M.C. Lisaius, S. Keshav, A. Blake, and C. Atzberger, "Towards Accessible Smallholder Crop Classification in the Groundnut Basin of Senegal," *Environmental Research: Food Systems*, to appear, 2026.
- J3. S. Keshav, "Why Computer Science is at the Foundation of the Energy Transition," Viewpoint, *Communications of the ACM*, to appear, 2026.
- J4. C.E. Wheeler et al., "The path to robust evaluation of carbon credits generated by forest restoration and REDD+ projects," *Remote Sensing of Environment*, **332**, 2026.
- J5. F.N. Begliomini, F.J. Fischer, S. Keshav, P.H.S. Brancalion, P.G. Molin, A.M. Almeyda Zambrano, A.F. de Resende, C. Toledo, C.T. de Almeida, D.R.A. de Almeida, D.E.A. César, E.N. Broadbent, J. van Melis, L.B. Vedovato, P.R. da Silva Rodrigues, R.R. Rodrigues, V.C. Souza, D. Coomes, "Tracking forest carbon and growth in large-scale passive restoration using multi-temporal airborne lidar," *ISPRS Journal of Photogrammetry and Remote Sensing*, **240**, October 2026.
- J6. T. Swinfield, A. Williams, D.A. Coomes, M. Dales, P. Ferris, A. Guizar-Coutiño, J. Hartup, J. Holland, S. Jaffer, J.P.G. Jones, M.O.K. Lam, S. Keshav, A. Madhavapeddy, E. Toye-Scott, T.A.P. West, A. Balmford, "Learning lessons from over-crediting to ensure additionality in forest carbon credits," *Nature Communications*, April 2026.
- J7. Y. She, A. Blake, D.A. Coomes, and S. Keshav, "Scaling Up Forest Vision with Synthetic Data," *International Journal of Computer Vision*, June 2026.
- J8. J. Wang, L. Chang, S. Aggarwal, O. Abari, and S. Keshav. "Sustainable and Low-Cost Greenhouse Soil Moisture Monitoring Using Battery-Free RFID Sensors," *ACM Transactions on Sensor Networks*, January 2025.
- J9. L. Capol, S. Keshav, and Z. Nagy, "Activity hours: Assessing liveability during heatwaves," *Building and Environment*, **269**, February 2025.
- J10. Rau, E-Ping, et al. "Strengthening the integrity of REDD+ credits: objectively assessing counterfactual methods using placebos." *Environmental Research Letters*, 2025.
- J11. Z. Feng, Y. She, and S. Keshav, SPREAD: A large-scale, high-fidelity synthetic dataset for multiple forest vision tasks, *Ecological Informatics*, **87**, February 2025.
- J12. A. Berkes and S. Keshav, SPAGHETTI: a synthetic data generator for post-Covid electric vehicle usage, *Energy Informatics*, **7**(15), Jan 2024.
- J13. A. Holcomb, P. Burns, S. Keshav, and D. Coomes, "Repeat GEDI footprints measure moderate-scale tropical forest disturbance," *Remote Sensing of the Environment*, **308**, May 2024.
- J14. E-P. Rau, J. Gross, D. A. Coomes, T. Swinfield, A. Madhavapeddy, A. Balmford, and S. Keshav, "Mitigating risk of credit reversal in nature-based climate solutions by optimally anticipating carbon release" *J. Carbon Management*, **15** (1), September 2024.
- J15. M. C. Lisaius, A. Blake, S. Keshav and C. Atzberger, "Using Barlow Twins to Create Representations from Cloud-corrupted Remote Sensing Time Series," *IEEE J. of Selected Topics in Applied Earth Observations and Remote Sensing*, **17**, pp13162-13168, August 2024.
- J16. Z. Feng, M. Xie, A. Holcomb, and S. Keshav, "An app for tree trunk diameter estimation from coarse optical depth maps", *Ecological Informatics*, **82**, September 2024.
- J17. A. Balmford et al., Credit credibility threatens forests, *Science*, **380**, 466-467, May 2023.
- J18. A. Balmford, S. Keshav, F. Venmans et al. Realizing the social value of impermanent carbon credits, *Nature Climate Change*, **13**, October 2023. Preprint
- J19. A. Holcomb, L. Tong, and S. Keshav, Robust Single-Image Tree Diameter Estimation with Mobile Phones, *MDPI Remote Sensing*, **15**, 772, January 2023.
- J20. A. Holcomb, S. Mathis, S. Keshav, and D. Coomes, Computational tools for assessing forest recovery with GEDI shots and forest change maps, *Science of Remote Sensing*, **8**, November 2023.
- J21. H.S. Bhundar, L. Golab, S. Keshav, Using EV charging control to provide building load flexibility. *Energy Informatics*, ** 6**(1):5, January 2023.
- J22. Y. Aussat, A. Rosmanis, S. Keshav, A Power-Efficient Self-Calibrating Smart Lighting System, *Energy and Buildings Journal version Author's preprint*, January 2022.
- J23. C. Gorenflo, S. Lee, L. Golab, S. Keshav, FastFabric: Scaling Hyperledger Fabric to 20,000 Transactions per

Second, *International Journal of Network Management*, Article DOI: 10.1002/nem.2099, September 2020.

- J24. F. Kazhamiaka, C. Rosenberg, and S. Keshav, **Tractable Lithium-Ion Storage Models for Optimizing Energy Systems**, *Energy Informatics*, 2:1, 2019.
- J25. F. Kazhamiaka, Y. Ghiassi-Farokhfal, S. Keshav, and C. Rosenberg, **Comparison of Different Approaches for Solar PV and Storage Sizing**, *Proc. IEEE Transactions on Sustainable Computing*, September 2019.
- J26. J. Wang, O. Abari, and S. Keshav, **RFID Hacking for Fun and Profit.**, *GetMobile: Mobile Comp. and Comm.* 23, 1 (July 2019), 21-23. DOI: <https://doi.org/10.1145/3351422.3351430>
- J27. A. Adepetu, A. Alyousef, S.Keshav, and H. de Meer, **Comparing Solar Photovoltaic and battery adoption in Ontario and Germany: an agent-based approach**, *Energy Informatics*, Vol. 1, No. 1, July 2018.
- J28. F. Kazhamiaka, S. Keshav, C. Rosenberg, and K.-H. Pettinger, **Simple Spec-Based Modelling of Lithium-Ion Batteries**, *IEEE Transactions on Energy Conversion*, Vol 33, No. 4, December 2018.
- J29. G. Tang, S. Keshav, L. Golab, and K. Wu, **Bikeshare Pool Sizing for Bike-And-Ride Multimodal Transit**, *IEEE Transactions on Intelligent Transportation Systems*, March 2018.
- J30. M. Jain, R. Kalaimani, S. Keshav, and C. Rosenberg, **"Using Personal Environmental Comfort Systems to Mitigate the Impact of Occupancy Prediction Errors on HVAC Performance,"** *Energy Informatics.*, December 2018.
- J31. R. Kalaimani, M. Jain, S. Keshav, and C. Rosenberg, **On the Interaction between Personal Comfort Systems and Centralized HVAC Systems in Office Buildings**, *J. Advances in Building Energy Research*, August 2018, V7:p.1-29.
- J32. S. Edge, J. Dean, M. Cuomo, and S. Keshav, **Exploring e-bikes as a mode of sustainable transport: a temporal qualitative study of the perspectives of a sample of novice riders in a Canadian city**, *Canadian Geographer/Le Geographe Canadien*, April 2018.
- J33. S. Keshav **Paradoxes of Internet Architecture**, Invited paper, *IEEE Internet Computing*, January/February 2018.
- J34. C. Gorenflo, I. Rios, L. Golab, S. Keshav, "Usage Patterns of Electric Bicycles: An Analysis of the WeBike Project," *Journal of Advanced Transportation*, vol. 2017, Article ID 3739505, 2017. <https://doi.org/10.1155/2017/3739505>. [link](#)
- J35. F. Kazhamiaka, P. Jochem, S. Keshav, and C. Rosenberg, **"PV-Storage System Profitability in Multiple Jurisdictions,"** *Energy Policy*, Vol. 109, Oct. 2017.
- J36. A. Adepetu, V. Arya, and S. Keshav, **An Agent-Based Electric Vehicle Ecosystem Model: San Francisco Case Study**, *Transport Policy*, 46 (2016): 109-122.
- J37. F. Kazhamiaka, C. Rosenberg and S. Keshav, **"Practical Strategies for Storage Operation in Energy Systems: Design and Evaluation,"** *IEEE Transactions on Sustainable Energy*, vol. 7, no. 4, pp. 1602-1610, Oct. 2016.
- J38. R. P. Singh, B. Cassell, S. Keshav, T. Brecht, **"TussleOS: Managing Privacy Versus Functionality Trade-Offs on IoT Devices"**, *ACM SIGCOMM Computer Communication Review*, July 2016.
- J39. Y. Ghiassi-Farrokhfal, C. Rosenberg, S. Keshav, and M.-B. Adjaho, **"Optimal Operation and Design of Hybrid Energy Storage Systems,"** *IEEE Journal on Selected Areas in Communications (JSAC)*, Special Issue on Emerging Technologies, Vol. 34, # 3, March 2016.
- J40. A. Adepetu and S. Keshav, **The Relative Importance of Price and Driving Range on Electric Vehicle Adoption: Los Angeles Case Study**, *Transportation Journal*, August 2015 pp. 1-21.
- J41. Y. Ghiassi-Farrokhfal, F. Kazhamiaka, C. Rosenberg, and S. Keshav, **Optimal Design of Solar PV Farms with Storage**, *IEEE Transactions on Sustainable Energy*, Vol 6 No. 5, October 2015.
- J42. Y. Ghiassi-Farrokhfal, S. Keshav, C. Rosenberg, and F. Ciucu. **Solar Power Shaping: An Analytical Approach**, *IEEE Transactions on Sustainable Energy*, Vol 6, No. 1, Jan. 2015.
- J43. Y. Ghiassi-Farrokhfal, S. Keshav, and C. Rosenberg, **Towards a Realistic Performance Analysis of Storage Systems in Smart Grids**, *IEEE Trans on Smart Grids*, Vol 6, No. 1, January 2015, pp. 402-410.
- J44. O. Ardakanian, S. Keshav, and C. Rosenberg, **Real-Time Distributed Control for Smart Electric Vehicle Chargers: From a Static to a Dynamic Study**, *IEEE Transactions on Smart Grid*, vol.5, no.5, pp.2295,2305, Sept. 2014.
- J45. R.P. Singh, T. Brecht, and S. Keshav, **IP address multiplexing for VEEs**, *ACM SIGCOMM CCR*, April 2014.
- J46. S. Singla, Y. Ghiassi-Farrokhfal, and S. Keshav. **Using Storage to Minimize Carbon Footprint of Diesel Generators for Unreliable Grids**, *IEEE Transactions on Sustainable Energy*, Vol 5, No. 4, pp. 1270-1277. 2014.

- J47. T. Carpenter, S. Keshav, and J.W. Wong, "Sizing Finite Population Vehicle Pools," *IEEE Trans. on Intelligent Transportation Systems*, Volume PP issue 99, Jan 2014.
- J48. H. Zarkoob, S. Keshav, and C. Rosenberg, **Optimal Contracts For Providing Load-Side Frequency Regulation Service Using Fleets of Electric Vehicles**, *J. Power Sources*, Volume 241, 1 November 2013, Pages 94-111.
- J49. S. Singla, Y. Ghiassi-Farrokhfal, and S. Keshav, **Battery Provisioning and Scheduling For a Hybrid Battery-Diesel Generator System**, *ACM Performance Evaluation Review (PER)*, December 2013.
- J50. T. Carpenter, A. R. Curtis, and S. Keshav, **"The Return On Investment For Taxi Companies Transitioning To Electric Vehicles,"** *Transportation*, June 2013.
- J51. S. Guo, M. Derakhshani, M.H. Falaki, U. Ismail, R. Luk, E.A. Oliver, S. Ur Rahman, A. Seth, M.A. Zaharia, S. Keshav, **Design and implementation of the KioskNet system**, *Computer Networks*, Available online 10 August 2010, ISSN 1389-1286, DOI: 10.1016/j.comnet.2010.08.001.
- J52. M.A. Zaharia and S.Keshav,**Gossip-based Search Selection in Hybrid Peer-to-Peer Networks**, *J. Concurrency and Computation: Practice and Experience*, 2007.
- J53. S. Guo, M.H. Falaki, E.A. Oliver, S. Ur Rahman, A. Seth, M.A. Zaharia, and S. Keshav **Very Low-Cost Internet Access Using KioskNet**, *ACM Computer Communication Review*, October 2007.
- J54. L. Qiu, Y. Zhang and S. Keshav, **Understanding the Performance of Many TCP Flows**, *Computer Networks*, 37(3-4), pp. 277-306, November 2001
- J55. A.E. Kaplan, S. Keshav, N.L. Schryer and J.H. Venutolo, **An Internet Accessible Telepresence**, *Multimedia Systems Journal*, March 1997.
- J56. C.R. Kalmanek, S. Keshav, W.T. Marshall, S.P. Morgan, and R.C. Restrict, **Xunet 2: Lessons from an Early Wide-Area ATM Testbed**, *IEEE/ACM Transactions on Networking*, April 1997.
- J57. M. Grossglauser, S. Keshav, D. Tse, **RCBR: A Simple and Efficient Service for Multiple Time-Scale Traffic**, *IEEE/ACM Transactions on Networking*, December 1997.
- J58. R. Ahuja, S. Keshav and H. Saran, **Design,Implementation, and Performance Measurement of a Native-Mode ATM Transport Layer (Extended Version)**, *IEEE/ACM Transactions on Networking*, August 1996.
- J59. A. Demers, S. Keshav and S. Shenker, "Analysis and Simulation of a Fair Queueing Algorithm," *ACM SIGCOMM Computer Communication Review*, January 1995. **Appeared in the 25th Anniversary Special Issue on the "most important papers that have appeared in Computer Communication Review over the past 25 years."**
- J60. S. Keshav, "A Control-Theoretic Approach to Flow Control," *ACM SIGCOMM Computer Communication Review*, January 1995. **Appeared in the 25th Anniversary Special Issue on the "most important papers that have appeared in Computer Communication Review over the past 25 years."**
- J61. S. Keshav, C. Lund, S. Phillips, N. Reingold and H. Saran, **An Empirical Evaluation of Virtual Circuit Holding Time Policies in IP-over- ATM Networks**, *IEEE Journal on Selected Areas in Communication*, October 1995.
- J62. A. Berenbaum, M.J. Dixon, A. Iyengar and S. Keshav, **A Flexible ATM Host-Interface for Xunet 2**, *IEEE Network Magazine*, V7, N4, July 1993.
- J63. H. Saran, S. Keshav and C.R. Kalmanek, **A Scheduling Discipline and Admission Control Policy for Xunet 2**, *Proc. NOSSDAV '93*, November 1993; also *Multimedia Systems Journal*, 1994.
- J64. S. Keshav, **On the Efficient Implementation of Fair Queueing**, *Journal of Internetworking: Research and Experience*, V2, N3, September 1991.
- J65. A. Demers, S. Keshav and S. Shenker, **Analysis and Simulation of a Fair Queueing Algorithm**, *Journal of Internetworking Research and Experience*, V1, N1, pp 3-26, September 1990; also in *Proc. ACM SigComm 1989*, pp 1-12, September 1989. **Winner of Test-of-Time Award**

- C1. J. Gschwind, H. Shen, and S. Keshav, "Joint Optimization of PV System Sizing, Operation, and Placement for Residential Roofs," *Proc. ACM Energy* 2026, June 2026.
- C2. M.C. Lisaius, A. Blake, C. Atzberger, and S. Keshav, "Towards improved crop type classification: a compact embedding approach suitable for small fields," *Proc. XXV ISPRS Congress, ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, XI-2-2026, 873-880, July 2026.
- C3. X. Wang, G. Tang, J. Xue, S. Keshav, T. Li, C. Ding, "Energy Injection Identification enabled Disaggregation with Deep Multi-Task Learning," *Proc. ACM Energy* 2026, June 2026.
- C4. Z. Feng, C. Atzberger, S. Jaffer, J. Knezevic, S. Sormunen, R. Young, M.C. Lisaius, M. Immitzer, T. Jackson, J. Ball, D.A. Coomes, A. Madhavapeddy, A. Blake, S. Keshav, "TESSERA: Temporal Embeddings of Surface Spectra for Earth Representation and Analysis," *Proc. CVPR* 2026, June 2026.
- C5. A. Domiter and S. Keshav, "Fine-Grained Mapping of Urban Energy Demand During Heatwaves," *Poster, Proc. ACM eEnergy*, June 2025.
- C6. A. Domiter and S. Keshav, "Machine Learning for Building-Level Heat Risk Mapping," *Proc. ACM eEnergy*, June 2025.
- C7. J. Gschwind and S. Keshav, "SolExplore: A Successive Refinement Approach for Sizing of PV and Storage Systems in EV-Enabled Homes," *Proc. ACM BuildSys*, November 2025.
- C8. J. Gschwind and S. Keshav, "Fast Optimal Sizing of Domestic PV Energy Systems," *Poster, Proc. ACM eEnergy*, June 2025.
- C9. A. Berkes and S. Keshav, "SOPEVS: Sizing and Operation of PV-EV-Integrated Modern Homes," *Proc. ACM eEnergy* 2024, June 2024.
- C10. G. Wilkins, S. Keshav, and R. Mortier, "Offline Energy-Optimal LLM Serving: Workload-Based Energy Models for LLM Inference on Heterogeneous Systems", *Proc. HotCarbon Workshop*, July 2024.
- C11. G. Wilkins, S. Keshav, and R. Mortier, "Hybrid Heterogeneous Clusters Can Lower the Energy Consumption of LLM Inference Workloads", *Proc. EEDC workshop at ACM eEnergy* 2024, June 2024.
- C12. P. Ferris, M. Dales, T. Swinfield, S. Jaffer, S. Keshav, and A. Madhavapeddy, "Uncertainty at scale: how CS hinders climate research," *Undone Computer Science workshop*, 2024.
- C13. S. Jaffer, M.W. Dales, P. Ferris, D. Sorensen, T. Swinfield, R. Message, S. Keshav, and A. Madhavapeddy, "Global, robust and comparable digital carbon assets", *Poster, Proc. IEEE ICBC* 2024, May 2024.
- C14. Y. She, C. Atzberger, A. Blake, and S. Keshav, "From Spectra to Biophysical Insights; End-to-End Learning with a Biased Radiative Transfer Model", *Proc. ICLR CCAI Workshop*, May 2024.
- C15. S. Ghasemitaheeri, A. Holcomb, L. Golab, and S. Keshav, "On the Data Quality of Remotely Sensed Forest Maps," *Proc. VLDB Workshops*, April 2023.
- C16. A. Findeis, F. Kazhamiaka, S. Jeon, and S. Keshav, "Beobench: A Toolkit for Unified Access to Building Simulations for Reinforcement Learning," *Proc. ACM eEnergy*, June 2022.
- C17. J. Wang, L. Chang, O. Abari, and S. Keshav, "How Manufacturers Can Easily Improve Working Range of Passive RFIDs," *Proc. IEEE SECON* 2022, October 2022.
- C18. X. Wang, G. Tang, Y. Wang, S. Keshav, and Y. Zhang, "EVSense: A Robust and Scalable Approach to Non-Intrusive EV Charging Detection," *Proc. ACM eEnergy*, June 2022.
- C19. A. Holcomb, B. Tong, M. Penny, and S. Keshav, "Measuring Forest Carbon with Mobile Phones," *Poster Proc. ACM Mobisys, Winner of the Best Poster Award*, June 2021.
- C20. A. Mitra, C. Gorenflo, L. Golab, and S. Keshav, "TimeFabric: Trusted Time for Hyperledger Fabric," *Proc. Foundations and Applications of Blockchain*, May 2021.
- C21. B.G. Huang, F. Kazhamiaka, and S. Keshav, "Sizing Solar Panels and Storage for Multiple Roofs," *Proc. ACM eEnergy*, June 2021.
- C22. M.S. Parsa, L. Golab, and S. Keshav, "Climate Action During COVID-19 Recovery and Beyond: A Twitter Text Mining Study," *Proc. International Conference on Social, Cultural, and Behavioral Modeling*, July 2021.
- C23. S. Keshav, "Towards a Trusted Marketplace for Nature-based Solutions," *Poster at Climate Exp0*, May 2021.
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- E10. S. Keshav, [The Riches of White Space](#), Editorial in *The Mark News*, October 2009. [pdf](#)
- E11. S. Keshav, [The SIGCOMM Community](#), Editorial in *ACM SIGCOMM Computer Communication Review*, October 2009.

E12. S. Keshav, *Why Cell Phones Will Dominate the Future Internet*, Editorial in *ACM Computer Communication Review*, April 2005.

Datasets

- D1. A. Rabbani, C. Ograda-Bratu, S. Huo, S. Keshav, “*Personal thermal comfort and occupancy dataset*”, <https://doi.org/10.5683/SP2/2NWMDY>, *University of Waterloo Dataverse*, November 2020.
- D2. C. Gorenflo, I. Rio, L. Golab, C. Ograda-Bratu, S. Huo, S. Keshav, “*Webike dataset*”, <https://doi.org/10.5683/SP2/7OAETS>, *University of Waterloo Dataverse*, November 2020.
- D3. J.Y. Lin, C. Ograda-Bratu, S. Huo, and S. Keshav, *Detecting Snow Covered Solar Panels Dataset*, <https://doi.org/10.5683/SP2/ITQPHZ>, *University of Waterloo Dataverse*, December 2020.
- D4. O. Ardakanian, S. Huo, and S. Keshav, *6-second load measurement dataset*, <https://doi.org/10.5683/SP2/R4SVBF>, *University of Waterloo Dataverse*, December 2020.
- D5. S. Doubov, C. Ograda-Bratu, S. Huo, S. Keshav, *Camera-based Occupancy Detection Dataset*, <https://doi.org/10.5683/SP2/X30EPQ>, *University of Waterloo Dataverse*, December 2020.
- D6. Y. Aussat, C. Ograda-Bratu, S. Huo, S. Keshav, “*Office Light Level dataset*”, <https://doi.org/10.5683/SP2/3BCADM>, *University of Waterloo Dataverse*, November 2020.

Software

TEE: The Tessera Embeddings Explorer, a web-based interface to the Tessera geospatial foundation model for ecologists. 2026.

KioskNet/VLink: KioskNet and VLink are comprehensive systems for low-cost internet access from rural kiosks using mechanical backhaul. 2010.

ITX: A Java-based computer telephony platform. 1999.

IDLInet: The first Personal-Computer based ATM LAN. 1995.

XUNET II: The first wide area ATM network. 1993.

REAL: An early packet level public-domain network simulator that provided extensive support for research in flow and congestion control. 1989.

US Patents

I am a co-inventor of 77 US/EU patents on a wide variety of systems issues. The US patents include:

12,094,013 Operation method and system for distributed generation

11,842,245 Automated soil moisture effects sensor with improved RFID system

11,271,800 Leaderless, parallel, and topology-aware protocol for achieving consensus with recovery from failure of all nodes in a group

10,848,549 Leaderless, parallel, and topology-aware protocol for achieving consensus

8,422,988 Controlling activity levels and reducing infrastructure data transmission costs for wireless mobile devices

8,412,101 Optimally controlling short-range wireless communication on mobile communication devices

8,351,449 Scheduling data communication for mobile communication devices with multiple wireless network interfaces associated with differing costs

8,238,913 Wireless network augmentation using other wireless networks

8,190,088 Optimally controlling short-range wireless communication on mobile communication devices

7,769,887 Opportunistic data transfer over heterogeneous wireless networks

7,219,354 Virtualizing super-user privileges for multiple virtual processes

7,143,024 Associating identifiers with virtual processes

6,985,937 Dynamically modifying the resources of a virtual server

6,976,258 Providing quality of service guarantees to virtual hosts

6,909,691 Fairly partitioning resources while limiting the maximum fair share

6,907,421 Regulating file access rates according to file type
 6,754,716 Restricting communication between network devices on a common network
 6,732,211 Intercepting I/O multiplexing operations involving cross-domain file descriptor sets
 6,393,581 Reliable time delay-constrained cluster computing
 6,363,483 Methods and systems for performing article authentication
 5,864,605 Voice menu optimization method and system
 5,835,595 Method and apparatus for cryptographically protecting data
 5,793,768 Method and apparatus for collapsing TCP ACKs on asymmetrical connections
 5,761,289 800 number callback
 5,627,970 Methods and apparatus for achieving and maintaining optimum transmission rates and preventing data loss in a processing system network
 5,623,605 Methods and systems for interprocess communication and inter-network data transfer
 5,604,731 Renegotiated bit-rate service system and method
 5,559,798 Data segmentation within a renegotiated bit-rate service transmission system
 5,272,697 Apparatus and method for time multiplexing a resource among a plurality of entities

RESEARCH FUNDING

Since 2019, at Cambridge

Dr. Robert Sansom — postdoctoral researcher and communications officer	£280,000
Tezos - Cambridge Centre for Carbon Credits (4C), co-founder and co-PI	£3,750,000
Nokia — research grant	£250,000

2003-2019, at Waterloo: approximately CAD 8,000,000 raised in total across 35 awards, of which my share was approximately CAD 5,180,000. Principal awards:

NSERC Collaborative Research and Development (50%)	CAD 1,361,350
NSERC Collaborative Research and Development (33%)	CAD 1,250,000
NSERC Strategic Grant (25%)	CAD 627,000
NSERC Strategic Grant (20%)	CAD 503,488
NSERC Canada Research Chair, Tier II (two terms, 100%)	CAD 1,000,000
Ontario Council for Innovation (100%)	CAD 600,000
NSERC Discovery Grants (three awards) and Accelerator Supplement (100%)	CAD 567,100
Huawei Joint Innovation Lab (33%), National Research Council (50%), Hydro One (50%), HP Labs (50%)	CAD 645,000
Industrial awards: Sprint, Intel, Microsoft, Cisco, Google, Nortel, Sun, Ensium, Handshake, Essex Power	CAD 687,000 + USD 385,000

STUDENTS

Current postdoctoral fellows

- Silja Sormunen (Ph.D., Aalto University, Helsinki, 2026), 2026-2028
- Jingtao Li (Ph.D., Wuhan University, 2026), 2026-2028

Current PhD students (lead supervisor)

- Yihang She (co-supervised with David Coomes and Andrew Blake)
- Zhengpeng (Frank) Feng
- Robin Young

Current PhD students (co-supervisor)

- Felipe Begliomini (with David Coomes, Plant Sciences)
- Jovana Knezevic (with David Coomes, Plant Sciences)
- Tom Ratsakatika (with Emily Lines, Geography)
- Jakob Poffley (with Rachael Garrett, Geography)

Students elsewhere

- Enming Liang (City University of Hong Kong, supervised by Minghua Chen)

Postdoctoral fellows (alumni)

- E-Ping Rau (co-supervised with David Coomes), 2023-2025
- Charlotte Wheeler (UCL), 2023-2025
- Ju Wang (Northeast University, China) 2018-2019
- Liqiong Chang (Northeast University, China) 2018-2019
- Sun Sun (Toronto) 2017-2019
- Ansis Rosmanis (U. Waterloo) 2016
- Rachel Kalaimani (IIT Bombay) 2015-16
- Yashar Ghiassi-Farrokhfal (U. Toronto) 2012-15
- Kirill Kogan (Ben Gurion) 2011-2012
- Weihong Wang (Toronto) 2010-2011
- Andre Allavena (Cornell) 2004-2005

Graduated PhD students (first position)

- *Madeline Lisaius*: 2022-2026, Thesis: Self-supervised learning for remote sensing of crop types under challenging conditions (GeoWatch, France)
- *Amelia Holcomb*: 2021-2025, Thesis: Measuring Tropical Forest Disturbance and Regrowth with Spaceborne Lidar (NASA/GEDI team at U. Maryland)
- *Sajjad Rizvi*: 2015-2021, Thesis: On the Importance of Infrastructure-Awareness in Large-Scale Distributed Storage Systems (Employee at CockroachDB)
- *Christian Gorenflo*: 2015-2020, Waterloo. Thesis: Towards a New Generation of Permissioned Blockchain Systems (Employee at Axelar)
- *Fiodar Kazhamiaka*: 2014-2019, Waterloo. Thesis: Modelling, Design, and Control of Energy Systems: A Data-Driven Approach (Postdoc at Stanford)
- *Adedamola Adepetu*: 2012-2016, Waterloo. Thesis: An Agent-Based Modeling Framework for Energy Policies (CIBC Bank)
- *Rayman Preet Singh*: 2011-2015, Waterloo. Thesis: Personal Data Management in the Internet of Things (MTS at Samsung Research)
- *Omid Ardakanian*: 2009-2015, Waterloo. Thesis: On the Control of Active End-nodes in the Smart Grid (Postdoc at UC Berkeley)
- *Tommy Carpenter*: 2010-2015, Waterloo. Thesis: Measuring & Mitigating Electric Vehicle Adoption Barriers (MTS at AT&T Research)
- *Earl Oliver*: 2006-2012, Waterloo. Thesis: Censorship Tolerant Networking (Founder, Brio Mobile)
- *Andy Curtis*: 2008-2012, Waterloo. Thesis: Reducing the cost of Operating a Datacenter Network (Nicera Inc.)
- *Nabeel Ahmed*: 2004-2009, Waterloo. Thesis: Interference Management in Dense 802.11 Networks (Post-doc at MIT)
- *Aaditeshwar Seth*: 2004-2008, Waterloo, Co-supervised by Prof. R. Cohen. Thesis: Design of a Recommender System for Participatory Media Built on a Tetherless Communication Infrastructure (IBM Research, India)
- *Majid Ghaderi*: 2004-2006, Waterloo, Co-supervised by Prof. R. Boutaba. Thesis: Resource management in heterogeneous wireless networks (PostDoc at U. Mass. Amherst)
- *Rosen Sharma*: 1996-99, Cornell. Thesis: 'Internet TV' (CEO at Ensim Inc.)

Graduated Master's students

- 2025: H. Shen, J. Gschwind (ETH, Zurich)
- 2024: L. Capol (ETH, Zurich)
- 2021: A. Holcomb
- 2020: D. Karakashev, D. Adeboye
- 2019: Y. Aussat
- 2016: A. Pat, A. Rabbani, M. Doroshenko
- 2015: I. Rios
- 2014: E. Rezaei, X. Gao
- 2013: P.X. Gao, S. Singla, P. Srikantha
- 2012: B. Hu, R. Case
- 2011: O. Ardakanian
- 2009: U. Ismail
- 2008: H. Falaki, S. Ur Rahman, D. Hadaller
- 2007: S. Guo, O. Beg, E. Oliver
- 2005: N. Ahmed
- 1999: Y. Xu, N. Sastry, J. Wann, P. Singh, A. Singh, M. Ranjan, W. Ng, J. Howes
- 1998: K. Lee, R. Schwager, R. Siamwalla
- 1997: D. Balakrishna, K. Chan, B. Nicks, J. Teo, M. Wu, L. Wu, H. Jamjoom
- 1995: M. Grossglauser (Institut Eurecom)

SELECTED RECENT PROFESSIONAL ACTIVITIES (SINCE 2010)

Teaching

- CSM Computer Systems Modeling, 2021–2024, 2026, University of Cambridge
- R47/L47 Distributed Ledger Technologies: Foundations and Applications, Lent 2021–2024, University of Cambridge
- CS 856 Blockchain Foundations and Applications, Winter 2019, University of Waterloo
- CS 798 Mathematical Foundations of Computer Networking, Fall 2011 and Fall 2017, University of Waterloo
- CS 436 Computer Networking and Distributed Systems (for non-CS majors), Winter 2012 and Fall 2014 (flipped classroom), University of Waterloo

University Service

2021-: Co-founder and co-PI Cambridge Centre for Carbon Credits
2020-2022: Member, Faculty Board and Degree Committee
2020, 2021: Member and Chair, respectively, Admissions Committee, AI4ER CDT
2020-: Organizer of weekly Systems Research Group seminar series
2019-: Member, Management committee and Research Committee, AI4ER CDT

College Service, Fitzwilliam College, Cambridge

2024-: Fellow for Research
2021-: Director of Studies for Computer Science, Part IB, Part II, and Part III
2021-: Graduate Tutor
2021-: Member, Environment Committee
2020-2021: Director of Studies for Computer Science, Part IB

Advisory Boards

2026-: Research Advisor, **RAIN (Research Advisor for International Networking)** programme, University of Oldenburg, Germany

2020-2024: Scientific Advisory Board, **Institute of Energy Economics** (EWI), Cologne

2020-: Advisor, **Maker Bhavan Foundation**

2020–2021: Member, ACM Presidential Task Force on Virtual Conferences

2019-2025: Academic Advisory Board, **INATBA**: International Association for Trusted Blockchain Applications

Program review

Evaluation of CS cluster at Indian Institute of Technology, Delhi, 2025

Imperial College Department of Computing PGR Periodic Review, April 2023

Evaluation of the KIT Center Information Systems Technologies, 2021

Department of Computer Science, University of British Columbia, 2014

Professional Societies

Member of ACM, ACM SIGENERGY

2021-2023: Founding Vice-Chair, ACM SIGENERGY

2019-2021: Member, Executive Committee, ACM EIG-Energy

2013-2017: Elected Chair, ACM SIGCOMM

2013-2017: Member of ACM SIG Governing Board

2008-2021: Member, Executive Committee, ACM SIGCOMM

Editorial positions

2021-2024: Founding Editor-in-Chief, ACM SIGENERGY Energy Informatics Review

2021-2022: Editor, Proc. VLDB Foundation

2021-: Editor, CACM Research Highlights

2017-2018: Editor, PeerJ Computer Science

2016-: Member, Steering Committee, ACM SIGMETRICS PACM Series

2009-2013: Member/Chair, Steering Committee, IEEE/ACM Transactions on Networking

2008-2012: Editor-in-chief, ACM SIGCOMM Computer Communication Review

Recent conference organization

2021: Co-General Chair, ACM HotNets

2021: Co-organizer Dagstuhl seminar on “Towards Climate-Friendly Internet Research”

2016: General Chair, ACM eEnergy

2013-: Member Steering Committee, ACM e-Energy

2013: TPC Co-Chair, ACM eEnergy

2011: General Co-Chair, ACM SIGCOMM

2010: TPC Co-Chair, ACM Mobisys

Recent selected program committee memberships

2026: ACM eEnergy, ACM BuildSys
2025: ACM eEnergy, ACM SIGCOMM
2022-2023: AAAI Fall Symposium on AI and Climate Change
2018-2022: IEEE ICBC
2018: ACM COMPASS
2017: ACM NetEcon Workshop
2016: IEEE SmartGridComm
2015: ACM ICDCS, ACM CoNEXT
2014, 2016-18: USENIX NSDI
2014: ACM APSys Workshop
2014, 2017: ACM GreenMetrics Workshop
2013-2022: ACM eEnergy
2013-2017: ACM BuildSys
2013: IEEE SmartGridComm, ACM COMSNETS
2011: ACM NSDR
2008-2010: ACM SIGCOMM

Ph.D. examiner

Ali Shibli, KTH Royal Institute of Technology, Stockholm, 2026 (opponent)
Joshua Dimasaka, Cambridge, 2026
Rachel Ward, Cambridge, 2021
Aravindh Raman, King's College London, 2020
Chien-Ming Tseng, Masdar Institute, Abu Dhabi, 2017
Mauricio Restrepo, Dept. of ECE, U. Waterloo, 2017
Nafeesa Mehboob, Dept. of ECE, U. Waterloo, 2016
Jelmer Kuiper, U. Twente, 2015
Alfredo Vaccaro, Dept. of ECE, U. Waterloo, 2015
Abbas Mehrabian, Department of Combinatorics and Optimization, U. Waterloo, 2014
ACM India Dissertation Award Committee 2014-16
Mikko Pervilä, U. Helsinki, 2013
Jing Su, U. Toronto, 2010

Summer Schools/Tutorials

Opening **Keynote** at the 3rd **Swedish Electricity Storage and Balancing Centre (SESBC)** Summer School, Chalmers University of Technology, **Gothenburg**, Sweden, August 2026.
"Self-supervised learning for energy informatics", Tutorial at ACM eEnergy, **Rotterdam**, June 2025
"Blockchains and Energy," Tutorial at ACM eEnergy, **Online**, June 2020.
"Blockchain, Storage, and Demand-Side Management," Ph.D. CIESS Summer school, EWI **Cologne**, July 2019.
"Research Methods in Networks and Systems," Summer School, Sharif University, **Teheran**, Iran, August 2018 (online)
"Communication Technologies for Energy Informatics," Summer School, University of Passau, **Passau**, Germany, September 2017
"How Internet Technologies Can Green the Grid," Tutorial at ACM SIGCOMM, **Helsinki**, Finland, August 2012
"Game Theory," U. Alberta Summer School, **Banff**, Canada, 2011

Selected keynotes and invited talks

Invited talk at the **President's Conference: Assured Space**, Royal Aeronautical Society, **London**, September 2026.
Panellist, "Foundation Models for Earth Observation," **UK Earth Observation Conference 2026**, University of **Warwick**, September 2026.

"Computing for Sustainability," **Keynote** at the **VLDB Summer School on Sustainability of Very Large Databases**, University of Wrocław, **Wrocław**, Poland, August 2026.

"TESSERA: a foundation model for Earth observation," Invited talk at the AI4EO Community Event, GEO Symposium, **Geneva**, Switzerland, May 2026.

"Is There Hope for the Climate?" Colloquium, Department of Computer Science and Engineering, Chalmers University of Technology, **Göteborg**, Sweden, May 2026.

"Is there Hope for the Climate," **Keynote** at International Summer Programme, U. Cambridge Centre for Continuing Education, July 2025.

"Hints on Doing Research," **Keynote** at ACM eEnergy 2025, June 2025.

"Is there Hope for the Climate," **Keynote** at U. Cambridge Energy Policy Research Group Spring Seminar, May 2025.

"Self-supervised Learning for Earth Observation," **Keynote** at AI for Greener Future Day, University of Exeter, April 2025.

"Climate, Carbon, and Computer Science," Distinguished Seminar Series, School of Data Science, City University of Hong Kong, **Online**, September 2021.

"How Technology Can Inform Public Policy for Smart Cities," **Keynote** at ORION Smart Cities Governance Lab, March 28th, Catalyst 137 Kitchener, March 2019.

"On Trustworthy Cyber-physical Gateways for Blockchains", Keynote at ACM Open IoT Day, **Munich**, June 2018

"Scalable Blockchains for Transactive Energy," Invited Lecture, Alan Turing Institute, **London**, July 2017

"Paradoxes in Internet Architecture," **Distinguished Lecture**, Queen Mary University of **London**, July 2017

"Paradoxes in Internet Architecture," Keynote at ACM TUR-C conference, **Shanghai**, May 2017

"Solar + Storage + IoT + LED = \$30 Trillion," Keynote at Erasmus Energy Day, Erasmus University, **Rotterdam**, Netherlands, May 2016

"Smart Grid: Status and Challenges," Keynote at Communications and Control for Smart Energy Systems Workshop, IEEE INFOCOM, **Toronto**, April 2014

"The Challenge of Deployment," Keynote at Workshop on Lowest Cost Networking for Universal Access, ACM MOBICOM, **Miami**, Florida, 2013

"How the Internet can Green the Grid," Distinguished Lecture, University of North Carolina, **Chapel Hill**, November 2010

OUTREACH

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- YouTube channel with talks and videos about my research: https://www.youtube.com/channel/UC3AkpcXf_aiYwW2uXZR2pEA
 - Public lecture: "Is there hope for the climate?"
 - "How blockchain can democratize green power", *The Conversation*, January 2018.
 - Invited to testify as an expert on cell phone pricing at the US Senate Judiciary Committee, 2009.