Alireza Vahid, PhD

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Research Interests

- Information Theory, Signal Processing, Communication Theory, and Wireless Communications
- Coding Theory and its Applications in High-Performance Computing and Memory Systems

Education

- **Cornell University** — Ithaca, NY
  MSc & PhD in Electrical and Computer Engineering — 2015
  - PhD Thesis: The Impact of Imperfect Feedback on the Capacity of Wireless Networks
  - **2015 Best PhD Thesis Award**
  - Advisor: Salman Avestimehr, PhD
- **Sharif University of Technology** — Tehran, Iran
  BSc in Electrical Engineering — 2009

Positions Held

- **University of Colorado Denver** — Denver, CO
  Assistant Professor of Electrical Engineering — 2017 to present
- **Duke University** — Durham, NC
  Adjunct Assistant Professor of Electrical & Computer Engineering — Summer 2018, Spring 2020
- **Duke University** — Durham, NC
  Postdoctoral Research Scientist — 2014-2017
- **Qualcomm Inc.** — San Diego, CA
  Innovation Fellow — 2013
- **Bell Labs** — Holmdel, NJ
  Research Intern — 2012

Selected Awards & Honours

- Lab Venture Challenge Award for our invention "Theia" ($125k) — 2019
- Runner-up Best Paper Award at Dependable Systems and Networks (DSN) — 2019
- New Faculty Research Award, CU Denver — 2019
- Creative Research Collaborative (CRC) Fellowship, CU Denver — 2018
- Young Upwardly Mobile Professor (YUMP) Award, CU Denver — 2018, 2019
- Best PhD Thesis Award, School of ECE, Cornell University — 2015
- Qualcomm Innovation Fellowship ($100k) — 2013
- Best PhD Teaching Award, School of ECE, Cornell University — 2011
- Jacobs Scholar Fellowship, School of ECE, Cornell University — 2009
- Ranked 2nd among over 360,000 in Iranian University Entrance Exam — 2004
- Ranked 2nd in Azad University National Entrance Exam — 2004
- Silver Medal in Iranian National Physics Olympiad — 2003

Teaching Experience and Student Mentorship

- Instructor, University of Colorado Denver
  - Data and Information Inference Theory (G) — Fall 2019
  - Engineering Probability and Statistics (UG) — Spring 2019
  - Random Processes (G) — Fall 2018
  - Digital Communication Systems (G) — Spring 2018 & 2019
  - Information and Coding Theory (G) — Fall 2017 & 2019
- **Data+ Summer Program, Duke University** — Durham, NC
  Mentor for Water Reservoir Project — Jun. to Aug. 2015
  - Advised a team of undergraduates and two graduate students
  - Aligned the capabilities of the undergraduates with the demands of the external client
  - Managed communication with the external client
  - Conducted comprehensive study of water reservoirs across North America
  - Quantified the role of human operator in water level fluctuations
- **Teaching Assistant, Cornell University** — Ithaca, NY
  Random Signals in Communication and Signal Processing — Fall 2010
  - The sole teaching assistant for the course
  - **2011 Best PhD Teaching Award**

Professional Activities

- Reviewer:
  - IEEE Transactions on Information Theory
  - IEEE Transactions on Communications
  - IEEE Transactions on Wireless Communications
  - IEEE Transactions on Vehicular Technology
  - IEEE International Symposium on Information Theory
  - IEEE INFOCOM
  - IEEE Information Theory Workshop
  - IEEE Magnetic Letters
- Organized the 2016 North American School of Information Theory
- TPC member, IEEE CCWC 2020

Patents

(Patent1) D. Sorin, G. Mappouras, R. Calderbank, A. Vahid,"Systems and Methods for Improving Memory Bandwidth," US Provisional Patent No. 62/836, 817, April 22, 2019.

(Patent2) A. Vahid, M. Johnny, "Low-Complexity Practical Implementation of Blind Interference Alignment using Reconfigurable Antennas," US Provisional Patent No. 62/888, 697, Aug. 19, 2019.

(Patent3) A. Vahid, M. Johnny, "Embedding Information in Radiation Pattern Fluctuations," US Provisional Patent No. , 2019.

Journal Publications

(J1) A. Vahid, "On the Degrees-of-Freedom of Two-Unicast Wireless Networks with Delayed CSIT," *IEEE Transactions on Information Theory*, vol. 65, no. 8, pp. 5176–5188, 2019.

(J2) A. Vahid, A. R. Calderbank, "Throughput Region of Spatially Correlated Interference Packet Networks," *IEEE Transactions on Information Theory*, vol. 65, no. 2, pp. 1220–1235, 2019.

(J3) G. Mappouras, A. Vahid, R. Calderbank, D. Sorin, "Extending Flash Lifetime in Embedded Processors by Expanding Analog Choice," *IEEE Transactions on Computer-Aided Design Integrated Circuits and Systems*, vol. 37, no. 11, pp. 2462–2473, 2018.

(J4) A. Vahid, V. Aggarwal, S. Avestimehr, A. Sabharwal, "Interference Management with Mismatched Partial Channel State Information," *EURASIP Journal on Wireless Communications and Networking*, 2017.

(J5) A. Vahid, M. Maddah-Ali, S. Avestimehr, and Y. Zhu, "Binary Fading Interference Channel with No CSIT," *IEEE Transactions on Information Theory*, vol. 63, no. 6, pp. 3565–3578, 2017.

(J6) A. Vahid, A. R. Calderbank, "Two-User Erasure Interference Channels with Local Delayed CSIT," *IEEE Transactions on Information Theory*, vol. 62, no. 9, pp. 4910–4923, 2016.

(J7) A. Vahid, M. Maddah-Ali, and S. Avestimehr, "Approximate Capacity Region of the MISO Broadcast Channels With Delayed CSIT," *IEEE Transactions on Communications*, vol. 64, no. 7, pp. 2913–2924, 2016.

(J8) A. Vahid, M. Maddah-Ali, and S. Avestimehr, "Capacity Results for Binary Fading Interference Channels with Delayed CSIT," *IEEE Transactions on Information Theory*, vol. 60, no. 10, pp. 6093–6130, 2014.

(J9) A. Vahid, C. Suh, and S. Avestimehr, "Interference Channels with Rate-Limited Feedback," *IEEE Transactions on Information Theory*, vol. 58, no. 5, pp. 2788–2812, 2012.

Conference Publications

(C1) S. Nassirpour, A. Vahid, "Throughput, Delay, and Complexity Tradeoffs in Interference Channels," *Proceedings of 10th IEEE Annual Computing and Communication Workshop and Conference (CCWC)*, 2020.

(C2) A. Vahid, I. H. Wang, S. C. Lin, "Capacity results for erasure broadcast channels with intermittent feedback," *Proceedings of IEEE Information Theory Workshop (ITW)*, 2019.

(C3) Mappouras, A. Vahid, R. Calderbank, D. Sorin, "GreenFlag: Protecting 3D-Racetrack Memory from Shift Errors," *Proceedings of 49th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN)*.

(C4) S. C. Lin, I. H. Wang, A. Vahid, "No Feedback, No Problem: Capacity of Erasure Broadcast Channels with Single-User Delayed CSI," *Proceedings of International Symposium on Information Theory (ISIT)*, 2019.

(C5) A. Vahid, "Finite Field X-Channels with Delayed CSIT and Common Messages," *Proceedings of International Symposium on Information Theory (ISIT)*, 2018.

(C6) A. Vahid, R. Calderbank, "ARQ for interference packet networks," *Proceedings of International Symposium on Information Theory (ISIT)*, 2018.

(C7) G. Mappouras, A. Vahid, R. Calderbank, D. R. Hower, D. Sorin, "Jenga: Efficient Fault Tolerance for Stacked DRAM," *Proceedings of IEEE International Conference on Computer Design (ICCD)*, 2017.

(C8) A. Vahid, R. Calderbank, "When does spatial correlation add value to delayed channel state information?" *Proceedings of International Symposium on Information Theory (ISIT)*, 2016.

(C9) G. Mappouras, A. Vahid, R. Calderbank, D. Sorin, "Methuselah Flash: Rewriting Codes for Extra-Long Storage Lifetime," *Proceedings of 46th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN)*, 2016.

(C10) A. Eslami, A. Velasco, A. Vahid, G. Mappouras, R. Calderbank, D. Sorin, "Writing without Disturb on Phase Change Memories by Integrating Coding and Layout Design," *Proceedings of Memory Systems (MEMSYS)*, 2015.

(C11) A. Vahid, I. Shomorony, R. Calderbank, "Informational Bottlenecks in Two-Unicast Wireless Networks with Delayed CSIT," *Proceedings of Allerton conference*, 2015.

(C12) A. Vahid, R. Calderbank, "Impact of Local Delayed CSIT on the Capacity Region of the Two-User Interference Channel," *Proceedings of International Symposium on Information Theory (ISIT)*, 2015.

(C13) A. Vahid, G. Mappouras, A. Velasco, R. Calderbank, and D. J. Sorin, "Virtual Cells and Concatenated Codes for Flash Memory," *Proceedings of Fifth Non-Volatile Memories Workshop (NVMW)*.

(C14) A. Vahid, M. Maddah-Ali, and S. Avestimehr, "Binary Fading Interference Channel with No CSIT," *Proceedings of International Symposium on Information Theory (ISIT)*, 2014.

(C15) A. Vahid, M. Maddah-Ali, and S. Avestimehr, "Communication Through Collisions: Opportunistic Utilization of Past Receptions," *Proceedings of IEEE Infocom*, 2014.

(C16) A. Vahid, M. Maddah-Ali, and S. Avestimehr, "Approximate Capacity of the Two-User MISO Broadcast Channel with Delayed CSIT," *Proceedings of Allerton conference*, 2013.

(C17) A. Vahid, M. Maddah-Ali, and S. Avestimehr, "Binary Fading Interference Channel with Delayed Feedback," *Proceedings of International Symposium on Information Theory (ISIT)*, 2012.

(C18) A. Vahid, M. Maddah-Ali, and S. Avestimehr, "Interference Channel with Binary Fading: Effect of Delayed Network State Information," *Proceedings of Allerton conference*, 2011.

(C19) A. Vahid, V. Aggarwal, S. Avestimehr, and A. Sabharwal, "On the Capacity of Multi-hop Wireless Networks with Partial Network Knowledge," *Proceedings of Allerton conference*, 2010.

(C20) A. Vahid and S. Avestimehr, "The Two-User Deterministic Interference Channel with Rate-Limited Feedback," *Proceedings of International Symposium on Information Theory (ISIT)*, 2010.

Preprints and Submitted Papers

(P1) S. Nassirpour, A. Vahid, "On Duality of Stability and Capacity Regions in Interference Networks," *under review.*

(P2) T. Levy, A. Vahid, R. Giryes, "Ranking Recovery from Limited Comparisons using Low-Rank Matrix Completion," *under review.*

(P3) A. Vahid, "Capacity Results for Intermittent X-Channels with Delayed Channel State Feedback," *submitted to IEEE Transactions on Information Theory*, 2019.

(P4) A. Vahid, , I. H. Wang, S. C. Lin, "Erasure Broadcast Channels with Intermittent Feedback," *submitted to IEEE Transactions on Information Theory*, 2019.

(P5) A. Vahid, , S. C. Lin, I. H. Wang, "Capacity Region of Erasure Broadcast Channels with Common Message and Feedback," *under review*.