

# Arash Gholami Davoodi

## Research Interests

Statistics, Machine Learning, Algorithms, Information Theory, Convex Optimization

## Employment

2018–Present **Research Fellow**, *School of Computer Science, Carnegie Mellon University.*

Research Topics:

High dimensional classification, universal hash design for discrete probability distributions (Locality sensitive hashing)

Finding associations in large datasets with subquadratic complexity

Large scale string alignment (Hidden Markov Model)

## Education

2013–2018 **University of California Irvine**, *PhD in Electrical Engineering and Computer Science, Information Theory*, GPA: 4.00/4.00.

Research Topics:

Finding asymptotic bounds on the entropies (Measure theory approach)

Capacity region Characterization (Graph theory point of view)

Sum-set Inequalities for entropies of discrete random variables (Combinatorics)

2009–2012 **Sharif University of Technology**, *M.Sc. in Electrical Engineering.*

Research Topics:

Power Allocation characterization (Convex optimization perspective)

Power allocation (Game theoretic approach)

Partial differential equations

2005–2009 **Sharif University of Technology**, *B.Sc. in Electrical Engineering (Minor in Mathematics).*

## Honors and Awards

2019 IEEE Communications Society and Information Theory Society Joint **Best Paper Award**, France.

2018–2020 **Lane Fellowship** from School of Computer Science, Carnegie Mellon University.

2014 IEEE GLOBECOM **Best Paper Award**, Austin, Texas.

2014 University of California Fellowship for Graduate Studies.

2014 Henry Samueli Fellowship Summer 2014.

2013 Ranked **1<sup>st</sup>** in the Ph.D. Preliminary Exam, EECS, UCI.

2012 Ranked **2<sup>nd</sup>** (top 0.007%) among 20,000 participants in the Iranian nationwide Ph.D. entrance exam.

2009 Ranked **2<sup>nd</sup>** (top 0.007%) among 30,000 participants in the Iranian nationwide M.Sc. entrance exam.

2005 Ranked **8<sup>th</sup>** (top 0.002%) among 400,000 participants in the Iranian nationwide B.Sc. entrance exam.

2005 Iran National Elite Foundation Fellowship.

2003 **Bronze Medal** National Mathematics Olympiad.

## Journal Papers

DAMI 2020 **A. G. Davoodi**, S. Chang, H. Yoo, A. Baweja, M. Mongia, H. Mohimani, "ForestDSH: A Universal Hash Design for Discrete Probability Distributions", Data Mining and Knowledge Discovery.

IEEE IT 2020 **A. G. Davoodi**, S. A. Jafar, "Sum-set Inequalities from Aligned Image Sets: Instruments for Robust GDoF Bounds," IEEE Transactions on Information Theory.

IEEE IT 2020 **A. G. Davoodi**, S. A. Jafar, "DoF Region of the MIMO  $(M, N_1, N_2)$  Broadcast Channel with Partial CSIT," IEEE Transactions on Information Theory.

- IEEE IT 2019 **A. G. Davoodi**, S. A. Jafar, "Optimality of Simple Layered Superposition Coding in the 3 User MISO BC with Finite Precision CSIT," IEEE Transactions on Information Theory.
- IEEE IT 2018 **A. G. Davoodi**, S. A. Jafar, "Aligned Image Sets and the GDoF of Symmetric MIMO Interference Channel with Partial CSIT," IEEE Transactions on Information Theory.
- IEEE IT 2018 **A. G. Davoodi**, S. A. Jafar, " $K$ -User Symmetric  $M \times N$  MIMO Interference Channel with Finite Precision CSIT: A GDoF Perspective," IEEE Transactions on Information Theory.
- IEEE IT 2018 **A. G. Davoodi**, B. Yuan, S. A. Jafar, "GDoF of the MISO BC: Bridging the gap between finite precision CSIT and perfect CSIT," IEEE Transactions on Information Theory.
- IEEE IT 2018 **A. G. Davoodi**, S. A. Jafar, "Network Coherence Time Matters: Interference Networks with Finite Precision CSIT Perfect CSIR," IEEE Transactions on Information Theory.
- IEEE IT 2017 **A. G. Davoodi**, S. A. Jafar, "Generalized DoF of the symmetric K-user interference channel under finite precision CSIT," IEEE Transactions on Information Theory.
- IEEE IT 2016 **A. G. Davoodi**, S. A. Jafar, "Aligned image sets under channel uncertainty: Settling conjectures on the collapse of degrees of freedom under finite precision CSIT," IEEE Transactions on IT. Recipient of IEEE Communications Society and Information Theory Society Joint **Best Paper Award**.
- IEEE IT 2016 **A. G. Davoodi**, S. A. Jafar, "Transmitter cooperation under finite precision CSIT: A GDoF perspective.
- IEEE IET 2013 M. J. Emadi, **A. G. Davoodi**, M. R. Aref, "Analytical power allocation for a full duplex decode-and-forward relay channel," IET Communications.
- Elsevier 2010 A. Davodi, D. Ganji, **A. G. Davoodi**, A. Asgari, "Finding general and explicit solutions  $(2 + 1)$  dimensional Broer-Kaup-Kupershmidt system nonlinear equation," Applied Mathematics and Computation.
- Wiley 2010 G. Domairry, A. Davodi, **A. G. Davoodi**, "Solutions for the Double Sine-Gordon equations by Exp-function method, Tanh and Extended Tanh methods," Numerical Method For PDE.

## Selected Conference Papers

For the complete list of my conference publications, please see my Google Scholar profile.

- AISTATS 2020 M. Ferdowsi, **A. G. Davoodi**, H. Mohimani, "Measuring Mutual Information Between All Pairs of Variables in Subquadratic Complexity.
- PAKDD 2020 M. Mongia , B. Soudry, **A. G. Davoodi**, H. Mohimani, "Efficient Database Search via Tensor Distribution Sensitive Bucketing.
- IEEE Globecom 2014 **A. G. Davoodi**, S. A. Jafar, " Settling conjectures on the collapse of degrees of freedom under finite precision CSIT. Recipient of IEEE Globecom **Best Paper Award**.

## Advising

- 2018–Present PhD Students: Mihir Mongia, Mohsen Ferdowsi
- 2018–Present Master Students: Chengze Shen
- 2018–2019 Undergraduate Students: Anubhav Bajewa, Benjamin Sourdi, Hyungon Yoo, Sean Chang

## Reviewing activities

IEEE Transactions on Information Theory  
 IEEE Transactions on Communication Systems  
 IEEE ISIT, IEEE GLOBECOM, IEEE ICC

## Programming

Python, C++, HTML, Matlab