

Professional Interests

Algorithm design and prototyping in machine learning, signal processing, & wireless networks;
Network information theory, signal processing, & statistics.

Education

Ph.D.	Electrical Engineering	Rice University — 2012
M.S.	Electrical Engineering	Rice University — 2008
B.S. (with honors)	Electrical Engineering	Univ. of Illinois at Urbana-Champaign — 2006

Selected Languages, Tools, & Platforms

- ◇ C, C++, Python, L^AT_EX, Matlab, NS2, NumPy/SciPy, Scikit-Learn, WARP
- ◇ Professional proficiency in spoken/written German, spoken Chinese (Mandarin)

Professional Experience

<i>Research Scientist</i>	Pixels.IO	MAR 2015 – Present
	Visual light communication systems R&D: Developed test procedures and new schemes for video response (VR) codes, specifically focusing on quantitatively developing signal processing techniques that create a screen-to-mobile-device communication link which remains unobtrusive (invisible) to human vision.	
<i>Postdoc. Researcher</i>	Univ. Southern California – EE Department	MAR 2014 – FEB 2015
	Network information theory research (<i>continuation of prior (Cornell) position</i>): Developed new schemes to represent/store/transmit data that outperform the state of the art in a broad range of settings including: <ul style="list-style-type: none">· content-caching device networks,· device-to-device communication networks,· wireless (interference) networks,· 5G communications. Developed new analytical tools to bound fundamental limits of performance for each setting, which confirm that in certain cases the new schemes are in fact optimal.	
<i>Postdoc. Researcher</i>	Cornell Univ. – ECE Department	2013–2014
	Network information theory research (<i>please see above</i>).	
<i>Research Assistant</i>	Rice Univ. – ECE Department (CMC Lab)	2006–2012
	Network information theory research: Studied fundamental limits of communication and interference management in wireless networks with distributed and mismatched knowledge of the network/channel state: 1) proved that in even in networks with a small number of users, existing approaches can be optimal if transmitters are not given “enough” channel knowledge, and 2) identified for each transmitter the critical amount of “enough” channel knowledge needed to exploit sophisticated interference management techniques. <i>[Thesis: A Matter of Perspective: Reliable Communication and Coping with Interference with Only Local Views]</i>	

Operations research: Used graph-, game-, and optimization-theoretic tools to study the impact of information asymmetry in resource allocation problems, with a specific application to dynamic spectrum allocation in wireless networks. Constructed distributed schemes to optimize usage of limited spectrum and analyzed the impact of locally-limited interaction on fairness of allocations.

[Thesis : *On Fairness in Wireless Networks Under Channel Uncertainty*]

Course assistant: Assisted in administration, grading, and instruction of numerous courses including Signals and Systems, Digital Communications, & Wireless Communications

Visiting Researcher **Arizona State Univ. – School of Arts, Media & Eng.** Summer 2010

Social media research: Studied the interplay between user devices, communication network infrastructure, and spread of information in social networks. Developed scripts to gather sample social network data (Twitter) and created statistical models for subsequent analyses. Assisted in composition of grant proposal.

Visiting Researcher **Princeton Univ. – EE Department** Summer 2008

Operations research: Developed axiomatic system of measuring “fairness” which generalizes many mathematical notions of fairness and social optimality in engineering, economics, social sciences, and philosophy. Consequently, this system of axioms quantifying prevalent socio-psychological themes across many disciplines.

Engineering Intern **Motorola Customer’s Center for Solutions Integration** Summer 2006

Designed, staged, and tested new large scale, two-way trunking radio systems for first responders. Integrated new systems with previously deployed systems. Demonstrated and guided clients through various system features.

Honors & Awards

Edmund McAshan Dupree Distinguished Graduate Fellowship in Electrical Engineering (2008), Texas Instruments Distinguished Fellowship (2006), Alton B. Zerby & Carl T. Koerner Award Finalist (2007), Vodafone Research Scholarship (2005), University of Illinois Chancellor’s Scholar (2002), University of Illinois Outstanding ECE Freshman (2002), National Merit Finalist (2002), Brown University Book Award (2002), Hillsborough High School Valedictorian & Math Award (2002)

Selected Publications

- ◇ D.T.H. Kao, M. Maddah-Ali, and A.S. Avestimehr, “Blind index coding.” in preparation for submission to Information Theory, IEEE Transactions on.
[preprint: <http://arxiv.org/abs/1504.06018>]
- ◇ D.T.H. Kao and A.S. Avestimehr, “Linear degrees of freedom of the MIMO X-channel with delayed CSIT.” submitted to Information Theory, IEEE Transactions on.
[preprint: <http://arxiv.org/abs/1405.1091>]
- ◇ D.T.H. Kao and A. Sabharwal, “Two-User Interference Channels With Local Views: On Capacity Regions of TDM-Dominating Policies,” Information Theory, IEEE Transactions on, vol.59, no.11, pp.7014,7040, Nov. 2013.
[DOI: <http://dx.doi.org/10.1109/TIT.2013.2274512>]
- ◇ H. Yu, L. Zhong, A. Sabharwal, and D.T.H. Kao, “Beamforming on mobile devices: A first study,” in Proc. ACM Int. Conf. Mobile Computing and Networking (MobiCom), 2011.
[DOI: <http://dx.doi.org/10.1145/2030613.2030643>]
- ◇ T. Lan, D.T.H. Kao, M. Chiang, and A. Sabharwal, “An Axiomatic Theory of Fairness in Network Resource Allocation,” INFOCOM, 2010 Proceedings IEEE, vol., no., pp.1,9, 14-19 March 2010.
[DOI: <http://dx.doi.org/10.1109/INFCOM.2010.5461911>]

- A comprehensive curriculum vitae may be found at <http://dthkao.github.io/files/kao-CV.pdf>.
- References available upon request.