MICHAEL C. GRANT, Ph.D.

Optimization, Computational Mathematics, Engineering Applications

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Current projects:

Primary developer of cvx, a MATLAB-based modeling framework for disciplined convex and geometric programming (http://www.stanford.edu/~boyd/cvx). As of April 2009, cvx has been incorporated into coursework in at least 29 universities and used in some capacity in over 120 additional universities, research institutions, and corporations.

Staff Scientist, Department of Applied and Computational Mathematics, California Institute of Technology (Emmanuel Candès, advisor). Using GPU-based computation to accelerate compressed sensing algorithms in a wideband wireless sensing system.

Chief engineer, Cardinal Optimization. Developing a commercially deployable implementation of a high-performance ad-hoc network localization system.

Guest lecturer for a graduate course in nonlinear programming for the Operations Research & Industrial Engineering Group, University of Texas at Austin.

Education:

Ph.D., Electrical Engineering. Stanford University, January 2005. Dissertation: "Disciplined Convex Programming." Advisors: Stephen Boyd and Yinyu Ye.

M.S., Electrical Engineering. Stanford University, 1992.

B.S., Electrical Engineering. The University of Texas at Austin, 1990.

Prior appointments:

Stanford University. Research Associate, Petroleum Engineering, 2006-2007.

Stanford University. Consulting Assistant Professor, Electrical Engineering, 2005-2006.

Woodside Networks, Inc./Airgo Networks., Inc. consultant, 2001.

Clarity Wireless, Inc./Cisco Systems, Inc. wireless algorithm design engineer, 1998-2001.

Numerical Technologies, Inc. co-founder, Vice President of Product Development, 1995-1998.

Integrated Systems, Inc. consultant, 1991-1993.

Stanford University. teaching & research assistant, systems administrator, 1990-1996.

Synergistic activities:

Wireless communications. Developed algorithms for wireless communications, including OFDM modulation and demodulation, channel estimation, power control, signal acquisition and synchronization, and error-correcting codes. Constructed a high-performance simulation framework, improving simulation productivity by a factor of 1000. Served as chief architect in a collaboration to build an ASIC implementation of full transmit and receive processing chains. Actively participated in standardization efforts.

Electronic design automation. Co-founded a company devoted to the advancement of subwavelength semiconductor manufacturing. Exploited advances in numerical algorithms, signal and image processing, and optimization to construct a high-speed simulation and visualization system for the lithography process. Applications include process verification, mask defect detection and analysis, and optical proximity correction. Developed first revenue-generating products, and co-negotiated bootstrap financing and partnership.

Petroleum engineering. Assisted in the development and promotion of an interdisciplinary program tasked with applying advanced optimization methods to petroleum reservoir design. Led the process to select graduate students and a postdoctoral researcher, and supervised their work. Co-developed a system for performing distributed optimization of reservoir well placement.

Engineering design. Developed a visualization system and a signal processing toolbox for a mathematical modeling system.

Publications:

M. Grant and S. Boyd, "Graph Implementations for Nonsmooth Convex Programs," V. Blondel, S. Boyd, and H. Kimura (eds.), *Recent Advances in Learning and Control (tribute to M. Vidyasagar)*, Springer, 2008.

M. Grant, S. Boyd, and Y. Ye, "Disciplined Convex Programming," L. Liberti and N. Maculan (eds.), *Global Optimization: From Theory to Implementation*, Springer Science + Business Media, New York, 2005.

S. Boyd, L. Vandenberghe, and M. Grant, "Efficient Convex Optimization for Engineering Design," *Proceedings IFAC Symposium on Robust Control Design*, September 1994, pp. 14-23.

Selected talks:

M. Grant, "Convex optimization as a tool for engineering design", Wireless Networking and Engineering Group seminar series, The Unversity of Texas at Austin, November 2007.

M. Grant and D. Echeverria, "Distributed Field Development Optimization (FDO) using MATLAB", Smart Fields Consortium meeting, Stanford, California, April 2007.

M. Grant and S. Boyd, "`CVX`: A modeling framework for disciplined convex programming", ICCOPT II — MOPTA 07, Hamilton, Ontario, August, 2007.

M. Grant, P. Sarma, *et. al.*, "The Smart Field: Advanced Optimization for Petroleum Reservoirs", ICME Colloquium, November 2006.

M. Grant and S. Boyd, "Canonicalizing disciplined convex programs", EURO XXI, Reykjavik, Iceland, July, 2006.

S. Boyd, M. Grant, *et. al.*, "Engineering Applications of Convex Optimization", EURO XXI, Reykjavik, Iceland, July, 2006.

M. Grant, S. Boyd, and Y. Ye, "A Framework for Modeling, Analyzing, and Solving Disciplined Convex Programs," CORS/INFORMS Joint International Meeting, Banff, Alberta, May 2004.

M. Grant, "Infeasible primal-dual methods for the general cone,", International Symposium on Mathematical Programming, EPFL, Lausanne, Switzerland, 1997.

M. Grant, "Improving the Efficiency of Interior-Point Methods Using Conic Formulations," Fifth SIAM Conference on Optimization, Victoria, British Columbia, Canada, May 1996.

M. Grant and S. Boyd, "Efficient Convex Optimization for Control Design," Third SIAM Conference on Control and its Applications, April, 1995.

Miscellany:

Reviewer for the INFORMS Journal on Computing; Computers and Operations Research; Journal of Global Optimization.

Memberships in IEEE, SIAM, ACM, INFORMS, MPS, MAA.

National Science Foundation fellowship, Stanford University, 1991-1996.

Virginia and Ernest H. Cockrell scholarship, University of Texas at Austin, 1986-1990.