

EDUCATION

Harvard University: Div. of Applied Sciences, M.S., Ph.D. Thesis advisor: Y. C. Ho.
Brown University: Div. of Applied Mathematics. Sc.B. - Sc.M.

PROFESSIONAL EXPERIENCE

Defense Science Board task force on Defense Intelligence **2010 - 2011**

Member of taskforce making recommendations related to Counter Insurgency (COIN) Intelligence, Sureveillance, and Reconnaissance (ISR) Operations. Final report presented to most senior members of the DoD.

cf. <http://www.acq.osd.mil/dsb/reports/2011-05-COIN.pdf>

The MITRE Corporation, Group Leader **2009 -**

Selected Recent Projects: Provide technical guidance to ONR for their HSCB (Human Social, Cutural and Behavioral Sciences) program; perform mathematical analysis of social media; modeled preferences of aircraft pilots for new communication system;evaluated IRS marketing study; conducted portfolio analysis to assist a value based budgeting project.

MIT Lincoln Laboratory, Member Technical Staff **2000 - 2009**

- *SUMMARY:* Member of Communication Division (2000-2003) focused on performance analysis of optical communication systems. Member of Sensor Division (2004-present) focused on tracking and abnormality detection at the theoretical and applied level with increasingly levels of responsibility.
- Principal Investigator for multi-year effort for tracking/abnormality resolution project with up to 10 staff. Raised total of \$1.6M.
- Technical lead for multi-sensor traffic maritime tracking project. Applied analysis to heaviest traffic lane in the world using real data. Automatically identified pirate activity based on ship tracks. Raised \$535K for last two years of three year effort.
- Developed algorithm for georegistrating EO detections and EO fusion of tracklets.
- Guide development of multiple hypothesis GMTI tracker.
- Consultant to DARPA maritime abnormality project, PANDA.
- Applied performance analysis and system analysis of optimal communication systems.
- Led effort to develop and patent fast large scale erasure code.

GTE / Verizon Laboratories, Prin. Mem. of Tech. Staff **1983-2000**

- *SUMMARY:* Technical leadership role in telecommunication system analysis effort for over ten years; consultant for all major GTE subsidiaries in areas of wireless communication, traffic engineering, capacity estimation and scheduling; recipient of highest technical award from GTE CEO; collaborated with researchers at major universities around the world.

- Developed world's fastest numerical algorithms to solve a wide class of capacity estimation problems with anticipated application to cellular telephone access, wireless voice/data protocols, and multi-class internet capacity estimation. *Status:* Cellular telephone rollout expected in 2000 with multi-million dollar savings expected.
- Jointly developed inventory policy recommendations for new telephone lines which mediates tradeoffs between capital costs and installation expenses. *Impact:* Recommendations adopted with multi-million dollar savings expected; received highest GTE Technical Award from GTE's Chief Executive Officer (1999).
- Proposed and implemented a new approach to maintenance scheduling of airplanes with air-to-ground telephones based on statistical analysis of billing records. *Impact:* Radically reduced time to detection of faulty equipment while reducing costs.
- Proposed and implemented a new approach to inferring the delays and lost revenue due to impatient air-to-ground telephone customers based on statistical analysis of billing records. *Impact:* Analysis supported capacity expansion plans.
- Proposed and conducted fundamental research for a new approach for incorporating burstiness of SS7 signaling traffic in the SS7 network capacity design. *Impact:* Recommendations adopted using substantially less capacity than previously planned.
- Assisted GTE Airfone with testimony to the FCC.
- Patented new approach for fraud protection for use in cellular communication system.
- Support call center operations using analytic methods to improve agent staffing levels, identify critical drivers of customer service, and invent an improved routing algorithm.
- Proposed new processor schedule, *Bernoulli* Schedule, that received worldwide attention in academic literature, which was motivated by GTE's local switch scheduling needs.
- Generalized a longstanding cornerstone formula in queueing theory, Little's Law, to relate waiting time distributions to queue length probability distributions.
- Extensive personal research collaborations with researchers around the world. Strong role advising and vetting projects between universities and GTE Laboratories.

**Harvard University
Massachusetts Institute of Technology**

1989-1990

- *SUMMARY:* Sabbatical leave from GTE Laboratories.
- Taught graduate queueing theory course at MIT.
- Advised Ph.D. students at Harvard University and MIT.

- Published research related to transient networks of queues, inferencing of queues, and scheduling issues.

Bell Laboratories: Member of Technical. Staff Summer '78, 1981-1983

- *SUMMARY*: Performance analysis of telecom systems, published three papers.

PROFESSIONAL ACTIVITIES

INFORMS (Institute of Operations Research and Management Sciences)

- Board of Directors ,1998-2002, 2007-2008.
- Elected Fellow, 2004.
- Chair, INFORMS Boston Chapter, 2005 – present.
- Chair, INFORMS Applied Probability Society, 1999.
- Chair, INFORMS Telecommunication Society. 1995.
- Associate Editor, ORSA Journal on Computing. 1992-98.
- Associate Editor, Operations Research, 1989-1994.
- Associate Editor, Management Science, 2005 – 2009.
- Co-Program Chair of first Northeast Regional INFORMS conference, 2011

Other

- Department Editor, *J. of Discrete Event Dynamic Systems*, 2009-
- Ph.D. thesis committee, MIT, 1990, 2000.
- Ph.D. thesis committee, Harvard, 1990.
- Ph.D. thesis committee, BU, 2007-present.
- Judge, Mass. State Science Fair, 1996 – present.
- Evaluation committee, Math Dept, UMASS, Lowell, 1993.
- IEEE Senior member

PATENTS

- *System and Method for Determining an Optimal Threshold for Increasing Telephone Line Capacity and For Evaluating Line Management Policies*, with R. Tobin and J. Drew. No. 7,162,017. January 9, 2007.
- *Method and Apparatus for Protecting Data*. No. 7,032,166. April 18, 2006.
- *System and method for redirecting calls to blocked cell sites*, with G. Greene, W. Hogg, M. Nail, V. Stone, No. 6,681,113. January 20, 2004.
- *Fast method for capacity estimation of systems*. No 6,397,066. May 28, 2002.
- *Probabilistic use of wireless reserve channels for admission control*, with G. Greene, W. Hogg, M. Nail. No. 6,314,293. November 6, 2001.
- *Method and apparatus for efficient call routing*, with S. Humair, No. 6,115,462. September 5, 2000.
- *Method of fault identification for multiplexed devices*. No. 5,940,754. August 17, 1999.
- *Control process for allocating services in communication systems*, with J. Keilson, No.5,381,546. January 10, 1995.

- *Method of verifying identification*. No. 5,278,904. January 11, 1994.
- *Wireless device for verifying identification*. No. 5,319,711. January 7, 1994.

SELECTED PUBLICATIONS (5 with over 20 citations)

- *Software-based Erasure Codes for Scalable Distributed Storage*, with J. Cooley, E. Tsung and J. Mineweaser. *Mass Storage Systems and Technologies*, 2003. (MSST 2003). Apr 7-10, 2003, pp. 157-164.
- *Exploiting Markov Chains to Infer Queue-Length From Transactional Data*, with D. J. Daley, *Journal of Applied Probability*, Vol. 29, 1992, pp. 713-732.
- *Optimizing Bernoulli Routing Policies for Balancing Loads on Call Centers and Minimizing Transmission Costs*, with S. Humair, *Journal of Optimization Theory and Applications (JOTA)*, 1999. Vol. 100, No. 3, pp. 623-659.
- *A Distributional Form of Little's Law*, with J. Keilson, *Operations Research Letters*, Vol. 7, No. 5, 1988, pp. 223-227.
- *A Class of Center-Free Resource Allocation Algorithms*, with Y. C. Ho and R. Suri, *Journal of Large Scale Systems: Theory and Application*, Vol. 1, No. 1, Feb., 1980, pp. 51-62.
- *Average Delay Approximation of M/G/1 Cyclic Service Queue with Bernoulli Schedules*, *IEEE Trans. on Selected Areas of Communications*, Vol. SAC-4, No. 6, Sept., 1986, pp. 813-822.
- *Capacity Estimation of Cyclic Queues*, *IEEE Trans. On Communications*, Vol. COM-33, No. 3, Mar., 1985, pp. 279-281.
- *Oscillating Random Walk Models for GI/G/1 Vacation Systems with Bernoulli Schedules*, with J. Keilson, *Journal of Applied Probability*, Vol. 23, Sept., 1986, pp. 790-802.
- *Networks of Non-homogeneous M/G/ ∞ Systems*, with J. Keilson, *J. of Applied Probability*, Vol. 31A, 1994, pp. 157-168.
- *The D/G/1 Queue with Vacations*, *Operations Research*, Vol. 34, No. 4, July-August, 1986, pp. 619-629.
- *Nested Square Roots of Two*, *American Math. Monthly*, Vol. 110, No. 4, pp. 326-330.