

Michael P. Frank

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Education

Degree	Field	School	Received
Doctor of Philosophy	Electrical Engineering & Computer Science	Massachusetts Institute of Technology	June 1999
Master of Science	Electrical Engineering & Computer Science	Massachusetts Institute of Technology	June 1994
Bachelor of Science (with distinction & departmental honors)	Symbolic Systems	Stanford University	June 1991

Massachusetts Institute of Technology

Cambridge, MA

1991-1999

Ph.D. in Electrical Engineering and Computer Science, June 1999. Dissertation under Dr. Thomas F. Knight, Jr. on *Reversibility for Efficient Computing*. Minor in VLSI design. Additional coursework in computer architecture, artificial intelligence (AI), and theoretical computer science. **M.S.** in Electrical Engineering and Computer Science, June 1994. Masters thesis under Dr. Jon Doyle on decision-theoretic AI. Student work experience as research assistant, teaching assistant, and UNIX sysadmin. Cumulative **GPA** at MIT: 4.9 (out of 5.0).

Stanford University

Stanford, CA

1987-1991

B.S., with distinction & departmental honors, in Symbolic Systems, June 1991. Broad curriculum emphasizing computer science, mathematical logic, and artificial intelligence. Independent research & programming work exploring 3-D rendering and AI techniques. **GPA** in major: 3.9 (out of 4.0). **GRE** scores: Verbal 730 (97%ile), Quantitative 800 (97%ile), Analytical 750 (96%ile) (all out of 800), Computer Science 850 out of 900 (99%ile).

Professional Positions

Ribbit.me! SA

San Francisco, CA

Fall 2014-present

Part-time member of the advisory board for this startup company that is developing a universal rewards points program based on cryptocurrency technology. Provided advisement regarding various technological issues and staffing.

Cryptowerks, Inc.

Pompano Beach, FL

Spring-Summer 2014

Informal advisor to this startup company which aimed to develop novel applications of cryptocurrency technology. Developed conceptual designs for new blockchain-based protocols for various applications. Participated in sales pitch meetings to venture capital firms.

FAMU-FSU College of Engineering

Tallahassee, FL

Sep. 2012-present

Full-time faculty member in a non-tenure-track position with an emphasis on teaching and administrative duties, appointed with the title Associate in Engineering (2012-14), and subsequently Associate Teaching Professor (2014-present). Taught and coordinated the multidisciplinary capstone Senior Design Project course with regards to the students and faculty in the department of Electrical & Computer Engineering. Position involved technical and nontechnical advising of 14-24 projects per year, including numerous industry-sponsored and entrepreneurial projects, and multidisciplinary projects including students from disciplines including Electrical Engineering, Computer Engineering, Mechanical Engineering, Industrial & Manufacturing Engineering, Civil Engineering, and Computer Science; as well as projects involving international collaborations. Also oversaw the Center for Academic Support in Engineering (C.A.S.E.) instructional laboratory in 2012-14, which provided tutoring services to undergraduate engineering students. Also organized the College's Engineering Entrepreneurship Kickoff Event in April 2013, which brought together students, faculty, and local business leaders in a workshop to foster student entrepreneurial activities at our college. Also taught the college's Introduction to Electrical Engineering course in Summer 2013.

Turf-Tec International

Tallahassee, FL

Fall 2010, Summer 2012

Provided occasional electronics design consulting services to this local manufacturer and distributor of turfgrass maintenance equipment. In 2010, designed the electronics for a new digital soil moisture meter product, now a market success; subsequently completed a prototype electronic system for a forthcoming turf hardness impact tester product.

FAMU-FSU College of Engineering

Tallahassee, FL

Sep. 2010-June 2012

Half-time adjunct faculty position in the Department of Electrical & Computer Engineering as Senior Design Coordinator & Teaching Lab Supervisor. Updated lab assignments for the Microprocessor-Based System Design course in Fall 2010; served as lecture & lab instructor for Digital Logic Design in Spring 2011; taught the multidisciplinary capstone Senior Design course in academic year 2011-2012, coordinating 15 projects involving ~70 students from 3 departments and ~30 faculty & external advisors. Also taught Introduction to Electrical Engineering in Tianjin, China in Summer 2012 as part of FSU's International Program.

Florida A&M University

Tallahassee, FL

Nov. 2008-May 2012

Research Associate in the Department of Physics under Prof. Ray O'Neal, serving as lead engineer on the COSMICi project to develop novel scientific instrumentation for cosmic-ray astronomy, funded under an NSF CREST grant. Position has involved: Digital system design, selection and purchasing of electronic components & equipment, custom printed circuit board (PCB) design using Mentor Graphics PADS tools, PCB assembly & analog/digital testing, FPGA-based embedded hardware/software co-design using the Altera Nios soft-core CPU, custom programming of wireless networking modules, design & implementation of a multi-threaded network server with GUI in Python, design and prototyping of custom optical and mechanical components using eMachineShop.com.

Florida State University

Tallahassee, FL

Sep. 2008-Jan. 2009

Part-time postdoctoral associate (research staff member) in the Dept. of Electrical & Computer Engineering, responsible for the design and development of a space-efficient quantum computer simulator which was prototyped in Visual C++, to be translated to VHDL for FPGA embedding. Project won an FSU CRC award and produced two conference papers.

Frank Enterprises, LLC

Quincy, FL

Aug. 2007-Dec. 2008

Owner and sole manager of this limited liability company registered in Florida. Conceived, designed and started up a new local business, Books & Bytes Bookstore & Internet Café. Acting as CIO, installed and configured the store's inventory software, point-of-sale (POS) system, and client-server network. Acting as COO, developed and implemented business processes for inventory management, purchasing, receiving, and customer relations management (CRM). As HR director, hired two employees and carried out payroll functions. As Marketing Director, conducted market research, and designed and implemented various promotional and advertising campaigns.

FAMU-FSU College of Engineering

Tallahassee, FL

Aug. 2004-May 2007

Tenure-track assistant professor and member of the graduate faculty (both FSU & FAMU) in the Electrical & Computer Engineering department. Taught courses in Microprocessor-Based System Design, Computer Architecture, Digital Logic, and the Physical Limits of Computing. Active in supervising senior design projects and managing the senior design course. Helped department meet ABET criteria. Performed additional student mentoring and advising in collaboration with the Traffic Engineering Research Lab (TERL) and the High-Performance Computing & Simulation (HCS) group. Also active in a variety of research and service activities, including authoring a number of grant proposals and publications.

Sandia National Laboratories

Albuquerque, NM

2003-2007

Occasional contract worker, providing consulting services relating to the development of a new roadmap for supercomputing that surveys novel technologies to take supercomputing beyond the physical limits that threaten to end Moore's Law.

University of Florida

Gainesville, FL

Aug. 1999-July 2004

Tenure-track assistant professor and member of the graduate faculty in the Computer & Information Science & Engineering Department, and affiliate assistant professor and graduate

faculty member in the Electrical & Computer Engineering Department. Both departments are in UF's College of Engineering. Position involved teaching graduate and undergraduate courses, advising students, supervising student projects (including Masters and Ph.D. theses), applying for research contracts and grants, leading research projects, and pursuing research, writing academic publications and patent applications, and performing services for the academic community.

Massachusetts Institute of Technology

Cambridge, MA

Summer 1999

Postdoctoral researcher in the Artificial Intelligence Laboratory under the supervision of Dr. Tom Knight. Extended my Ph.D. research, worked on publications, and supervised a summer student.

Marketplace.Net, Inc.

San Jose, CA

March 1998-February 1999

Senior software engineer and web developer for this internet startup's primary web site, **StockMaster.com**, which provided public and corporate financial information services. Created custom extensions to the Apache web server for fast communication with an ObjectStore back-end object database. Created prototype CGI-based software for processing and displaying international stock and index data from Dow Jones. Many other software engineering and site maintenance responsibilities.

NASA Ames Research Center

Mountain View, CA

Summer 1996

Aided the design and development of high-level control software for the Deep Space One autonomous spacecraft, part of NASA's "New Millennium" program. Created an object-oriented, extensible spacecraft simulator, using the Common Lisp Object System. Contract work administered through Caelum Research Corporation.

Newton Research Labs

Cambridge, MA

Fall 1995

Software design subcontractor for Microsoft. Helped architect software to support the digital broadcast of multimedia & web content via DirectTV satellite.

IBM T. J. Watson Research Center

Hawthorne, NY

Summers 1994-1995

Research assistant in the handwriting recognition group. Participated in R&D of a large software system in C for on-line recognition of handwritten words using Hidden Markov Models (HMMs) for statistical pattern recognition.

NEC Research Institute

Princeton, NJ

Summer 1993

Research intern. Worked on decision-theoretic game-tree search algorithms.

SRI International

Menlo Park, CA

Summers 1990-1991

Helped develop the Tileworld software environment for simulation of agent architectures. Increased simulation performance, created an X interface in Common Lisp. Later, developed a system for conducting HCI (human-computer interaction) experiments for speech and handwriting recognition systems. Created an LCD tablet graphical interface in C using the X window system.

Center for the Study of Language & Information (CSLI) Stanford, CA
Summer 1989

Research intern at this Stanford-affiliated research facility. Developed PROSIT, a new logic programming language based on the logic of Situation Theory.

Microsoft Corporation Redmond, WA
Summer 1988

Software engineer on Microsoft Works 2.0 for MS-DOS; coded many new features in C. Invented an algorithm for reverse-scanning strings of variable-length characters.

Awards & Honors

- Teacher of the Year award, presented by UF ACM student chapter, 1999-2000.
- National Science Foundation Graduate Fellow, 1992-1995.
- World champion team member, ACM Collegiate Programming Contest, 1991.

Research

Publications:

Book chapters:

- Michael P. Frank, "**Nanocomputers-Theoretical Models**," invited article (review chapter) in the *Encyclopedia of Nanoscience and Nanotechnology*, Hari Singh Nalwa, ed., American Scientific Publishers, 2004. Manuscript at <http://www.cise.ufl.edu/research/revcomp/Nanocomputers.doc>.

Monographs:

- Michael P. Frank, "**Reversibility for Efficient Computing**," Ph.D. thesis, Massachusetts Institute of Technology, Cambridge, Massachusetts, May 1999.
- Michael P. Frank, "**Advances in decision-theoretic AI: Limited rationality and abstract search**," Master's thesis, Massachusetts Institute of Technology, Cambridge, Massachusetts, May 1994.

Refereed journal publications:

- Michael P. Frank, "**On the Interpretation of Energy as the Rate of Quantum Computation**," *Quantum Information Processing*, 4(4):283-334, Oct. 2005.
- Michael P. Frank, "**Physical Limits of Computing**," *Computing in Science and Engineering*, 4(3):16-25, IEEE/AIP, May/June 2002.
- Michael P. Frank and Tom Knight, "**Ultimate theoretical models of nanocomputers**," *Nanotechnology* 9(3):162-176, Sep. 1998. Also presented at

the Fifth Foresight Conference on Molecular Nanotechnology, Palo Alto, CA, Nov. 1997.

Preprints of journal articles in progress:

- Darryl W. McGowan, Jr., David R. Grosby, Michael P. Frank, Sachin Junnarkar, and Ray H. O'Neal, Jr., "**Field-Programmable Gate Array Based Front-End Data Acquisition Module for the COSMICi Astroparticle Telescope System,**" preprint, arXiv:1204.5104v1, Apr. 23, 2012.

Magazine articles:

- Michael P. Frank, "**Reversible Computing,**" *Developer 2.0* programmers' magazine (affiliated w. *Dr. Dobb's Journal*), India, Jan. 2004.

Refereed conference publications:

- Michael P. Frank, Kamal E. Amin, Okenwa I. Okoli, Sungmoon Jung, Robert A. Van Engelen, and Chiang Shih, "**Expanding and Improving the Integration of Multidisciplinary Projects in a Capstone Senior Design Course: Experience Gained and Future Plans,**" paper ID #9523 in the Proceedings of the 121st ASEE Annual Conference & Exposition, Indianapolis, IN, June 15-18, 2014.
- Michael P. Frank, Sachin S. Junnarkar, Triesha Fagan, Ray H. O'Neal, Jr., and Helio Takai, "**Design of a Wireless Sensor Network with Nanosecond Time Resolution for Mapping of High-Energy Cosmic Ray Shower Events,**" presented in Conference 7706: Wireless Sensing, Localization, and Processing V, at the SPIE Defense, Security and Sensing Symposium, Orlando, FL, April 5-9, 2010, published in the Proceedings of SPIE, vol. 7706, paper 7706-2 (2010).
- Michael P. Frank, Liviu Oniciuc, Uwe H. Meyer-Baese, and Irinel Chiorescu, "**A space-efficient quantum computer simulator suitable for high-speed FPGA implementation,**" Proceedings of SPIE, vol. 7342, Quantum Information and Computation VII, E. J. Donkor, A. R. Pirich, and H. E. Brandt, eds., 734203, 2009.
- Michael P. Frank, Uwe H. Meyer-Baese, Irinel Chiorescu, Liviu Oniciuc, Robert A. van Engelen, "**Space-efficient simulation of quantum computers,**" Proc. of the 47th Ann. ACM Southeast Regional Conf., Clemson, SC, article #83, 2009.
- Michael P. Frank, "**Reversible Computing and Truly Adiabatic Circuits: The Next Great Challenge for Digital Engineering,**" invited talk presented at the *Fifth IEEE Dallas Circuits and Systems Workshop on Design, Applications, Integration and Software* (DCAS-06), held Oct. 29-30, 2006, at UT Dallas, pp. 31-38.
- Michael P. Frank, "**Approaching the Physical Limits of Computing,**" invited keynote talk at *ISMVL 2005, The Thirty-Fifth IEEE Symposium on Multiple-Valued Logic*, May 19-21, 2005, University of Calgary, Calgary, Canada, pp. 168-185.

- Michael P. Frank, “**Introduction to Reversible Computing: Motivation, Progress, and Challenges**,” in *Proceedings of the 2nd ACM Conference on Computing Frontiers*, Ischia, Italy, May 4-6, 2005, pp. 385-390.
- Maojiao He, Michael P. Frank, and Huikai Xie, “**CMOS-MEMS Resonator as a Signal Generator for Fully-Adiabatic Logic Circuits**,” invited paper presented at the MEMS I session of the *Smart Structures, Devices, and Systems II* conference at the *SPIE International Symposium on Smart Materials, Nano-, and Micro-Smart Systems*, held 12-15 Dec. 2004, University of New South Wales, Sydney, Australia. Published in *Proceedings of SPIE*, vol. #5649, paper #18.
- Venkiteswaran Anantharam, Maojiao He, Krishna Natarajan, Huikai Xie, and Michael P. Frank, “**Driving Fully-Adiabatic Logic Circuits Using Custom High-Q MEMS Resonators**,” paper presented at the 2004 workshop on *Methodologies for Low Power Design (MLPD '04)*, part of the *Embedded Systems and Applications (ESA '04)* conference, Las Vegas, Nevada, June 21-24, 2004. Published in *Proceedings of the International Conference on Embedded Systems & Applications, ESA '04*, H.R. Arabnia, M. Guo, & L. T. Yang, eds., CSREA Press, pp. 5-11.
- Michael P. Frank, “**A Technology-Independent Model of Nanoscale Logic Devices**,” *Technical Proceedings of the 2004 Nanotechnology Conference and Trade Show*, sponsored by NSTI, held in Boston, Mar. 7-11, 2004. Volume 2, chapter 2, pages 29-32.
- Pradeep Padala and Michael P. Frank, “**Design of a Self-evolving Scalable Matching Network for OCEAN**,” poster paper accepted at the International Symposium on High-Performance Computing (HiPC'03), Dec. 2003.
- Pradeep Padala, Cyrus Harrison, Nicholas Pelfort, Erwin Jansen, Michael P. Frank and Chaitanya Chokkareddy, “**OCEAN: The Open Computation Exchange and Arbitration Network, A Market Approach to Meta computing**,” in the proceedings of the International Symposium on Parallel and Distributed Computing (ISPDC'03), Oct. 2003.
- Michael P. Frank, “**Common Mistakes in Adiabatic Logic Design and How to Avoid Them**,” paper presented at Methodologies in Low-Power Design Workshop, part of the International Conference on Embedded Systems and Applications, at the International Multiconference in Computer Science & Computer Engineering, held in Las Vegas, Nevada, June 23-26, 2003.
- Michael P. Frank, “**Nanocomputer Systems Engineering**,” paper presented at the NanoEngineering World Forum, sponsored by the International Engineering Consortium, held in Marlborough, MA, June 23-25, 2003.
- Michael P. Frank, “**Reversible Computing: Quantum Computing's Practical Cousin**,” invited general introductory lecture presented at the James H. Simons Foundation Conference on Quantum and Reversible Computing, Stony Brook, NY, May 28-31, 2003.
- Michael P. Frank, “**Nanocomputer Systems Engineering**,” proceedings of the 2003 Nanotechnology Conference and Trade Show, held Feb. 23-27, 2003, San Francisco, CA.
- Sama Govindaramanujam, Cyrus Harrison, Erwin Jansen, Sriram Kumar Nallan, Sahib Singh, and Michael P. Frank, “**Locating Suitable Resources in OCEAN**,”

- paper accepted for poster presentation at HiPC (High-Performance Computing), 2002.
- Michael P. Frank, Tom Knight, Norm Margolus, ``**Reversibility in optimal scalable computer architectures**,'' in Calude, Casti, Dineen, eds., *Unconventional Models of Computation* (proceedings of the First International Conference on Unconventional Models of Computation, Jan. 1998), pages 165-182, Springer, 1998.
 - Michael P. Frank, Carlin Vieri, M. Josephine Ammer, Nicole Love, Norman H. Margolus, Thomas F. Knight, Jr., ``**A scalable reversible computer in silicon**,'' in *ibid.*, pages 183-200.
 - Sharon Oviatt, Philip Cohen, Martin Fong, and Michael Frank, ``**A rapid semi-automatic simulation technique for investigating interactive speech and handwriting**,'' *Proceedings of the International Conference on Spoken Language Processing*, Bariff, Canada, October 1992.
 - Matthew L. Ginsberg, Michael Frank, Michael P. Halpin, and Mark C. Torrance, ``**Search lessons learned from crossword puzzles**,'' *Proceedings Eighth National Conference on Artificial Intelligence*, 1990.

Patent applications:

- Michael P. Frank and Huikai Xie, UF patent application #11550, U.S. Provisional Patent Application No. 60/570,170, ``**High-Q MEMS Resonators and Adiabatic Logic Circuits Using the Same**,'' Feb. 2004 (submitted, patent is pending).

Technology disclosures:

- Michael P. Frank and Huikai Xie, ``**Custom micro-electromechanical oscillator for generating custom-shaped resonant energy-recovering AC voltage waveforms for driving adiabatic circuits and other applications**,'' disclosure to University of Florida Office of Technology Licensing, 2003. (Led to above patent application.)
- Michael P. Frank, ``**Efficient, two-level, fully-adiabatic, pipelineable logic family**,'' disclosure to University of Technology Licensing, 2002. (UF declined to exert, due to prior exposure in publicly available lecture materials.)

Technical reports:

- Michael P. Frank and David Mondrus, ``**Introducing NDcoin: A Cryptocoin-Based Concept for Incentivized, Distributed Nondeterministic Computation**,'' working whitepaper, Feb. 1st, 2014.
- Michael P. Frank, ``**Why Portfolio Rebalancing Works: An Analytical Demonstration**,'' research memo, Dec. 21, 2013.
- Sarah E. Frost-Murphy, Marco Ottavi, Michael P. Frank and Erik P. DeBenedictis, ``**On the design of reversible QDCA systems**,'' technical report

- SAND2006-5990, Computation, Computers, Information and Mathematics (CCIM) Center, Sandia National Laboratories, Sep. 2006.
- Michael P. Frank, “**The Indefinite Logarithm, Logarithmic Units, and the Nature of Entropy,**” manuscript (research note) posted at <http://arXiv.org/abs/physics/0506128>, June 14, 2005.
 - Shashank Shetty, Pradeep Padala and Michael P. Frank. “**A Survey of Market-Based Approaches to Distributed Computing,**” University of Florida, Technical Report TR03-013, Aug, 2003.
 - Janik Borota, Michael Frank, John Fry, Atsushi Ito, Hideyuki Nakashima, Stanley Peters, Michael Reilly, and Hinrich Schutze, “**The PROSIT Language, version v1.0,**” manuscript, *Center for the Study of Language and Information*, Stanford, CA, 1994.

Contracts & grants awarded:

- U. Meyer-Baese, I. Chiorescu (I was not formally a co-PI but helped author proposal), “**Next Generation Quantum Computer Simulator,**” FSU/CRC planning grant, \$12,000, Spring 2008.
- Michael P. Frank, “**Travel Support for Junior Researchers Attending the Workshop on Frontiers of Extreme Computing,**” NSF/CISE/CCF travel grant, \$5,000, Oct. 2005.
- Michael P. Frank (PI), “**Design, Simulation, and Experimental Design of Techniques for Nearly Thermodynamically Reversible Computation based on Y-Junction Electron Waveguide Devices,**” FSU/CRC/FYAP award, \$14,000, Summer 2005.
- Michael Frank (PI) and Huikai Xie (co-PI), “**Design & feasibility study for practical adiabatic logic driven by custom high-Q MEMS/NEMS clock/power resonators,**” a \$40,000, 1-year (2004) grant from Semiconductor Research Corporation in their Cross-disciplinary Semiconductor Research (CSR) program.
- \$5,000 grant from Harris Corporation to support UF’s effort in the ACM programming contest, 2003.
- 2001-2002: Two \$15,000 contracts from Siemens corporation to coach student teams working on a Siemens DSL modem project through UF’s Integrated Product & Process Design (IPPD) program.

Funding proposals written:

- Irinel Chiorescu, R. van Engelen, U. Meyer-Baese, M. Frank, “**Multi-level manipulation by strongly coupled photons: an experimental and memory-efficient simulation approach,**” white paper to DARPA/USARO BAA W911NF-10-R-0007, submitted May 2010.
- U. Meyer-Baese, M. Frank, Irinel Chiorescu, R. van Engelen, “**CDI- Type II: Space-Efficient Hardware Simulator for Quantum Computers, with Applications in Computational Physics,**” NSF CDI program, \$1,457,538.05, submitted Dec. 2008.

- U. Meyer-Baese, I. Chiorescu (I was not formally a co-PI but helped author proposal), “**Next Generation Quantum Computer Simulator**,” FSU/CRC planning grant, \$12,000, Spring 2008. **Funded**.
- Michael P. Frank, Petru Andrei, David W. Snoke, “**Collaborative Research: Ballistic Reversible Computation via Steering of Exciton Wavepackets in Double-Well Quantum Wires**,” NSF/CISE/CCF program, \$362,033.00, submitted Feb. 2007.
- Mogus D. Mochena, Petru Andrei, Hongmei Chi, Michael P. Frank, Edward L. Jones, “**CRI: IAD Infrastructure Acquisition: A Computer Cluster for Research in High Performance Computing**,” NSF/CISE/CRI program, \$796,344.00, submitted Nov. 2006.
- Renato J. Figueiredo, Patrick Boykin, Jose A. Fortes, Alan D. George, Tao Li, Jose Renau, David J. Lilja, David R. Kaeli, Mehdi B. Tahoori, Michael P. Frank, Linda S. DeBrunner, Lois W. Hawkes, Gary S. Tyson, Ming Yu, Sally A. McKee, Lizy K. John, Alain J. Roy, Gokhan Memik, “**CRI:CRD Collaborative Research: Archer—Seeding a Community-based Distributed Computing Infrastructure for Computer Architecture Education and Research**,” NSF/CISE/CRI program, \$1,511,224.00, submitted Nov. 2006.
- Michael P. Frank, “**Travel Support for Junior Researchers Attending the Workshop on Frontiers of Extreme Computing**,” NSF/CISE/CCF travel grant, \$5,000, Oct. 2005. **Funded**.
- Michael P. Frank, “**Clarifying the Fundamental Physical Limits of Computer Energy Efficiency**,” FSU/CRC/CS Planning Grant proposal, Oct. 2005.
- Michael Frank, “**Design and Simulation of Techniques for Nearly Thermodynamically Reversible Computation Based on Y-Junction Electron Waveguides**,” FSU First-Year Assistant Professor program (FYAP), 2nd submission, Jan. 2005. **Funded**.
- Michael Frank, “**Building an International Alliance to Challenge the Barriers to Computer Energy Efficiency**,” FSU First-Year Assistant Professor program (FYAP), Nov. 2004.
- Michael Frank (FAMU-FSU) and Gary Tyson (FSU), “**A multi-domain systems-engineering optimization tool for the design of complex systems that include integrated high-performance computing capabilities**,” proposal to Office of Naval Research, BAA #ONR 04-024, “Research Tools Design Consortia,” Sep. 2004.
- Michael Frank and Bing Kwan, “**Design & simulation of a high- Q microwave cavity and microstrip transmission-line system for resonant generation and distribution of custom AC waveforms for high-frequency, low-power, low-skew clocking of adiabatic and conventional logic**,” proposal to SRC CSR (Cross-Disciplinary Semiconductor Research) program, Sep. 2004.
- Michael Frank (FAMU-FSU) and Huikai Xie (UF), “**Ultra-low-power adiabatic circuits driven by high- Q MEMS resonators**,” proposal to SRC ICSS (Integrated Circuit & Systems Sciences) program, Sep. 2004.
- Reginald Perry, Michael Frank, and Bing Kwan, “**Nanoelectronic Modeling for Ultra-low-power Sensor Data Processing and Supercomputing**”

- Technologies,”** proposal to Army High-Performance Computing Research Center (AHPCRC) through FAMU, Sep. 2004.
- Michael Frank and Bing Kwan, “**Design & simulation of a high- Q microwave cavity and microstrip transmission-line system for resonant generation and distribution of custom AC waveforms for high-frequency, low-power, low-skew clocking of adiabatic and conventional logic,**” proposal to SRC CSR (Cross-Disciplinary Semiconductor Research) program, Sep. 2004.
 - Michael Frank & Huikai Xie, “**Design & Feasibility study for practical adiabatic logic driven by custom high- Q MEMS/NEMS clock/power resonators,**” \$40K white paper proposal to SRC CSR (Cross-disciplinary Semiconductor Research) program, Sep. 2003. **Funded.**
 - Michael Frank, Joachim Hammer, Abdelsalam Helal, Jorg Peters, Sanjay Ranka, Mark Schmalz, “**OCEAN: A Peer-to-Peer Market for Allocating Grid Computing Resources,**” \$1M proposal to NSF STI (Strategic Technologies for the Internet) program, May 2003.
 - “**Scalable Architectures and Engineering Analysis for Adiabatic Circuits and Reversible Computing,**” NSF/Eng/ECS/CAREER, July 2001.
 - “**OCEAN: A Highly Liquid Market for Distributed Computation,**” NSF/STI, June 2001.
 - “**Dawn of a New Field: Quantum Computer Systems Engineering,**” NSF/CISE/QuBIC, June 2001.
 - “**Cost-Effective Adiabatic Digital System Technology for Low-Power Computing Applications,**” informal proposal to IBM, Jan. 2001.
 - “**OCEAN: The Open Computation Exchange & Arbitration Network: An open platform and commodities market for distributed computation,**” business proposal presented to Cenetec, Nov. 2000.
 - “**Adiabatic Logic for High-Bandwidth Networking Equipment: A Proposed Feasibility Study,**” invited proposal to Nortel Networks, Nov. 2000.
 - “**Nanoelectronics Science and Engineering Center,**” NSF, collaboration with Clemson, Nov. 2000.
 - “**Thermodynamically Efficient Models and Architectures for Maximally Scalable Computing,**” NSF/CISE/Arch./CAREER, Jul. 2000.
 - “**Practical Energy-Recycling Computation for Mobile Tactical Applications,**” DARPA/ATO, Mar. 2000.
 - “**Dynamic Optimization of Semi-Adiabatic Power-Managed Architectures,**” \$1M proposal to DARPA/PACC, Oct. 1999.

Research talks given:

- Michael P. Frank, “**NDCoin: A Cryptocurrency-Based Distributed Computing Market,**” ECE Graduate Seminar, presented Sep. 9th, 2014, in the Dept. of Electrical and Computer Engineering, FAMU-FSU College of Engineering, Tallahassee, FL.
- Frank, M.P., “**Decentralized Virtual Currencies: A Very Far-Reaching Innovation (The Case for Regulatory Permissiveness),**” invited talk at the Florida Office of Financial Regulation, Tallahassee, FL, July 30, 2014.

- Frank, M.P., “**Reversible Computing: A Cross-Disciplinary Introduction,**” invited talk presented remotely to the Beyond Moore Research Challenge meeting, Sandia National Laboratories, Albuquerque, NM, March 10th, 2014.
- Frank, M.P., “**Digital Cash, Bitcoin, and the Distributed Consensus Revolution,**” ECE Graduate Seminar, presented Jan. 14, 2014, in the Dept. of Electrical and Computer Engineering, FAMU-FSU College of Engineering, Tallahassee, FL.
- Frank, M.P., “**Towards a More General Model of Reversible Logic Hardware,**” invited talk presented at the *Superconducting Electronics Approaching the Landauer Limit and Reversibility* (SEALeR) workshop, sponsored by NSA/ARO, Annapolis, MD, Mar. 15-16, 2012.
- Frank, M.P., “**Space-Efficient Quantum Computer Simulators,**” invited talk presented at the Laboratory for Physical Sciences, College Park, MD, Mar. 14, 2012.
- Frank, M.P., “**Controlling Application-Specific Hardware in C on Altera FPGAs: A Case Study in Embedded Systems Development,**” invited talk presented at the ECE Graduate Seminar, FAMU-FSU College of Engineering, Oct. 4th, 2011.
- Frank, M.P. and O'Neal, R.H., “**The COSMICi Project: Wireless sensor networks for measuring direction of high-energy cosmic-ray showers,**” presented at the 2009 MARIACHI workshop, Jul. 6-10, SUNY Stony Brook, NY.
- “**Addressing the Funding Gap in Energy-Efficient Computing: Research Overview and Program Management Philosophy,**” invited talk presented to the National Science Foundation, Directorate for Computer & Information Science and Engineering (CISE), Computer & Communication Foundations (CCF) Division, July 10, 2006.
- “**Improved Flops/Watt with Ballistic, Adiabatic, Reversible Computing (BARC): Progress and Challenges,**” invited talk presented at the workshop on *Energy and Computation: Flops/Watt and Watts/Flop*, MIT Center for Bits and Atoms, May 10, 2006.
- “**The Reversible Computing Question: A Crucial Challenge for Computing,**” invited talk presented at the *Workshop on Frontiers of Extreme Computing* (Sponsors: Sandia, CSRI, Lawrence Berkeley, NSF, IBM), Santa Cruz, CA, Oct. 24-27, 2005.
- “**Requirements for Energy-Efficient Computing Beyond the von Neumann Limit,**” FAMU-FSU College of Engineering, ECE Department, Graduate Seminar, Oct. 20, 2005.
- “**Requirements for Practical Reversible Computing,**” invited lecture, Solid State Seminar, Notre Dame, April 19, 2005.
- “**Low Power Electronics: Exploring the Fundamental Limits of Computation,**” invited videoconference lecture, Pragyaa Festival, Shri Guru Gobind Singhji Institute of Engineering and Technology, Vishnupuri, Nanded, India, April 3, 2005.
- “**Reversible Computing: Its Promise and Challenges,**” MARCO-FCRP/NCN Workshop on Nano-Scale Reversible Computing, hosted by the MSD (Materials,

- Structures, and Devices) Focus Center, Massachusetts Institute of Technology, Feb. 14, 2005.
- **“Nanocomputing Technology Requirements,”** tutorial presented at the *IASTED International Conference on Advances in Computer Science & Technology* (ACST 2004), St. Thomas, US Virgin Islands, Nov. 23, 2004.
 - **“The Future of Computing,”** Graduate Seminar Talk, FAMU-FSU ECE Dept., Sep. 2, 2004.
 - **“Reversible Computing: A Brief Introduction,”** lecture delivered at the *Computing Beyond Silicon Summer School*, California Institute of Technology, Pasadena, CA, July 2004.
 - **“Physical Limits of Computing: A Brief Introduction,”** lecture delivered at the *Computing Beyond Silicon Summer School*, California Institute of Technology, Pasadena, CA, July 2004.
 - Venkiteswaran Anantharam, Maojiao He, Krishna Natarajan, Huikai Xie, and Michael P. Frank, **“Driving Fully-Adiabatic Logic Circuits Using Custom High-Q MEMS Resonators,”** paper presented at the 2004 workshop on *Methodologies for Low Power Design* (MLPD '04), part of the *Embedded Systems and Applications* (ESA '04) conference, Las Vegas, Nevada, June 21-24, 2004.
 - **“Nanocomputer Systems Engineering,”** invited talk delivered at the Department of Electrical & Computer Engineering, FAMU/FSU College of Engineering, Feb. 25, 2004.
 - **“The Imminent Practicality of Reversible Computing,”** invited talk delivered at the IBM T.J. Watson Research Center, Yorktown Heights, NY, Aug. 28, 2003. Powerpoint file at <http://www.cise.ufl.edu/research/revcomp/talks/IBM-Talk.ppt>.
 - **“Common Mistakes in Adiabatic Logic Design and How to Avoid Them ,”** paper presented at Methodologies in Low-Power Design Workshop, part of the International Conference on Embedded Systems and Applications, at the International Multiconference in Computer Science & Computer Engineering, held in Las Vegas, Nevada, June 23-26, 2003.
 - **“Nanocomputer Systems Engineering,”** paper presented at the NanoEngineering World Forum, sponsored by the International Engineering Consortium, held in Marlborough, MA, June 23-25, 2003.
 - **“Reversible Computing: Quantum Computing's Practical Cousin ,”** invited general introductory lecture presented at the James H. Simons Foundation Conference on Quantum and Reversible Computing, Stony Brook, NY, May 28-31, 2003.
 - **“Physical Computing Theory, Ultimate Models, and the Tight Church's Thesis: A More Accurate Complexity Theory for Future Nanocomputing ,”** invited talk given to the Algorithms & Theory Club, CISE dept., UF, Tue., Sep. 17, 2002.
 - Michael Frank and DoRon Motter, **“Quantum Computer Architectures for Physical Simulations ,”** invited talk presented by Frank at the Quantum Computation for Physical Modeling workshop sponsored by the Air Force research labs, held at Martha's Vineyard, Wed., May 8, 2002.

- **"Systems Engineering for Reversible Quantum Nanocomputers ,"** invited talk given at University of Southern California, Dept. of Electrical Engineering (Architecture), Wed., May 1, 2002.
- **"Cost/Performance/Power Efficiency of Adiabatic Circuits, as a function of Device On/Off Power Ratios ,"** talk given in the Brown Bag Seminar series, ECE Dept., UF, March 2002.
- **Lecture on adiabatic circuits,** untitled guest lecture delivered in Dr. Bill Eisenstadt's VLSI class, ECE dept., Spr. 2002.
- **"Cost/Performance/Power tradeoffs in Adiabatic Logic,"** talk given in the Brown Bag Seminar, ECE Dept., UF, March 2002.
- **"Can Hintikka's Independence-Friendly Logic Be Used to Prove the Non-Existence of the Reals?,"** talk given at the Logic Seminar, Math Dept., UF, March 2002.
- **"Robust and Universal Reversible Machines & High-Level Programming Languages in a Recombinase DNA System,"** talk given at the DARPA/NSF BioComp PI meeting, Nov. 2001.
- **"A Mathematical Theory of Existence,"** invited philosophy talk given to UF's Atheist/Agnostic Student Association, Nov. 2001.
- **"OCEAN: The Open Computation Exchange & Auctioning Network,"** talk given to the Harris Lab research group, summer 2001.
- **"DNA Computing, Reversibility, and Physical Models of Computing",** invited talk given at the University of Delaware's ECE/CIS department, April 2001.
- **"Parallel and Distributed Technology and Infrastructure,"** personal research overview presented to the UF CISE department's Industrial Advisory Board, March 2001.
- **"Quantum Computational Networks,"** lecture series delivered as part of the Quantum Computing seminar, Mathematics Department, University of Florida, March 2001.
- **"Reversible Logic and Its Looming Importance",** Logic Seminar lecture, Mathematics Department, University of Florida, February 2001.
- **"OCEAN: The Open Computation Exchange & Arbitration Network: An Open Platform and Commodities Market for Distributed Computation",** business proposal presented to the Cenetec technology incubator firm, November 2000.
- **"Adiabatic circuits and reversible logic: Prospects for Improving Computational Efficiency in Present and Future Computing Technologies,"** AeMES seminar, AeMES Department, University of Florida, September 2000.
- **"Adiabatic logic circuits for ultra-low-power computing,"** presentation to Intersil corporation, June 2000.
- **"Ultra-Low-Power Computing via Adiabatic CMOS: Current Status and Future Prospects,"** Brown Bag Seminars in Electronics, Electrical and Computer Engineering Department, University of Florida, May 2000.
- **"Nanotechnology Research at the UF Computer & Information Science & Engineering Department (CISE),"** presentation to Sandia National Labs, April 2000.

- “**Adiabatic logic circuits for energy-limited applications**,” presentation to Siemens Corporation, March 2000.
- “**Thermodynamically reversible computing technology for low-power/high-performance applications**,” presentation to Harris Corporation, December 1999.
- “**Thermodynamically reversible computing technology for low-power/high-performance applications**,” presentation to the UF Industrial Advisory Board, October 1999.
- “**Reversibility for Efficient Computing**,” job talk, University of Florida, June 1999. (Job was offered.)
- “**Reversibility for Efficient Computing**,” thesis defense, MIT EECS Dept., May 1999. (Thesis was approved.)
- “**Reversibility in Optimally Scalable Computer Architectures**,” talk prepared for the First International Conference on Unconventional Models of Computation, Auckland, New Zealand, January 1998. (Colleague delivered talk.)
- “**A Scalable Reversible Computer in Silicon**,” talk prepared for the First International Conference on Unconventional Models of Computation, Auckland, New Zealand, January 1998. (Colleague delivered talk.)
- “**Reversibility for Efficient Computing**,” job talk, Texas Instruments DSP Research Division, December 1997. (Job was offered.)
- “**Ultimate Theoretical Models of Nanocomputers**,” presented at the Fifth Foresight Conference on Molecular Nanotechnology, November 1997.
- “**The O.C.E.A.N. Project: An Open Computation Exchange & Arbitration Network**,” MIT AI Lab student seminar, February 1997.
- “**Low-Energy Computing for Implantable Medical Devices**,” MIT Clinical Decision-Making Group research seminar, February 1996.
- “**Quantum Computation Primitives**,” area exam talk, MIT EECS Dept., February 1996.
- “**Automatic Programming and the Programmer's Apprentice Project**,” MIT Clinical Decision-Making Group journal club talk, October 1992
- “**Virtual Reality for Computer-Supported Cooperative Work (and Medical Applications)**,” MIT Clinical Decision-Making Group research seminar, April 1992.
- “**Rational Distributed Reasoning**,” MIT Clinical Decision-Making Group journal club talk, March 1992.

Press Exposure:

- Luke Muehlhauser and Michael P. Frank, “**Mike Frank on reversible computing**,” interview, Machine Intelligence Research Institute, Jan. 31st, 2014.
- Linda Dailey Paulson, “**Reversible Computing May Improve Mobile Performance**,” news article in *IEEE Computer*, March 2004, p. 21.
- Ram Mohan Rao, “**Reversible Computing**,” interview in *Digit*, India’s #1 pop-tech magazine, March 2004, pp.28-29.
- Mention in Michael Swaine, “**Backward to the Future**,” article in *Dr. Dobb’s Journal*, CMP publishers, February 2004.

- David Greenfield, “**Get Mean, Go Green,**” *Network Magazine*, January 2004.
- Shane Peterson, “**Researching Reversible Computing,**” *Government Technology Spectrum*, January 2004.
- “**Are “reversible” computers more energy efficient, faster?**” *Planet Analog*, January 26, 2004.
- Winn L. Rosch, “**Chip designers try to beat the heat,**” *The Plain Dealer* (Ohio’s largest newspaper), Cleveland, OH, Nov. 11, 2003.
- Ashlee Vance, “**Reversible computing is ‘the only way’ to survive Intel’s heat,**” *The Register* (IT News site).
- Amit Asaravala, “**Chip Design Reverses a Hot Trend,**” *Wired News*, Nov. 13, 2003.
- James Clark, “**‘Reversible’ Computers More Energy Efficient,**” *Slashdot*, Nov. 11, 2003.
- Aaron Hoover, “**UF Researcher: ‘Reversible’ Computers More Energy Efficient, Faster,**” UF press release, Oct. 31, 2003. Appeared in *ACM Technews*, *AScribe Newswire*, and *SuperComputingOnline.com*.
- Sarah Walker, segment on OCEAN on *Eyewitness News*, 9 WFTV, Orlando, FL, Jan. 2002.
- Aaron Hoover, “**Tapping a Virtual Goldmine: Univ. of Fla. research: Put idle PCs to work via Internet in ‘computing marketplace,’**” UF press release, Dec. 13, 2001. Appeared in *Pompano Ledger*, Pompano Beach, FL, Dec. 20, 2001; *Pinellas News*, St. Petersburg, FL, Dec. 21, 2001; *Brevard Business News*, West Melbourne, FL, Jan. 7, 2002.
- Brad Fennessy, “**Idle computers may yield profit,**” *Alligator* (student newspaper), Gainesville, FL, April 17, 2002.
- Jay Stein, “**More Computing Power, Less Electrical Power,**” *ET Currents* (power industry newsletter), no. 7, March 2001.
- George Johnson, “**A Radical Computer Learns to Think in Reverse,**” *New York Times* Science section, June 15, 1999.

Thesis and/or dissertation committees served on:

Ph.D. committee chairman (or co-chair) for:

- Erwin Jansen (UF), 2001-2004
- Shawn Outman (UF), 2002-2004
- Jeff King (UF), 2002-2004

Ph.D. committee member for:

- Erastus O. “Larry” Ogunti (FAMU)
- Charlie Williams (FAMU)
- Numerous University of Florida students, 2000-2004

M.S. committee member for:

- Edward Michael McDonald (FSU)
- Matthew R. Murphy (FSU, graduated)

M.S. thesis (& non-thesis) committee chairman (or co-chair) for numerous students at UF, 2000-2004.

M.S. thesis (& non-thesis) committee member (or substitute member) for numerous students at UF, 2000-2004.

Teaching

Courses taught:

FAMU/FSU College of Engineering, 2004-present:

- EEL 3003, "**Introduction to Electrical Engineering**," Summers 2012 (in China) & 2013.
- EEL 3705, "**Digital Logic Design**," Fall 2006-Spring 2007, Spring 2011.
- EEL 4930/5930, "**Physical Limits of Computing**," grad/undergrad tech-elective, research-survey course, Spring 2005 & Spring 2006.
- EEL 4713/5763, "**Computer Architecture**," Spring '05, Fall '05, Spr. '06.
- EEL 4746/4746L, "**Microprocessor-Based System Design**," Fall 2004. (Also updated lab assignments in Fall 2010.)
- EEL 4911C, "**Senior Design Project I**," Fall 2011, 2012, 2013, 2014.
- EEL 4914C, "**Computer Engineering Senior Design Project II**," Spring 2012, 2013, 2014.
- EEL 4915C, "**Electrical Engineering Senior Design Project II**," Spring 2012, 2013, 2014.

University of Florida, 1999-2004:

- CIS 4930/6930, "**Physical Limits of Computing**", novel research-survey course, (grad/undergrad) Spr. 2000, (grad) Spr. 2002, Fall 2003.
- CDA 5155, "**Principles of Computer Architecture**" (grad), Fall 2001, Fall 2002, Summer 2003, Spring 2004.
- COT 3100, "**Applications of Discrete Structures**" (undergrad), Fall 1999, Spr. 2001, Spring 2002, Fall 2003, Spring 2004.
- CDA 3101, "**Computer Organization**" (undergrad), Fall 2000.
- CIS 4912C/4913C, "**Integrated Product & Process Design**" (undergrad), Fall 2000, Spr. 2001, Fall 2001, Spr. 2002.
- CIS 4914, "**Senior Project**" (undergrad), Spr. 2000-Sum. '04.
- CIS 4905/6905, "**Individual Study**" (grad/undergrad), Spr. 2000-Summer '04.
- CIS 6971/6972/7979/7980, "**Graduate Research**", through Summer 2004.

Massachusetts Institute of Technology, 1991:

- Graduate teaching assistant and recitation section instructor, course number 6.034, "Introduction to Artificial Intelligence," Fall 1991.

Additional student advisement & mentoring:

- Advising two freshmen participating in FSU's Undergraduate Research Opportunities Program, Fall 2014.
- Mentored two visiting high school students in FSU's Young Scholars Program, Summer 2014.
- Mentored several student lab assistants in the ACPR-DRDL lab in the FAMU Physics Dept., 2009-2012.
- Coordinated, co-coordinated, advised or co-advised 2 senior design project teams at FAMU-FSU College of Engineering in 2010-11, 15 teams in 2011-12, 14 teams in 2012-13, 22 teams in 2013-14, and 24 teams in 2014-15.
- Informally advised students in the Traffic Engineering Research Lab (TERL) and the High-performance Computing & Simulation (HCS) group at FAMU-FSU.
- Mentor for UF's *University Minority Mentoring Program (UMMP)*, academic year 2000-2001 and 2001-2002. Assigned 3 freshman mentees each year.
- Faculty Liason and Programming Contest Coach for the University of Florida's ACM Student Chapter, 1999-2004.
- Mentored a high school summer student as part of MIT's *Research Science Institute* summer program, Summer 1999.

Professional Service

International service:

- Program committee member, 5th ACM conference on Computing Frontiers, 2007.
- Organizer, 1st International Workshop on Reversible Computing, held as part of the 2nd ACM Computing Frontiers conference, Ischia, Italy, May 2004.
- Reviewer for many international conferences & journals, 2002-2006.
- Co-Chairman, Conference on "Mathematics & Applications of Reversible, Randomized, and Quantum Computing Systems (MARRQCS)" at SPIE International Symposium on Optical Science and Technology, 2002.
- Reviewer, International Workshop on Logic Synthesis, April 2001.
- Chairman, Conference on "Quantum and Reversible Computation and Biocomputing" at SPIE International Symposium on Optical Science and Technology, 2001.
- Program committee member, conference on "Parallel and Distributed Methods for Image Processing IV" part of SPIE's International Symposium on Optical Science and Technology, to be held 30 Jul-4 Aug, 2000, San Diego, CA.

- Reviewer, *Physica D*, 1997.
- Reviewer, *Computational Intelligence*, special issue on "Games: Planning and Learning," 1994.

National service:

- Panel Member, NSF SBIR (Small Business Innovation Research) program, Microelectronics/MEMS, Spr. 2003; Microelectronics/Power Management, Fall 2004; Nanotechnology, Fall 2006.

Regional service:

- Contest judge, Southeast Regional ACM collegiate programming contest, 1999-2001.

University service:

- Faculty senate member, Florida State University, Spring 2005-2007.
- Commencement marshal, University of Florida, Fall 2001-2004 .
- UF ACM programming contest team coach, 1999-2004.
- Member, UF Laptops in Education committee, 2000-2001.
- Member, Stanford University's (world-championship winning) team in 1990-91 ACM International Collegiate Programming Contest

Collegiate service:

- Coordinated and supervised undergraduate tutoring services in the Center for Academic Support for Engineering (CASE) Instructional Laboratory at the FAMU-FSU College of Engineering, from Fall 2012-Spring 2014.
- Represented the FAMU-FSU College of Engineering in the FSU International Program in Tianjin, China, Summer 2012.
- Computer Facilities Committee member, FAMU-FSU College of Engineering, Spring 2004-2007.
- Faculty coach, Integrated Product & Process Design Program, University of Florida College of Engineering, academic years 2000-'01 and '01-'02. Supervised a DSL modem design project for Siemens corporation.

Departmental service:

- Member, curriculum committee, FAMU-FSU ECE dept., Fall 2005-2007.
- Member, faculty recruitment committee, FAMU-FSU ECE dept., Spr. 2005.
- Member, computer facilities committee, FAMU-FSU ECE dept., Fall 2005-
- Member, scholarship committee, UF CISE Dept., 2003-2004
- Member, facilities committee, UF CISE Dept., 1999-2001
- Member, graduate committee, UF CISE Dept., 2000-2002
- Faculty liason to Microsoft Research, UF CISE Dept., 2000-2004.

- Faculty liason to student ACM chapter, UF CISE Dept., Fall 2000-2004.
- Organized local “GridWars” programming competition, MIT AI Lab Olympics, January 1993.

Memberships in professional organizations:

- **Institute of Electrical and Electronics Engineers** – Occasional member, including Circuits & Systems Society, Electron Devices Society, Computer Society, Power Electronics Society, and Solid-State Circuits Society, 2000-.
- **Association for Computing Machinery**, occasional member, 1990-1992, 2004-.
- **American Association for the Advancement of Science**, former member.
- **Sigma Xi**, membership offered (twice)

END OF DOCUMENT

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