

PINAKI MAZUMDER¹

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Immigration Status: US Citizen (1995); Permanent Resident (1989-1995).

I. Educational Qualification

Ph.D. in Computer Engineering	University of Illinois, Urbana-Champaign	1988
M. Sc. in Computer Science	University of Alberta, Edmonton, Canada	1985
B.S. in Electrical Engineering	Indian Institute of Science, Bangalore, India	1976

I also received a degree in B.Sc. Physics Honors securing the first rank in Guwahati University, India amongst estimated 100,000 students in all disciplines of liberal arts and basic sciences.

II. Work Experience

US Government (National Science Foundation):

2007-2008	Program Director for Emerging Models and Technologies Program (funding areas: Nanoelectronics, Quantum Computing, and Biologically Inspired Computing with an annual budget of \$18 Million) in the Directorate for Computer and Information and Science and Engineering, National Science Foundation, Arlington, Virginia.
2009	Program Director in Electrical, Communications and Cyber Systems Division (funding areas: Quantum, Molecular and High Performance Computing, Adaptive Intelligent Systems, Electronic and Photonic Devices, and Major Research Instrumentation) of the Engineering Directorate at National Science Foundation.

Academic Teaching and Research:

1998- to date	Tenured Professor, Division of Computer Science and Engineering, Department of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, USA.
1996-1997	Research Fellow, Division of Electrical and Computer Engineering, Department of Electrical Engineering and Computer Science, University of California, Berkeley, USA.
1996-1997	Visiting Associate Professor, Department of Computer Science and Engineering, Stanford University, Palo Alto, California, USA.
1997	Visiting Professor, NTT Basic Research Laboratories, Atsugi-shi, Japan.
1992-1998	Tenured Associate Professor, Division of Computer Science and Engineering, Department of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, USA.
1987-1992	Assistant Professor, Division of Computer Science and Engineering, Department of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, USA.
1985-1987	Research Assistant, University of Illinois at Urbana-Champaign, USA.
1982-1984	Teaching Assistant at University of Alberta, Edmonton, Canada.
1974-1975	Research Assistant at Indian Institute of Science, Bangalore, India.

¹ Fellow of AAAS, Fellow of IEEE, Member of Sigma Xi, and Member of Phi Kappa Phi

Industrial Research and Development:

1985, 1986	Member of Technical Staff, AT&T Bell Laboratories, Indian Hill, Chicago
1976-1982	Senior R&D Engineer, Bharat Electronics Ltd., Bangalore, India

III. Major Fields of Research

1) VLSI design, testing and layout automation; 2) Nanoelectronics and nanomagnetism: multiscale modeling, simulation tools, circuits and architectures; 3) Terahertz technology and applications in signal processing, computing and communications.

IV. Awards and Recognitions

- Fellow of American Association for the Advancement in Science (AAAS), 2007 for “distinguished contributions to the field of very large scale integrated (VLSI) systems”. The honor of being elected a Fellow of AAAS is given to those whose “efforts on behalf of the advancement of science or its applications are scientifically or socially distinguished.”
- Fellow of IEEE, 1999 for “contributions to the field of VLSI Design.”
- IEEE Distinguished Lecturer
- Digital Equipment Corporation Faculty Award: Excellence in Research
- Departmental Research Excellence Award (1995), The University of Michigan
- BF Goodrich National Collegiate Invention Award
- DARPA Research Excellence Award for the work in Quantum MOS Project
- Best Undergraduate Student Medal
- IETE Best Student Paper Award, and IETE Best Paper Presentation Award
- NSF Research Initiation Award
- Bell Northern Research Laboratory Faculty Development Grant
- Commendation Letter from the Dean of College of Engineering, University of Michigan, for Excellence in Teaching
- Member, Sigma Xi
- Member, Phi Kappa Phi

V. Research Funding

1. National Science Foundation (RIA): \$69,948; 1988 – 1991 (Single PI)
2. Bell Northern Research Laboratory: \$20,900; 1988 – 1989 (Single PI)
3. National Science Foundation: \$90,620; 1989 – 1990 (Single PI)
4. Digital Equipment Corporation: \$180,000; 1989 – 1992 (Single PI)
5. Office of Naval Research: \$420,000; 1988 - 1991, (Co-PI)
6. National Science Foundation: \$125,000; 1991 – 1993 (Single PI)
7. Rackham Faculty Research Grant: \$9,980; 1991 – 1993 (Single PI)
8. U.R.I. Program (US Army): \$6,000,000 (total); \$250,000 (my portion); 1988 - 1992
9. General Motors: \$20,000; 1992 – 1992 (Single PI)
10. International Business Machines: \$45,000 (student fellowship); 1990 – 1993
11. National Science Foundation: \$47,000; 1992 – 1993 (Single PI)
12. Hewlett Packard: \$81,400; 1993 – 1995 (Single PI)
13. Office of Vice President Research: \$52,300; 1995 - 1996
14. Defense Advanced Research Projects Agency (DARPA): \$825,000; 1993 -1997 (Co-PI)
15. National Science Foundation: \$182,400; 1994 – 1998 (Single PI)
16. U.R.I. Program (US Army): \$5,000,000; \$200,000; 1993 - 1997
17. State of Michigan Display Technology Center: \$2,000,000; My portion: \$200,000; 1995 - 1998
18. Texas Instruments (subcontract of a DARPA project): \$304,000; 1995 – 1998 (Single PI)
19. Army Research Office’s MURI-95 (Co-PI with 7 others): \$4,000,000; 1995-2000 + 1 year.
20. Army Research Office’s MURI-96 (Co-PI with 13 others): \$5,000,000; 1996-2001 + 1 year.

21. Defense Advanced Research Projects Agency: \$750,000; June 1997- May 2000 (PI)
22. National Science Foundation: \$300,000; 1998 – 2002 (Single PI)
23. Nippon Electric Company, Japan: \$40,000; 1998 (Single PI)
24. National Science Foundation: \$195,000; 1998 – 2002 (Single PI)
25. Office of Naval Research; \$270,000; 1998-2001 (Single PI)
26. NanoLogic Inc. \$10,000; 1999-2000 (Single PI)
27. Air Force Office of Scientific Research: \$5,000,000: 2001-2006 (Co-PI with 9 other investigators)
28. Office of Naval Research: \$303,000: 2001-2002; (Single PI)
29. National Science Foundation: \$210,000: 2001-2004 (Single PI)
30. Korean Government Nanoelectronics Research: \$200,000: 2001-2002 (PI: Prof. G.I. Haddad).
31. Office of Naval Research: \$820,000: 2002-2005 (PI)
32. Tera-Level Nanoelectronics Project, Korean Government: \$170,000: 2003-2006; (Single PI)
33. National Science Foundation: \$120,000: 2004-2007 (Single PI)
34. Air Force Office of Scientific Research, \$480,000: 2006-2009 (Single PI)
35. National Science Foundation IPA Assignment Grant: \$620,000; 2007-2009 (Single PI)
36. DARPA SyNAPSE Program on Brain Plasticity: \$807,812; Co-PI: Hughes Research Laboratory
37. National Science Foundation, NIRT: \$1,000,000: 2006-2012 (Co-PI).
38. SRC NRI Center (MIND): ~\$200,000: 2008-2011 (Single PI)
39. National Science Foundation: EAGER Grant, \$200,000; 2009-2012. (Single PI)
40. National Science Foundation: \$400,281; 2010-2014. (Single PI)
41. Army Research Office: \$580,000; 2010-2013. (Single PI)
42. National Science Foundation: \$149,111; 2011-2012. (Single PI)
43. Army Research Office, MURI: \$6,500,000; 2010-2015. (Co-PI)
44. National Science Foundation: \$400,415; 2011-2014. (Single PI)
45. National Science Foundation: \$1,750,000; 2011-2015. (Co-PI)
46. Defense Advanced Research Projects Agency (DARPA): \$150,000; 2011-2013 (Single PI)
47. Air Force Office of Scientific Research: \$449,772; 2012-2015 (Single PI)
48. National Science Foundation: \$480,000; 2012-2015 (Co-PI)
49. National Science Foundation: \$400,000; 2014-2017 (PI)
50. National Science Foundation: \$900,000; 2015-2018 (PI).
51. Air Force Office of Scientific Research: \$150,000; 2016-2017 (Single PI)
52. National Science Foundation: \$330,000; 2017-2020 (Single PI)
53. National Science Foundation: \$620,000; 2017-2020 (PI)
54. Air Force Office of Scientific Research: \$501,000; 2018-2021 (Single PI)

Pending Proposals:

1. Engineering Research Center (ERC): Foundation for Integrative Research on Short-range Terahertz in Wireless Communication and Signal Processing, National Science Foundation, \$18,000,000 for 5 years (Mazumder, PI; University of Michigan, Massachusetts Institute of Technology, University of California at Los Angeles, New Jersey Institute of Technology, University of Central Florida, and Cornell University).
2. Nanoarchitectures for Adaptive Control and Intelligence Processing Chips, Office of Naval Research, \$450,000 (PI)
3. Ultra-Low-Power Bio-inspired Nanoelectronics for Navigation in Autonomous Insect-Scale Robots, Air Force Office of Scientific Research, \$790,000 (PI)

VI. Committees and Professional Activities

1. Nomination Committee Member for *The Blue Planet Prize*, an international environmental award sponsored awarded by Asahi Glass Foundation, Japan, 2015-
2. Member of Board of Editors, *Proceedings of the IEEE*, 1999-2002
3. Associate Editor, *IEEE Transactions on VLSI Systems*, 1997-2000
4. Guest Editor, *IEEE Transactions on VLSI Systems* - A Special Issue on Impact of Emerging Technologies on VLSI Systems, December 1997

5. Guest Editor (with Prof. A. Seabaugh), *Proceedings of the IEEE* - A Special Issue on Nanoelectronic Devices and Circuits, June 1998.
6. Guest Editor (with Prof. S. M. Kand and Prof. R. Wasser), *Proceedings of the IEEE* - A Special Issue on Memristors: Device, Models, and Applications, June 2012.
7. Guest Editor (with Prof. A. Benso and Prof. Y. Makris), *IEEE Transaction on Computer* – A Special Issue on Architectures for Emerging Technologies and Applications, June 2008
8. Guest Editor, *Journal of Electronic Testing - Theory and Application* - A Special Issue on Multi-megabit Memory Testing, April 1994
9. Guest Editor (with Prof. J.P. Hayes), *IEEE Design & Test Magazine* - A Special Issue on Memory Testing, 1993
10. Editorial Advisory Board, *The Arabian Journal for Science and Engineering*, King Fahd University of Petroleum and Minerals, Saudi Arabia.
11. Council of Editors, *International Society for Genetic and Evolutionary Computation* (ISGEC)
12. As lead NSF Program Director, organized the Emerging Models and Technology Workshop on Bio-Inspired Computing and Bio-Computing at Princeton University on July 24-25, 2008.
13. As lead NSF Program Director, organized the EMT Workshop on Nanoelectronics on October 29-30, 2007.
14. As lead NSF Program Director, held the EMT Workshop on Quantum Information Science and Engineering on September 10-11, 2007.
15. Member, University of Michigan Research Policies Committee of Senate Assembly, 2002-05.
16. Member, Electrical Engineering and Computer Science Curriculum Committee, 2002-03.
17. Member, Electrical Engineering and Computer Science DCO Committee, 2002-03.
18. Member, Computer Science and Engineering Graduate Curriculum Committee, 1988-89, 1998-00, 2002-06.
19. Counselor, Computer Engineering Undergraduate Students, 1990-95.
20. Member, Computer Science and Engineering Graduate Admission Committee, 1995-96.
21. Member, IEEE Standards Subcommittee for Semiconductor Memories, 1989-90.
22. Member, IEEE Test Technologies Committee
23. Member, IEEE VLSI Technical Committee
24. General Chair, 2007 High Performance Computing (HPC) for Nanotechnology
25. General Chair, 1999 IEEE Great Lakes VLSI Conference
26. Program Committee, 1992 Fault-Tolerant Computing Symposium Workshop
27. Program Committee, 1992 IEEE Defects and Fault Tolerance Workshop
28. Program Committee, 1993 IEEE Intl. Conference on Memory Testing
29. Program Committee, 1994 IEEE Intl. Conference on Memory Testing
30. Program Committee, 1994 IEEE Asian Testing Symposium
31. Program Committee, 2000 IEEE Great Lakes VLSI Conference
32. Serving on organizing committee for Department of Defense Nano Conference, 2009
33. Served regularly on NSF panels in Engineering and CISE Directorates
34. Proposals Reviewed for: US National Science Foundation, The Israel Science Foundation, Louisiana University Board of Regents, and US Army Research Office, New Jersey Center for Science and Technology, Saudi Arabia King Fahd University Research Foundation, and private venture capitalist firms.

VII. Professional Experience

Details of My Professional Accomplishments

US Government at National Science Foundation (3 years)

In 2007 and 2008, I worked as the lead Program Director for Emerging Models and Technologies (EMT) program in the Division of Computing and Communication Foundations (having nearly \$140 Million annual budget) of the Directorate for Computer and Information and Science and Engineering, National Science Foundation, Arlington, Virginia. My mandate was to manage research grants in Nanoelectronic Modeling and Systems, Quantum Computing, and Biologically Inspired Computing for which I had an operating annual budget of about \$18 Million. Additionally, I participated in several NSF crosscutting programs such as Cyber-Enabled Discovery and Innovation (CDI), Expeditions in Computing, Major Research Instrumentation (MRI), Computing Research Infrastructure (CRI) and Cyber Physical Systems (CPS). In 2009, I worked as a Program Director in the Engineering

Directorate where I managed research in three broad areas: Adaptive Intelligent Systems (Machine Learning), Quantum, Molecular and High-Performance Modeling, and Electronic and Photonic Devices. During these three years, I interacted with several program managers and administrators of NSF, DARPA, ARO, ONR, and AFOSR to help launch national-level major research initiatives. I consider that serving the US government for a stint of three years has provided me an exceptional opportunity to acquire a vast amount of knowledge in various fields of science and engineering, to network with numerous researchers around the nation, and to gain divergent administrative experience.

Teaching Experience (29 years)

Since 1988, I have been teaching at the Department of Electrical Engineering and Computer Science of the University of Michigan, Ann Arbor, Michigan.

Graduate courses developed and taught: 1) VLSI System Design, 2) Optimization and Synthesis of VLSI Layout, 3) Testing of Digital Circuits and Systems, 4) Advanced Computer Architectures, 5) Nanocircuits and Nanoarchitectures, 6) Ultra-Low-Power Subthreshold CMOS Circuits, and 7) Terahertz Technology and Applications.

Undergraduate courses upgraded and taught: 1) Introduction to Digital Logic Design (sophomore level), 2) Digital Integrated Circuit Design (junior level), and 3) VLSI System Design (senior level).

Industrial Experience (6.5 years)

After my baccalaureate degrees in Physics and Electrical Engineering, I worked for six years (1976-1982) as a Senior R&D Engineer at Bharat Electronics Ltd. (BEL) in its Integrated Circuits Division. I designed several bipolar and CMOS analog and digital integrated circuits for consumer electronic systems. I was associated with the following chip development projects: i) Raster-scan vertical deflection system microchip for TV display, ii) Sync processing and horizontal deflection system microchip for TV display, iii) Video and audio IF stage IC's for vestigial-AM and FM signal detection in TV receiver, iv) High-gain audio amplifier microchip for TV audio stage, v) Tape Recorder IC with automatic gain adjustments, vi) Hearing-aid IC, vii) Analog clock driver IC, and viii) LCD and AC Plasma display drive IC's. Several million commercial chips were fabricated based on these designs.

After finishing my MSc degree in Computer Science and while working towards my PhD degree in Electrical and Computer Engineering, I worked during the summers of 1985 and 1986 as a Member of Technical Staff at AT&T Bell Laboratories. I was one of the two engineers who started the Bell Laboratory *Cones/Spruce* project - a new behavioral synthesis and layout automation tool for rapid prototyping of digital circuits. The main contribution of this effort was to demonstrate how a restricted version of C language could be used to model digital hardware much before commercial hardware description language (HDL) software tools like Verilog and System C were designed.

Teaching Accomplishments and Evaluations:

I have endeavored to pursue multidimensional education frontiers that transcend the confines of classroom and impact students as well as other professionals alike. My teaching contributions include authoring an undergraduate textbook and a video book, developing four advanced graduate courses, developing courseware for practicing engineers in industry, editing special issues in professional journals to stimulate research in emerging technologies, and fostering STEM education for K-12 students. Highlights of my teaching accomplishments are enumerated below:

- Breakdown of my course offering at the University of Michigan over the past 30 years: (i) nearly 60% of courses I taught are on *three* undergraduate courses for sophomore, junior and senior; approximately 10% of courses are on *two* regular graduate courses; and about 30% of courses are on *four* new graduate courses designed and developed by me to promote the state-of-the-art CMOS research and train the future engineering workforce. I have taught *three* distinct undergraduate and *six* graduate courses at the University of Michigan.

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