SANJAY SARMA

Dean of Digital Learning
Fred Fort Flowers (1941) and Daniel Fort Flowers (1941) Professor of Mechanical Engineering

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SUMMARY

Radio Frequency ID, Internet of Things, Sensing, Manufacturing, Supply Chain, Design, Automotive Technology, Innovation. Learning Science, Digital Learning. See here for full details.

EDUCATION

Indian Institute of Technology, Kanpur	B Tech	1989
Carnegie Mellon University	ME	1992
University of California, Berkeley	Ph.D.	1995

WORK EXPERIENCE

Massachusetts Institute of Technology 1996-present

- Assistant Professor: 1996-2000
- Associate Professor without tenure: 2000-2003
- Associate Professor with tenure: 2003-2009 (On leave from MIT 2004-2008 for entrepreneurship)
- Full Professor: 2010-present
- Director of Singapore University of Technology and Design Collaboration: 2010-2012
- Director of Digital Learning, MIT: 2012-2014
- Dean of Digital learning, MIT: 2014-present

OATSystems, Waltham MA 2003 to 2008

- Founder, Director: 2003-2008
- Chief Technology Officer: 2004-2006

Schlumberger, Aberdeen and Edinburgh, Scotland, UK 1989 to 1990

- Junior Field Engineer serving oilrigs in the Brent Sector of the North Sea

SCHOLARSHIP

My interest is in performing fundamental research, but at the same time building systems to scale. Scale, to me, involves commercialization, standardization and proliferation. As a result, my journey has extended outside academia and involved entrepreneurship, organizational innovation, standards bodies, IP law and national policy. For example, nearly 5 billion UHF Gen 2 RFID tags used around the world in 2014, and there are over 800 million issued UID's in India today.

Academic Papers (Full list here):

- Ehrenberg, S. Sarma, T. Steffen and B.I. Wu, "Incorporation of active RF circuit elements into additively manufactured substrates", Antennas and Propagation & USNC/URSI National Radio Science Meeting, 2015.
- R. Bhattacharyya, E. Amin, I. Ehrenberg, S. Sarma, C. Swanson, B. Tien and M. Wong, "Towards low-cost, wireless blood anomaly sensing: An RFID-based anemia detection sensor", Proceedings of the 2015 IEEE International Conference on RFID, San Diego, CA, April 2015, pp. 189 – 196.
- E. Wilhelm, J. Siegel, S. Mayer, L. Sadamori, S. Dsouza, C.K. Chau and S. Sarma, "Cloudthink: a scalable secure platform for mirroring transportation systems in the cloud", Transport 30 (3), 320-329
- P. Jain and S.E. Sarma, "Light scattering and transmission measurement using digital imaging for online analysis of constituents in milk", SPIE Optical Metrology, 95254A-95254A-9.

- J. Siegel, R. Bhattacharyya, A. Deshpande and S. Sarma, “Vehicular engine oil service life characterization using On-Board Diagnostic (OBD) sensor data”, SENSORS, 2014 IEEE, 1722-1725.
- Weis, Stephen A., Sanjay E. Sarma, Ronald L. Rivest, and Daniel W. Engels. "Security and privacy aspects of low-cost radio frequency identification systems." In *Security in pervasive computing*, pp. 201-212. Springer Berlin Heidelberg, 2004.
- Chawathe, Sudarshan S., Venkat Krishnamurthy, Sridhar Ramachandran, and Sanjay Sarma. "Managing RFID data." In *Proceedings of the Thirtieth international conference on Very large data bases-Volume 30*, pp. 1189-1195. VLDB Endowment, 2004.
- Miles, Stephen B., Sanjay E. Sarma, and John R. Williams, eds. *RFID technology and applications*. Vol. 1. Cambridge: Cambridge University Press, 2008.

Patents (Full list here):

- Sarma, Sanjay, Daniel W. Engels, Laxmiprasad Putta, Sridhar Ramachandran, and James L. Waldrop. "Method and apparatus for routing data in an automatic identification system." U.S. Patent 7,621,447, issued November 24, 2009.
- Foley, Joseph T., Sanjay Sarma, and Stephen A. Weis. "Enhanced security protocol for radio frequency systems." U.S. Patent 8,384,546, issued February 26, 2013.
- Sarma, Sanjay, and Brian Subirana. "Method and system for performing mobile RFID asset detection and tracking." U.S. Patent 8,477,013, issued July 2, 2013.
- Phan, Long N., Jonathan Lee Jesneck, and Sanjay Sarma. "3D radiometry." U.S. Patent 8,818,079, issued August 26, 2014.

Academic/Industry Policy Papers:

- Sarma, Sanjay. "Towards the 5¢ tag." *Auto ID White Paper MIT-AUTOID-WH-006* (2001).
- Sarma, Sanjay, David L. Brock, and Kevin Ashton. "The networked physical world." *Auto-ID Center White Paper MIT-AUTOID-WH-001* (2000).
- Kanakia, Hemant, Srikanth Nadhamuni, and Sanjay Sarma. "A UID numbering scheme." *White Paper, May* (2010). See Indian UIDAI website here.
- Testimony to US House of Representatives, Subcommittee on Commerce, Trade and Consumer Protection. House Hearing, 108 Congress. July 2004. See minutes here.
- Co-Chair of MT Institute-wide Task Force on the Future of MIT Education. See report here.
- Co-Chair of MIT Online Education Policy Initiative. See website here.
- Contributor to: Locke, Richard M., and Rachel L. Wellhausen. *Production in the innovation economy*. MIT Press, 2014.

TEACHING

Term	*Course Number*	*Course Title*	*Role*	*Course Type*	*# Students Registered*	*Instructor's Evaluation*
ST96	2.002	Mechanics of Materials	Lab. Instructor	Lab	23	7.00 /7.00
FT96	2.002	Mechanics of Materials	Lab. Instructor (2 sections)	Lab	60	6.42 /7.00
ST97	2.007	Introduction to Design and Manufacturing I	Section Instructor	Lecture	12	6.50 /7.00
ST97	2.008	Introduction to Design and Manufacturing II	Co-Instructor	Lecture	70	5.64 /7.00
FT97	2.31	Finite Element Design and CAD	Co-Instructor	Lecture	21	5.92 /7.00
FT97	2.002	Mechanics of Materials	Lab. Instructor	Lab	84	6.78 /7.00
ST98	2.007	Introduction to Design and Manufacturing I	Section Instructor	Lecture	12	4.80 /5.00
ST98	2.008	Introduction to Design and Manufacturing II	Co-Instructor	Lecture	54	4.96 /5.00
FT98	2.002	Mechanics of Materials	Lab Instructor (2 sections)	Lab	28	4.77 /5.00
ST99	2.008	Introduction to Design and Manufacturing II	Lead Instructor	Lecture	50	4.89 /5.00

FT99	2.008	Introduction to Design and Manufacturing II	Lead Instructor	Lecture	65	6.64 /7.00
IAP00	2.670	Mechanical Engineering Tools	Co-Instructor	Lecture	(4)	4.80 /5.00
IAP01	2.670	Mechanical Engineering Tools	Co-Instructor	Lecture	(4)	6.47 /7.00 6.76 /7.00
FT01	2.008	Introduction to Design and Manufacturing II	Lead Instructor	Lecture	69	6.80 /7.00
ST03	2.001	Mechanics of Materials I	Lead Instructor	Lecture	74	6.44 /7.00
FT03	2.001	Mechanics of Materials I	Lead Instructor	Lecture	58	6.35 /7.00
ST04	2.001	Mechanics of Materials I	Lead Instructor	Lecture	81	6.29 /7.00
FT06	2.003J	Modeling Dynamics and Control I	Lead Instructor	Lecture	112	6.63 /7.00
ST07	2.003J	Modeling Dynamics and Control I	Lab. Instructor	Lab	50	6.83 /7.00
FT07	2.003J	Modeling Dynamics and Control I	Lead Instructor	Lecture	112	6.59/7.00
ST08	2.003J	Modeling Dynamics and Control I	Lead Instructor	Lecture	66	6.79/7.00
FT08	2.008	Introduction to Design and Manufacturing II	Lead Instructor	Lecture	83	6.5/7.00
ST09	2.003J	Modeling Dynamics and Control I	Lead Instructor	Lecture	82	6.82/7.00

KEY LEADERSHIP EFFORTS

Auto-ID Center/Labs, MIT: Co-founded consortium that lead to modern RFID. 1998 to 2003
Center spanned 6 universities across the world. Formed consortium with 100 members including Wal*Mart, P&G, Unilever and others. Initiated cloud-approach to RFID, lightweight protocol Lead to Gen 1 and Gen 2 standards, ISO 18000-6c. Created new standards process, help navigate IP impasse.
The term "Internet of Things" was created during the consortium, and remains an area of research Auto-ID Labs.

EPCglobal: The standards developed by the Auto-ID Center were acquired by GS1. 2003-2015
Founded EPCglobal, an entity on GS1 to manage the standards process and focus on innovation. Founding governor of EPCglobal, became Chairman of GS1 in 2012.

Singapore University of Technology and Design: Director of Collaboration 2010-2012
Helped establish new university in Singapore. Lead MIT team of over 100 in design and implementation of MIT principles in new university. Worked closely with president and leadership team of SUTD and Singapore government, and at fledgling university.

UID System, India: Key designer of the Indian version of the Social Security number. 2009
Over 800 million numbers have been issued to Indian citizens, or 2/3 of the total population. Currently used for public distribution in India.

Field Intelligence Lab, MIT: Principal Investigator 2009-present
Established lab to conduct research in Internet of Things. Research spans sensing, big-data, connected things. Resulted in 3 startups.
Currently used for public distribution in India.

MIT Office of Digital Learning: Director, Dean 2012-present
Founding director of MIT effort to innovate in education using online tools. MITx has now reached over 1 million students worldwide on edX, which was previously set up by MIT in 2011. The Office of Digital Learning has also served more than 100 classes on campus.

BOARDS, EXECUTIVE POSITIONS AND ENTREPRENEURSHIP

OATSystems: Founder, CTO (2004-2006), Board of Directors. 2003 to 2008

Leading RFID software company. Acquired by Checkpoint Systems (NYSE:CKP) in 2008. Venture funded by Greylock and Matrix.

ESSESS: Founder, Chairman of Board. 2011 to present
Infrared, LiDar, based energy scanning/navigation company.
Venture funded by Vocap Ventures, DFJ Athena and Constellation Ventures.

Senaya: Director. 2011-present
GPS, Cellular and RFID based pallet/container tracking technology

Top Flight Technologies: Chief Scientific Officer 2014-present
Hybrid-powered drone technology

GS1US: Board member of organization originally known as the Uniform Code Council.
edX: Board member of MOOC provider which now has more than 3 million enrollees from 195 countries.

GS1: Permanent guest of the board of standards body which governs barcode and other commerce standards.

GS1 Innovation Network/EPCglobal: Chairman of the Board.

Tracelink: Advisory Board of leading cloud-based pharmaceutical track and trace company.

TempTime: Scientific Advisory Board of leading vaccine expiry tracking company.

Manufacton: Advisory Board of cloud-based supply-tracking company.

AWARDS

Academic Awards:

NSF Career Initiation Grant (1997)
Den Hartog Teaching Excellence Award (2001)
Joseph H. Keenan Award for Innovation in Undergraduate Education (2002)
MacVicar Fellowship (2008)

Industry Awards/Recognitions:

Information Week's Innovators and Influencers (2003)
Business Week's e.biz 25 Innovators (2003)
New England Business and Technology Award (2005)
MIT Global Indus Award (2005)
Fast Company Magazine's "Fast 50" (2005)
Boston Magazine's 40 under 40 (2006)
RFID Journal Special Achievement Award (2010)