

# Prof. Neil Gershenfeld

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## EMPLOYMENT

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Professor, MIT (7/92-)

Junior Fellow, Harvard University Society of Fellows (9/89-7/92)

Technician, Bell Labs (9/81-9/83; 6-12/84)

Visiting Scientist, San Francisco Laser Center (9/83-6/84)

Summer Fellow, Woods Hole Oceanographic Institution (6-9/80; 7-8/83)

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## EDUCATION

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*Graduate (1/85-1/90, MA, Ph.D.)*

Department of Applied and Engineering Physics, Cornell University, Ithaca, NY. Prof. Watt Webb, advisor, working with Profs. David Mermin, John Guckenheimer, Robert Pohl, and Jim Sethna. IBM Graduate Fellowship.

*Undergraduate (9/77-6/81, BA)*

Swarthmore College, Swarthmore, PA. Physics major, Engineering minor; graduated with High Honors, Phi Beta Kappa, and Sigma Xi; co-captain of the swim team.

*Secondary (9/74-6/77)*

Plymouth Whitemarsh High School, Plymouth Meeting, PA. Years also spent in Kingston, Jamaica and Oxford, England.

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## RECOGNITION

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Fellow, American Physical Society

Honorary doctorates from Swarthmore College, Strathclyde University, and the University of Antwerp

Top 100 public intellectuals, Prospect/Foreign Policy

50 leaders in science and technology, Scientific American

40 Modern-Day Leonardos, Museum of Science and Industry

25 Makers, Popular Mechanics

Principal Voice, CNN/Time/Fortune

Brain Scan, The Economist

National Academy of Sciences Great Hall

Mario Pani Prize

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## BOOKS

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- (6) *Designing Reality*, Neil Gershenfeld, Alan Gershenfeld, and Joel Cutcher-Gershenfeld, Basic Books (2017).
- (5) *Fab: The Coming Revolution On Your Desktop – from Personal Computers To Personal Fabrication*, Neil Gershenfeld, Basic Books (2005). (BusinessWeek Best of 2005)
- (4) *The Physics of Information Technology*, Neil Gershenfeld, Cambridge University Press (2000).
- (3) *When Things Start to Think*, Neil Gershenfeld, Henry Holt and Company (1999). (Amazon top 10)
- (2) *The Nature of Mathematical Modeling*, Neil Gershenfeld, Cambridge University Press (1999).
- (1) *Time Series Prediction: Forecasting the Future and Understanding the Past*, Andreas S. Weigend and Neil A. Gershenfeld eds., Santa Fe Institute Studies in the Sciences of Complexity, Addison–Wesley (1993).

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## ARTICLES

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- (80) *Hierarchical assembly of a self-replicating spacecraft*, W. Langford, A. Ghassaei, B. Jenett, and N. Gershenfeld, Aerospace Conference, 2017 IEEE, pp. 1-10 (2017).
- (79) *Cardboard Machine Kit: Modules for the Rapid Prototyping of Rapid Prototyping Machines*, N. Peek, J. Coleman, I. Moyer, and N. Gershenfeld, Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems, pp. 3657-3668. ACM (2017).
- (78) *Digital morphing wing: active wing shaping concept using composite lattice-based cellular structures* B. Jenett, S. Calisch, D. Cellucci, N. Cramer, N. Gershenfeld, S. Swei, and K.C. Cheung, *Soft Robotics* (4), pp. 33-48 (2017).
- (77) *Progress in fabrication of waveguide spatial light modulators via femtosecond laser micromachining* N. Savidis, S. Jolly, B. Datta, M. Moebius, T. Karydis, E. Mazur, N. Gershenfeld, and V.M. Bove, Proc. SPIE 10115, Advanced Fabrication Technologies for Micro/Nano Optics and Photonics X, 101150R, doi: 10.1117/12.2250596 (2017).
- (76) *Automated Assembly of Electronic Digital Materials*, W. Langford, A. Ghassaei, and N. Gershenfeld, ASME 2016 11th International Manufacturing Science and Engineering Conference, pp. V002T01A013-V002T01A013. American Society of Mechanical Engineers (2016).
- (75) *Macrofabrication with Digital Materials: Robotic Assembly*, N. Gershenfeld, M. Carney, B. Jenett, S. Calisch, S. Wilson, S., *Architectural Design* (85), pp. 122-127 (2015).
- (74) *As Objects Go Online: The Promise (and Pitfalls) of the Internet of Things*, Neil Gershenfeld and JP Vasseur, *Foreign Affairs* (93), pp. 60-67 (2014).
- (73) *Reversibly Assembled Cellular Composite Materials*, Kenneth C. Cheung and Neil Gershenfeld, *Science* (341), pp. 1219-1221 (2013).

- (72) *The Milli-Motein: A Self-Folding Chain of Programmable Matter with a One Centimeter Module Pitch*, Ara N. Knaian, Kenneth C. Cheung, Maxim B. Lobovsky, Asa J. Oines, Peter Schmidt-Neilsen, and Neil A. Gershenfeld, IEEE/RSJ International Conference on Intelligent Robots and Systems (2012).
- (71) *How to Make Almost Anything: The Digital Fabrication Revolution*, Neil Gershenfeld, Foreign Affairs (91), pp. 43-57 (2012).
- (70) *Aligning the Representation and Reality of Computation with Asynchronous Logic Automata*, Neil Gershenfeld, Computing (93), pp. 91-102 (2011).
- (69) *Cryptography with Asynchronous Logic Automata*, Peter Schmidt-Nielsen, Kailiang Chen, Jonathan Bachrach, Scott Greenwald, Forrest Green, and Neil Gershenfeld, Quisquater Festschrift, LNCS 6805, D. Naccache (Ed.), pp. 355-363 (2011).
- (68) Review, *Physics of the Future: How Science Will Shape Human Destiny and Our Daily Lives by the Year 2100*, N. Gershenfeld, Physics Today (64), p. 56 (2011).
- (67) *Inertial Measurement With Trapped Particles: A Microdynamical System*, E. Rehmi Post, George A. Popescu, and Neil Gershenfeld, Applied Physics Letters (96), p. 143501 (2010).
- (66) *Reconfigurable Asynchronous Logic Automata*, Neil Gershenfeld, David Dalrymple, Kailiang Chen, Ara Knaian, Forrest Green, Erik D. Demaine, Scott Greenwald, and Peter Schmidt-Nielsen, POPL'10 (ACM SIGACT-SIGPLAN Symposium on Principles of Programming Languages), January 17-23, Madrid, Spain (2010).
- (65) *Analog Logic Automata*, K. Chen, L. Leu, L. and N. Gershenfeld, Proceedings of the IEEE Biomedical Circuits and Systems Conference (BioCAS), pp. 189-192 (2008).
- (64) *Asynchronous Logic Automata*, D.A. Dalrymple, N. Gershenfeld, and K. Chen, Proceedings of AUTOMATA 2008, pp. 313-322 (2008).
- (63) *Ultra-Small-Sample Molecular Structure Detection Using Microslot Waveguide Nuclear Spin Resonance*, Y. Maguire, I.L. Chuang, S. Zhang, and N. Gershenfeld, Proceedings of the National Academy of Sciences (104), pp. 9198-9203 (2007).
- (62) *Microfluidic Bubble Logic*, M. Prakash and N. Gershenfeld, Science (315), pp. 832-835 (2007).
- (61) *On the Search for Quantum Control of Electronic Spin by Shaped Ultrafast Optical Pulses*, J. Taylor, A. Florean, P. Bucksbaum, and N. Gershenfeld, Quantum Computing: Back-Action (AIP Press, 2006).
- (60) *Digital Printing of Digital Materials*, G.A. Popescu, P. Künzler, and N. Gershenfeld, DF 2006 International Conference on Digital Fabrication Technologies, Denver, Colorado (2006).
- (59) *Digital Materials for Digital Printing*, G.A. Popescu, N. Gershenfeld, and T. Mahale, DF 2006 International Conference on Digital Fabrication Technologies, Denver, Colorado (2006).
- (58) *Internet 0: Interdevice Internetworking*, N. Gershenfeld and D. Cohen, IEEE Circuits and Devices (22), pp. 48-55 (2006).
- (57) *Synchronization of Pseudo-Random Signals by Forward-Only Message Passing with Application to Electronics Circuits*, B. Vigoda, H. Dauwels, M. Frey, N. Gershenfeld, T. Koch, H.-A. Loeliger, and P. Merkli, IEEE Transactions of Information Theory (52), pp. 3843-3852 (2006).

- (56) *SEA: a Scalable Encryption Algorithm for Small Embedded Applications*, F. Standaert, G. Piret, N. Gershenfeld, and J. Quisquater, Springer Lecture Notes in Computer Science (3928), pp. 222–236 (2006).
- (55) *The Internet of Things*, N. Gershenfeld, R. Krikorian, and D. Cohen, *Scientific American* (291), pp. 76–81 (2004).
- (54) *Slitted Microstrip Fabrication Using Laser Micromachining for Small Sample Detection*, Y. Maguire, R. Elavarasan, I. Chuang, and N. Gershefeld, The 45th Experimental Nuclear Magnetic Resonance Conference (April, 2004).
- (53) *Physical One–Way Functions*, R. Pappu, B. Recht, J. Taylor, and N. Gershenfeld, *Science* (297), pp. 2026–2030 (2002).
- (52) *A Quantum Conversation*, N. Gershenfeld, *Science* (293), pp. 2035–7 (2001).
- (51) *An Immersive, Multi–User, Musical Stage Environment*, M. Reynolds, B. Schoner, J. Richards, K. Dobson, and N. Gershenfeld, *SIGGRAPH Proceedings*, ACM, New York, NY (2001).
- (50) *Bits and Chips*, N. Gershenfeld, *New Scientist* (169), p. 55–55 (March 17, 2001).
- (49) *Remotely Interrogated Temperature Sensors based on Magnetic Materials*, R. Fletcher and N. Gershenfeld, *IEEE Transactions on Magnetics* (36), pp. 2794–2795 (2000).
- (48) *Towards a Table–Top Quantum Computer*, Y. Maguire, E. Boyden, and N. Gershenfeld, *IBM Systems Journal* (39), pp. 823–839 (2000).
- (47) *E–broidery: Design and Fabrication of Textile–based Computing*, E.R. Post, M. Orth, P.R. Russo, and N. Gershenfeld, *IBM Systems Journal* (39), pp. 840–860 (2000).
- (46) *An Installation of Interactive Furniture*, O. Omojola, E.R. Post, M.D. Hancher, Y. Maguire, R. Pappu, B. Schoner, P.R. Russo, R. Fletcher, and N. Gershenfeld, *IBM Systems Journal* (39), pp. 861–879 (2000).
- (45) *Everything, the Universe, and Life*, N. Gershenfeld, *IBM Systems Journal* (39), pp. 932–934 (2000).
- (44) *Cluster–Weighted Sampling for Synthesis and Cross–Synthesis of Violin Family Instruments*, B. Schoner, C. Cooper, and N. Gershenfeld, *Proc. International Computer Music Conference*, Berlin, Germany (August 2000).
- (43) *Cluster–Weighted Modeling: Probabilistic Time Series Prediction, Characterization and Synthesis*, B. Schoner and N. Gershenfeld, in *Nonlinear Dynamics and Statistics*, edited by Alistair Mees (Birkhaeuser, Boston, 2000).
- (42) *TouchTags: Using Touch to Retrieve Information Stored in a Physical Object*, N. Gershenfeld, and B. Vigoda, *ACM SIGCHI Conference on Human Factors in Computing Systems*, Pittsburgh, PA (May, 1999).
- (41) *Cluster–Weighted Modeling for Time Series Analysis*, N. Gershenfeld, B. Schoner, and E. Metois, *Nature* (397), pp. 329–332 (1999).
- (40) *Reconfigurable Agile Tag Reader Technologies for Combined EAS and RFID Capability*, R. Fletcher, O. Omojola, E. Boyden, and N. Gershenfeld, *Proc. of the Second IEEE Workshop on Automatic Identification Advanced Technologies*, Summit, New Jersey, (October 1999).
- (39) *Data–Driven Modeling of Nonlinear Microwave Devices*, Bernd Schoner and Neil Gershenfeld, *Digest 53rd ARFTG Conference on Nonlinearity Characterization*, Anaheim, California (June 1999).

- (38) *Code–Division Multiplexing of a Sensor Channel: a Software Implementation*, J.R. Smith, C. Salt-house, and N. Gershenfeld, *IEEE Journal on Selected Areas in Communications* (17), pp. 725–31 (1999).
- (37) *Parasitic Power Harvesting in Shoes*, J. Kymisis, C. Kendall, J. Paradiso, and N. Gershenfeld, *Second IEEE International Conference on Wearable Computing*, Atlanta, GA (October 1998). (ISWC 2018 20 years impact award)
- (36) *Data–Driven Modeling and Synthesis of Acoustical Instruments*, B. Schoner, C. Cooper, C. Douglas, and N. Gershenfeld, *International Computer Music Conference* (selected as best paper), Ann Arbor, MI (August 98).
- (35) *Electric Field Sensing for Graphical Interfaces*, J. Smith, T. White, C. Dodge, J. Paradiso, and N. Gershenfeld, *IEEE Computer Graphics and Applications*, pp. 54–59 (May/June 1998).
- (34) *Quantum Computing with Molecules*, N. Gershenfeld and I. Chuang, *Scientific American* (278), pp. 66–71 (June 1998).
- (33) *Experimental Implementation of Fast Quantum Searching*, I.L. Chuang, N. Gershenfeld, and M. Kubinec, *Physical Review Letters* (80), pp. 3408–3411 (1998).
- (32) *Bulk Quantum Computation with Nuclear Magnetic Resonance: Theory and Experiment*, I.L. Chuang, N. Gershenfeld, M.G. Kubinec, and D.W. Leung, *Proceedings of the Royal Society A* (454), pp. 447–467 (1998).
- (31) *Intrabody Buses for Data and Power*, E.R. Post, M. Reynolds, M. Gray, J. Paradiso, N. Gershenfeld, *First International Symposium on Wearable Computers*, pp. 52–5 (IEEE Computer Society, Los Alamitos CA, 1997).
- (30) *Application of Smart Materials to Wireless ID Tags and Remote Sensors*, R. Fletcher, J.A. Levitan, J. Rosenberg, N. Gershenfeld, in *Materials for Smart Systems II*, edited by E.P. George et. al., pp. 557–62 (Materials Research Society, Pittsburgh PA, 1997).
- (29) *The Future of Time Series: Learning and Understanding*, N. Gershenfeld and A. Weigend, in *Pattern Formation in the Physical and Biological Sciences*, edited by H.F. Nijhout, L. Nadel, and D.L. Stein (Addison–Wesley, Reading MA, 1997).
- (28) *Bulk Spin Resonance Quantum Computation*, N. Gershenfeld and I. Chuang, *Science* (275), pp. 350–356 (1997).
- (27) *Musical Applications of Electric Field Sensing*, J.A. Paradiso and N. Gershenfeld, *Computer Music Journal* (21), pp. 69–89 (1997).
- (26) *Non–Contact Sensing of People and Things*, N. Gershenfeld, *SAE Convergence* 96.
- (25) *Signal Entropy and the Thermodynamics of Computation*, N. Gershenfeld, *IBM Systems Journal* (35), pp. 577–587 (1996).
- (24) *Digital Dressing, or Software to Wear*, N. Gershenfeld, *The New York Times Sunday Magazine Men’s Fashion Supplement* (5/96).
- (23) *Wearable Computing*, N. Negroponte and N. Gershenfeld, *WIRED* (12/95).
- (22) *Entrainment and Communication with Dissipative Pseudorandom Dynamics*, N. Gershenfeld, and G. Grinstein, *Physical Review Letters* (74), pp. 5024–7 (1995).
- (21) *Why I Am/Am Not a Physicist*, *Physics Today*, pp. 50–51 (July, 1995).

- (20) *Applying Electric Field Sensing to Human–Computer Interfaces*, T.G. Zimmerman, J.R. Smith, J.A. Paradiso, D.A. Allport, N. Gershenfeld, ACM/ SIGCHI–95.
- (19) *Results Of The Time Series Prediction Competition at the Santa Fe Institute*, A.S. Weigend and N.A. Gershenfeld, in Proceedings of 1993 IEEE International Conference on Neural Networks, p. 1786–93 (IEEE Press, New York, 1993).
- (18) *The Future of Forecasting*, N. Gershenfeld, Proceedings of the SPIE (2038) p. 241 (1993).
- (17) *Information in Dynamics*, N. Gershenfeld, in Proceedings of the Workshop on Physics of Computation, D. Matzke ed., pp. 276–280 (IEEE Press, New York 1993), pp. 276–280.
- (16) *Dimension Measurement on High–Dimensional Systems*, N. A. Gershenfeld, Physica D (55), p. 135 (1992).
- (15) *Measurement of Glasslike and Crystalline Elasticity in Quasicrystals*, J.E. VanCleve, N.A. Gershenfeld, K. Knorr, and P.A. Bancel, Physical Review B (41), p. 980 (1990).
- (14) *An Experimentalist’s Introduction to the Observation of Dynamical Systems*, N. Gershenfeld, in *Direction in Chaos*, Vol II, edited by Hao Bai–lin (World Scientific, Singapore, 1988), p. 310 (reviewed in Amer. Sci. (78), p. 73 (1990)).
- (13) *Percolating Cermet Thin Film Thermistors Between 50mK–300K and 0–20 Tesla*, N.A. Gershenfeld, J.E. VanCleve, W.W. Webb, H.E. Fischer, N.A. Fortune, J.S. Brooks, and M.J. Graf, The Journal of Applied Physics (64), p. 4760 (1988).
- (12) *Versatile Low Temperature and High Magnetic Field Thermometers: The Low Temperature Magneto–Resistance of Thin Film Cermets*, N.A. Gershenfeld, J. VanCleve, M.J. Graf, N.A. Fortune, and J.S. Brooks, Proceedings of the 18th Intl. Conf. on Low Temp. Physics, Japanese Journal of Applied Physics supplement (26–3) p. 1741 (1987).
- (11) *State–Selective Detection of H<sub>2</sub> by 1+1 REMPI via the C<sup>1</sup>Π<sub>u</sub>(ν′ = 0, J′) States*, A.H. Kung, T. Trickl, N.A. Gershenfeld, and Y.T. Lee, Chemical Physics Letters (144), p. 427 (1988).
- (10) *Temperature Dependence of Photon Stimulated Desorption Ground State and Excited States from NaCl*, E. Taglauer, N.H. Tolk, R. Riedel, E. Colavita, G. Margaritondo, N. Gershenfeld, N. Stoffel, J.A. Kelber, G. Loubriel, A.S. Bommanavar, M. Bakshi, Z. Huric, Surface Science (169) p. 267 (1986).
- (9) *XUV Generation in Pulsed Free Jets: Theory of Operation and Application to Detection*, A.H. Kung, N.A. Gershenfeld, C.T. Rettner, D.S. Bethune, E.E. Marinero, and R.N. Zare, in Laser Techniques in the Extreme Ultraviolet, edited by S.E. Harris and T.B. Lucatorto, AIP Conf. Proc. 119, p. 10 (1984).
- (8) *The Measurement of Optically Thick Atomic Vapor Densities by the Nonlinear Least–Squares Fitting of Absorption or Fluorescence Spectra*, N. Gershenfeld, Nuclear Instruments and Methods A (224) p. 570 (1984).
- (7) *Desorption Induced by Electronic Transitions*, N. Tolk, P. Bucksbaum, N.A. Gershenfeld, J.S. Kraus, R.J. Morris, D.E. Murnick, J.C. Tully, R.R. Daniels, G. Margaritondo, and N.G. Stoffel, Nuclear Instruments and Methods B (230) p. 457 (1984).
- (6) *A Recurring Textbook Error: Graphs of the Hydrogen Radial Probability Density*, N. Gershenfeld, American Journal of Physics (52)p. 81 (1984).
- (5) *APL and the Numerical Solution of High–Order Linear Differential Equations*, N.A. Gershenfeld, E. H. Schadler, and O. M. Bilaniuk, American Journal of Physics (51) p. 743 (1983).

- (4) *A Versatile, High Precision Process Controller*, N. Gershenfeld and R. Darling, AT&T Bell Labs TM83–11131–41.
- (3) *An Optically Pumped  ${}^6\text{Li}$  Target for PNC Studies*, D.E. Murnick, N. Gershenfeld, Y. Niv, and P.G. Pappas, in *Lasers in Nuclear Physics*, edited by C. Bemis and H.K. Carter, Harwood Academic, Chur (1982) p. 395.
- (2) *Selective Withdrawal from a Rotating Stratified Current with Applications to OTEC*, J.A. Whitehead, Jr., and N. Gershenfeld, *Ocean Engineering* (8) p. 507 (1981).
- (1) *Rotating Flume with Uniformly Flowing, Linear Stratified Water*, N. Gershenfeld, R. E. Frazel, and J. A. Whitehead, Jr., *Reviews of Scientific Instruments* (52) p. 1556 (1981).

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## PATENTS

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- (53) 9,690,286: *Methods and apparatus for digital material skins* S. Hovsepian, N. Gershenfeld and K. Cheung (6/27/2017).
- (52) 9,566,758: *Digital flexural materials* K. Cheung and N. Gershenfeld (2/14/2017).
- (51) 9,525,330: *Electropermanent magnet-based motors* A. Knaian, N. Gershenfeld and Maxim Lobovsky (12/20/2016).
- (50) 9,506,485: *Hierarchical functional digital materials* N. Gershenfeld and J.D. Ward (11/29/2016).
- (49) 9,404,835: *Microfluidic bubble logic devices* M. Prakash and N. Gershenfeld (8/2/2016).
- (48) 9,073,962: *Methods of serial assembly of DNA bricks into larger structures* C. Fracchia, N. Gershenfeld and K. Cheung (7/7/2015).
- (47) 8,986,809: *Methods and apparatus for digital composites* N. Gershenfeld and K. Cheung (3/24/2015).
- (46) 8,742,794: *Analog logic automata* N. Gershenfeld, K. Chen and J. Leu (6/3/2014).
- (45) 8,692,575: *Asynchronous logic automata* N. Gershenfeld, K. Chen and D. Dalrymple (4/8/2014).
- (44) 8,674,576: *Electropermanent magnet-based motors*, A. Knaian, N. Gershenfeld, and M. Lobovsky (3/18/2014).
- (43) 8,666,547: *Cellular automotion digital material*, K. Cheung, A. Knaian, and N. Gershenfeld (3/4/2014).
- (42) 8,590,377: *Inertial measurement unit*, E. Post and N. Gershenfeld (11/26/2013).
- (41) 8,473,093: *Methods and apparatus for online calorimetry*, N. Gershenfeld, N. Peek, K. Cheung, and D. Watson (6/25/2013).
- (40) 8,473,123: *Programmable surface*, A. Sun and N. Gershenfeld (6/25/2013)
- (39) 8,383,061: *Microfluidic bubble logic devices*, M. Prakash and N. Gershenfeld (2/26/2013).
- (38) 8,235,071: *Microfluidic bubble logic devices and methods*, M. Manu and N. Gershenfeld (8/7/2012).
- (37) 8,041,037: *Cryptographic system and methods using a one way multidimensional function*, B. Recht, N. Gershenfeld, and A. Rahimi (10/18/2011).
- (36) 8,035,414: *Asynchronous logic automata*, N. Gershenfeld, K. Chen, and D. Dalrymple (10/11/11).
- (35) 8,013,629: *Reconfigurable logic automata*, D. Dalrymple, E. Demaine, N. Gershenfeld, F. Green, and A. Knaian (9/6/11).

- (34) 7,918,244: *Microfluidic bubble logic devices*, M. Prakash and N. Gershenfeld (4/5/11).
- (33) 7,860,687: *Analog continuous time statistical processing*, B. Vigoda and N. Gershenfeld (12/28/10).
- (32) 7,848,838: *Digital assembler for digital materials*, N. Gershenfeld, P. Kunzler, and G.A. Popescu (12/7/10).
- (31) 7,784,495: *Microfluidic bubble logic devices*, M. Prakash and N. Gershenfeld (8/31/10).
- (30) 7,560,927: *Slitted and stubbed microstrips for high sensitivity, near-field electromagnetic detection of small samples and fields*, Y. Maguire, N. Gershenfeld, I. Chuang (7/14/09).
- (29) 7,221,275: *Tunable wireless tags using spatially inhomogeneous structures* Fletcher, R. Fletcher and N. Gershenfeld (5/22/2007).
- (28) 7,209,867: *Analog Continuous Time Statistical Processing*, B. Vigoda and N. Gershenfeld (4/24/07).
- (27) 6,891,382: *Three-dimensional characterization using a one-dimensional electrode array*, E. Post and N. Gershenfeld (5/10/05).
- (26) 6,791,452: *Platform for item sensing and identification*, R. Fletcher, N. Gershenfeld, P. Yarin, and H. Ishii (9/14/04).
- (25) 6,724,310: *Frequency-based wireless monitoring and identification using spatially inhomogeneous structures*, N. Gershenfeld and R. Fletcher (4/20/04).
- (24) 6,693,540: *Wireless Monitoring and Identification using Spatially Inhomogeneous Structures*, N. Gershenfeld and R. Fletcher (2/17/04).
- (23) 6,642,837: *Method and Apparatus for Touch-Activated Identification and Information Transfer*, B. Vigoda and N. Gershenfeld (11/4/03).
- (22) 6,584,214: *Identification and Verification using Complex Three-Dimensional Structural Features*, R. Pappu, N. Gershenfeld, and J.R. Smith (6/24/03).
- (21) 6,493,933: *Method of Making Flexible Electronic Circuitry*, E.R. Post and N. Gershenfeld (12/17/02).
- (20) 6,472,987: *Wireless Monitoring and Identification using Spatially Inhomogeneous Structures*, N. Gershenfeld and R. Fletcher (10/29/02).
- (19) 6,460,557: *Transmissionless Pressure-Control Valve*, J. Levitan, N. Gershenfeld, and E. Blanco (10/8/02).
- (18) 6,211,799: *Method and Apparatus for Transbody Transmission of Power and Information*, E.R. Post, B. Nivi, and N. Gershenfeld (4/3/01).
- (17) 6,208,253: *Wireless Monitoring of Temperature*, R. Fletcher and N. Gershenfeld (3/27/01).
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- (15) 6,066,954: *Apparatus for Resolving Presence and Orientation within a Defined Space*, N. Gershenfeld and J. Smith (5/23/00).
- (14) 6,051,981: *Method and apparatus for characterizing movement of a mass within a defined space*, N. Gershenfeld and J. Smith (4/18/00).
- (13) 6,025,726: *Method and apparatus for determining three-dimensional position, orientation and mass distribution*, N. Gershenfeld and J. Smith (2/15/00).



- (12) 6,025,725: *Electrically Active Resonant Structures for Wireless Monitoring and Control*, N. Gershenfeld and R. Fletcher (2/15/00).
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- (10) 5,936,412: *Method For Resolving Presence, Orientation, and Activity in a Defined Space*, N. Gershenfeld and J. Smith (8/10/99).
- (9) 5,914,610: *Apparatus and Method for Characterizing Movement of a Mass Within a Defined Space*, N. Gershenfeld and J. Smith (6/22/99).
- (8) 5,914,701: *Non-Contact System For Sensing And Signalling By Externally Induced Intra-Body Currents*, D. Allport, N. Gershenfeld, and T. Zimmerman (8/6/97).
- (7) 5,917,322: *Method and Apparatus for Quantum Information Processing*, I. Chuang and N. Gershenfeld.
- (6) 5,844,415: *Method for Three-Dimensional Positions, Orientation, and Mass Distribution*, N. Gershenfeld and J.R. Smith (12/1/98).
- (5) 5,790,025: *Tamper Detection Using Bulk Multiple Scattering*, N. Amer, D. DiVincenzo, N. Gershenfeld (8/4/98).
- (4) 5,612,973, 5,729,388, 5,737,360: *System Employing Dissipative Pseudorandom Dynamics For Communications and Measurement*, N. Gershenfeld and G. Grinstein (3/18/97, 3/17/98, 4/7/98).
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