

# Dr. Alexander D. Wissner-Gross

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## Overview

Dr. Alexander D. Wissner-Gross is an award-winning computer scientist, entrepreneur, advisor, and investor. He serves as President and Chief Scientist of Gemed and Managing Director of Reified and has taught at Harvard and MIT. He has received 128 major distinctions, authored 23 publications, been granted 24 issued, pending, and provisional patents, and founded, advised, and invested in 25 technology companies with a combined valuation of over \$800 million. In 1998 and 1999, respectively, he won the USA Computer Olympiad and the Intel Science Talent Search. In 2003, he became the last person in MIT history to earn a triple major, with bachelor's degrees in Physics, Electrical Science and Engineering, and Mathematics, and graduated first in his class from the MIT School of Engineering with a Marshall Scholarship. In 2007, he completed his Ph.D. in Physics at Harvard, where his research on neuromorphic computing, machine learning, and programmable matter was awarded the Hertz Foundation's Doctoral Thesis Prize. A thought leader in artificial intelligence and cyber-physical systems, he is a contributing author of the New York Times Science Bestseller, *This Idea Must Die*, and the Amazon #1 New Release, *What to Think About Machines That Think*. A popular TED speaker, his talks have been viewed more than 2 million times and translated into 27 languages. His work has been featured in more than 200 press outlets worldwide, including The Wall Street Journal, BusinessWeek, CNN, USA Today, and Wired.

## Education

2003-2007 Ph.D., Physics, Harvard University (Hertz Fellow; Hertz Doctoral Thesis Prize Winner)  
A.M., Physics, Harvard University  
1999-2003 S.B., Physics, Massachusetts Institute of Technology  
S.B., Electrical Science and Engineering, Massachusetts Institute of Technology  
S.B., Mathematics, Massachusetts Institute of Technology  
(1st out of ~550 in MIT School of Engineering class as Henry Ford II Scholar)  
1995-1999 Great Neck South High School, Great Neck, NY (1st out of 225)

## Industrial Experience

2019-Present Founder and Managing Director, Reified, LLC (startup investing and advising)  
2011-Present Founder, President, and Chief Scientist, Gemed, Inc. (intelligent government systems)  
2007-2016 Founder, Enermetics, Inc. (web analytics; acquired by Sustainable Travel International in 2016)  
2006-2011 Founder and Partner, Maxtile Holdings GP  
(software incubator; acquired by Surf My Ads, Inc., in 2007 and ISC / Mindhive Inc. in 2011)

## Academic Experience

2017-Present Alumni Expert in Residence, Massachusetts Institute of Technology  
2012-2021 Institute Fellow and Associate, Institute for Applied Computational Science, Harvard University  
2012-2020 SEAS Expert in Residence, Harvard Innovation Lab, Harvard University  
2010-2019 Research Affiliate, Media Laboratory, Massachusetts Institute of Technology  
2008-2010 Ziff Fellow, Computer Science, Harvard University

## Government Experience

2016-Present Subject Matter Expert, Homeland Defense and Security Information Analysis Center (HDIAC)  
2016-2017 Task Force Observer (Design and Acquisition of Software for Defense Systems), Defense Science Board

## Philanthropic Experience

2018-Present Advisory Board Member, Brain Preservation Foundation  
2016-Present Organizing Committee Member, MIT Alumni Angels of Boston  
2016-Present Advisory Board Member, Organ Preservation Alliance  
2015-Present Scientific Advisory Board Member, The Lifeboat Foundation  
2013-2020 Founding Member, W3C Sustainable Web Design Community Group  
2010-Present Fellowship Interviewer, The Fannie and John Hertz Foundation

## Editorial and Refereeing Experience

ACM Computer-Human Interaction, Applied Physics Letters, Applied Sciences, Computer Graphics International, Econometrics, Energies, Entropy, IEEE Sensors Journal, IEEE Transactions of Knowledge and Data Engineering, Journal of Electronic Materials, Mathematics, Military Cyber Affairs, Nano Letters, Physica A, Physical Review X (Ad Hoc Editorial Board Member), Physical Review Letters, Proceedings of the National Academy of Sciences, Processes, Recent Patents on Nanotechnology (Editorial Board Member), Recent Patents on Space Technology, Software: Practice and Experience, Symmetry

## Teaching Experience

Spring 2018 Guest Lecturer, George Mason University CYSE 499 Blockchain Technology  
Fall 2016 Guest Lecturer, Harvard APCOMP 298R Interdisciplinary Seminar in Computational Science & Engineering  
Jan 2012-2015 Creator and Instructor, Harvard IACS Computational Science Ventures  
Spring 2007 Guest Lecturer, Harvard Freshman Seminar 22e Molecular Motors: Wizards of the Nanoworld  
Spring 2006 Teaching Fellow, Harvard Physics 15a Introductory Mechanics and Relativity  
Jan 2001 Creator and Instructor, MIT 6.370 IEEE/ACM (Battlecode) Programming Competition

## Doctoral Committee Memberships

2020 John Paul F. Mintz (“Measuring the Effects of Artificial Intelligence Agents on Military-Strategic Behavior”, Ph.D. in Military Strategy, School of Advanced Air and Space Studies, Air University, Maxwell AFB, Alabama)

## Distinctions

2019 Contributing Author, Amazon #1 Best Seller in Science Essays & Commentary (“The Last Unknowns”)  
2019 Contributing Author, Amazon #1 New Release in Science Essays & Commentary (“The Last Unknowns”)  
2018 Certificate of Appreciation, U.S. Department of the Army  
2016 Contributing Author, Amazon #1 New Release in Science Essays & Commentary (“Know This”)  
2016 Hive Global Leader  
2016 SBA Emerging Business Leader (E200)  
2015 Contributing Author, Amazon #1 New Release in Artificial Intelligence (“What to Think About Machines That Think”)  
2015 American Men & Women of Science  
2015 Secretary of Defense Challenge Coin Recipient  
2015 Renaissance Weekend Participant  
2015 Contributing Author, #19 on New York Times Science Best Sellers List (“This Idea Must Die”)  
2015 Contributing Author, #5 on Northern California Indie Bestseller List (“This Idea Must Die”)  
2015 MIT Gathering of Titans Collaborator  
2015 Google Solve for X Moonshot Pioneer  
2014 Northrop Grumman Information Systems’ Supplier Excellence Award  
2014 TED Talk of the Week (ranked among top 20% of all TED Talks by views)  
2013 Gifted Citizen Entrepreneurship Award Finalist  
2013 Biggest Brain Award, Frog Design Inc.  
2012 Elected to Young Engineers Organization (YEO)  
2012 Featured Intel ISEF Alumnus, Society for Science & the Public  
2012 Brain Sciences Foundation Fellowship  
2012 Certificate of Recognition, Harvard Institute for Applied Computational Science  
2011 Elected to Philosophical Society of Washington (PSW)  
2011 Forbes 30 Under 30 Rising Stars of Science Nominee  
2010 Science News of the Year (Technology), Society for Science & the Public  
2009 Featured Young Innovator, NSF National Science Board  
2009 Certificate of Appreciation, IEEE Computer Society of Connecticut  
2008 Crunchies Startup Award Finalist (“Most Likely to Make the World a Better Place”)  
2008 Hertz Doctoral Thesis Prize Winner, Fannie and John Hertz Foundation  
2008 Featured Entrepreneur, MIT Chairman’s Salon  
2008 Y Combinator Founder  
2008 Winner, Summer@Highland Entrepreneurship Program (declined)  
2008 Ziff Environmental Fellowship, Harvard University Center for the Environment  
2007 Harold T. White Prize for Excellence in Teaching, Harvard Physics Department  
2007 Nominee, Derek C. Bok Award for Excellence in Graduate Student Teaching of Undergraduates

2007 Dan David Prize Scholarship for Future Energy applications, Tel Aviv University  
 2007 Graduate Student Silver Award, Materials Research Society  
 2006 Finalist, named one of top 6 directors in amateur category, Materials Research Film Festival  
 2006 Nanotechnology paper selected for Institute of Physics Journal Highlights  
 2006 Book Prize, Harvard's Derek Bok Center for Teaching and Learning  
 2006 Harvard University Certificate of Distinction in Teaching  
 2006 Nominee, Harvard's Joseph R. Levenson Memorial Teaching Prize (only Physics nominee)  
 2004 First place (5km race) and Second place (500m race) team in division, Jichuan Cup International Dragon Boat Invitational Tournament for University Students in Tianjin, China  
 2003 Harvard Purcell Fellowship  
 2003 Malcolm Cotton Brown Award as top ranked MIT senior pursuing experimental physics  
 2003 Elected to Sigma Xi (scientific research) honor society  
 2003 Elected to Sigma Pi Sigma (physics) honor society  
 2003 Elected to Phi Beta Kappa (arts and sciences) honor society  
 2003 Runner-Up, Stanford Entrepreneur's Challenge  
 2003 Finalist, Carrot Capital Business Plan Challenge  
 2003 Finalist, MIT \$50K Entrepreneurship Competition  
 2003 Henry Ford II Scholar Award, MIT School of Engineering  
 2003 Fannie and John Hertz Foundation Fellowship  
 2003 One of 20 named to USA Today All-USA 1st Academic College Team  
 2003 National Defense Science and Engineering Graduate Fellowship (declined)  
 2003 DOE Computational Science Graduate Fellowship (declined)  
 2003 NSF Graduate Research Fellowship (declined)  
 2003 Stanford Graduate Fellowship (declined)  
 2003 Caltech Richard P. Feynman Fellowship (declined)  
 2003 Yale Leigh Page Prize (declined)  
 2002 British Marshall Scholarship (declined)  
 2002 Winner in Tiny Technologies Category, MIT \$1K Entrepreneurship Competition  
 2002 Elected to Tau Beta Pi (engineering) honor society  
 2002 Elected to Eta Kappa Nu (electrical & computer engineering) honor society  
 2002 First place nationally, Inaugural Intel Undergraduate Research Award  
 2001 Barry M. Goldwater Scholar  
 2001 Letters of commendation (top 2%) in 3 of the 4 core MIT EECS courses  
 2000 Director's Award, MITRE Corporation  
 2000 National Dean's List  
 1999 First Place, Ray L. Summa 34th Bomb Group Scholarship Award  
 1999 National Winner, New Technology, NITA Young Inventors & Creators Competition  
 1999 American Academy of Achievement's Salute to Excellence (personally sponsored by Lemelson Foundation)  
 1999 First place nationally, American Scholastic Mathematics Association (ASMA)  
 1999 Honorable Mention, First Step to Nobel Prize in Physics  
 1999 Valedictorian, Great Neck South High School  
 1999 National Winner, 10th Place, Intel Science Talent Search  
 1999 Inducted into National Young Inventors' Hall of Fame, National Gallery for America's Young Inventors  
 1999 One of 20 named to USA Today All-USA 1st Academic High School Team  
 1999 Lucent Global Science Scholar  
 1999 United States Navy Science Achievement Award  
 1999 Tandy Technology Scholar  
 1999 Grand Prize Winner, USA Math Talent Search (USAMTS)  
 1999 First Place, Army Physics Award, International Science and Engineering Fair (ISEF)  
 1999 Intel Best Use of PC Award, International Science and Engineering Fair  
 1999 Second Place, Physics Grand Award, International Science and Engineering Fair  
 1999 Second Place, Air Force Physics Award, International Science and Engineering Fair  
 1999 American Association of Physics Teachers Award, International Science and Engineering Fair  
 1999 Citation for Excellence, Nassau County Legislature  
 1999 International Honor Winner, Canadian Open Mathematics Challenge  
 1999 Honored Scholar, National Alliance for Excellence  
 1999 National AP Scholar  
 1999 National Merit Finalist  
 1998-1999 Who's Who Among American High School Students

- 1998-1999 First place in Senior Division with perfect score, American Computer Science League (ACSL)
- 1998 Member of U.S. team at International Olympiad in Informatics (IOI)
- 1998 Second place nationally, USA Computer Olympiad Finals
- 1998 First place individual, Fall Open Competition of USA Computer Olympiad
- 1998 First place nationally with perfect score, USA Math Talent Search (USAMTS)
- 1998 Winner and top-scoring American, Email Informatics Competition (EIC)
- 1998 Winner, Long Island Software Award
- 1998 Highest Scoring Student Award, American Scholastic Mathematics Association (ASMA)
- 1998 George Washington University School of Engineering & Applied Science Medal
- 1998 National Winner, Computer Science, NITA Young Inventors & Creators Competition
- 1998 Third place American and 14th place internationally, Central European Olympiad in Informatics (CEOI)
- 1998 First place out of 20,000 students with perfect score, Canadian Mathematics Fermat Competition
- 1998 First Place, C++, Continental Math League Computer Contest
- 1997 Fourth Place, Intel Grand Award in Computer Science, International Science and Engineering Fair
- 1997 Fourth place nationally, USA Computer Olympiad Fall Championship
- 1997 First place, American Computer Science League (ACSL)
- 1997 Top scoring U.S. sophomore, American Computer Science League (ACSL)
- 1997 Ross Young Scholar, Ohio State University
- 1997 AT&T Student Software Award, Long Island Software Awards
- 1997 Certificate of Achievement, Mathematical Contest in Modeling
- 1997 Certificate of Merit, The Assembly of the State of New York
- 1997 Certificate of Distinction, American High School Mathematics Examination
- 1997 Summa Cum Laude, National Latin Exam
- 1996-1998 Columbia University Science Honors Program
- 1996 Brandeis Summer Odyssey Young Scholar
- 1996 Perfect Score, National Latin Exam
- 1995-1996 Creative Problem-Solving Institute for Gifted and Talented Students
- 1995 Summa Cum Laude, National Latin Exam
- 1995 First Place, Pascal, Continental Math League Computer Contest
- 1994-1995 John Hopkins Center for Talented Youth (CTY)
- 1994 State and Regional Award, Mathematics and Verbal Talent Search
- 1992-1993 Performed with the New York City Opera Children's Chorus

## Publications

- 23. L. Lawley, W. Frey, P. Mullen, A. D. Wissner-Gross, "Joint sparsity-biased variational graph autoencoders," *Journal of Defense Modeling and Simulation: Applications, Methodology, Technology* 18, 239-246 (2021).
- 22. A. D. Wissner-Gross, J. C. Willard, N. Weston, "Tamper-proofing imagery from distributed sensors using learned blockchain consensus," *IEEE Applied Imagery and Pattern Recognition* 2020, 1-4 (2021).
- 21. A. D. Wissner-Gross, S. Kapa, J. Lee, D. Keenan, N. Drapeau, K. Londoner, "Computational reconstruction of electrocardiogram lead placement," *Computing in Cardiology* 2020, 1-3 (2020).
- 20. A. D. Wissner-Gross, N. Weston, M. Vindiola, "Adaptive online learning for human-robot teaming in dynamic environments," *IEEE Applied Imagery and Pattern Recognition* 2019, 1-4 (2020).
- 19. A. D. Wissner-Gross, "Can general-purpose computers be constructed out of pure gravity?" *The Last Unknowns*, 314 (ed., J. Brockman, 2019).
- 18. A. D. Wissner-Gross, "Datasets over algorithms," *Know This: Today's Most Interesting and Important Scientific Ideas, Discoveries, and Developments*, 475-477 (ed., J. Brockman, 2017).
- 17. A. D. Wissner-Gross, "Engines of freedom," *What To Think About Machines That Think: Today's Leading Thinkers On The Age Of Machine Intelligence*, 418-420 (ed., J. Brockman, HarperCollins, 2015).
- 16. A. D. Wissner-Gross, "Intelligence as a property," *This Idea Must Die: Scientific Theories That Are Blocking Progress*, 277 (ed. J. Brockman, HarperCollins, 2015).
- 15. A. D. Wissner-Gross, C. E. Freer, "Causal entropic forces," *Phys. Rev. Lett.* 110, 168702 (2013).
- 14. A. D. Wissner-Gross, T. M. Sullivan, "Participatory telerobotics," *Proc. SPIE* 8758, 87580O (2013).
- 13. A. D. Wissner-Gross, C. E. Freer, "Relativistic statistical arbitrage," *Phys. Rev. E* 82, 056104 (2010).
- 12. A. D. Wissner-Gross, "Dielectrophoretic architectures," *Bio-Inspired and Nanoscale Integrated Computing*, 155-173 (ed. M. Eshaghian-Wilner, Wiley, 2009).
- 11. A. D. Wissner-Gross, "Intruder dynamics on vibrofluidized granular surfaces," *Mater. Res. Soc. Symp. Proc.* 1152E, TT03-01 (2009).
- 10. A. D. Wissner-Gross, "Pattern formation without favored local interactions," *J. Cell. Auto.* 4, 27-36 (2008).
- 9. A. D. Wissner-Gross, T. M. Sullivan, "Multicolor symbology for remotely scannable 2D barcodes," *Proc. SPIE* 6623,

- 662304 (2008).
8. L. Cong, A. D. Wissner-Gross, "Interrogating single molecules," *Rec. Pat. Nanotech.* 2, 19-24 (2008).
  7. A. D. Wissner-Gross, "Physically programmable surfaces," Ph.D. Thesis, Department of Physics, Harvard University (2007).
  6. A. D. Wissner-Gross, E. Kaxiras, "Diamond stabilization of ice multilayers at human body temperature," *Phys. Rev. E Rapid Comm.* 76, 020501 (2007).
  5. A. Hatzor-de Picciotto, A. D. Wissner-Gross, G. Lavalley, P. S. Weiss, "Arrays of Cu(2+)-complexed organic clusters grown on gold nano dots," *J. Exp. Nanosci.* 2, 3-11 (2007).
  4. A. D. Wissner-Gross, T. M. Sullivan, "From codex to poster," *Libr. J.* 132, S12-S13 (2007).
  3. A. D. Wissner-Gross, "Dielectrophoretic reconfiguration of nanowire interconnects," *Nanotechnology* 17, 4986-4990 (2006).
  2. A. D. Wissner-Gross, "Preparation of topical reading lists from the link structure of Wikipedia," *Proc. IEEE ICALT* 6, 825-829 (2006).
  1. E. Wissner-Gross, A. D. Wissner-Gross, "People with disabilities," *Journalism Across Cultures*, 203-220 (ed. F. Cropp, Iowa State Press, 2003).<sup>[1]</sup><sub>SEP</sub>

## Patents

24. A. D. Wissner-Gross, T. M. Sullivan, "Surveillance using low-dimensional sensors," U.S. Provisional Patent Application 62/617,772 (2018).
23. A. D. Wissner-Gross, T. M. Sullivan, "System and method for extracting and exploiting causal networks," U.S. Provisional Patent Application 62/243,193 (2015).
22. A. D. Wissner-Gross, T. M. Sullivan, "Environmental footprint monitor for computer networks," U.S. Patent 8,862,721 B2 (2014).
21. A. D. Wissner-Gross, et al., "Identifying where to buy ingredients of a recipe," U.S. Patent Application 14/289,412 (2014).
20. A. D. Wissner-Gross, et al., "Providing an altered shopping experience in retail environments," U.S. Patent Application 14/289,382 (2014).
19. A. D. Wissner-Gross, "Process for electromagnetic vitrification," U.S. Provisional Patent Application 62/003,241 (2014).
18. C. E. Freer, A. D. Wissner-Gross, "System and method for relativistic statistical securities trading," U.S. Patent 8,635,133 (2014).
17. A. D. Wissner-Gross, et al., "Providing recreation and social activities in retail environments," U.S. Patent Application 13/710,227 (2014).
16. A. D. Wissner-Gross, et al., "Providing a proximity triggered response in a video display," U.S. Patent Application 13/710,053 (2014).
15. A. D. Wissner-Gross, et al., "In-store guidance systems and methods," U.S. Patent Application 13/710,204 (2013).
14. A. D. Wissner-Gross, et al., "Back-to-back video displays," U.S. Patent Application 13/875,890 (2013).
13. A. D. Wissner-Gross, T. M. Sullivan, "Data exfiltration attack detection," U.S. Provisional Patent Application 61/775,822 (2013).
12. A. D. Wissner-Gross, et al., "In-room hospitality devices and systems," U.S. Patent Application 13/770,841 (2013).
11. A. D. Wissner-Gross, "Causal entropy engine," U.S. Provisional Patent Application 61/738,573 (2012).
10. A. D. Wissner-Gross, et al., "User interface for accessing information about a retail store," U.S. Patent Application 13/710,163 (2012).
9. A. D. Wissner-Gross, et al., "Smart device location in retail environments," U.S. Patent Application 13/710,126 (2012).
8. A. D. Wissner-Gross, T. M. Sullivan, "Human-based telerobotic and telepresence method," U.S. Provisional Patent Application 61/705,657 (2012).
7. A. D. Wissner-Gross, T. M. Sullivan, "Method and apparatus for human-powered mobile visual search and feedback," U.S. Patent 8,073,864 (2011).
6. A. D. Wissner-Gross, T. M. Sullivan, "System and method for electronically certifying relationships," U.S. Provisional Patent Application 61/361,144 (2010).
5. A. D. Wissner-Gross, "Method for creating a topical reading list," U.S. Patent 7,739,294 (2010).
4. A. D. Wissner-Gross, E. Kaxiras, "Diamond stabilization of ice multilayers at human body temperature," U.S. Provisional Patent Application 61/053,737 (2008).
3. A. D. Wissner-Gross, T. M. Sullivan, "Multicolor symbology for remotely scannable codes," U.S. Provisional Patent Application 60/918,736 (2007).
2. A. D. Wissner-Gross, "Method of robotic manipulation utilizing patterned granular motion," U.S. Patent 6,335,059 (2002).

1. A. D. Wissner-Gross, "Robotic manipulation system utilizing patterned granular motion," U.S. Patent 6,216,631 (2001).