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Engineering & Scientific Consulting

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Professional Profile

Dr. Sinenian has expertise in the fields of applied physics, electrical engineering & computer science and nuclear engineering. He has advised corporate leadership and management on business and technical matters and given evidence before courts and tribunals on matters involving electronics, control systems, and electrical and power systems.

Dr. Sinenian has experience in the analysis and design of electronic circuits and systems for a wide range of applications, including control systems and instrumentation, power electronics, and radio-frequency circuits and systems, among others. He has experience with both analog and digital systems, including integrated circuits. He has conducted investigations and design reviews of circuits and systems to assist clients during product development and manufacturing, to address the root causes of field failures, and in various contentious contexts.

In relation to electrical and power systems, Dr. Sinenian has assessed the design of power systems and the integration of power system components into either products or new or existing infrastructure. His experience includes transformers, power capacitors, circuit breakers and other protective devices, and electric motors and generators. He has experience with both electronics and electrical power systems in various sectors, including industrial processing facilities, oil & gas, transportation, and conventional, nuclear, and renewable power plants.

Given the large amount of data generated in today's systems and processes, Dr. Sinenian also has extensive experience in applying data analytics, algorithms and machine learning to large datasets in the context of various investigations. He has experience applying clustering, regression and deep-learning techniques to large datasets to draw actionable insights and for predictive modeling applications. He has analyzed dynamic control algorithms in embedded systems and products in the context of failure analysis and assisted clients with software and signal processing related matters. He is proficient in numerous programming languages, including C, C++, Java and Python. Dr. Sinenian is actively involved in open-source software development and is the co-author of a book on data structures and algorithms.

Prior to joining Exponent, and as part of his studies, Dr. Sinenian gained research experience in the area of plasma physics and its applications in propulsion and fusion. In his earlier studies, he designed and built a novel compact radio-frequency driven plasma thruster for small satellite applications. As part of this work, he designed and built plasma diagnostics and used them to characterize the performance of the thruster with argon and nitrogen propellants. He also designed and built associated electrical systems, including radio-frequency circuits and power management systems for electric propulsion applications.

In his doctoral research, Dr. Sinenian built nuclear instrumentation and used it to study aspects of laser inertial fusion in support of the national laser fusion program. As part of this work, he led a team that built an ion accelerator laboratory and used it to develop and calibrate nuclear instruments for use on the

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OMEGA and the National Ignition Facility laser systems. Dr. Sinenian's dissertation focused on using measurements of fast ions produced in inertial fusion experiments to diagnose the performance of fusion implosions.

Academic Credentials & Professional Honors

Ph.D., Nuclear Science and Engineering, Massachusetts Institute of Technology (MIT), 2013

M.S., Electrical Engineering and Computer Science, Massachusetts Institute of Technology (MIT), 2008

M.S., Nuclear Science and Engineering, Massachusetts Institute of Technology (MIT), 2008

B.S., Physics, University of California, San Diego, 2005

UCSD Physics Best Project (Winter 2005): GPS-navigated Autonomous Rover

UCSD Marshall College Provost's Honors

Licenses and Certifications

PADI Certified Open Water Scuba Diver

Udacity Certified ML Engineer

Languages

Armenian

Publications

Sinenian N, et al., Chapter 1: Advances in Power Converters. D'Andrade Briwn W. (Editor), The Sustainable Power Grid: Challenges, Applications, and Case Studies. Book, ISBN 9780443134425, 2024.

Klopp, R, Martens, J, and Sinenian, N. Today's Complex Mining and Minerals Disputes Favor Breadth Over Depth in Expertise, Mining Arbitration Report, Jus Mundi, March 2022.

Zhang, Q, Sinenian, N, and Huang, R. Investigations on Electrolytic Capacitors to Improve Reliability under Assembly-Level Impact Conditions; IEEE International Conference on (ICEPT) Electronic Packaging Technology, 2019.

Sinenian, N. and Shai, D., Chapter 3: Advances in Power Converters. D'Andrade Brian W. (Editor), The Power Grid: Smart, Secure, Green and Reliable. Book, ISBN 978-0-12-805321-8, 2017.

Jagannathan S, Sinenian N. Algorithms and data structures in Python. ISBN: 9781502378712. 2014.

Sinenian N, Manuel M J-E, Frenje, JA, et al. An empirical target discharging model relevant to hot-electron preheat in direct-drive implosions on OMEGA. Plasma Physics and Controlled Fusion 2013; 55(4).

Sinenian N, Zylstra AB, Manuel M, et al. A multithreaded modular software toolkit for control of complex experiments. Computing in Science and Engineering 2013; 15(1):65.

Sinenian N, Theobald W, Frenje JA, et al. Proton emission from cone-in-shell fast-ignition experiments at Omega. Physics of Plasmas 2012; 19(11):112,708.

Sinenian N, Fiksel G, Frenje JA, et al. Heavy-ion emission from short-pulse laser-plasma interactions with thin foils. Physics of Plasmas 2012; 19(9):093,118.

Sinenian N, Zylstra AB, Manuel MJ-E, et al. Total energy loss to fast ablator-ions and target capacitance of direct-drive implosions on OMEGA. Applied Physics Letters 2012; 101(11):114,102.

Sinenian N, Manuel MJ-E, Zylstra AB, et al. Upgrade of the MIT Linear Electrostatic Ion Accelerator (LEIA) for nuclear diagnostics development for Omega, Z, and the NIF. Review of Scientific Instruments 2012; 83(4):043502.

Sinenian N, Rosenberg MJ, Manuel M, et al. The response of CR-39 nuclear track detector to 1-9 MeV protons. Review of Scientific Instruments 2011; 82(10).

Presentations

Sinenian N. Watts in Arbitration? The Development of Energy Arbitration. AIAC Asia ADR Week 2021, Asian International Arbitration Centre (Defects in Solar PV and Wind Installations), August 29-21, Kuala Lumpur, Malaysia.

Sinenian N. An empirical target discharging model for direct-drive implosions on OMEGA. 54th Annual Meeting of the APS Division of Plasma Physics, Providence, RI, November 2, 2012.

Sinenian N. Measurements of deuteron ablator-ion energy spectra for studies of energy-loss and preheat in direct-drive implosions on OMEGA. Doctoral Seminar at the Plasma Science & Fusion Center, MIT, Cambridge, MA, December 13, 2011.

Sinenian N. Measurements of the ablator-ion energy-loss channel in direct-drive implosions on OMEGA. 53rd Annual Meeting of the APS Division of Plasma Physics, Salt Lake City, UT, November 14, 2011.

Sinenian N. Implementation of a Thomson Parabola for improved fast-ion measurements and nuclear physics studies. Laboratory for Laser Energetics Theory Group Meeting, Rochester, NY, September 27, 2011.

Sinenian N. Observations of energetic protons in recent integrated fast-ignition experiments at the OMEGA Laser Facility. Doctoral Seminar at the Plasma Science & Fusion Center, MIT, Cambridge, MA, November 11, 2010.

Sinenian N. The role of nuclear particles at OMEGA, OMEGA EP, and the NIF. Doctoral Seminar at the Plasma Science & Fusion Center, MIT, Cambridge, MA, October 28, 2009.