

# Niraj K. Inamdar | Ph.D.

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## Education

<b>Massachusetts Institute of Technology</b> , Department of Earth, Atmospheric and Planetary Sciences <i>Ph.D., Planetary Science</i> GPA: 5.0/5.0. Dissertation: <i>The Formation and Evolution of Planetary Systems</i>	Cambridge, MA 2016
<b>Massachusetts Institute of Technology</b> , Department of Mechanical Engineering <i>S.M., Mechanical Engineering</i> GPA: 5.0/5.0. Thesis: <i>Analysis and Implementation of the Bilayer Microfluidic Geometry</i>	Cambridge, MA 2011
<b>University of Pennsylvania</b> , School of Engineering and Applied Science <i>B.S.E., Mechanical Engineering</i> <i>Magna Cum Laude</i> . Senior Design Projects: <i>Reconnaissance Robot; Envirodyne Filtration Tank Cleaning System</i>	Philadelphia, PA 2008
<b>University of Pennsylvania</b> , The Wharton School, Aresty Institute of Executive Education <i>Certificate in Product Management and Strategy</i>	Philadelphia, PA 2022

## Professional Experience: Summary

Senior Manager, Product Engineering, Lockheed Martin Space	April 2022 - present
Chief System Architect and Associate Director, Raytheon Intelligence & Space	June 2021 - April 2022
Senior Principal Systems Engineer, Raytheon Intelligence & Space	June 2019 - June 2021
Associate Physical Scientist, RAND Corporation	May 2018 - June 2019
Adjunct Faculty, Santa Monica College	August 2017 - July 2020
Senior Member of Technical Staff, The Aerospace Corporation	April 2017 - April 2018
Graduate Research and Teaching Assistant (Doctoral), MIT	August 2011 - September 2016
Graduate Research Assistant (Master's), MIT	September 2009 - July 2011

## Professional Experience: Details

<b>Lockheed Martin Space</b> <i>Senior Manager, AI/ML, Algorithms, Processing, and Simulations</i>	Sunnyvale, CA April 2022 - present
<ul style="list-style-type: none"><li>Lead an organization of 30+ engineers in LM's Optical Payload Center of Excellence (OPCoE) whose work lies at the forefront of computer vision and advanced mission data processing executed both on orbit and on the ground, and at the heart of the missions comprising LM's active and passive EO/IR space portfolio.</li><li>Oversee LM Space product strategy in the development of AI, ML, algorithms, processing, and simulations, and coordinate the same across the LM Enterprise. With program management/PXO, I ensure program, IRAD, and capital projects implementing my team's products execute successfully.</li><li>Outside the scope of my management responsibilities, I continue to contribute to technical execution across mission areas on programs such as Hawkeye/Next Generation Interceptor, and on IRADs such as HypIRS as PI and architect.</li></ul>	
<b>Raytheon Intelligence &amp; Space</b> <i>Chief System Architect and Associate Director, Systems Engineering Center</i> <i>Senior Principal Systems Engineer</i>	El Segundo, CA June 2021 - April 2022 June 2019 - June 2021
<ul style="list-style-type: none"><li>Algorithm Development and Modeling Lead, Signal Chain. Led development and design of novel algorithms and space and ground signal chains. Wrote implementations for self-consistent onboard adaptive spatiotemporal data packet allocation and target identification; onboard image transformation, interpolation, and resampling; and ground data packet management on go-fast Next Gen OPIR Geo program through successful PDR, CDR, and competitive downselect, with designs used on multiple other programs. Led 16-engineer team through further design, development, and performance analysis activities and development of performance assessment environment. Technical Lead, R3 resiliency effort. <i>My work led directly to nearly \$2B in business.</i></li><li>Performance Lead for photonic integrated circuit-based optical phased array communication networks (Kyber) and the same for Everlong. Created novel concepts and algorithms for automated PIC layout and calibration techniques. LSE, Laser Communication Subsystem (Everlong).</li><li>Lead Architect and Systems Engineer, Alma. PI, Rushmore Tech I. Perf. CPT Lead, Verona (led 14 senior engineers across the US). Chief System Architect, STACK, a novel integrated PNT+crypto. authentication protocol. Analysis Lead, TCD. Chief Analyst and Mission Architect, SDA Tranche I Tracking Layer.</li></ul>	
<b>RAND Corporation</b> <i>Associate Physical Scientist</i>	Santa Monica, CA May 2018 - June 2019
Led or otherwise made significant contributions to a number of projects for US Government customers, including: <ul style="list-style-type: none"><li>Methodology for defining resilient space enterprise in support of Joint Force. Created numerical models for missile dynamics and detection, analytical models for scenarios such as rad-hardened constellation design, and methodology for carrying out sensitivity analysis (USAF).</li><li>Created genetic algorithm codeset to calculate operational energy transport scheduling and allocation for maritime domain and corresponding sea/land interfaces at strategic, operational levels for wargaming (OSD).</li><li>Created novel mathematical and computational models for assessment/valuation of Mosaic warfare systems (DARPA).</li><li>Created end-to-end constellation lifetime fielding and replenishment simulation for proliferated LEO constellations to determine launch, management, and reconstitution requirements (OSD).</li><li>IDed driving and nascent capabilities and tech for space and quantum computing test and evaluation, assessed current infrastructure, and recommended actions for new ones. Developed taxonomy for space threats, offensive and defensive space capabilities, and corresponding concepts and physical models (OSD).</li></ul>	

## The Aerospace Corporation

### Senior Member of Technical Staff

El Segundo, CA

April 2017 - April 2018

- Principal Investigator, Project Delphi (May 2017 - April 2018). Led initiative through corporation's iLab to develop techniques to forward engineer innovative concepts for the Corporation and its customers. Project included need-space and solution-space generation exercises integrated with concurrent engineering/concept design methodologies, with demonstration through several case studies.
- Lead, Project Rogue Flash (January 2018 - March 2018). Team generated out-of-the-box concepts for rapid missile defense and warning capability reconstitution. Team member, Project Thor Blue/Black Swan Futures Foresighting workshop (March 2018).
- Developed network analysis toolset (with Monte Carlo capabilities) for utility, reliability, resiliency, and link budget systems characterization. Developed models for optical communication networks, including novel acquisition probability and optimization calculations.
- Other activities: Participated in architecture-level design activities and supported end-to-end modeling. Developed utilities in Python and VBA to improve architecture-level mission analysis and Enterprise information exchange (May 2017-April 2018); mentored interns on planetary defense study through Concept Design Center (June 2017 - September 2017); and supported Hosted Payload Office (May 2017).

## Massachusetts Institute of Technology

### Research Assistant

Cambridge, MA

August 2011-September 2016

- Constructed self-consistent planet formation models to identify formation pathways for super-Earths and mini-Neptunes. Other work on planetesimal statistical mechanics and reconstruction of NRM of 433 Eros (April 2014-September 2016).
- Science and Optics Lead for REXIS, an X-ray imaging spectrometer which will examine surface composition of asteroid 101955 Bennu for NASA's OSIRIS-REx mission. Constructed instrument system performance model, modeling Solar X-ray and asteroid fluorescence spectra, as well as instrument response (including radiation damage) and data interpretation in order to determine whether REXIS can place Bennu within an analogue meteorite class and infer its formation history (September 2012-June 2014). Led team based at MIT and Harvard-Smithsonian CfA. Carried out instrument cover deployment dynamics and shielding analysis, coded aperture mask and frame design, and engineering model thermal test (September 2011-June 2014).
- Constructed quaternion dynamics models, leapfrog integrator, and control laws in MATLAB and Simulink for NIAC-funded project investigating use of high-temperature superconductors for electromagnetic formation flight and structures deployment (August 2011-October 2012)
- Modeled dynamics and control of small satellite opticalcom systems for startup Planetary Resources, Inc. (PRI) from inception of the company and under NAIC funding. Built testbed with telescopes and demonstrated tip-tilt mirror laser control (February 2012-February 2013).

## MIT & Charles Stark Draper Laboratory

### Research Assistant

Cambridge, MA

October 2009 - August 2011

- Conducted research in microfluidics towards development of new devices for *in vitro* biomedical applications
- Developed the first analytical model characterizing solute transport and consumption in bilayer geometry and extended Sturm-Liouville theory of PDEs into multiple adjacent domains
- Designed, built, and populated bilayer microfluidic devices with hTERT mesenchymal stem cells. Research supported under Award Number R01EB010246 from the National Institute of Biomedical Imaging and Bioengineering.

## Teaching

- Former adjunct faculty at Santa Monica College in Physical Sciences Department. Past teaching experience at MIT, the Politecnico di Torino in Italy, and University of Pennsylvania. Details available upon request.

## Publications and Presentations

- Extensive list of publications includes journal articles, conference proceedings, book chapters, and refereed abstracts. Extensive list of presentations includes conference talks and formal design reviews. Details available upon request.

## Additional Details

- **Computing:** MATLAB, Simulink, AutoCAD, Pro/E, SolidWorks, Inventor, CATIA, UN\*X, VBA,  $\LaTeX$ , Python, R, experience with C++, IDL, and DELMIA
- **Languages:** English, Italian, Latin, Gujarati, varying levels of familiarity with several other languages
- **Art:** Extensive portfolio of engineering/architectural design, figure drawing, and other artwork
- **Writing:** Details available upon request
- **Mentoring:** Extensive mentoring experience with undergraduate and graduate students at MIT and Penn. Details available upon request.
- **Outreach and Other Activities:** Reviewer for *AJ*, *ApJ*, and *MNRAS*. Details available upon request.

## Selected Intellectual Property, Awards, Honors, and Fellowships

- "Photonic Integrated Circuit-Based Optical Phased Array Calibration Technique", US Patent Application #20220252908, August 2022
- Invention Award, Raytheon Technologies, December 2021
- Patent Award, Raytheon Technologies, February 2021
- 2020 Innovators Award (2 $\times$ ), Raytheon I&S, November 2020
- Invention Award, Raytheon Technologies (2 $\times$ ), July and December 2020
- Achievement Award, Raytheon Intelligence & Space, May 2020
- Finalist, Raytheon Innovation Challenge, January 2020
- Asteroid 134180 Nirajinamdar named for me, August 2016
- Robert R. Shrock Fellowship, June 2015 - June 2016
- On the Spot Award, MIT Division of Student Life, April 2015
- Grayce B. Kerr Fellowship, September 2014 - May 2015
- Award for Excellence in Teaching, MIT Department of Earth, Atmospheric and Planetary Sciences, May 2014
- Achievement Award, Raytheon SAS, June 2009
- Research Fellowship, Draper Labs, October 2009-August 2011
- Spotlight on Performance Award, RF Surveillance Group, Raytheon SAS, January 2009
- Engineering Excellence Award, Boeing Integrated Defense Systems, August 2006