

# Nina R. Sinatra

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## Education

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<b>Harvard University</b>	Cambridge, MA
PhD, Materials Science and Mechanical Engineering	2019
M.S., Materials Science and Mechanical Engineering	2017
<b>Columbia University</b>	New York, NY
M.S., Materials Science and Engineering	2013
<b>Massachusetts Institute of Technology (MIT)</b>	Cambridge, MA
B.S., Materials Science and Engineering	2012

## Selected Experience

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**Imaging and Sensing Org, Apple** Cupertino, CA  
Sr. Product Design Engineer 2023-present

- Lead module product designer for Touch ID on multiple shipped iPads

**Advanced Technology and Projects, Google** Mountain View, CA  
Sr. Mechanical / Materials Engineer 2021-2023  
Mechanical / Materials Engineer 2019-2021

- Provided primary product design oversight for prototype consumer electronic device build
  - Drove 3 prototype builds with cross-functional Google and JDM partners
- Streamlined assembly process by 36%, increased yield across multiple sub-assemblies, and improved sensor performance by 20%
- Co-drove research, prototyping, and development agenda with external vendors
- Established and led mechanical design and validation for NTI sensor array on VP's top-prioritized development project
- Oversaw reliability analyses, established mechanical specifications, and sourced materials as go-to materials engineering resource on team
- Spearheaded an initiative to connect >2000 Googlers working on Hardware, document best practices, and collectively level up ME/PD Googlers' skills and knowledge

**Harvard Microrobotics Laboratory | Harvard University. Advisor: Robert Wood** Cambridge, MA  
Graduate Research Assistant [PhD] 2017-2019

- *Designing Soft Robots:*
  - Engineered ultra-soft pneumatic polymer actuators for delicate manipulation of irregular structures
  - Developed novel fabrication strategy for fiber-reinforced actuators and soft grippers
  - Prototyped and visualized components using Fusion 360, Blender, and 3D printing
  - Derived analytical models for large deformation of soft pneumatic polymer actuators
  - Integrated nanotextiles into soft robots, and targeted complex bending modes using fiber orientation
- *Deep Sea Field Testing:*
  - Prepared devices and developed test protocols for delicate gripping in the deep-sea
  - Collaborated with American Museum of Natural History and CUNY to define organismal benchmarks for soft gripper and to integrate gripper with existing remotely operated vehicle setup

**Disease Biophysics Group | Harvard University** Cambridge, MA  
Graduate Research Assistant [PhD] 2014-2017

- Established novel manufacturing processes for point-of-use and multi-material polymer nanofabrics
- Co-authored 2 peer-reviewed publications, 2 patents, and 1 funded grant; 6 presentations and invited talks

- Co-supervised and developed summer polymer/nanotechnology research projects for four U.S. Military Academy (West Point) cadets
- Cadets' work was accepted to poster session at Biomedical Engineering Society Annual Meeting, Sept. 2015

**Biomaterials and Interface Tissue Engineering Laboratory | Columbia University** New York, NY  
Graduate Research Assistant [MS] 2012-2013

- Developed novel hydroxyapatite-xerogel scaffolds for interfacial bone regeneration

**Max Planck Institute for Polymer Research (Max-Planck-Institut für Polymerforschung)** Mainz, Germany  
Research Fellow 2011

- Fabricated colloidal monolayers of photochromic nanospheres using emulsion polymerization
- Analyzed reversible, light-induced data storage on three-dimensional colloid polymer structures

**United States Army Corps of Engineers, Engineer Research and Development Center** Concord, MA  
Analyst Intern 2010

- Formulated decision analysis framework for nanotoxicology and life cycle analysis

## Relevant Skills

**Computer:** NX, Solidworks, OpticStudio, Python, Adobe Illustrator, Mathematica, MATLAB, Blender, LaTeX, COMSOL

**Selected Fabrication:** Injection molding, Overmolding, Die-cutting, Design for manufacturing, Physical prototyping, Digital prototyping and manufacturing of polymers and fabric, 3D printing, Laser cutting, 3D Knitting

**Selected Laboratory:** Instron mechanical testing, Spectroscopy (FTIR, Raman, XRD), Emulsion polymerization, Soft lithography, Scanning Electron Microscopy, Nanofiber fabrication (rotary jet spinning, pull spinning)

**Languages:** English (native), Spanish (adv.), Farsi (conv.), Japanese (beg.)

## Selected Leadership & Mentoring

**Project Trestle: Google ATAP's COVID-19 Response** Mountain View, CA  
Co-Founder, Co-Lead 2020

- Spearheaded a 6-week cross-org sprint to bridge the initial March-May global supply chain gap of PPE manufacturing
- Built a coalition of 89 volunteers from 12 Google orgs to conceptualize, design, iterate, validate, manufacture, and ship PPE
- >50k face shields were fabricated and shipped to Bay Area healthcare foundations
- Final face shield design is composed of >90% post-consumer plastic and released [open source](#) for global manufacturing
- Granted FDA Emergency Use Authorization, and Google executive, legal, and policy approval
- Donated units to >58 healthcare facilities across the US and to Google PO data centers globally

**Harvard University John A. Paulson School of Engineering and Applied Sciences (SEAS)** Cambridge, MA  
Industry Mentor 2016-2021

- Advise graduate/undergraduate students and postdocs on career planning, industry opportunities in mechanical engineering, job skills, and research
- Invited speaker for SEAS and 1:1 mentorship sessions

## Publications

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M.L. Kim, E.H. Otal, J. Takizawa, **N.R. Sinatra**, K. Dobson, M. Kimura. "All-Organic Electroactive Shape-Changing Knitted Textiles Using Thermoprogrammed Shape-Memory Fibers Spun by 3D Printing." *ACS Applied Polymer Materials*. 4(4), 2022. [Cover article](#)

M. Tessler, M.R. Brugler, J.A. Burns, **N.R. Sinatra**, D.M. Vogt, A. Varma, M. Xiao, R.J. Wood, and D.F. Gruber. "Ultra-gentle soft robotic fingers induce minimal transcriptomic response in a fragile marine animal." *Current Biology*. 30(4), 2020.

**N.R. Sinatra**, C.B. Teeple, D.M. Vogt, K.K. Parker, D.F. Gruber, and R.J. Wood. "Ultragentle manipulation of delicate structures using a soft robotic gripper." *Science Robotics*, 4(33), 2019.

**N.R. Sinatra**, T. Ranzani, J.J. Vlassak, K.K. Parker, and R.J. Wood. "Nanofiber-Reinforced Soft Fluidic Micro-Actuators." *Journal of Micromechanics and Microengineering*, 2018.

**N.R. Sinatra**, J.U. Lind, and K.K. Parker. "Fabricating Multi-Material Nanofabrics using Rotary Jet Spinning." *2017 IEEE International Conference on Nanotechnology (IEEE-NANO)*, 2016 (pp. 715-719).

L.F. Deravi, **N.R. Sinatra (co-first author)**, C.O. Chantre, A.P. Nesmith, H. Yuan, S.K. Deravi, J.A. Goss, L.A. MacQueen, M.R. Badrossamy, G.M. Gonzalez, M.D. Phillips, K.K. Parker. "Design and Fabrication of Fibrous Nanomaterials using Pull Spinning." *Macromolecular Materials and Engineering*, 2017. [Cover article](#)

K. Bley, **N. Sinatra**, N. Vogel, K. Landfester, C.K. Weiss. "Switching light with light – Advanced functional colloidal monolayers." *Nanoscale*, 2013.

J.M. Keisler, Z.A. Collier, E.J. Chu, **N. Sinatra**, and I. Linkov. "Value of Information Analysis: State-of-the-Application." *Environment, Systems and Decisions*, 2013.

## Conference Presentations & Invited Talks

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"Industry Insights: Google's Advanced Projects & Technology Group." Harvard University School of Engineering and Applied Sciences, Cambridge, MA, Nov. 2022.

"Project Trestle: ATAP's COVID-19 Response." Devices & Services College- Hardware for Good Initiatives, Google, Mountain View, CA, June 2020.

"Handle With Care: Soft Robots for Delicate Midwater Investigations of Soft-Bodied Gelatinous Zooplankton." National Academies Keck Futures Initiative: Discovering the Deep Blue Sea Mid-Cycle Grant Meeting, Huntington Beach, CA, June 2018.

"Fabricating Multi-Material Nanofabrics using Rotary Jet Spinning." 2017 IEEE International Conference on Nanotechnology (IEEE-NANO), Pittsburgh, July 2017. (*Accepted*)

"Women in Wearable Tech" panel, Harvard College Women's Center discussion series "Women in Innovation", March 8, 2017. (Moderator)

"Engineering Novel Nanofabrics." Tangible Media Group, MIT Media Lab, Host: Hiroshi Ishii, March 2017.

“Manufacturing Smarter Fabrics.” MIT Alumni Association Faculty Forum Webcast, MIT, Jan. 2017.

“NANO.STASIS: Merging Art and Science.” Art Technology Psyche II Symposium, Harvard University, Apr. 2016

“Modular Fabrication of Non-Cylindrical Nanofiber Geometries.” Materials Research Society Fall Meeting, Poster Session, Nov. 2015

“Applied Mathematics in Biomaterials Engineering.” United States Military Academy at West Point, Sept. 2015

“Pull Spinning: A Novel Nanofiber Fabrication Technique.” Biomedical Engineering Society Annual Meeting, Poster Session, Sept. 2015

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## Grants

**Physical Sciences and Engineering Accelerator Award** (co-author) 2015  
Harvard University Office of Technology Development

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## Patents

+3 more patents filed with Google, awaiting publication.

K.E. Dobson, F. Schlagenhauf, W.E. Singhose, K.L. Sorensen, **N.R. Sinatra**. Systems and methods for customizing a haptic output of a haptic actuator of a user device. Published July 2022.

**N.R. Sinatra**, T. Ranzani, J.J. Vlassak, K.K. Parker, and R.J. Wood. Nanofiber-Reinforced Soft Fluidic Micro-Actuators. Provisional Patent, filed May 2018.

A.R. Gannon, A.L. Gliberman, K.K. Parker, B.D. Pope, K.L. Shores, and **N.R. Sinatra**. Cartridge-Based System for Long Term Culture of Cell Clusters. U.S. Patent Application 62/411,124, published May 2017.

K.K. Parker, B.D. Pope, and **N.R. Sinatra**. Three-Dimensional Scaffolds for Cell Culture and Methods of Use Thereof. Provisional Patent Serial No. 62/332,092, filed Oct. 2016.

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## Selected Honors & Achievements

Mini-MBA Program, Harvard Graduate Business Club, 2016 (intensive five-week business course)

John A. and Elizabeth S. Armstrong Innovation Fund Fellowship, 2015

Herbert French Fellowship: Outstanding Engineering Graduate Student, 2013

Sigma Xi Engineering Honor Society: Nominated, inducted 2012

National Science Foundation Fellowship: Honorable Mention, 2012

Anthony Sun Fellowship Award, 2011

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## Community Service

### Sky to Sea Explorers

Technical consultant

2024-present

- Partner with academic researchers to provide technical outdoors field support for various grant projects

## Bay Area Mountain Rescue Unit

Member 2021-present

- Participate in search and recovery operations across Northern California with Type 1 unit
- Train in various skill areas, including: high angle rescue, avalanche rescue, tracking

## Peer Reviewer

2019-present

- Author peer reviews for journal and conference publications, including but not limited to: *IEEE Robotics and Automation Letters, Micromachines, Actuators, Applied Sciences, Journal of Marine Science and Engineering*

## Teaching

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### Harvard University

Teaching Fellow: "Introduction to Biomaterials" Spring 2015

- Coordinated laboratory sections for class of 37 students
- Held weekly office hours and graded assignments

### Columbia University

Teaching Assistant: "Elements of Materials" Fall 2012

- Held weekly office hours and graded assignments for 40 students

Teaching Assistant: "Processing of Metals and Semiconductors"

Spring 2013

- Held weekly office hours and graded assignments for 20 students

## Media

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Keene Hogue, Kat. "David Gruber: Researching with respect and a gentler touch." *National Geographic*. 25 Mar. 2021. Web. <https://www.nationalgeographic.com/impact/article/david-gruber-researching-with-respect>

CNBC. "Google just donated 49,000 face shields to Bay Area hospitals." *CNBC, YouTube*. 24 Apr. 2020. Web. [https://www.youtube.com/watch?v=xRdDO\\_iDHOw&ab\\_channel=CNBCTelevision](https://www.youtube.com/watch?v=xRdDO_iDHOw&ab_channel=CNBCTelevision)

Elliot, Michael. "Google donates 49,000 face shields for local healthcare workers." *VMC Foundation*. 28 Apr. 2020. Web. <https://vmcfoundation.org/google-donates-49000-face-shields-for-local-healthcare-workers/>

Li, Abner. "Google assembles 49,000 face shields to help its local community." *9to5Google*. 28 Apr. 2020. Web. <https://9to5google.com/2020/04/28/google-donates-face-shields/>

Renault, Marion. "This Noodle-Fingered Robot Is a Friend to Jellyfish." *Gizmodo*. 24 Feb. 2020. Web. <https://gizmodo.com/this-noodle-fingered-robot-is-a-friend-to-jellyfish-1841887528>

Brownell, Lindsay. "A stress test for jellyfish." *Harvard Gazette*. 24 Feb. 2020. Web. <https://wyss.harvard.edu/news/a-stress-test-for-jellyfish/>

Sheikh, Knvul. "A Robot With Noodle-like Fingers Helps Handle Soft Jellyfish." *The New York Times*. 29 Aug. 2019. Web. <https://www.nytimes.com/2019/08/29/science/jellyfish-robot.html>

Leman, Jennifer. "Cool New Robot Can Grab Squishy Fish Without Hurting Them." *Popular Mechanics*. 28 Aug. 2019. Web. <https://www.popularmechanics.com/technology/robots/a28844093/jellyfish-grabbing-robot/>

Finucane, Martin. "Harvard researchers say they've developed a gripping tool that will keep delicate jellyfish from going splat." *The Boston Globe*. 4 Sept. 2019. Web. <https://www.bostonglobe.com/metro/2019/09/04/harvard-researchers-say-they-developed-gripping-tool-that-will-keep-delicate-jellyfish-from-going-splat/ICKOgGbpD4hkgJxtGDfaIj/story.html>

Knapton, Sarah. "Robot with 'fettuccini-like fingers' built by Harvard to catch jellyfish." *The Telegraph*. 28 Aug. 2019. Web. <https://www.telegraph.co.uk/science/2019/08/28/robot-fettuccini-like-fingers-built-harvard-catch-jellyfish/>

Coldewey, Devin. "Softly, softly, catchy jelly: This 'ultragentle' robotic gripper collects fragile marine life." *TechCrunch*. 28 Aug. 2019. Web. <https://techcrunch.com/2019/08/28/softly-softly-catchy-jelly-this-ultragentle-robotic-gripper-collects-fragile-marine-life/>

Brownell, Lindsay. "A gentle grip on gelatinous creatures." *The Harvard Gazette*. 28 Aug. 2019. Web. <https://news.harvard.edu/gazette/story/2019/08/ultra-soft-underwater-grippers-reach-next-level-of-perfection/>

Wilke, Carolyn. "This robot catches jellyfish with a gentle 'hug.'" *Science News for Students*. 2 Oct. 2019. Web. <https://www.sciencenewsforstudents.org/article/robot-catches-jellyfish-gentle-hug>

Feather, Katie and Flatow, Ira. "Soft Robot Gives Jellyfish A Hug." *Science Friday*. 30 Aug. 2019. Web (Podcast). <https://www.sciencefriday.com/segments/soft-robot-gives-jellyfish-a-hug/>

DeViscio, Jeffery and Harper, Kelso. "Nanomachines, Jellyfish Hugs and Hurricane Dorian from Space: The Week's Best Science GIFs." *Scientific American*. 30 Aug. 2019. Web. <https://www.scientificamerican.com/article/nanomachines-jellyfish-hugs-and-hurricane-dorian-from-space-the-weeks-best-science-gifs/>

Boettner, Benjamin. "A new spin for soft micro-actuators." *Harvard Wyss Institute*. 24 Aug. 2018. Web. <https://wyss.harvard.edu/a-new-spin-for-soft-micro-actuators/>

Sookne, Keren. "Taking Cues from Spiders." *Healthcare Packaging*. May/June 2017. Print and web. [https://www.healthcarepackaging.com/sites/default/files/digital\\_edition/MayJune2017HCP/HCP\\_May\\_2017/index.html](https://www.healthcarepackaging.com/sites/default/files/digital_edition/MayJune2017HCP/HCP_May_2017/index.html)  
Cover article

Huesmann, David. "Point and Shoot: Nanofiber Manufacturing using Pull Spinning." *Advanced Science News*. 22 March 2017. Web. <http://www.advancedsciencenews.com/point-shoot-nanofiber-manufacturing-using-pull-spinning/>

Burrows, Leah. "Portable nanofiber device offers precise, point-and-shoot capability for fabricating 3D tissue and smart fabrics." *Harvard Wyss Institute*. 1 March 2017. Web. <https://wyss.harvard.edu/portable-nanofiber-device-offers-precise-point-and-shoot-capability-for-fabricating-3d-tissue-and-smart-fabrics/>

ArtfixDaily. "Harvard Visiting Artist Carla Ciuffo Merges Art With Cutting-Edge Science." *ArtfixDaily*, 14 November 2015. Web. <http://www.artfixdaily.com/artwire/release/9911-harvard-visiting-artist-carla-ciuffo-merges-art-with-cutting-edge>

Skinner, Emily. "Encryption at the flick of a light switch." *RSC Chemistry World*, 18 November 2013. Web. <http://www.rsc.org/chemistryworld/2013/11/encryption-colloidal-pixels-data-storage>