

# Nina R. Sinatra

## Education

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- Harvard University** Cambridge, MA  
PhD, Materials Science and Mechanical Engineering, GPA 3.7/4.0 2019
- Completed Harvard GSAS Business Club Mini-MBA (Summer 2016); coursework at Harvard Graduate School of Design (Fall 2013) and MIT Sloan (Fall 2015) on product design and digital fabrication
- Columbia University** New York, NY  
Master of Science, Materials Science and Engineering, GPA 3.8/4.0 2013
- Herbert French Fellowship: Outstanding Engineering Graduate Student
- Massachusetts Institute of Technology (MIT)** Cambridge, MA  
Bachelor of Science, Materials Science and Engineering, GPA 4.4/5.0 2012
- Sigma Xi Engineering Honor Society (inducted 2012)

## Selected Experience

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- Advanced Technology and Projects group, Google** Mountain View, CA  
*Mechanical / Materials Engineer* 03/19-present
- Research, prototyping, and product development
- Harvard Microrobotics Laboratory | Harvard University. Advisor: Robert Wood** Cambridge, MA  
*Graduate Research Assistant* 03/17 – 02/19
- **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
    - Worked with collaborators at 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* 01/14-02/17
- 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* 09/12-06/13
- Developed novel hydroxyapatite-xerogel scaffolds for interfacial bone regeneration
- Max Planck Institute for Polymer Research (Max-Planck-Institut für Polymerforschung)** Mainz, Germany  
*Research Fellow* 05/11-09/11
- 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**  
**Analyst - Intern**

Concord, MA  
05/10-09/10

- Formulated decision analysis framework for nanotoxicology and life cycle analysis

## **Relevant Skills**

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**Computer:** Fusion 360, Solidworks, Python, Adobe Illustrator, Mathematica, MATLAB, Blender, LaTeX, COMSOL

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

**Fabrication:** Digital prototyping and manufacturing of polymers and fabric using 3D printing, laser cutting, molding

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

## **Leadership Experience & Mentoring**

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**Harvard College Women in Science, Technology, Engineering, and Math (WISTEM)**

Cambridge, MA

**Mentor**

09/16-present

- Advise undergraduate students on research and opportunities in engineering

**Harvard Graduate Women in Science and Engineering (HGWISE)**

Cambridge, MA

**Member, Event Coordinator**

05/15-present

- Coordinate events and discussion panels relating to materials engineering and wearable technology

**TEDx Baghdad**

Baghdad, Iraq (worked remotely)

**Project Leader**

05/12-12/12

- Developed leadership and engineering initiatives for Iraqi students, children, and entrepreneurs
- Collaborated on project to build a fabrication laboratory (Fab Lab) in Baghdad
- Coordinated partnerships with MIT Fab Academy

## **Publications**

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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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"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

## **Grants**

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

01/2015

## **Patents**

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**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.

## **Selected Honors & Achievements**

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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

## 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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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>