

Ava Amini

Formerly Ava Soleimany

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EDUCATION

- **Harvard University** Cambridge, MA
Doctor of Philosophy (PhD); Biophysics
2016 – 2021
- **Massachusetts Institute of Technology (MIT)** Cambridge, MA
Bachelor of Science (SB); Computer Science and Molecular Biology; GPA 5.0/5.0
2012 – 2016

EXPERIENCE

- **Microsoft Research** Cambridge, MA
Senior Researcher
June 2021 - present
Research at the interface of machine learning and biophysics.
- **Laboratory for Multiscale Regenerative Technologies (LMRT)** Koch Institute, MIT
Graduate Student
Jan. 2017 - May 2021
Thesis research on engineering novel technologies for disease diagnosis and monitoring. Advisor: Sangeeta N. Bhatia.
- **MIT 6.S191: Introduction to Deep Learning** EECS, MIT
Lead Organizer and Lecturer
2018 - present
Developed entire course curriculum, taught lectures, managed sponsorships from industrial partners, published the content online, and organized all course operations.
- **Synthetic Biology Group** Research Laboratory of Electronics, MIT
Undergraduate Researcher
Sep. 2013 - June 2016
Synthetic recombinase-based state machines in living cells. Advisor: Timothy K. Lu.
- **Seven Bridges Genomics** Cambridge, MA
Research Intern
June 2015 - Sep. 2015
Development of the Seven Bridge Cancer Genomics Cloud and extensions to the Seven Bridges API. Advisor: Brandi Davis-Dusenbery.
- **Wang Genomics Lab** Keck School of Medicine, USC
Undergraduate Researcher
May 2013 - Sep. 2013
Single cell transcriptomics. Advisor: Kai Wang.
- **ALEKS Corporation** Irvine, CA
Research Intern
June 2011 - Aug. 2012
Creation of example problems for a new Pre-Algebra textbook written as a supplement to the ALEKS learning software. Advisor: Jean-Claude Falmagne.
- **Chubb-Wright Lab** University of California, Irvine
Research Intern
Feb 2011 - Aug. 2011
Psychophysical representation of visual texture recognition. Advisor: Charlie Chubb.

PUBLICATIONS

Formerly Ava P. Soleimany. *Equal contribution. †Corresponding authors.

1. Greenman, K.P., **Amini, A.P.**[†], Yang, K.K.[†] Benchmarking uncertainty quantification for protein engineering. *bioRxiv (preprint, under review)*, 2023. [link]
2. Aung, A., Cui, A., Maiorino, L., **Amini, A.P.**, Gregory, J.R., Bukenya, M., Zhang, Y., Lee, H., Cottrell, C.A., Morgan, D.M., Silva, M., Suh, H., Kirkpatrick, J.D., Amlashi, P., Remba, T., Froehle, L.M., Xiao, S., Abraham, W., Adams, J., Love, J.C., Huyett, P., Kwon, D.S., Hachohen, N., Schief, W.R., Bhatia, S.N., Irvine, D.J., Low protease activity in B cell follicles promotes retention of intact antigens after immunization. *Science*, 2023. [link]
3. Martin Alonso, C.*, Tabrizi, S.*, Xiong, K., Blewett, T., Patel, S., An, Z., Sridhar, S., Bekdemir, A., Shea, D., **Amini, A.P.**, Wang, S.T., Kirkpatrick, J.D., Rhoades, J., Golub, T.R., Love, J.C., Adalsteinsson, V.A., Bhatia, S.N. A nanoparticle priming agent reduces cellular uptake of cell-free DNA and enhances the sensitivity of liquid biopsies. *bioRxiv*, 2023. [link]
4. **Amini, A.P.***, Kirkpatrick, J.D.*, Wang, C.S., Jaeger, A.M., Su, S., Naranjo, S., Zhong, Q., Cabana, C.M., Jacks, T., Bhatia, S.N., Multiscale profiling of protease activity in cancer. *Nature Communications*, 2022. [link]

5. Wu, K.E., Yang, K.K., van den Berg, R., Zou, J.Y., Lu, A.X., **Amini, A.P.**[†] Protein structure generation via folding diffusion. *arXiv (preprint, under review)*, 2022. [link]
6. Li, F.Z., **Amini, A.P.**, Yang, K.K., Lu, A.X. Pretrained protein language model transfer learning: is the final layer representation what we want?. *NeurIPS Workshop on Machine Learning in Structural Biology*, 2022. [link]
7. Wang, A., **Amini, A.P.**, Lu, A.X., Yang, K.K. Learning from physics-based features improves protein property prediction. *NeurIPS Workshop on Machine Learning in Structural Biology*, 2022. [link]
8. Rios-Martinez, C., Bhattacharya, N., **Amini, A.P.**, Crawford, L., Yang, K.K. Deep self-supervised learning for biosynthetic gene cluster detection and product classification. *bioRxiv (preprint, under review)*, 2022. [link]
9. **Soleimany, A.P.**^{*†}, Martin-Alonso, C.^{*}, Anahtar, M.^{*}, Wang, C.S., Bhatia, S.N.[†], Protease activity analysis: a toolkit for analyzing enzyme activity data. *ACS Omega*, 2022. [link]
10. Anahtar, M., Chan, L.W., Ko, H., Rao, A., **Soleimany, A.P.**, Khatri, P., Bhatia, S.N., Host protease activity classifies pneumonia etiology. *Proceedings of the National Academy of Sciences*, 2022. [link]
11. Kirkpatrick, J.D., **Soleimany, A.P.**, Dudani, J.S., Liu, H., Lam, H.C., Priolo, C., Henske, E.P.[†], Bhatia, S.N.[†], Protease activity sensors enable real-time treatment response monitoring in lymphangioleiomyomatosis. *European Respiratory Journal*, 2022. [link]
12. Greenman, K.P., **Soleimany, A.P.**, Yang, K.K., Benchmarking uncertainty quantification for protein engineering. *ICLR Workshop on Machine Learning for Drug Discovery*, 2022. [link]
13. Bekdemir, A., Tanner, E.E.L., Kirkpatrick, J., **Soleimany, A.P.**, Mitragotri, S., Bhatia, S.N., Ionic liquid-mediated transdermal delivery of thrombosis-detecting nanosensors. *Advanced Healthcare Materials*, 2022. [link]
14. Aung, A., Cui, A., **Soleimany, A.P.**, Bukenya, M., Lee, H., Cottrell, C.A., Silva, M., Kirkpatrick, J.D., Amlashi, P., Remba, T., Xiao, S., Froehle, L.M., Abraham, W., Suh, H., Huyett, P., Kwon, D.S., Hacohen, N., Schief, W.R., Bhatia, S.N., Irvine, D.J., Spatially regulated protease activity in lymph nodes renders B cell follicles a sanctuary for retention of intact antigens. *bioRxiv*, 2021. [link]
15. **Soleimany, A.P.**^{*}, Kirkpatrick, J.D.^{*}, Wang, C.S., Jaeger, A.M., Su, S., Naranjo, S., Zhong, Q., Cabana, C.M., Jacks, T., Bhatia, S.N., Multiscale profiling of enzyme activity in cancer. *bioRxiv*, 2021. [link]
16. He, J.^{*}, Nissim, L.^{*}, **Soleimany, A.P.**^{*}, Binder-Nissim, A., Fleming, H.E., Lu, T.K., Bhatia, S.N., Synthetic circuit-driven expression of heterologous enzymes for disease detection. *ACS Synthetic Biology*, 2021. [link]
17. **Soleimany, A.P.**^{*}, Amini, A.^{*}, Goldman, S.^{*}, Rus, D., Bhatia, S.N., Coley, C.W., Evidential deep learning for guided molecular property prediction and discovery. *ACS Central Science*, 2021. [link]
18. **Soleimany, A.P.**^{*}, Kirkpatrick, J.D.^{*}, Su, S., Dudani, J.S., Zhong, Q., Bekdemir, A., Bhatia, S.N., Activatable zymography probes enable in situ localization of protease dysregulation in cancer. *Cancer Research*, 2021. [link]
19. **Soleimany, A.P.**^{*}, Amini, A.^{*}, Goldman, S.^{*}, Rus, D., Bhatia, S.N., Coley, C.W., Evidential deep learning for guided molecular property prediction and discovery. *Machine Learning for Molecules, NeurIPS*, 2020. [link]
20. Amini, A., Schwarting, W., **Soleimany, A.**, and Rus, D., Deep evidential regression. *Advances in Neural Information Processing Systems*, 2020. [link]
21. Mehta, N.K., Pradhan, R.V., **Soleimany, A.P.**, Moynihan, K.D., Rothschilds, A.M., Momin, N., Rakhra, K., Mata-Fink, J., Bhatia, S.N., Wittrup, K.D., Irvine, D.J., Pharmacokinetic tuning of protein-antigen fusions enhances the immunogenicity of T-cell vaccines. *Nature Biomedical Engineering*, 2020. [link]
22. **Soleimany, A.P.**, Bhatia, S.N., Activity-based diagnostics: an emerging paradigm for disease detection and monitoring. *Trends in Molecular Medicine*, 2020. [link]
23. Kirkpatrick, J.D.^{*}, Warren, A.D.^{*}, **Soleimany, A.P.**^{*}, Westcott, P.M.K., Voog, J.C., Martin-Alonso, C., Fleming, H.E., Tammela, T., Jacks, T., Bhatia, S.N., Urinary detection of lung cancer in mice via noninvasive pulmonary protease profiling. *Science Translational Medicine*, 2020. [link]
24. Schuerle, S., Furubayashi, M., **Soleimany, A.P.**, Gwisai, T., Huang, W., Voigt, C.A., Bhatia, S.N., Genetic encoding of targeted MRI contrast agents for tumor imaging. *ACS Synthetic Biology*, 2020. [link]
25. Loynachan, C.N.^{*}, **Soleimany, A.P.**^{*}, Dudani, J.S., Lin, Y., Najer, A., Bekdemir, A., Chen, Q., Bhatia, S.N.[†], Stevens, M.M.[†], Renal clearable catalytic gold nanoclusters for in vivo disease monitoring. *Nature Nanotechnology*, 2019. [link]

26. **Soleimany, A.P.**, Suresh, H., Gonzalez Ortiz, J. J., Shanmugam, D., Gural, N., Guttag, J., Bhatia, S.N., Image segmentation of liver stage malaria infection with spatial uncertainty sampling. *International Conference on Machine Learning Workshop on Computational Biology; arXiv*, 2019. [link]
27. Amini, A.*, **Soleimany, A.P.***, Schwarting, W., Bhatia, S.N., Rus, D., Uncovering and mitigating algorithmic bias through learned latent structure. *AAAI/ACM Conference on Artificial Intelligence, Ethics, and Society*, 2019. [link]
28. Schuerle, S., **Soleimany, A.P.**, Yeh, T., Anand, G.M., Haberli, M., Fleming, H.E., Mirkhani, N., Qiu, S., Hauert, S., Wang, X., Nelson, B.J., Bhatia, S.N., Synthetic and living micropellers for convection-enhanced nanoparticle transport. *Science Advances*, 2019. [link]
29. Chen, Y., Millstein, J., Liu, Y., Chen, G.Y., Chen, X., Stucky, A., Qu, C., Fan, J., Chang, X., **Soleimany, A.**, Wang, K., Zhong, J., Liu, J., Gilliland, F.D., Li, Z., Zhang, X., Zhong, J.F., Single-cell digital lysates generated by phase-switch microfluidic device reveal transcriptome perturbation of cell cycle. *ACS Nano*, 2018. [link]
30. Amini, A., **Soleimany, A.**, Karaman, S., Rus, D., Spatial uncertainty sampling for end-to-end control. *Neural Information Processing Systems Workshop on Bayesian Deep Learning*, 2017. [link]
31. Roquet, N., **Soleimany, A.P.**, Ferris, A.C., Aaronson, S., Lu, T.K., Synthetic recombinase-based state machines in living cells. *Science*, 2016. [link]

TEACHING

- **Lead organizer and lecturer** MIT
Introduction to Deep Learning, 6.S191 2018 – present
 Developed, organized, and taught MIT's official introductory course on deep learning methods and applications. 2021 MIT enrollment of 700 students; MIT enrollment of 300+ students per year in each of 2018, 2019, and 2020; over 30,000 registered students globally; over 6 million online lecture views.
- **Teaching fellow** Harvard University
Questions in Physical Biology, MCB 294 Fall 2019
 Seminar course on topics in biophysics, systems biology, physical biology, and bioengineering.
- **Teaching assistant** MIT
General Biochemistry, 7.05 Spring 2015, Spring 2016
 Lectured on course material in a weekly recitation section of approximately 25 students. Led review sessions to all students in the course, wrote problem sets, and facilitated and graded exams. Course taught by Matthew Vander Heiden, M.D., Ph.D. and Michael Yaffe, M.D., Ph.D.
- **Visiting teacher** Rome, Italy
Liceo Scientifico Nomentano Jan. 2014
 Full time teacher; taught physics, chemistry, and English to Italian high school students.
- **Tutor** MIT
Biology & Chemistry departments Sep. 2013 – June 2016

RESEARCH MENTORSHIP AND ADVISING

- **Taylor Killian** Microsoft Research
PhD research intern, University of Toronto Computer Science June 2022 – September 2022
- **Dan Yuan** Microsoft Research
With L. Crawford. PhD research intern, University of Washington Bioengineering June 2022 – September 2022
- **Megan Richards** Microsoft Research
Undergraduate research intern, Duke Electrical and Computer Engineering June 2022 – September 2022
- **Kevin Wu** Microsoft Research
With K. Yang and A. Lu. PhD research intern, Stanford Computer Science June 2022 – September 2022
- **Francesca-Zhoufan Li** Microsoft Research
With K. Yang and A. Lu. PhD research intern, Caltech Bioengineering June 2022 – September 2022
- **Amy Wang** Microsoft Research
With K. Yang and A. Lu. PhD research intern, Stanford Chemical Engineering June 2022 – September 2022
- **Kevin Greenman** Microsoft Research
With K. Yang. PhD research intern, MIT Chemical Engineering January 2021
- **Cathy Wang** MIT
PhD student, MIT Biological Engineering June 2021 – August 2022

- **Carolina Rios-Martinez** Microsoft Research
With K. Yang and L. Crawford. Undergraduate research intern, UC Berkeley Bioengineering July 2021 – Sep. 2021
- **Carmen Martin Alonso** MIT
PhD student, MIT Health Sciences & Technology Jan. 2019 – June 2021
- **Susan Su** MIT
Undergraduate student, MIT Mechanical Engineering Sep. 2019 – May 2021
- **Ahmet Bekdemir** MIT
Postdoctoral associate, MIT Koch Institute June 2018 – Dec. 2018
- **Neha Kapate** MIT
PhD rotation student, MIT Health Science & Technology Sep. 2018 – Dec. 2018

INVITED TALKS AND PRESENTATIONS

- **TEDx MIT** Cambridge, MA
Invited talk 2023
- **ICLR Workshop on Physics for Machine Learning** Kigali, Rwanda
Keynote talk 2023
- **Boston University Center for Computing & Data Sciences** Boston, MA
Invited talk 2023
- **Marble Center for Cancer Nanomedicine** MIT
Keynote talk 2023
- **MILA AI Helps Ukraine Conference** MILA, Montreal
Keynote talk 2022
- **PRISME Technical Forum** Carlsbad, CA
Invited talk 2022
- **Microsoft Research Summit** Microsoft
Invited talk 2022
- **Molecular Modeling and Drug Discovery Seminar** MILA (virtual)
Keynote talk 2022
- **ICML Adaptive Experimental Design and Active Learning in the Real World (ReALML)** Baltimore, MD
Keynote talk 2022
- **Microsoft Research Intern Week** Redmond, WA
Invited talk 2022
- **Advanced Regenerative Manufacturing Institute (ARMI) Annual Meeting** Manchester, NH
Invited talk 2022
- **Flagship Pioneering AI Talks** Cambridge, MA
Invited talk 2022
- **Broad Institute of MIT and Harvard** Cambridge, MA
Special seminar 2022
- **MIT Department of Electrical Engineering and Computer Science** Cambridge, MA
Special seminar 2022
- **Harvard University Department of Biomedical Informatics** Harvard University
Special seminar 2022
- **Healthy ML Group Seminar** MIT
Invited talk 2022
- **Dana Farber Cancer Institute Department of Data Science** Dana Farber Cancer Institute
Special seminar 2022
- **Amgen Science Council** Amgen (virtual)
Invited talk 2022
- **UC Berkeley and UCSF Program in Computational Precision Health** UC Berkeley, UCSF
Special seminar 2022
- **University of Pennsylvania Department of Bioengineering** Philadelphia, PA
Special seminar 2022
- **Columbia University Department of Biomedical Engineering** Columbia University
Special seminar 2022

• IBM Research Zurich <i>Invited talk</i>	IBM (virtual) 2021
• Microsoft Research Summit <i>Invited talk</i>	Microsoft 2021
• Koch Institute Focus Seminar <i>Invited talk</i>	MIT 2021
• Ludwig Center for Molecular Oncology Retreat <i>Invited talk</i>	MIT 2021
• Basil Hetzel Institute for Translational Health Research <i>Invited talk</i>	Adelaide, Australia (virtual) 2021
• Virtual Seminar in Biomedical Science <i>Invited talk</i>	MIT 2021
• Koch Institute Image Awards <i>Invited talk</i>	MIT 2021
• Marble Center for Cancer Nanomedicine <i>Invited talk</i>	MIT 2021
• Microsoft Research New England <i>Invited talk</i>	Microsoft Research 2021
• NeurIPS Machine Learning for Molecules Workshop <i>Contributed talk</i>	NeurIPS Conference 2020
• NeurIPS Machine Learning for Molecules Workshop <i>Poster</i>	NeurIPS Conference 2020
• NeurIPS Bayesian Deep Learning Workshop <i>Poster</i>	NeurIPS Conference 2020
• NeurIPS Women in Machine Learning <i>Poster</i>	NeurIPS Conference 2020
• Embodied Intelligence Seminar <i>Contributed talk</i>	MIT 2020
• Biophysics Program Retreat <i>Invited talk</i>	Harvard University 2020
• Broad Institute Chemical Biology Meeting <i>Invited talk</i>	Cambridge, MA 2020
• Harvard Biophysics Student Seminar <i>Invited talk</i>	Cambridge, MA 2019
• Koch Institute for Cancer Research Retreat <i>Poster</i>	Falmouth, MA 2019
• Early Detection of Cancer Conference <i>Poster</i>	Stanford, CA 2019
• ICML Workshop on Computational Biology <i>Poster</i>	Long Beach, CA 2019
• Broad Institute Blood Biopsy Meeting <i>Invited talk</i>	Cambridge, MA 2019
• Ludwig Center for Molecular Oncology Retreat <i>Poster</i>	Dedham, MA 2019
• Biomedical Engineering Society Annual Meeting <i>Contributed talk</i>	Atlanta, GA 2018
• Ludwig Center for Molecular Oncology Retreat <i>Invited talk</i>	Dedham, MA 2019
• Gordon Research Conference, Proteolytic Enzymes and Their Inhibitors <i>Contributed talk</i>	Barga, Italy 2018
• Marble Center for Cancer Nanomedicine <i>Invited talk</i>	Cambridge, MA 2018
• Biomedical Engineering Society Annual Meeting <i>Contributed talk</i>	Phoenix, AZ 2017

AWARDS

- **TEDx Speaker** TEDx MIT
2023
- **Koch Institute Image Awards** MIT
2021 winning image
- **National Science Foundation (NSF) Graduate Research Fellowship** Harvard University
Graduate Fellow, 2017 – 2021
- **Henry Ford II Scholar Award** MIT
2016 recipient
To a senior engineering student who has maintained a cumulative average of 5.0 at the end of his/her seventh term and has exceptional potential for leadership.
- **AMITA Senior Academic Award** MIT
2016 recipient
To an outstanding senior woman who has demonstrated the highest level of academic excellence through her coursework and related professional activities at MIT.
- **Vikki Auzenne Memorial Women's Tennis Leadership Award** MIT
2016 recipient
To a member of the MIT varsity women's tennis team who best exemplifies the qualities of leadership through mentoring, advising, and counseling others, both on and off the court.
- **SuperUROP Outstanding Research Project Award** MIT
2015 recipient
- **MIT-EECS Wertheimer Undergraduate Research and Innovation Scholar** MIT
2014 recipient

LEADERSHIP

- **Momentum AI** Cambridge, MA
Co-founder *2021 – present*
Co-founded and directed an outreach program that teaches AI to under-resourced and under-served high school students from the Boston area. Two week capstone program is a free, project-based deep-dive into AI on MIT's campus.
- **MIT Varsity Women's Tennis** MIT
Captain 2014 – 2016 *2012 – 2016*
- **MIT Leadership Training Institute** MIT
Managing Director 2014 – 2016 *2012 – 2016*
Directed a service-focused leadership program for underserved high school students from the Boston area.
- **MIT Freshman Leadership Program** MIT
Counselor *2014 – 2016*
Developed and counseled in annual pre-orientation program for MIT freshmen centered on personal empowerment, social justice, inclusivity and diversity, and leadership skill-building.

SKILLS

- **Computational skills:** Python; Java; MATLAB; Unix/BASH; R; TensorFlow; PyTorch; machine learning; deep learning; data analysis; bioinformatics
- **Wet laboratory skills:** techniques in bioengineering, biochemistry, cancer biology, including: small animal pre-clinical models; chemical probe design; nanoparticle engineering; biochemical and proteomic assays; mammalian and bacterial cell culture; molecular biology assays; flow cytometry and FACS; RNA-seq and single-cell RNA-seq
- **Languages:** English (native), Farsi (fluent)