

Ava P. 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, biomedicine, and engineering.
- **Laboratory for Multiscale Regenerative Technologies (LMRT)** Koch Institute, MIT
Graduate Student April 2017 - May 2021
Thesis research on engineering novel technologies for disease diagnosis and monitoring. Advisor: Sangeeta 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.
- **Laboratory for Multiscale Regenerative Technologies (LMRT)** Koch Institute, MIT
Rotation Student Jan. 2017 - April 2017
Rotation project studying magnetotactic bacteria and potential applications for living cancer therapy. Advisors: Simone Schuerle, Sangeeta Bhatia.
- **Molecular Systems Lab** Wyss Institute, Harvard University
Rotation Student Sep. 2016 - Dec. 2016
Rotation project on strategies for conditional genome editing. Advisor: Peng Yin.
- **Synthetic Biology Group** Research Laboratory of Electronics, MIT
Undergraduate Researcher Sep. 2013 - June 2016
Synthetic recombinase-based state machines in living cells. Advisor: Timothy 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

*Equal contribution. †Co-corresponding authors.

1. 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 (preprint, under review)*, 2021. [link]
2. **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 (preprint, under review)*, 2021. [link]

3. 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 lymphangioliomyomatosis. *European Respiratory Journal (in press)*, 2021.
4. 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]
5. **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]
6. **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]
7. **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.
8. Amini, A., Schwarting, W., **Soleimany, A.**, and Rus, D., Deep evidential regression. *Advances in Neural Information Processing Systems*, 2020. [link]
9. 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]
10. **Soleimany, A.P.**, Bhatia, S.N., Activity-based diagnostics: an emerging paradigm for disease detection and monitoring. *Trends in Molecular Medicine*, 2020. [link]
11. 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]
12. 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]
13. 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]
14. **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]
15. 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]
16. 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]
17. 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. (11th out of 18 authors.) [link]
18. 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]
19. 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**

Introduction to Deep Learning, 6.S191

Developed, organized, and taught MIT's official introductory course on deep learning methods and applications. 2021 MIT enrollment of 650 students; MIT enrollment of 300+ students per year in each of 2018, 2019, and 2020; 30,000 registered students globally; over 5 million online lecture views.

MIT

2018 – present

- **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

- **Carmen Martin Alonso** MIT
PhD student, MIT Health Sciences & Technology
Jan. 2019 – present
- **Cathy Wang** MIT
PhD student, MIT Biological Engineering
June 2021 – present
- **Carolina Rios-Martinez** Microsoft Research
Undergraduate research intern, UC Berkeley Bioengineering
July 2021 – Sep. 2021
- **Bruce Wittman** Microsoft Research
PhD research intern, Caltech Bioengineering
July 2021 – Sep. 2021
- **Yaniv Yacoby** Microsoft Research
PhD research intern, Harvard University Computer Science
July 2021 – Sep. 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

PRESENTATIONS

- **Microsoft Research Summit** Microsoft
Invited talk
2021
- **Koch Institute Focus Seminar** MIT
Invited talk
2021
- **Ludwig Center for Molecular Oncology Retreat** MIT
Invited talk
2021
- **Basil Hetzel Institute for Translational Health Research** Adelaide, Australia (virtual)
Invited talk
2021
- **Virtual Seminar in Biomedical Science** MIT
Invited talk
2021
- **Koch Institute Image Awards** MIT
Invited talk
2021
- **Marble Center for Cancer Nanomedicine** MIT
Invited talk
2021
- **NeurIPS Machine Learning for Molecules Workshop** NeurIPS Conference
Contributed talk
2020
- **NeurIPS Machine Learning for Molecules Workshop** NeurIPS Conference
Poster
2020
- **NeurIPS Bayesian Deep Learning Workshop** NeurIPS Conference
Poster
2020
- **NeurIPS Women in Machine Learning** NeurIPS Conference
Poster
2020

- **Embodied Intelligence Seminar** MIT
Contributed talk 2020
- **Biophysics Program Retreat** Harvard University
Invited talk 2020
- **Broad Institute Chemical Biology Meeting** Cambridge, MA
Invited talk 2020
- **Harvard Biophysics Student Seminar** Cambridge, MA
Invited talk 2019
- **Koch Institute for Cancer Research Retreat** Falmouth, MA
Poster 2019
- **Early Detection of Cancer Conference** Stanford, CA
Poster 2019
- **ICML Workshop on Computational Biology** Long Beach, CA
Poster 2019
- **Broad Institute Blood Biopsy Meeting** Cambridge, MA
Invited talk 2019
- **Ludwig Center for Molecular Oncology Retreat** Dedham, MA
Poster 2019
- **Biomedical Engineering Society Annual Meeting** Atlanta, GA
Contributed talk 2018
- **Ludwig Center for Molecular Oncology Retreat** Dedham, MA
Invited talk 2019
- **Gordon Research Conference, Proteolytic Enzymes and Their Inhibitors** Barga, Italy
Contributed talk 2018
- **Marble Center for Cancer Nanomedicine** Cambridge, MA
Invited talk 2018
- **Biomedical Engineering Society Annual Meeting** Phoenix, AZ
Contributed talk 2017

AWARDS

- **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

- **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

- **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
- **Computational skills:** Python; Java; MATLAB; Unix/BASH; R; TensorFlow; PyTorch; machine learning; deep learning; data analysis; bioinformatics
- **Languages:** English (native), Farsi (fluent)