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 (BS); 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** — Koch Institute, MIT
  Graduate Student — *April 2017 - May 2021*
  Thesis research on engineering novel technologies for disease diagnosis and monitoring. Advisor: Sangeeta Bhatia.
- **Laboratory for Multiscale Regenerative Technologies** — 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

*Co-first authors.

1. 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]
2. **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]
3. **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]
4. **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.

5. Amini, A., Schwarting, W., **Soleimany, A.**, and Rus, D. Deep evidential regression. *Advances in Neural Information Processing Systems*, 2020. [link]

6. 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]

7. **Soleimany, A.P.**, Bhatia, S.N. Activity-based diagnostics: an emerging paradigm for disease detection and monitoring. *Trends in Molecular Medicine*, 2020. [link]

8. 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]

9. 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]

10. 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]

11. **Soleimany, A.P.**, Suresh, H., Gonalez 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]

12. 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]

13. Schuerle, S., **Soleimany, A.P.**, . . . , Bhatia, S.N. Synthetic and living micropropellers for convection-enhanced nanoparticle transport. *Science Advances*, 2019. [link]

14. Chen, Y., et al. 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]

15. 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]

16. 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 to a class of over 300 students (per year), and a 2021 MIT enrollment of 650 students.

- **Teaching fellow** — Harvard University
  Questions in Physical Biology, MCB 294 — *Fall 2019*
  Seminar course on topics in biophysics, systems biology, physical biology, and bioengineering.

- **Research mentor** — MIT
  1 graduate student and 1 undergraduate student — *Spring 2019 – present*

- **Research mentor** — MIT
  2 graduate rotation students — *Fall 2018, Spring 2019*

- **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 Matt 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 Department — *Sep. 2013 – June 2016*

- **Tutor** — MIT
  Chemistry Department — *Spring 2014*

Presentations

- **Ludwig Center for Molecular Oncology Retreat** — MIT
  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*
- **Machine Learning for Molecules Workshop** — NeurIPS Conference
  Contributed talk — *2020*
- **Machine Learning for Molecules Workshop** — NeurIPS Conference
  Poster — *2020*
- **Bayesian Deep Learning Workshop** — NeurIPS Conference
  Poster — *2020*
- **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

- **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**: small animal pre-clinical models, including injections (intravenous, intraperotineal, intratracheal, subcutaneous), blood collection, urine collection, necropsy, imaging (MR, CT, intravital); nanoparticle chemistry, synthesis, and characterization; immunohistochemistry; cryosectioning; biochemistry including enzyme activity assays, Western blotting, ELISA; ICP-MS; mammalian and bacterial cell culture; plasmid construction/cloning; molecular biology including PCR and qPCR; FACS
- **Computational skills**: Python; Java; MATLAB; Unix/BASH; R; TensorFlow; PyTorch; deep learning including CNNs, RNNs, VAEs, GANs; machine learning including SVM, KNN, decision trees, random forest; bioinformatics tools
- **Languages**: English (native), Farsi (fluent)