

Lennart J. Justen

PhD Student, MIT Media Lab & Broad Institute
Draper Scholar, Charles Stark Draper Laboratory
Ending Bioweapons Fellow, The Council on Strategic Risks

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Education **Massachusetts Institute of Technology**, Cambridge, MA (2023-present)

GPA: 5.0/5.0

PhD, Biosecurity

Advisor: Dr. Kevin Esvelt and Dr. Pardis Sabeti

M.S., Biosecurity and Pandemic Preparedness

Thesis title: *Advancing Biosecurity in the Age of AI - Integrating Novel Detection, Suppression, and Evaluation Approaches*

Committee: Dr. Kevin Esvelt, Dr. Andrew (Drew) Endy, and Dr. Daniel Bryant-Cunningham

University of Wisconsin-Madison, Madison, WI (2019-2022)

GPA: 3.79/4.0

B.S., Physics

B.S., Political Science

University of Minnesota-Twin Cities, Minneapolis, MN (2017)

GPA: 4.0/4.0

Research and work activities **Broad Institute**, Cambridge, MA (2025-present)

Graduate research, with Dr. Pardis Sabeti

Advancing biotechnologies for pathogen early warning.

Massachusetts Institute of Technology, MIT Media Lab, Cambridge, MA (2023-present)

Graduate research, with Dr. Kevin Esvelt

Advancing biotechnologies for pathogen early warning, transmission suppression, and AI safety.

SecureBio, Inc., Cambridge, MA (2023)

Research assistant

Advancing biotechnologies for pathogen early warning, transmission suppression, and AI safety.

Massachusetts Institute of Technology, MIT Media Lab, Cambridge, MA (2022-2023)

Research assistant, with Dr. Kevin Esvelt

Advancing biotechnologies for pathogen early warning, transmission suppression, and AI safety.

Federation of American Scientists, Washington, D.C. (2023)

Contractor

Examined international mass spectrometry high-performance

chromatography markets.

U.S. Department of State, Washington, D.C. (2021-2022)
VSFS Intern, with Dr. Mary Edwards

Wrote whitepaper on international policy that defines or supports the bioeconomy.

University of Wisconsin-Madison, Department of Atmospheric and Oceanic Sciences, Madison, WI (2020-2022)
Research assistant, with Dr. Elizabeth Maroon

Studied natural variability in climate model ensembles.
Developed methods to calculate wet-bulb temperature from climate model data.

University of Münster, European Research Center for Information Systems, Münster, Germany (2021)
German Academic Exchange Service RISE Intern, with Dr. Marco Niemann and Dr. Jörg Becker

Studied how language change impacts machine learning classification of abusive language.
Trained and evaluated transformers like BERT and other text classification models.

University of Wisconsin-Madison, Midwest Center of Vector-Borne Disease, Madison, WI (2020-2021)
Research assistant, with Dr. Duncan Carlsmith, Dr. Gebbiena Bron, Dr. Susan Paskowitz, and Dr. Lyric Bartholomay

Developed a deep learning system to classify tick species.
Helped assess Lyme disease risk in user images submitted through implementation in a public health app.

University of Wisconsin-Madison, Department of Geoscience, Madison, WI (2020)

Research assistant, with Dr. Ben Heath and Dr. Clifford Thurber
Applied deep learning methods to seismic tomography.
Benchmarked human and model performance on identifying earthquake signatures in seismic data.

Max Planck Institute for Astronomy, Haus der Astronomie, Heidelberg, Germany (2018)

Research assistant, with Dr. Markus Pössel
Studied the orbit of stars around black holes.
Applied orbital mechanics to star position data collected from the Very Large Telescope.

Honors and awards

Academic scholarships

2021, Thomas W. Parker Scholarship, University of Wisconsin-Madison
2020, Margaret E. and Allard Smith Undergraduate Scholarship, University of Wisconsin-Madison

Prizes and awards

2025, Next Generation Leader, The Spirit of Asilomar and the Future of Biotechnology Summit

2024, Ending Bioweapons Fellowship, Council on Strategic Risks, Washington, D.C.
2023, Draper Scholar, Charles Stark Draper Laboratory, Cambridge, MA
2018, MathWorks Math Modeling Challenge Scholarship, Society for Industrial and Applied Mathematics

Other training **T.M.C Asser Instituut**, The Hague, Netherlands (2022)
Training Program on Disarmament and Non-proliferation of WMD

Open Science Grid, Madison, WI (2020)
Open Science Grid User School in high-throughput computing

Teaching **How to Grow (Almost) Anything**, MAS.885, MIT (Spring 2025)
In 'How to Grow (Almost) Anything,' both experienced bio-enthusiasts and those new to the life sciences learn concepts and skills at the cutting edge of bioengineering, synthetic biology, and bio design.

Professional activities **Invited talks**
2024, Indoor air sampling for the detection of viral nucleic acids. Biosafety Level 4 Zoonotic Laboratory Network Conference. Virtual.
2024, Building intelligent agents for natural language control of laboratory automation. MIT Center for Biomedical Innovation, BioMAN Summit, Cambridge, MA.

Conferences, workshops, and events

2025, Advances in Global Disease Surveillance: An Introduction to BEACON, Boston University Center on Emerging Infectious Diseases, Boston, MA, participant
2025, AI+Biotechnology Summit, Special Competitive Studies Project, National Security Commission on Emerging Biotechnology (NSCEB), Washington, D.C., participant
2025, Technology and National Security Conference, Harvard Business School, MIT Sloan, Cambridge, MA, participant
2025, AlxBio Scenario Development Workshop, Council on Strategic Risks, virtual, invited participant
2025, UK AI Security Institute Industry Day, London, UK, participant
2025, PIBBS-SecureBio AI Safety Workshop, Cambridge, MA, invited participant
2025, The Spirit of Asilomar and the Future of Biotechnology Summit, Asilomar, CA, *Next Generation Leader*
2024, Chemical and Biological Defense Science & Technology Conference, Defense Threat Reduction Agency, Fort Lauderdale, FL, presenter
2024, AlxBTO East, Biological Technologies Office, DARPA, Boston, MA, participant
2024, Horizon-Brown Game Changers Workshop, Horizon Institute for Public Service and Brown University Pandemic Center, Washington, D.C., invited participant
2024, Boston Innovation Breakfast, Pillar VC, Advanced Research and Invention Agency (ARIA), Boston, MA, participant
2024, Draper Scholar Research Symposium, Charles Stark Draper Laboratory, Cambridge, MA, presenter
2024, Frontier Model Evaluation Science Day, RAND Technology and Security Policy Center, Washington, D.C., invited participant

2023, Taking Stock of the AI-Biosecurity Policy Discussion, Scowcroft Institute of International Affairs, Texas A&M University, Washington, D.C., invited participant
2023, Nextflow Summit, Seqera, Boston, MA, participant
2023, Wastewater Biosurveillance Workshop, MIT Lincoln Laboratory, Washington, D.C., invited participant
2023, AI Scenario Workshop, Transformative Futures Institute, Boston, MA, invited participant
2023, International Congress on Far-UVC Science and Technology, Columbia University, New York City, NY, invited participant
2023, MIT Microbiome Symposium, MIT Center for Microbiome and Therapeutics, Cambridge, MA, participant
2022, Global Metagenomics Summit, Metagenomics and Metadesign of Subways and Urban Biomes (MetaSUB) International Consortium, Miami, FL, participant
2022, Conference on Business Informatics, IEEE, Amsterdam, Netherlands, presenter
2021, Wisconsin Ideas Conference, Sifting & Winnowing, University of Wisconsin-Madison, Madison, WI, presenter

Conference and workshop organizing

2023, Workshop on far-UVC safety science, MIT and Longview Philanthropy, Miami, FL, co-organizer

Reviewing

2025, AI Safety Fund

Reviewer for journals

Medical and Veterinary Entomology

Memberships

Engineering Biology Research Consortium (EBRC) Student and Postdoc Association

Publications

Papers (peer reviewed and preprints)

1. Justen, L. (2025). Measuring LLM performance on biology benchmarks. *arXiv* (in preparation).
2. Götting, J., Medeiros, P., Sanders, J. G., Li, N., Phan, L., Karam, E., Justen, L., Hendrycks, D., Donoughe, S. (2025). Virology Capabilities Test (VCT): A Multimodal Virology Q&A Benchmark. *arXiv*.
3. Justen, L., Grimm, S., Esvelt, K., Bradshaw W. (2025). Indoor air sampling for detection of viral nucleic acids, *Aerosol Science and Technology*, 187, 106549
4. Görlitz, M.*, Justen, L.*, Rochette, P. J., Buonanno, M., Welch, D., Kleiman, N., Eadie, E., Kaidzu, S., Bradshaw, W., Javorsky, E., Cridland, N., Galor, A., Guttman, M., Meinke, M., Schleusener, J., Jensen, P., Söderberg, P., Yamano, M., Nishigori, C., O'Mahoney, P., Manstein, D., Croft, R., Cole, C., de Gruijl, F., Forbes, P., Trokel, S., Marshall, J., Brenner, D., Sliney, D., Esvelt, K. (2023). Assessing the safety of new germicidal far-UVC technologies. *Photochemistry and Photobiology*, 100(3), 501–520. (* co-first authors)

5. Gopal, A., Helm-Burger, N., Justen, L., Soice, H., Tzeng, T., Jeyapragasan, G., Grimm, S., Mueller, B., and Esvelt, K. (2023). Will releasing the weights of future large language models grant widespread access to pandemic agents? *arXiv*.
6. Justen, L., Carlsmith, D., Paskewitz, S. M., Bartholomay, L. C., Bron, G. M. (2021). Identification of public submitted tick images: A neural network approach. *PLoS ONE*, 16(12), e0260622.

Conference papers and talks

1. Carline, K., González, J. A. R., Sajjad, W., Justen, L. (2025). A Primer on Pathogen Research and Biological Weapons. The Spirit of Asilomar and the Future of Biotechnology Summit, Asilomar, CA.
2. Justen, L., Grimm, S., Bhasin, H., Cunningham-Bryant, D., Bradshaw, W., Esvelt, K. (2024). Biosurveillance of emerging viral threats through indoor air sampling. CBD S&T, Fort Lauderdale, FL.
3. Nguyen, P.*, Justen, L.* (2024). Building intelligent agents for natural language control of laboratory automation. MIT Center for Biomedical Innovation, BioMAN Summit, Cambridge, MA. (* equal contributions)
4. Justen, L.*, Grimm, S.* (2024). Indoor air sampling for the detection of viral nucleic acids. Biosafety Level 4 Zoonotic Laboratory Network Conference. Online. (* equal contributions)
5. Li, N., Pan, A., Gopal, A., Yue, S., Berrios, D., Gatti, A., Li, J., Dombrowski, A.K., Goel, S., Mukobi, G., Helm-Burger, N., Lababidi, R., Justen, L., Liu, A., Chen, M., Barrass, I., Zhang, O., Zhu, X., Tamirisa, R., Bharathi, B., Herbert-Voss, A., Breuer, C., Zou, A., Mazeika, M., Wang, Z., Oswal, P., Lin, W., Hunt, A., Tienken-Harder, J., Shih, K., Talley, K., Guan, J., Stenecker, I., Campbell, D., Jokubaitis, B., Basart, S., Fitz, S., Kumaraguru, P., Karmaker, K.K., Tupakula, U., Varadharajan, V., Shoshitaishvili, Y., Ba, J., Esvelt, K., Wang, A., Hendrycks, D. (2024). The WMDP bench-mark: Measuring and reducing malicious use with unlearning. *Proceedings of the 41st International Conference on Machine Learning (ICML)*, 28525–28550.
6. Justen, L., Grimm, S., Kaufman, J., Rice, D., Whittaker, C., Bradshaw, W., McLaren, M., Cunningham-Bryant, D., Esvelt, K. (2024). Pathogen-agnostic metagenomic sequencing of wastewater for early detection. Draper Scholars Research Symposium, Cambridge, MA.
7. Machtinger, A., Gopal, A., McLaren, M., Wang, B., Sowin, L., Rice, D., DeAmelio, S., Grimm, S., Justen, L., Bradshaw, W., Esvelt, K. (2023). Development of virus-like nucleic-acid tracers to improve the public-health utility of viral wastewater monitoring. CADDE Workshop on Portable Metagenomics for Pathogen Surveillance. São Paulo, Brazil.
8. Justen, L., Müller, K., Niemann, M., Becker, J. (2022). No time like the present: Effects of language change on automated comment moderation. *2022 IEEE 24th Conference on Business Informatics (CBI)*, 01, 40–49.

9. Justen, M.* , Justen, L.* (2021). Ending presidential sole authority over nuclear weapons. Wisconsin Ideas Conference, Madison, WI. (* equal contributions)

Theses

1. Justen, L. (2025). Advancing Biosecurity in the Age of AI: Integrating Novel Detection, Suppression, and Evaluation Approaches, *Master's Thesis in Media Arts and Sciences*, Media Lab, Massachusetts Institute of Technology.

Other writings

1. Justen, L., Grimm, S., Bradshaw, W. An update on our air sampling research. *Nucleic Acid Observatory Blog*. 2025-04-03. (<https://naobservatory.org/blog/air-sampling-paper/>)
2. Bhasin, H., McLaren, M., Justen, L. Exploring blood-based biosurveillance, part 3: The blood virome. *Nucleic Acid Observatory Blog*. 2025-02-07. (<https://naobservatory.org/blog/exploring-blood-biosurveillance-part3>).
3. Justen, L. Strategies for effective pathogen-agnostic biosurveillance in the United States. *Lenni Justen's Blog*. 2024-11-01. (<https://www.lennijusten.com/blog/effective-biosurveillance/>)
4. Justen, L. Trendlines in AlxBio evals. *Lenni Justen's Blog*. 2024-10-09. (<https://www.lennijusten.com/blog/biology-benchmarks/>).
5. Bhasin, H., Justen, L. Exploring blood-based biosurveillance, part 2: Sampling strategies within the US blood supply. *Nucleic Acid Observatory Blog*. 2024-09-10. (<https://naobservatory.org/blog/exploring-blood-biosurveillance-part2>).
6. Bhasin, H., Justen, L. Exploring blood-based biosurveillance, part 1: Blood as a sample type. *Nucleic Acid Observatory Blog*. 2024-07-16. (<https://naobservatory.org/blog/exploring-blood-biosurveillance-part1>).
7. Justen, L., Görlitz, M., Dattani, H., Esvelt, K. Broadening the Spectrum: The Role of Germicidal UV in ASHRAE's Control of Infectious Aerosols Standard. *SecureBio*. 2023-05-01. (<https://cms.securebio.org/content/2023-ASHRAE-UV-Public-Comment.pdf>)