

Kevin Lybarger, PhD

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Research Statement

My research interests combine data-driven machine learning and natural language processing (NLP) with important real-world problems. I investigate machine learning and NLP algorithm development and explore creative solutions to impactful use cases. My current research at the University of Washington (UW) explores the intersection of NLP and clinical informatics, including the extraction of information from clinical text that can improve health care and advance clinical research.

Education

University of Washington, Seattle, WA

Postdoctoral Fellow in Biomedical Informatics and Medical Education 2020-present

- Lab: UW BioNLP
- Funding: National Library of Medicine Biomedical Informatics Research Trainee Program
- Adviser: Dr. Meliha Yetisgen

University of Washington, Seattle, WA

PhD of Electrical & Computer Engineering 2014-2020

- Lab: Transformation, Interpretation and Analysis of Language (TIAL)
- Thesis: “Extracting information from clinical text with limited annotated data”
- Advisers: Drs. Mari Ostendorf and Meliha Yetisgen
- Committee: Drs. Shan Liu, Eve Riskin, and Thomas Payne

University of Colorado, Boulder, CO

MS of Electrical Engineering 2005-2007

Seattle University, Seattle, WA

BS of Electrical Engineering 1999-2003

Experience

University of Washington, Seattle, WA – Postdoctoral Fellow

Postdoctoral Fellow 2020-present

- Integrating clinical information extraction models into the UW Enterprise Data Warehouse, extracting information from millions of notes, and expanding biomedical research at UW
- Identifying the genetic make-up (genotyping) of patients who experience severe COVID-19, including the extraction of critical respiratory indicators from chest x-ray reports
- Extracting incidentalomas (findings unrelated to original imaging inquiry) from medical imaging reports, to assess the associated health and financial risks

University of Washington, Seattle, WA – Doctoral Student

Clinical information extraction 2017-2020

- Extracted critical information from clinical notes, including social determinants of health and COVID-19 diagnoses, testing, and symptoms
- Created novel corpora of clinical text with detailed annotations
- Developed a novel active learning framework for selecting samples for annotation that increase corpus heterogeneity and maximize model learning
- Developed state-of-the-art extraction models, focusing on the challenges associated with data-driven extraction in low resource settings

Clinical documentation processes 2015-2018

- Investigated clinical note creation using automatic speech recognition (ASR) to improve clinical workflow, documentation efficiency, and record quality
- Proposed a novel approach for using ASR transcripts and physician-edited transcripts to automatically identify portions of ASR transcripts that require careful review

Teaching Assistant 2014-2019

- Taught laboratory courses, including courses for international student-exchange programs: Circuit Theory and Power Electronics Design
- Recognized for teaching a highly rated course by the College of Engineering

ECE Recruiting and Admissions – Graduate Staff Assistant 2018-2020

- Recruited prospective graduate students, emphasizing underrepresented populations and recruiting at conferences, like the Society of Women Engineers, National Society of Black Engineers, and Society of Hispanic Professional Engineers
- Implemented a holistic graduate admissions process that included unconscious bias training for reviewers and an assessment rubric focused on the whole person

Vertically Integrated Projects (VIP) – Research Assistant 2015-2018

- Contributed to the advancement of the international VIP Consortium (vip-consortium.org), which promotes undergraduate research and explores project-based learning
- Developed the University of Washington VIP chapter, emphasizing diversity and inclusion in student and faculty recruitment

Seattle University, Seattle, WA

Adjunct Faculty 2012-2019

- Taught lecture and laboratory classes: Circuits Laboratory, Fundamentals of Electrical Engineering, Electronics 1, Electronics 2, Electronics Laboratory, and Power Electronics
- Advised students in year-long, industry-sponsored senior capstone projects: Engineering Design I, II, & III
- Developed course materials, including laboratory experiments
- Assisted in ABET accreditation activities

DNV KEMA, Seattle, WA

Senior Engineer 2007-2012

- Wind turbine power quality, power performance, and mechanical load testing
- Wind plant due diligence, including technology and site conditions analysis

- Root cause analyses of wind turbine mechanical and electrical system failures

National Renewable Energy Laboratory, Golden, CO

Graduate Researcher

2006-2007

- Designed a GPS-synchronized data acquisition system for wind turbines
- Tested a novel prototype wind turbine generator

Honors & Awards

Best Presentation Award, American Medical Informatics Association (AMIA) 2018

- Presented dissertation research at the NLP Working Group Doctoral Consortium

Husky 100 Recipient, University of Washington 2017

- Recognized for leadership, discovery mindset, and commitment to inclusion
- One of 100 students selected from across all UW campuses (0.2% of UW's students)

Professional & Humanitarian Services, Rotary International 2007

- Recognized by Rotary International for work with Engineers Without Borders

Publications

Journal papers

1. **K. Lybarger**, M. Ostendorf, M. Thompson, and M. Yetisgen, "Extracting COVID-19 diagnoses and symptoms from clinical text: A new annotated corpus and neural event extraction framework," *Journal Biomedical Informatics*, 2021. doi: [10.1016/j.jbi.2021.103761](https://doi.org/10.1016/j.jbi.2021.103761).
2. **K. Lybarger**, M. Ostendorf, and M. Yetisgen, "Annotating social determinants of health using active learning, and characterizing determinants using neural event extraction," *Journal Biomedical Informatics*, vol. 113, p. 103631, 2021. doi: [10.1016/j.jbi.2020.103631](https://doi.org/10.1016/j.jbi.2020.103631).
3. **K. Lybarger**, M. Ostendorf, E. Riskin, T. Payne, A. White, *et al.*, "Asynchronous speech recognition affects physician editing of notes," *Applied Clinical Informatics*, vol. 9, no. 4, pp. 782–790, 2018. doi: [10.1055/s-0038-1673417](https://doi.org/10.1055/s-0038-1673417).
4. T. Payne, D. Alonso, A. Markiel, **K. Lybarger**, R. Lordon, *et al.*, "Using voice to create inpatient progress notes: effects on note timeliness, quality, and physician satisfaction," *Journal American Medical Association Open*, vol. 1, no. 2, pp. 218–226, 2018. doi: [10.1093/jamiaopen/ooy036](https://doi.org/10.1093/jamiaopen/ooy036).
5. T. Payne, D. Alonso, A. Markiel, **K. Lybarger**, and A. White, "Using voice to create hospital progress notes: description of a mobile application and supporting system integrated with a commercial electronic health record," *Journal Biomedical Informatics*, vol. 77, pp. 91–96, 2017. doi: [10.1016/j.jbi.2017.12.004](https://doi.org/10.1016/j.jbi.2017.12.004).

Conference papers

6. **K. Lybarger**, M. Yetisgen, and M. Ostendorf, "Using neural multi-task learning to extract substance abuse information from clinical notes," in *AMIA Annual Symposium Proceedings*, pp. 1395–1404, 2018. PMID: [PMC6371261](https://pubmed.ncbi.nlm.nih.gov/36371261/).
7. **K. Lybarger**, M. Ostendorf, and M. Yetisgen, "Automatically detecting likely edits in clinical notes created using automatic speech recognition," in *AMIA Annual Symposium Proceedings*, pp. 1186–1195, 2017. PMID: [PMC5977669](https://pubmed.ncbi.nlm.nih.gov/35977669/).

8. B. Aazhang, R. Abler, J. Allebach, L. Bost, J. Cavallaro, *et al.*, “Vertically Integrated Projects (VIP) programs: multidisciplinary projects with homes in any discipline,” in *ASEE Annual Conference and Exposition*, 2017. Available at <https://www.asee.org/public/conferences/78/papers/19405/view>.
9. D. Malcolm, **K. Lybarger**, and G. Randall, “Advances in wind turbine site assessment,” in *AIAA Aerospace Sciences Meeting*, p. 456, 2011. doi: [10.2514/6.2011-456](https://doi.org/10.2514/6.2011-456).

Abstracts and posters

10. **K. Lybarger**, E. Chang, K. Kerker, J. Shen, E. Qiao, *et al.*, “A novel corpus with detailed annotations of social determinants of health,” in *AMIA Annual Symposium Proceedings*, 2020.
11. **K. Lybarger**, N. Dobbins, M. Ostendorf, M. Thompson, and M. Yetisgen, “Extracting COVID-19 diagnoses and symptoms from clinical text,” in *AMIA NLP Working Group*, 2020.
12. **K. Lybarger**, M. Ostendorf, O. Uzuner, and M. Yetisgen, “Automatic identification of social determinants of health from clinical records,” in *AMIA Annual Symposium Proceedings*, 2019.
13. **K. Lybarger**, “Extracting social behavioral factors from free-text clinical notes,” in *AMIA NLP Working Group*, 2018.
14. T. Payne, A. Markiel, D. Alonso, R. Lordon, **K. Lybarger**, *et al.*, “Improving electronic inpatient progress notes using voice: results from the VGEENS project,” in *AMIA Annual Symposium Proceedings*, 2017.
15. G. Randall, D. Malcolm, **K. Lybarger**, and M. Malkin, “Quantifying uncertainty in turbine suitability assessments,” in *American Wind Energy Association WINDPOWER*, 2010.
16. D. Malcolm and **K. Lybarger**, “Site suitability using generic wind turbine models,” in *American Wind Energy Association WINDPOWER*, 2010.

Under review

17. **K. Lybarger**, L. Mabrey, M. Thau, P. K. Bhatraju, M. Wurfel, and M. Yetisgen, “Identifying ARDS using the hierarchical attention network with sentence objectives framework,” *under review*, 2021. <https://arxiv.org/abs/2103.06352>

Service

Conference and Journal Reviewing

- Reviewer, American Medical Informatics Association Annual Symposium
- Reviewer, International Journal of Medical Informatics
- Reviewer, Journal of Biomedical Informatics

Engineers Without Borders, Boulder, CO

Project Manager

2005-2007

- Led the design and installation of a photovoltaic water pumping system, which brought potable water to a community of over 100 people in rural Peru

Skills

- Programming languages: Python, Java, C++, Bash, MATLAB
- Machine learning packages: PyTorch, TensorFlow, Scikit-learn

Licenses

- State of Washington Professional Engineer (PE)

2010