

Jiaxian Shen, Ph.D.

Civil and Environmental Engineering
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PROFESSIONAL EXPERIENCE

3 / 23 – present: National Microbiome Data Collaborative Ambassador | Lawrence Berkeley National Lab Affiliate

- Trained in microbiome data stewardship, metadata standards, bioinformatics workflows, and science communications.
- Will host workshops to engage with the research communities to promote Findable, Accessible, Interoperable, and Reusable (FAIR) microbiome data.

9 / 17 – 3 / 23: Graduate Research Assistant | 4 / 23 – present: Postdoctoral Scholar Laboratory of Dr. Erica Hartmann, Department of Civil and Environmental Engineering, Northwestern University, Evanston, IL, USA

- Designed and performed experiments for optimization of metagenomic analysis of indoor surfaces, focusing on low-biomass samples, viability distinguishment, and quantification.
- Designed and executed experiments on the antimicrobial resistance of hospital-isolated bacteria to chlorhexidine.
- Trained machine learning models to predict required sequencing resources in metagenomics. Employed bioinformatic tools to analyze sequencing data.
- Developed an [R package](#) to analyze bibliographic datasets for systematic reviews. Designed and conducted a scoping review.
- Managed diverse teams, including multiple undergraduate researchers.

3 / 15 – 4 / 17: Undergraduate research intern, Laboratory of Dr. Baolan Hu, Department of Environmental Engineering, Zhejiang University, Hangzhou, China

- Trained in bioreactor operation, fluorescence *in situ* hybridization, DNA extraction, and gas spectrometry.
- Enriched and identified ammonia oxidizing bacteria and archaea.
- Explored the effects of several organic and inorganic chemicals on nitrite-dependent anaerobic methane oxidizing bacteria.

EDUCATION

Ph.D., Environmental Engineering and Science (March 2023)
Northwestern University, Evanston, IL, USA

B.Eng., Environmental Engineering (June 2017, *graduated with the highest honor*)
Zhejiang University, Hangzhou, China

PUBLICATIONS

12. **Shen, J.**, McFarland, A. G., Blaustein, R. A., Rose, L. J., Perry-Dow, K. A., Moghadam, A. A., Hayden, M. K., Young, V. B., & Hartmann, E. M. (2022). An improved workflow for accurate and robust healthcare environmental surveillance using metagenomics. *Microbiome*, *10*(1), 206. <https://doi.org/10.1186/s40168-022-01412-x>
11. **Shen, J.**, Ling, F., & Hartmann, E. M. (2022). RefDeduR: A text-normalization and decision-tree aided R package enabling accurate and high-throughput reference deduplication for large datasets. (*Under Review*) Preprint available at *biorxiv*. <https://doi.org/10.1101/2022.09.29.510210>
10. **Shen, J.**, McFarland, A. G., Young, V. B., Hayden, M. K., & Hartmann, E. M. (2021). Toward Accurate and Robust Environmental Surveillance Using Metagenomics [Perspective]. *Frontiers in Genetics*, *12*(151). <https://doi.org/10.3389/fgene.2021.600111>
9. **Shen, J.**, McFarland, A., Blaustein, R., Hayden, M., Young, V., & Hartmann, E. (2020). Blind Spots in Methods Based on Cultivation and Metagenomic Sequencing for Surface Microbiomes in a Medical Intensive Care Unit [Conference Proceeding]. *Infection Control & Hospital Epidemiology*, *41*(S1), s141-s142.
8. Wang, Y., Thompson, K. N., Yan, Y., Short, M. I., Zhang, Y., Franzosa, E. A., **Shen, J.**, Hartmann, E. M., & Huttenhower, C. (2022). RNA-based Amplicon Sequencing Is Ineffective in Measuring Metabolic Activity in Environmental Microbial Communities. *Microbiome* (*Accepted*). Preprint available at Research Square. <https://doi.org/10.21203/rs.3.rs-1870950/v1>
7. Rohani, R., Scheetz, M. H., Donnelly, H. K., Donayre, A., Kang, M., Diaz, E., Dedicataria, K., Hauser, A. R., Ozer, E. A., Nozick, S., Qi, C., Pawlowski, A. E., Neely, M. N., Misharin, A. V., Wunderink, R. G., Rhodes, N. J., & **NU SCRIPT Study investigators** (2022). Individual target pharmacokinetic/pharmacodynamic attainment rates among meropenem-treated patients admitted to the ICU with hospital-acquired pneumonia. *J Antimicrob Chemother*, *77*(11), 2956-2959. <https://doi.org/10.1093/jac/dkac245>
6. McFarland, A. G., Bertucci, H. K., Littman, E., **Shen, J.**, Huttenhower, C., & Hartmann, E. M. (2021). Triclosan Tolerance Is Driven by a Conserved Mechanism in Diverse Pseudomonas Species. *Applied and Environmental Microbiology*, *87*(7). <https://doi.org/10.1128/aem.02924-20>
5. Wang, Y., Yan, Y., Thompson, K. N., Bae, S., Accorsi, E. K., Zhang, Y., **Shen, J.**, Vlamakis, H., Hartmann, E. M., & Huttenhower, C. (2021). Whole microbial community viability is not quantitatively reflected by propidium monoazide sequencing approach. *Microbiome*, *9*(1), 17. <https://doi.org/10.1186/s40168-020-00961-3>
4. Velazquez, S., Griffiths, W., Dietz, L., Horve, P., Nunez, S., Hu, J., **Shen, J.**, Fretz, M., Bi, C., & Xu, Y. (2019). From one species to another: A review on the interaction between

chemistry and microbiology in relation to cleaning in the built environment. *Indoor Air*, 29(6), 880-894.

3. Shen, Q., Zhang, K., Song, J., **Shen, J.**, Xu, J., Inubushi, K., & Brookes, P. C. (2018). Contrasting biomass, dynamics and diversity of microbial community following the air-drying and rewetting of an upland and a paddy soil of the same type. *Biology and Fertility of Soils*, 54(7), 871-875.
2. Liu, S., Hu, J., **Shen, J.**, Chen, S., Tian, G., Zheng, P., Lou, L., Ma, F., & Hu, B. (2017). Potential correlated environmental factors leading to the niche segregation of ammonia-oxidizing archaea and ammonia-oxidizing bacteria: A review. *Applied Environmental Biotechnology*, 2(2), 11-19.
1. He, Z., Wang, J., Hu, J., Zhang, H., Cai, C., **Shen, J.**, Xu, X., Zheng, P., & Hu, B. (2016). Improved PCR primers to amplify 16S rRNA genes from NC10 bacteria. *Applied microbiology and biotechnology*, 100(11), 5099-5108.

ORAL PRESENTATIONS & INVITED LECTURES

6. "Chlorhexidine persistence and microbial resistance in hospital environments." AEESP Distinguished Lecturer Event, University of Notre Dame, Notre Dame, IN, USA, March 31, 2023.
5. "Meta-analysis of the Indoor Microbiome: Where Are We Now and Where Should We Go?" Healthy Buildings America 2021, virtual, January 18-20, 2022.
4. "Chlorhexidine Resistance of Environmental Isolates from a Medical Intensive Care Unit." World Microbe Forum held by ASM and FEMS, virtual, June 20-24, 2021.
3. "Improving Methods for Understanding Surface Microbiomes in the Medical Intensive Care Unit: A Focus on Sample Treatments Prior to DNA Sequencing." ASM Microbe 2020, virtual, June 18-22, 2020 (*Poster presentation; Oral presentation accepted but canceled due to Covid-19*).
2. "Propidium Monoazide and Viability Assessment", Molecular Microbiology (CIV ENV 447), Northwestern University, Evanston, IL, USA, March 4, 2020.
1. Weng, Y., **Shen, J.**, Hayden, M. K., Hartmann, E. M. "Genetic Diversity of the Chlorhexidine Resistance in Cultivable Bacteria Isolated from a Medical Intensive Care Unit Environment." Microbiome-VIF 2021 International Forum, virtual, December 8, 2021 (*Presented by my undergraduate mentee*).

POSTER PRESENTATIONS

8. **Shen, J.**, Weng, Y., Ahluwalia, V. S., Ling, F., Hartmann, E. M. Meta-analysis of the Indoor Surface Microbiome. AEESP, St. Louis, MO, USA, June 28-30, 2022.
7. **Shen, J.**, Weng, Y., Ahluwalia, V. S., Ling, F., Hartmann, E. M. Are we ready for a meta-analysis of the indoor surface microbiome? A scoping review. ASM Microbe 2022, Washington, D.C., USA, June 9-13, 2022.
6. **Shen, J.**, Hartmann, E. M. Using machine learning approaches to predict required sequencing effort from accessible sample features in shotgun metagenomics. Purdue Applied Microbiome Sciences Symposium, Purdue University, West Lafayette, IN, USA, May 9-11, 2022 (*Best poster finalist*).
5. **Shen, J.**, Shimada, T. R., Hartmann, E. M. Chlorhexidine on Hospital Surfaces: a Focus on Interactions with Disinfectants and Microbes. ASM Microbe 2020, virtual, June 18-22, 2020.
4. **Shen, J.**, McFarland, A. M., Blaustein, R. A., Hayden, M. K., Young, V. B., Hartmann, E. M. Blind Spots in Methods Based on Cultivation and Metagenomic Sequencing for Surface Microbiomes in a Medical Intensive Care Unit. Decennial 2020 6th International Conference on Healthcare Associated Infections, Atlanta, GA, USA, March 26-30, 2020 (*Canceled due to Covid-19*).
3. **Shen, J.**, McFarland, A. G., Hayden, M. K., Young, V. B., Hartmann, E. M. Chlorhexidine Resistance in Cultivable Bacteria Isolated from a Medical Intensive Care Unit Environment. Microbiome Research Symposium, The University of Chicago, IL, USA, April 16, 2019.
2. Shimada, T., **Shen, J.**, Barber, O. W., Hartmann, E. M. Chlorhexidine Interacts with Disinfectants and Microbes on Indoor Surfaces. Healthy Buildings America 2021, virtual, January 18-20, 2022 (*Presented by my undergraduate mentee*).
1. Weng Y., **Shen, J.**, Barber, O. W., Miramontes, I. M., Smith, I. Z., Hayden, M. K., Young, V. B., Hartmann, E. M. Chlorhexidine Resistance in Cultivable Bacteria Isolated from a Medical Intensive Care Unit Environment. 2020 Chicago Area Undergraduate Research Symposium (CAURS), Chicago, IL, USA, April 4-6, 2020 (*Canceled due to Covid-19; Presented by my undergraduate mentee*).

AWARDS

- Terminal Year Fellowship, Northwestern University (2022)
- Northwestern University Conference Travel Grant (2022)
- Audience Choice Winner of “My Research in 180 Seconds”, Department of Civil and Environmental Engineering, Northwestern University (2019)
- Murphy Fellowship, Department of Civil and Environmental Engineering, Northwestern University (2017)
- Chu Kochen Scholarship (**12/6000**), *the highest student honor* at Zhejiang University (2016)
- Student Research Training Program Grant, Zhejiang University (2015, 2016)

PEER REVIEW ACTIVITIES

- Publication:
 - *npj Biofilms and Microbiomes* (May 2023)
 - *Nucleic Acids Research* (December 2022)
 - *Building and Environment* (August 2022)
 - *Environmental Science: Processes & Impacts* (April 2022)
 - *mSystems* (March 2022)
 - *Environmental Science & Technology* (March & September 2022)
 - *Microbiome* (October 2021, March 2023)

MENTORING ACTIVITIES

- Undergraduates: Yuhan Weng, Meghana Karan, Tyler Shimada, James Lindsay, Phuong Lam, Vikas Ahluwalia, Andrew Watson

REFERENCES

Erica M. Hartmann, Ph.D.

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Erica is my Ph.D. advisor.

Vincent B. Young, M.D., Ph.D.

William Henry Fitzbutler Collegiate Professor, Internal Medicine/Division of Infectious Diseases
Professor, Microbiology & Immunology
The University of Michigan Medical School
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Vincent is our collaborator on the projects to optimize metagenomics-based environmental surveillance methods and to explore antimicrobial resistance of hospital-isolated bacteria.

George Wells, Ph.D.

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George is a committee member of my Ph.D. thesis and candidacy exam.