

Yixiang Gao, PhD, *Electrical and Computer Engineering*

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PROFESSIONAL SUMMARY

Machine learning and robotics researcher. Exhibits profound expertise in **Deep Learning, Computer Vision, Robotics and Pattern Recognition**. Specialized in fostering interdisciplinary collaborations, notably with speech language pathology, and underground mining related applications. Advocate for open source technologies. Seeking to leverage extensive AI/ML expertise to address complex real-world challenges and drive innovation in technology application.

EDUCATION

University of Missouri - Columbia	Ph.D in Electrical and Computer Science	2017 – 2024
University of Missouri - Columbia	BS in Electrical Engineering	2014 – 2017
University of Missouri - Columbia	BS in Computer Engineering	2014 – 2017

EXPERIENCE

Post Doctorial Fellow | *Missouri S&T | Department of Mining & Explosives Engineering* Oct 2024 – Current

- *Effective Miner Self-Escape from Underground Mine Emergencies (CDC-NIOSH U60OH012350)*
 - Developing a quadruped robot platform (Boston Dynamics Spot) with ROS 2 to perform autonomous miner exploration and safety monitoring, utilizing advanced LiDAR and thermal cameras for navigation and deep learning-based object detection.

Technical Consultant (Part-Time) | *Ameren* July 2025 – Current

- *Autonomous Step-Voltage Measurement for Electric Substations*
 - Developing an autonomous quadruped robot platform (Boston Dynamics Spot) with ROS 2 to perform step voltage measurements in electric substations, integrating LiDAR for odometry/localization with a conductive shoe and voltage multimeter.

Senior Advisor (Part-Time) | *TouchTronix Robotics* April 2025 – Current

- *R&D for Tactile Sensing and Embodied AI*
 - Providing strategic guidance on tactile sensor hardware development for dexterous manipulation and embodied AI research; also developing visualization/control software with ROS 2 integration and create high-fidelity simulations in NVIDIA Isaac-Sim.

Graduate Research Assistant | *University of Missouri - Columbia | ViGIR Lab* Aug 2017 – Sep 2024

- *PhD Thesis: Confounded predictions in machine learning*
 - Detect, quantify, and mitigate confounding factors in machine learning and deep learning models.
- *Neurobiological signatures of vocal effort in early career teachers (NIH R01DC018026)*
 - Developed classification pipeline with transformers and CNN using Pytorch and Matlab for analyzing both sEMG and fMRI data.
- *Classifying Neck Surface EMG Signals for Early Detection of Vocal Fatigue (NIH R15DC015335)*
 - Developed machine learning algorithms with SVM, K-means, and MLP using scikit-learn and Pytorch for analyzing sEMG data.

FUNDING AND PROPOSALS

[1] **[Co-PI]**, "Collaborative Research: VINES Track 2: AutoMINES: Advanced Spectrum Enabled Intelligent Mobile Mesh Network for Underground Mining Automation." National Science Foundation (NSF). **\$4,250,000**. (Submitted: 09/2025, **Pending**).

JOURNAL PUBLICATIONS

- [1] Défaza, Mateo, Awuah-Offei, Kwame, and **Gao, Yixiang. 2025 (Under Review)**. "Stall Detection in Hydraulic Excavator Operations Using Heuristics and Machine Learning: A Case Study". In: *Automation in Construction*.
- [2] Berardi, Mark, [...], **Gao, Yixiang**, et al. **2025**. "Automated Analysis of Relative Fundamental Frequency in Continuous Speech: Development and Comparison of Three Processing Pipelines". In: *Journal of Voice*. doi: <https://doi.org/10.1016/j.jvoice.2025.04.006>.
- [3] **Gao, Yixiang**, Dietrich, Maria, and DeSouza, G. N. **2021**. "Classification of Vocal Fatigue Using sEMG: Data Imbalance, Normalization, and the Role of Vocal Fatigue Index Scores". In: *Applied Sciences*. doi: 10.3390/app11104335.

PEER-REVIEWED CONFERENCES

- [1] Addy, Cyrus, [...], **Gao, Yixiang**, et al. **2025 (Accepted)**. “A Comprehensive Dataset for Underground Miner Detection in Diverse Scenario”. In: *20th International Symposium on Visual Computing*.
- [2] **Gao, Yixiang** and Awuah-Offei, Kwame. **2025**. “Navigation in Underground Mine Environments: A Simulation Framework for Quadruped Robots”. In: *2025 IEEE 21st International Conference on Automation Science and Engineering*. DOI: 10.1109/CASE58245.2025.11163807.
- [3] Farag, Ramy, [...], **Gao, Yixiang**, et al. **2024**. “EfficientNet-SAM: A Novel EfficientNet with Spatial Attention Mechanism for COVID-19 Detection in Pulmonary CT Scans”. In: *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops*. DOI: 10.1109/CVPRW63382.2024.00528.
- [4] **Gao, Yixiang** et al. **2023**. “Removal of Confounding Factors using GA-SVM Feature Adaptation: Application on Detection of Vocal Fatigue thru sEMG Classification”. In: *IEEE 2023 Congress on Evolutionary Computation (CEC)*. DOI: 10.1109/CEC53210.2023.10253983.
- [5] Demby's, Jacket, **Gao, Yixiang**, and DeSouza, G. N. **2019**. “A Study on Solving the Inverse Kinematics of Serial Robots using Artificial Neural Network and Fuzzy Neural Network”. In: *2019 IEEE International Conference on Fuzzy Systems (FUZZ-IEEE)*. DOI: 10.1109/FUZZ-IEEE.2019.8858872.
- [6] Demby's, Jacket **Gao, Yixiang** et al. **2019**. “Object Detection and Pose Estimation Using CNN in Embedded Hardware for Assistive Technology”. In: *2019 IEEE Symposium Series on Computational Intelligence (SSCI)*. DOI: 10.1109/SSCI44817.2019.9002767.
- [7] **Gao, Yixiang** et al. **2018**. “Classification of sEMG Signals for the Detection of Vocal Fatigue based on VFI Scores”. In: *2018 40th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*. DOI: 10.1109/EMBC.2018.8513224.

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- [1] Farag, Ramy, [...], **Gao, Yixiang**, et al. **2024**. “COVID-19 detection from pulmonary CT scans using a novel EfficientNet with attention mechanism”. In: *CoRR*.

CONFERENCE PRESENTATION

- [1] **Gao, Yixiang** et al. **2024**. “Voice sEMG Classification of Sentences for Vocal Fatigue Detection using GA-SVM for Confounder”. In: *13th International Conference on Voice Physiology and Biomechanics (ICVPB)*.
- [2] **Gao, Yixiang** et al. **2023**. “Feature Adaptation with GA-SVM for Confounding Removal - An Application on Vocal Fatigue Detection Using sEMG Classification”. In: *The 15th Advances in Quantitative Laryngology, Voice and Speech Research (AQL)*.
- [3] **Gao, Yixiang**, Dietrich, Maria, and DeSouza, G. N. **2021**. “Classification of Vocal Fatigue using Neck sEMG with Leave-One-Subject-Out Testing”. In: *The 14th Advances in Quantitative Laryngology, Voice and Speech Research (AQL)*.
- [4] **Gao, Yixiang**, Dietrich, Maria, and DeSouza, G. N. **2021**. “Explore Voice Production Variability through Neck sEMG Clustering - Challenge for Accurate Labeling of Vocal Fatigue”. In: *The 14th Advances in Quantitative Laryngology, Voice and Speech Research (AQL)*.
- [5] Dietrich, Maria, **Gao, Yixiang**, and DeSouza, G. N. **2019**. “Extralaryngeal surface EMG features that distinguish between those with and without elevated scores on the Vocal Fatigue Index”. In: *The Fall Voice Conference*.
- [6] Dietrich, Maria, [...], **Gao, Yixiang**, et al. **2019**. “Relative fundamental frequency during vocal loading and relationships with laryngeal muscular patterns”. In: *The 13th Pan-European Voice Conference*.
- [7] **Gao, Yixiang** et al. **2019**. “Classification of Vocal Gestures Extracted from Quasi-Daily Sentences to Detect Vocal Fatigue”. In: *The 13th Advances in Quantitative Laryngology, Voice and Speech Research (AQL)*.
- [8] **Gao, Yixiang** et al. **2017**. “Classification of neck surface EMG signals for the early detection of vocal dysfunction”. In: *The 12th Advances in Quantitative Laryngology, Voice and Speech Research (AQL)*.

TECHNICAL SKILLS

Programming Languages: Python, C/C++/CUDA, Matlab, HTML

Libraries: pytorch, scikit-learn, ROS 2, Isaac Sim

MLOps and API Tools: Git, Docker, Kubernetes, Github Actions for CI/CD

Operating Systems: Linux(preferred), Windows

Languages: English, Chinese

OTHER ACTIVITIES

Academic Paper Reviews: EMBC2019/2020/2021, CEC2023, CASE2025, Applied Sciences, TAI

Open-Source Project Contributions: tinygrad, huggingface transformers