

# Qiaolin Wang

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## Education

**Columbia Univeristy**

*Sept 2024 – Dec 2005*

*M.S in Electrical Engineering*

- **Concentration:** Speech and Language Processing (Advisor: [Prof. Nima Mesgarani](#))

**Wuhan Univeristy**

*Sept 2020 – June 2024*

*B.Eng in Computer Science*

- **Core Course:** Computer Systems, Artificial Intelligence, Intelligent Speech Processing

## Research Interests

I enjoy studying models that can **Perceive, Reason, and Speak** like humans:

- Multimodal Large Language Models (MLLMs) • Audio-Visual Understanding • Speech Synthesis

## Publications

**Layer-wise Minimal Pair Probing Reveals Contextual Grammatical-Conceptual Hierarchy in Speech Representations**

Linyang He\*, **Qiaolin Wang\***, Xilin Jiang, and Nima Mesgarani

*EMNLP 2025 Oral* [[pdf](#)]

**SightSound-R1: Cross-Modal Reasoning Distillation from Vision to Audio Language Models**

**Qiaolin Wang**, Xilin Jiang, Linyang He, and Junkai Wu, Nima Mesgarani

*Submitted to ICASSP 2026* [[arXiv](#)]

## Research Experience

**AVMeme Exam: A Multimodal Multilingual Multicultural Benchmark for LLMs' Multimedia Knowledge and Thinking Beyond Text [Ongoing]**

Columbia University

New York, NY

*Research Assistant*

*Oct 2025 – Present*

- Built a large-scale audio-visual meme benchmark to test MLLMs' multimodal and cultural understanding
- Spearheaded evaluation of **15** models (Audio, Video, Omni, and commercial LLMs) with fine-grained QA categorization across **1000** memes in multiple languages and cultures
- Aiming for public release and preprint submission by Dec 2025

**SightSound-R1: Cross-Modal Reasoning Distillation from Vision to Audio Language Models**

Columbia University

New York, NY

*Research Assistant*

*Jun 2025 – Sept 2025*

- Proposed SightSound-R1, a novel framework to distill reasoning from Vision to Audio LLMs
- Engineered an audio-focused Chain of Thought (CoT) generation prompt for Qwen2.5-VL-32B with test-time scaling and used a GPT-4o fact-checker to filter visual hallucinations
- Implemented a two-stage training strategy (SFT + GRPO) to distill the verified CoT into Qwen2-Audio-7B
- Improved the LALM's reasoning on unseen datasets, outperforming baselines and achieving **66.1%** on MMAU-Test-Mini (Sound) and **59.5%** on MUSIC-AVQA

**Layer-wise Minimal Pair Probing Reveals Contextual Grammatical-Conceptual Hierarchy in Speech Representations**

Columbia University

New York, NY

*Research Assistant*

*Feb 2025 – May 2025*

- Conducted speech minimal-pair probing with **116k** pairs from BLiMP/COMPS across **71** linguistic tasks
- Probed **16** models (S3M, ASR, AudioLLM, Codec) with layer-wise linear classifiers on frozen representations
- Observed **syntax > morphology > concepts**: Speech models capture **form** more strongly than **meaning**

- Found **mean pooling** outperformed single-token extraction, yielding more stable speech representations
- Exposed **temporal asymmetry**: grammatical evidence in S3M/S2T-ASR **peaks 500–600 ms pre-onset**, whereas in AudioLLMs and Whisper it **accumulates through onset and beyond**

### Snoring Sound Dataset Annotation

Wuhan University

Wuhan, China

Research Assistant

Jan 2023 – Mar 2023

- Analyzed Polysomnography (PSG) data from **40** patients to identify respiratory events and sleep stages
- Synchronized clinical PSG signals with  $\approx$  **170** hours of audio using PSG4/Sleepware and Audition
- Labeled snores relative to respiratory events and cross-referencing sleep stages, categorizing snores based on their temporal relation to events
- Contributed to the foundational dataset published at *Interspeech 2023* [pdf]

## Work Experience – Speech AI

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**Research Engineer Intern**, Wiz.AI – Singapore

Mar 2024 – Aug 2024

- Developed a multi-task Speech Large Language Model to understand both content and emotion
- Engineered a prompt strategy that integrates dialogue history to enhance Chain of Thought reasoning
- Utilized a window-level query mechanism to capture fine-grained emotional features from raw speech
- Finetuned a cross-modal alignment module between speech (Q-former) and text (Vicuna LLM)
- Implemented a contrastive-learning loss on emotion embedding, achieving **SOTA 74.48%** on IEMOCAP and **62.61%** on MELD for SER

**Machine Learning Engineer Intern**, Wiz.AI – Singapore

July 2023 – Dec 2023

- Spearheaded a systematic evaluation of voice cloning models and automated the deployment pipeline
- Benchmarked open and closed-source voice-cloning solutions on speech quality and naturalness
- Fine-tuned a StyleTTS2-based voice cloning model on LibriSpeech and proprietary dataset
- Built a speaker verification framework with WeSpeaker, PyAnnote, and SpeechBrain for evaluation
- Achieved competitive speaker similarity ( $\approx$  **0.84**) to the commercial model using only **245** hours of data (**1/40** of the original dataset)

## Projects

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**Speech Synthesis Implementation on Game Avatars** [Colab] [Bilibili]

Wuhan University

Wuhan, China

Independent Developer

Jun 2022 – Sept 2022

- Developed a high-fidelity, Text-to-Speech (TTS) model for the character “Paimon” from Genshin Impact
- Engineered a pipeline using ECAPA-TDNN for speaker classification and Whisper for transcription
- Built and annotated a multi-speaker dataset of  $\approx$  **48000** clips (**15** hrs.) from **50** Genshin Impact characters
- Finetuned a VITS-based speech synthesis model using a curated set of “Paimon” audio clips
- Launched the project as a technical demo on Bilibili, attracting over **600,000** views and deploying the model on Google Colab for public inference

## Technologies

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**Languages:** Python, Java, C, C++ **Tools:** Linux, Git, PyTorch