

ZHIYUAN "PAUL" ZHOU

researcher & developer

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EDUCATION

Brown University

Expected May 2023

Sc.B. in Applied Mathematics and Computer Science

GPA: 4.0/4.0

Courses: Collaborative Robotics (grad level) · Deep Learning · Machine Learning · Reinforcement Learning (UCL online) · Software Engineering · Intro to Computer Systems · Statistical Inference · Honors Linear Algebra & Calculus

Awards: National **top 5%** (227th) in **Putnam** (**top 2** at Brown) · **2nd** place in Hartshorn-Hypatia Math Contest · Brown UTRA research scholarship · **top 1%** in Chinese Physics Olympiad · **Finalist** in HiMCM · Physics Bowl Regional **top 10** & international **top 100** · **Top 5%** in AMC12 and qualification for AIME · sole recipient of 2018 PROMYS Yongren Full Scholarship

CS RESEARCH

Research Assistant 📄 Code 📄 Code 📄 Code

📅 Dec 2020 - Present

Intelligent Robot Lab & RLAB, Brown University

📍 Providence, RI

- Engineering the first-ever Python library for parallelized environment execution of **Hierarchical Reinforcement Learning** algorithms
- Co-proposed an algorithm for generating reward functions using linear programs that enables RL algorithms to learn faster
- Explored the possibilities of explicit action generalization in **Deep Reinforcement Learning** using an inverse model in Q-learning; performed experiments using Atari domains from **OpenAI Gym**

Research Assistant 📄 Paper 📄 Code

📅 June 2020 - Oct 2020

Paradiso Lab, Brown University

📍 Providence, RI

- Invented 3 real-time **video object recognition** post-processing models in **Python** for use in a vision prosthetic headset that helps the visually impaired
- Increased recognition confidence by over 50% by using temporal information of videos obtained from **Inertial Measurement Unit**
- Employed **Kalman Filter**, Intersection over Union method, and quaternions in said models, and built an interface for connecting the models with **YOLOv4**

Research Assistant 📄 Demo 📄 Paper 📄 Code

📅 Jan 2020 - May 2020

Humans to Robots Lab, Brown University

📍 Providence, RI

- Developed a **C#** API in **Unity** that enables robots to navigate more accurately by providing hand gesture command to corroborate Natural Language commands
- Engineered the **Natural Language Processing (NLP)** back-end to find the location on the map described by NL commands by networking the **IBM Watson Speech to Text** API to a **CopyNet**-based neural net in **PyTorch** using **fastText**
- Built the front-end first-person-view visualization in Unity by inputting hand gestures using **Vive** headsets and laid groundwork for implementation of the API in **Virtual Reality (VR)**

WORK EXPERIENCE

Machine Learning Engineer Intern

📅 Dec 2020 - Jan 2021 & July 2021 - Aug 2021

Zencastr, Inc. 🐼

📍 online

- engineered and **deployed** a web app with **websockets** and **FastAPI** that allows users to edit (faulty) automatic audio-to-text transcriptions for uploaded audios, and provides a faster editing experience by intelligently recommending potentially incorrect segments; implemented a thread-safe **MongoDB** store with **asyncio** and **motor** to store user-made edits in the backend
 - automatically applies user-made edits to similar occurrences throughout the audio file using **Keyword Spotting** with language and acoustic models from **Kaldi** and **vosk-api**, and sped up the process 2x using **multithreaded offline-decoding** in **Python** and **Shell**
 - sped up automatic speech recognition 5x using **WeNet** architecture in **C++** together with **Speech Activity Detection** with **kaldi**; model is pushed to production
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- engineered a **CNN** in **Keras** that classifies audio files into speech, music, laughter, or noise with 93% accuracy; trained using audio data crawled from YouTube using **youtube-dl** and augmented by adding noise, changing pitch, and stretching time
 - aligned audio-to-text transcriptions from DeepSpeech and Webspeech API using **dynamic time warping** and grapheme confusion

SKILLS

- **Programming Languages:** Python · C · Shell · MATLAB · Java · Scala · ReasonML · Assembly x86-64 · C# · JavaScript · HTML/CSS
- **Frameworks & Tools:** PyTorch · TensorFlow · Keras · SQL · Docker · MongoDB · React