

Zhixuan LIU

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Education

Carnegie Mellon University, School of Computer Science

2022.8 – present

Robotics Institute, Master of Science in Robotics

- GPA: 4.25/4.0
- Relevant Coursework: Machine Learning, Computer Vision, Learning-based Image Synthesis, Visual Learning and Recognition
- Conducting research in cultural de-biasing in foundation text-to-image models.

The Chinese University of Hong Kong, Shenzhen

2018.9 – 2022.6

Bachelor of Engineering in Computer Science and Engineering

- Cumulative GPA: 3.72/4.0, major GPA: 3.88/4.0
- Awards and Honors: 2022 Presidential Award for Outstanding Student (Top 0.5%), University Entrance Half Scholarship, Dean's List of School of Data Science (2019 - 2022), School Academic Scholarship (2019-2022 for Top 2% students).
- Undergraduate Teaching Assistant for Mechanics in 2019 spring, for C++ in 2021 fall, for Data Mining in 2022 spring.
- Relevant Coursework: Data Mining, Computer Graphics, Convex Optimization, Linear Algebra, Statistics, Parallel Computing, Operating System, Data Structure, Software Engineering, Database System.

Publications

1. **Zhixuan Liu**, Youeun Shin, Beverley-Claire Okogwu, Youngsik Yun, Lia Coleman, Peter Schaldenbrand, Jihie Kim, Jean Oh, "Towards Equitable Representation in Text-to-Image Synthesis Models with the Cross-Cultural Understanding Benchmark (CCUB) Dataset", arXiv preprint. <https://arxiv.org/abs/2301.12073>
2. **Zhixuan Liu**, Youeun Shin, Beverley-Claire Okogwu, Youngsik Yun, Peter Schaldenbrand, Jihie Kim, Jean Oh, "Culturally-Aware Stable Diffusion: Supporting Representation with Culturally-Aware Text-to-Image Synthesis", 2023 AAAI workshop on Creative AI Across Modalities.
3. Peter Schaldenbrand, **Zhixuan Liu**, Jean Oh, "Towards Real-Time Text2Video via CLIP-Guided, Pixel-Level Optimization", 2022 NeurIPS Workshop on Machine Learning for Creativity and Design. <https://arxiv.org/pdf/2210.12826.pdf>
4. Peter Schaldenbrand, **Zhixuan Liu**, Jean Oh, "StyleCLIPDraw: Coupling Content and Style in Text-to-Drawing Translation", 2022 IJCAI. <https://www.ijcai.org/proceedings/2022/688>
5. Peter Schaldenbrand, **Zhixuan Liu**, Jean Oh, "StyleCLIPDraw: Coupling Content and Style in Text-to-Drawing Synthesis," 2021 NeurIPS Workshop on Machine Learning for Creativity and Design. <https://arxiv.org/abs/2111.03133>
6. **Zhixuan Liu**, Peter Schaldenbrand, Jean Oh, "Gander: A Comprehensive Machine Learning Media Synthesis Platform & Style-CLIPDraw: A Style-Transferred Text-to-Drawing Synthesis Method," 2021 CMU RISS Working Papers Journal, pp. 189-195. https://riss.ri.cmu.edu/research_showcase/working-papers-journals/
7. Kaiwen Xue, **Zhixuan Liu**, Jiaying Li, Xiaoqian Ji and Huihuan Qian, "SongBot: An Interactive Music Generation Robotic System for Non-musicians Learning from A Song," 2021 IEEE International Conference on Real-time Computing and Robotics (RCAR), 2021. <https://ieeexplore.ieee.org/document/9517454>

Research Experiences

Bot Intelligence Group (BIG) at Carnegie Mellon University

2022.6 – present

Research Intern supervised by Dr. Jean Oh, Dr. Ji Zhang, and Dr. Soonmin Hwang

Pittsburgh, USA

- Working on culturalize foundation text-to-image generation model and propose the first culturally accurate text-image dataset. The research paper is accepted by AAAI 2023 workshop on Creative AI Across Modalities and the full version is aiming for CVPR-24 submission.
- Conduct research in using 3d information for indoor scene generation using diffusion model.

Undergraduate Intern at Bot Intelligence Group (BIG) at Carnegie Mellon University	2021.8 – 2022.6
<i>Research Intern supervised by Dr. Jean Oh and PhD student Peter Schaldenbrand</i>	<i>Virtual</i>
<ul style="list-style-type: none"> ➤ Added artistic control to image synthesis ML models using CLIP guidance and style transfer network. ➤ Designed a text-to-drawing synthesis model StyleCLIPDraw, which is accepted by NeurIPS 2021 workshop and IJCAI 2022 with more than 200 stars on GitHub (https://github.com/pschaldenbrand/StyleCLIPDraw) and many shares on Twitter. ➤ Conduct research focused on natural language to video generation. 	
Carnegie Mellon's Robotics Institute Summer Scholars (RISS) Program	2021.6 – 2021.8
<i>Summer Research Intern supervised by Dr. Jean Oh and PhD student Peter Schaldenbrand</i>	<i>Virtual</i>
<ul style="list-style-type: none"> ➤ Designed the user interface of “Gander” – a machine learning competition website for generated media outputs, by interviewing potential users; and implemented some of the web pages. ➤ Implemented state-of-the-art code metrics such as FID score that measure the performance of media outputs generated by Generative Adversarial Networks (GAN) for Gander website. ➤ Designed “Style-CLIPDraw”, an algorithm that generates a drawing based on natural language input and a style image. ➤ Paper Link (published in CMU RISS 2021 Journal) , Video Link, Poster Link 	
Shenzhen Research Institute of Big Data (SRIBD)	2021.1 – 2021.6
<i>Research Assistant under Prof. Baoyuan Wu</i>	<i>Shenzhen, China</i>
<ul style="list-style-type: none"> ➤ Participated in building federated learning (e.g. a distributed training model) based machine learning training platform and create various python script to process medical datasets by leveraging machine learning algorithms such as fedavg. ➤ Conducted a backdoor defense research in Artificial Intelligence security area using GANs. 	
Shenzhen Institute for Artificial Intelligence and Robotics for Society (AIRS)	2020.4 – 2020.12
<i>Research assistant under Prof. Huihuan (Alex) Qian</i>	<i>Shenzhen, China</i>
<ul style="list-style-type: none"> ➤ Leveraged Probabilistic Graphical Model and Markov Chain Model to realize an automatic music composition robot. ➤ Implemented the controlling modules in Python and optimized hyperparameters by using crowdsourcing algorithm. ➤ Published the paper “SongBot: An Interactive Music Generation Robotic System for Non-musicians Learning from A Song” as the second author in IEEE RCAR 2021. 	

Projects and Presentations

Ancient Chinese IDE in course - C++ Programming Paradigms	2020.4 – 2020.6
<ul style="list-style-type: none"> ➤ Worked as a project leader, use C++ to design and implement an IDE including code editor, compiler, linker, assembler, simulator, and GUI which compiles and executes ancient Chinese language. 	
Database Management System for Intelligent Farm in course – Database System	2021.2 – 2021.5
<ul style="list-style-type: none"> ➤ Worked as a group leader, used MySQL to design the database system, used HTML+CSS+JS to implement the front-end UI design, used PHP to link the front-end to local database, used some APIs to do the data visualization. ➤ Used Long Short-Term Memory and CNNs to predict crop yields of farms based on time series. 	
Energy Consumption Prediction of Users in Pecan Street in course – Data Mining	2021.2 – 2021.4
<ul style="list-style-type: none"> ➤ Conducted Gaussian Process Regression model on the 16-week electricity consumption data, and predict the electricity consumption of users in the next week with uncertainty tolerance. ➤ Designed and found the best kernel functions; adjusted hyper parameters by using the Gaussian Regression package in PyTorch. 	

Skills and Interests

Languages: TOEFL: 111 (MyBest Score), Chinese (Mandarin)

Programming Language: python, C/C++, Java

Other Interests: machine learning and generative models in music and art