Xiatao Sun

Address: Apt 315, 18 High St., New Haven, CT, US   Phone: +1 5183609927
Website: sunxiatao.me   Email: xiatao.sun@yale.edu

EDUCATION

Yale University   *New Haven, Connecticut*
Ph.D. in Computer Science   Aug. 2023 – Now
M.S. in Computer Science   Aug.2023 - May 2025
University of Pennsylvania   *Philadelphia, Pennsylvania*
M.S.E. in Robotics   Aug. 2021 - May 2023
GPA: 3.94/4.0
Rensselaer Polytechnic Institute   *Troy, New York*
B.S. in Mechanical Engineering   Aug. 2017 - May 2021
GPA: 3.93/4.0
Honor: Summa Cum Laude, Dean's Honor List, Member of Tau Beta Pi

RESEARCH & WORKING EXPERIENCES

APOLLO Lab   *New Haven, CT*
Ph.D. student advised by Dr. Daniel Rakita   Aug. 2023 – Now
- Researching spatial representation, active perception and manipulation using reinforcement learning and imitation learning.
- Developing robotic software such as teleoperation interface, pose estimation, quadruped SLAM, and simulation environments.
- Advising undergraduate students on projects related to spatial computing, robot learning, and neuromorphic computing.

Vijay Kumar Lab   *Philadelphia, PA*
Research Assistant supervised by Dr. Vijay Kumar   May. 2022 – May. 2023
- Researched multi-robot exploration for topological map construction using algebraic topology and machine learning.
- Developed simulation environments in Unity for training and benchmark comparison with a frontier-based method.
- Worked on learning-based methods for quadrotor agile flight and safe corridor generation.

xLab   *Philadelphia, PA*
Research Assistant supervised by Dr. Rahul Mangharam   Nov. 2021 – May. 2023
- Developed XR autonomous driving simulation using Unreal Engine 4 and Python based on CARLA and OpenXR framework.
- Implemented imitation learning on the F1TENTH platform for direct learning and bootstrapping reinforcement learning.
- Researched on imitation learning with multiple weak experts using a control barrier function.

Qingdao Tian Yi Data Tech Co., Ltd.   *Qingdao, China*
Co-Founder, CTO   May. 2021 – Jul. 2022
- Led the technological development of a healthcare platform, designed software architecture, created the roadmap, managed the development team, and assessed employees' performance.
- Developed the demo of the platform from scratch for venture capitals and potential customers using Python, MySQL, HTML, Bootstrap, JavaScript, jQuery, and other relevant back-end and front-end technologies.
- Deployed the application on AWS with uWSGI for multithreading and server interface, and GoDaddy for DNS hosting.

CeMSIM (Center for Modeling, Simulation, & Imaging in Medicine)   *Troy, NY*
Undergraduate Student Researcher supervised by Dr. Suvranu De   Jun. 2020 - Dec. 2020
- Developed a general-propose interactable operating room simulator using Unity with High-Definition Rendering Pipeline and XR Framework.
- Developed agents using Unity ML-Agents based on PPO (proximal policy optimization) for a push block task.

School of Engineering at Rensselaer Polytechnic Institute   *Troy, NY*
AR/VR Developer supervised by Samuel Chiappone   Jan. 2020 - May 2020
- Built a VR environment of MILL (Manufacturing Innovation Learning Laboratory) and synchronized it with the actual MILL lab, using Unreal Engine 4, Blueprint and Maya.
- Developed continuous locomotion with dynamic collision detection, automatic height adjustment, and auto-alignment between player model and outside collider.

Department of MANE at Rensselaer Polytechnic Institute   *Troy, NY*

Course Development Assistant supervised by Dr. James Young   May 2019 - May 2020
- Developed a photorealistic interactable virtual environment as the front end for students in Propulsion Systems course using Unity3D, Blender, C#, and SteamVR.
- Derived the curve fit of thermal dynamics model using MATLAB and implemented the curve-fitted model into C# as the back end.

Department of Chemical Engineering at Rensselaer Polytechnic Institute   *Troy, NY*
VR Developer supervised by Dr. Ronald Hedden   May 2019 - May 2020
- Developed a high-fidelity interactable virtual reality lab for students' practice in process control and thermodynamics, using Unity3D and C# for game logic and Blender for 3D modeling.
- Transformed existing flat screen simulator into virtual reality, developed VR interaction mechanics and teleportation locomotion system in this project based on SteamVR Plugin in Unity.

Liandessen Electrical Institution and Technology Co., Ltd.   *Qingdao, China*
Mechanical Engineer Intern   Sep. 2019 – Dec. 2019
- Selected and arranged modes, analyzed the structure of parts to identify undercut, and examined the types of sidestep.
- Determined the cooling method and pipe arrangement, clarified the quantity and position of inserts, and utilized CAD to draw and verify the part diagram.

Rensselaer Artificial Intelligence and Reasoning Lab   *Troy, NY*
Undergraduate Student Researcher supervised by Dr. Selmer Bringsjord   Sep. 2018 – Dec. 2018
- Researched the logical eastern-western culture differences and assisted in building prototyping NLP translating programs

Goertek Electronics   *Qingdao, China*
Embedded System Developer Intern   Jun. 2018 – Jul. 2018
- Tested and debugged the prototype of OPPO O-Free, a truly wireless earbud, using SDK from Snapdragon and GAIA

CONFERENCE PAPERS
- **X. Sun**, S. Yang, Y. Chen, F. Fan, Y. Liang, D. Rakita, "Dynamic Rank Adjustment in Diffusion Policies for Efficient and Flexible Training", Robotics: Science and Systems (RSS) 2025.
- **X. Sun**, S. Yang, M. Zhou, K. Liu, and R. Mangharam, "MEGA-DAgger: Imitation Learning with Multiple Imperfect Experts", IEEE International Conference on Intelligent Transportation Systems (ITSC) 2024.
- **X. Sun**, M. Zhou, Z. Zhuang, S. Yang, J. Betz, and R. Mangharam, "A Benchmark Comparison of Imitation Learning-based Control Policies for Autonomous Racing", IEEE Intelligent Vehicles Symposium (IV) 2023.
- Z. Qiao, **X. Sun**, H. Loeb, and R. Mangharam, "Drive Right: Shaping Public's Trust, Understanding, and Preference Towards Autonomous Vehicles Using a Virtual Reality Driving Simulator", IEEE Intelligent Vehicles Symposium (IV) 2023.

JOURNAL ARTICLES
- Y. Wu, **X. Sun**, I. Spasojevic, and V. Kumar, "Deep Learning for Optimization of Trajectories for Quadrotors", IEEE Robotics and Automation Letters (RA-L), 2024.
- L. Lan, S. Cheng, **X. Sun**, W. Li, C. Yang, and F. Wang, "A Fast Singular Boundary Method for the Acoustic Design Sensitivity Analysis of Arbitrary Two-and Three-dimensional Structures", Mathematics.
  T. Lv, Z. Pan, W. Wei, G. Yang, J. Song, X. Wang, L. Sun, Q. Li, and **X. Sun**, "Iterative Deep Neural Networks Based on Proximal Gradient Descent for Image Restoration", PLOS ONE.

PREPRINTS
- **X. Sun**, Y. Chen, and D. Rakita, "PRISM-DP: Spatial Pose-based Observations for Diffusion-Policies via Segmentation, Mesh Generation, and Pose Tracking", arXiv preprint arXiv:2504.20359.
- **X. Sun**, F. Fan, Y. Chen, and D. Rakita, "A Comparative Study on State-Action Spaces for Learning Viewpoint Selection and Manipulation with Diffusion Policy", arXiv preprint arXiv:2409.14615.
- M. Zhou, B. Wang, T. Tan, and **X. Sun**, "Developing Path Planning with Behavioral Cloning and Proximal Policy Optimization for Path-Tracking and Static Obstacle Nudging", arXiv preprint arXiv: 2409.05289, 2024.
- **X. Sun**, Y. Wu, S. Bhattacharya, and V. Kumar, "Multi-Agent Exploration of an Unknown Sparse Landmark Complex via Deep Reinforcement Learning", arXiv preprint arXiv:2209.11794, 2022.

THESES

- **Master's Thesis:** Imitation Learning for Autonomous Quadrotor Flight, University of Pennsylvania, advised by Dr. Vijay Kumar, 2023.

AWARDS

- Winner of the ITS World Congress 2022 Student Essay and Video Competition
- Third prize of the Brain Bee 2020 Brain Challenge (China Division College Section)

ACTIVITIES

- Reviewer of CoRL, RA-L, ICRA, ITSC, HRI, ICVES
- Student volunteer at the 2023 Northeast Robotics Colloquium (NERC)
- Student volunteer at 2022 IEEE International Conference on Robotics and Automation (ICRA)

RELEVANT COURSEWORK

Yale: CPSC 587 3D Spatial Modeling, CPSC 581 Intro to Machine Learning, CPSC 539 Software Engineering, CPSC 585 Applied Planning and Optimization, CPSC 570 Artificial Intelligence, CPSC 563 Algorithms for Optimization

UPenn: MEAM 520 Intro to Robotics, ESE 650 Learning in Robotics, MEAM 620 Advanced Robotics, MEAM 5130 Feedback Control Design and Analysis

RPI: MANE 4240 Intro to Finite Elements, MANE 4050 Modeling and Control of Dynamic Systems, MANE 4060 Aerospace Structure and Materials, MATH 4600 Advanced Calculus

KNOWLEDGE & TECHNICAL SKILLS

Knowledge: Robotics, Machine Learning, Optimization, Computer Graphics, Game Development, Web Development

Programming Language: Python, Rust, C, C++, C#, SQL, MATLAB, HTML, TypeScript

Robotics Tools: ROS, Isaac Sim, MuJoCo, ManiSkill, CARLA, AirSim, Flightmare, OpenCV, GTSAM, CVAT

Machine Learning Frameworks: PyTorch, MXNet, ML-Agents, Tensorflow, Ray, Spark ML

Game Engines: Unity, Unreal Engine 4 & 5, Godot 4

CAD Software: NX Unigraphics, SpaceClaim, Rhino, SolidWorks

3D Modeling Software: Blender, Maya, ZBrush, Marvelous Designer, Substance Painter

Web Development Tools: FastAPI, Flask, MySQL, Three.js, Vue.js, jQuery

Other Technical Skills: Docker, LaTeX, LabVIEW, Lathe, Vertical Drill, Welding, FL Studio, Piano