

# XIHANG YU (JIMMY)

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## EDUCATION

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UNIVERSITY OF MICHIGAN, COLLEGE OF LITERATURE, SCIENCE, AND THE ARTS	ANN ARBOR, MI
B.S. in Computer Science with Honors, B.S. in Mathematics, GPA: 4.0 /4.0	Jan 2022 - May 2024(Expected)
COLUMBIA UNIVERSITY, COLUMBIA COLLEGE	NEW YORK, NY
Visiting Student Program in Computer Science track, GPA: 4.0/4.0	Sep 2021 - Dec 2021
CHINESE UNIVERSITY OF HONG KONG, DEPT. OF COMPUTER SCIENCE	HONG KONG
Major in Artificial Intelligence: Systems and Technologies, GPA: 3.869/4.0	Sep 2019 - May 2021

### SELECTED COURSES:

**Graduate Level:** Hybrid Control, Continuous Optimization Methods, Mobile Robotics, Nonlinear Dynamics and Geometric Mechanics, Robot Perception, Principles of Machine Learning.

**Undergraduate Level:** Analysis and Optimization, Combinatorics and Graph Theory, Linear Programming, Autonomous Robotics, Natural Language Processing, Computer Vision, Computational Aspects of Robotics, Computer Systems, Computer Science Theory, Cryptography.

## RESEARCH INTERESTS

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Optimization, Robot Perception, Vision-based Control

## PUBLICATIONS

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[1] Fully Proprioceptive Slip-Velocity-Aware State Estimation for Mobile Robots via Invariant Kalman Filtering and Disturbance Observer

X. Yu, S. Teng, T. Chakhachiro, W. Tong, T. Li, TY. Lin, S. Koehler, M. Ahumada, JM. Walls, M. Ghaffari  
2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) [\[arXiv\]](#) [\[video\]](#) [\[code\]](#)

[2] LaDyBot: Learning Language-Guided Collaborative Dynamics

X. Yu, E. A. Olson, and O. C. Jenkins

Computer Science Honors Thesis, University of Michigan. [\[video\]](#) [\[thesis\]](#)

[3] SIM-Sync: From Certifiably Optimal Synchronization over the 3D Similarity Group to Scene Reconstruction with Learned Depth

X. Yu, H. Yang

IEEE Robotics and Automation Letters (RAL) [\[arXiv\]](#) [\[code\]](#) [\[colab\]](#)

[4] APISR: Anime Production Inspired Real-World Anime Super-Resolution

B. Wang, F. Yang, X. Yu, C. Zhang, H. Zhao

2024 IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR)

## RESEARCH EXPERIENCES AND INTERNSHIPS

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**MANIPULATION AND ROBOT PERCEPTION | ROBOTICS INSTITUTE, UNIVERSITY OF MICHIGAN**

Research Assistant Supervised by Dr. Chad Jenkins (Lab for Progress)

Jan 2023-April 2023, Sep 2023 - Present

- Conducted Computer Science Honors Thesis: Learning Language-Guided Collaborative Dynamics in Robotics

**CERTIFIABLE ALGORITHM AND SEMIDEFINITE PROGRAMMING | HARVARD UNIVERSITY**

Visiting Scholar Supervised by Dr. Heng Yang (Computational Robotics Lab)

May 2023 - Aug 2023

- Developed certifiably correct camera trajectory estimation algorithm using semidefinite programming (SDP)

**MOBILE ROBOT | ROBOTICS INSTITUTE, UNIVERSITY OF MICHIGAN**

Research Assistant Supervised by Dr. Maani Ghaffari (Curly Lab)

April 2022 - Dec 2022

- Conducted research on state estimation using Invariant Extended Kalman Filter

**REHABILITATION ROBOT | MECHANICAL ENGINEERING DEPT., COLUMBIA UNIVERSITY**

Research Assistant Supervised by Dr. Sunil K Agrawal (ROAR Lab)

Dec 2021 - April 2022

- Contributed kinematics and dynamic libraries to wheelchair robot for active postural support using rospy [\[website\]](#)

**AV SIMULATION** | CIVIL ENGINEERING AND ENGINEERING MECHANICS DEPT., COLUMBIA UNIVERSITY  
*Research Assistant Supervised by Dr. Sharon Di (DitecT Lab)* Sep 2021 - Dec 2021

- Developed MmWave communication in TraCI framework for NS3 and SUMO Coupling in the COSMOS project

**SOFTWARE ENGINEER INTERNSHIP** | HUAWEI TECHNOLOGIES CO., LTD June 2021 - Aug 2021

- Contributed to code auto-generation frame on HUAWEI OptiX OSN1800 OTN communication platform

**LYAPUNOV STABILITY AND FINITE-TIME CONTROL** | CUHK SUMMER RESEARCH INTERNSHIP  
*Research Assistant Supervised by Dr. Dongkun Han* May 2020 - Aug 2020

- Designed Control Barrier Function-based multiagent coordination controller with Matlab simulation [\[video\]](#) [\[report\]](#)

## SELECTED COURSE PROJECTS

**3D SEMANTIC SCENE UNDERSTANDING** | EECS487 INTRODUCTION TO NLP, UNIVERSITY OF MICHIGAN

- Fine-tuned feed-forward network with GPT-J that achieves state-of-the-art scene classification performance [\[report\]](#)

**VISION AND LANGUAGE MANIPULATION** | EECS498 PRINCIPLE OF ML, UNIVERSITY OF MICHIGAN

- Conducted transfer learning experiments of the PerceiverActor model on the VLMbench dataset [\[report\]](#)

**PARALLEL COMPUTING** | EECS475 INTRODUCTION TO CRYPTOGRAPHY, UNIVERSITY OF MICHIGAN

- Developed from scratch parallelized versions of cryptographic algorithms, encompassing Counter Mode (CTR), Electronic Code Book (ECB), Cipher Block Chaining (CBC), and Hash Tree algorithms [\[report\]](#)

**HYBRID MODEL PREDICTIVE CONTROL** | EECS563 HYBRID CONTROL, UNIVERSITY OF MICHIGAN

- Proposed and implemented Moment Relaxation-based solver for Multi-Contact Consensus Complementarity Control via ADMM [\[report\]](#)

**3D VISION** | EECS442 COMPUTER VISION, UNIVERSITY OF MICHIGAN

- Proposed and implemented SDP-based formulation for joint camera trajectory estimation and depth finetuning [\[paper\]](#) [\[code\]](#) [\[colab\]](#)

## LEADERSHIP AND SERVICES

**TEACHING ASSISTANT** | ROB 530 MOBILE ROBOTICS, UNIVERSITY OF MICHIGAN  
*Instructor: Dr. Maani Ghaffari* Jan 2023 - Apr 2023

- Helped to develop homework and quizzes, organized office hour sessions in the graduate course with 158 students

**REVIEWER** | TRANSACTION ON MECHATRONICS (TMECH)

**GRADER** | MATH 465 COMBINATORICS AND GRAPH Oct 2022 - Dec 2022

**MOTION PLAN SUBTEAM LEADER** | COLUMBIA UNIVERSITY ROBOTICS CLUB Sep 2021 - Dec 2021

- Led 10+ Columbia students to develop autonomous vehicles, organized motion planning workshops

## HONORS AND AWARDS

JAMES B. ANGELL SCHOLAR, UMICH Academic Merit Apr 2024

UNIVERSITY HONORS, UMICH Academic Merit Dec 2022, Apr 2023, Dec 2023

LEUNG SIU KOI SCHOLARSHIP, CUHK Academic Merit Dec 2021

ELITE STREAM SCHOLARSHIP, CUHK Academic Merit Oct 2021

DEAN'S LIST, CUHK Top 10% in the department Aug 2021, Aug 2020

CHUNG CHI COLLEGE CLASS SCHOLARSHIP, CUHK Best student in the class of a department Nov 2020

TALENT DEVELOPMENT SCHOLARSHIP, HONG KONG GOVERNMENT EDUCATION BUREAU May 2020

NATIONAL CREATIVE COMPOSITION COMPETITION Grand Prize (10 awards in total, National-level) Aug 2018

## SKILLS

- Programming Tool: Experienced with C/C++ (system-level and high-performance code), Python (including PyTorch, Pandas, and Numpy), MATLAB (fast-implemented simulation code)
- Robotics Tool: ROS, CUDA, NVIDIA Isaac Gym, PyBullet
- Optimization Tool: MOSEK, Gurobi