

# 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) (acceptance rate: 43.3%) [\[arXiv\]](#) [\[video\]](#) [\[code\]](#)

[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  
Under Review at RA-L. [\[arXiv\]](#) [\[code\]](#) [\[colab\]](#)

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

B. Wang, F. Yang, **X. Yu**, C. Zhang, H. Zhao  
Under Review at 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

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**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

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**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

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

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- 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