

# CHENGHAO XU

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## EDUCATION

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### École Polytechnique Fédérale de Lausanne (EPFL)

- Ph.D. Candidate in Robotics, Control, and Intelligent Systems

Lausanne, Switzerland

Feb. 2024 - Now

### Delft University of Technology

- M.Sc. in Robotics
- **Courses:** Dynamics & Control, Planning & Decision Making, Machine Perception, Deep Learning

Delft, Netherlands

Sep. 2020 - Nov. 2023

### Southern University of Science and Technology

- B.Eng. in Mechanical Engineering **(with Distinction)**
- Overall GPA: **3.65** / 4.00, Major GPA: **3.85** / 4.00

Shenzhen, China

Sep. 2016 - Jun. 2020

### The University of British Columbia

- Vancouver Summer Program (Grades: A-)

Vancouver, Canada

Jul. 2017 - Aug. 2017

## PUBLICATIONS

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- **C. Xu**, M. Mielle, A. Laborde, *et al.*, “Exploiting Semantic Scene Reconstruction for Estimating Building Envelope Characteristics,” *Building and Environment*, 2025. [[Link](#)]
- S. Bian, **C. Xu**, Y. Xiu, *et al.*, “ChatGarment: Garment Estimation, Generation and Editing via Large Language Models,” *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2025.
- E. Bonetto, **C. Xu**, A. Ahmad, “GRADE: Generate Realistic Animated Dynamic Environments for Robotics Research with IssacSim,” *International Journal of Robotics Research (IJRR)*, 2025. [[Link](#)] [Conditional Accept]
- **C. Xu\***, E. Bonetto\*, A. Ahmad, “DynaPix SLAM: A Pixel-Based Dynamic Visual SLAM Approach”, In *Pattern Recognition: 46th DAGM German Conference on Pattern Recognition (GCPR)*, 2024. [[Link](#)]
- H. Liu, K. Fang, L. Chen, **C. Xu**, *et al.*, “Implementation of a Long-Lasting, Untethered, Lightweight, Upper Limb Exoskeleton”, *IEEE/ASME Transactions on Mechatronics (TMECH)*, 2024.
- E. Bonetto, **C. Xu**, A. Ahmad, “Learning from Synthetic Data Generated with GRADE,” In *Proceedings of ICRA 2023 Workshop on Pretraining for Robotics*, 2023. [[Link](#)]
- E. Bonetto, **C. Xu**, A. Ahmad, “Simulation of Dynamic Environments for SLAM,” In *Proceedings of ICRA 2023 Workshop on Active Methods in Autonomous Navigation*, 2023. [[Link](#)]
- **C. Xu**, “Breaking the Wall of Intensive Work Above Head,” *Oral presented at Falling Walls Lab Berlin*, 2019.
- L. Chen, H. Liu, **C. Xu**, *et al.*, Assisted exoskeleton devices. (Patent No. ZL201921545381.6)

## PROFESSIONAL EXPERIENCE

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### GRADE: Generating Realistic Animated Dynamic Environment

Student Research Assistant

Advisor: [Prof. Aamir Ahmad](#)

Max Planck Institute for Intelligent Systems, Germany

Aug.2022 - Mar.2023

- Developed synthetic environment's generation framework for robot navigation in **dynamic scenes** based on NVIDIA Issac Sim, involving **optical flow ground truth, motion blur, sensor noise, and event streams**
- Conducted verification of framework's generalization and usability with comparative testing on state-of-the-art SLAM frameworks (RTAB-Map, ORB-SLAM2, DynaSLAM, Dynamic-VINS, TartanVO, StaticFusion)
- Generated synthetic blurry image datasets with ground truth labels to fine-tune YOLO and Mask R-CNN models on human detection tasks, resulting in improvements of ~5% on YOLO and 2% on Mask R-CNN

## Multi-Camera Real-Time Surveillance Video Stitching

Computer Vision Engineer

Internship

Lely Technologies, Netherlands

Feb.2022 - Jul.2022

- Investigated feature-based image stitching methods for multi-view cameras with parallax, and conducted a comparative analysis of **ORB, BRISKS, SIFT and VGG16 features** for image stitching
- Proposed a feature matching strategy based on AutoStitch framework by mapping original features into undistorted images within corresponding ROIs separately to improve overall stitching performance
- Deployed the real-time stitching systems and positioning system in ROS2 in the real world

## Control Engineer for Industrial Manipulator

Internship

ROKAE Robotics, China

Jul.2021 - Sep.2021

- Developed online trajectory planning algorithm for industrial robots based on the **discrete-time double S profile**, which achieves trajectory update in real-time with **continuous acceleration**
- Accomplished trajectory planning and optimization under multiple industrial scenarios, and simulated joint states (peak torque, angular speed, power) during execution using Robotics System Toolbox
- Investigated impact of DH parameter deviation on the end effector position accuracy by Robotics Toolbox

## Quadruped Robot based on Discontinuous Terrain Perception

Student Research Assistant

Advisor: [Dr. Jianwen Luo](#)

SUSTech Institute of Robotics, China

Jun.2019 - Dec.2019

- Accomplished and optimized the design of robot structure by SolidWorks to obtain higher stability
- Constructed prototype and adjusted motor control to achieve basic stepping or walking locomotion
- Secured funding from Youth Program of National Natural Science Foundation of China

## Passive Adaptable Assistive Upper-Limb Exoskeleton

Research & Development Intern

Advisor: [Prof. Yiming Rong](#)

Milebot Robotics, China

Jun. 2019 - Sep. 2019

- Conducted market analysis on exoskeleton products and used decision matrix to generate design concepts
- Optimized structural design of the energy storage and adaptive device to achieve adjustable assist effect
- Accomplished assist effect through mechanical analysis and numerical simulations using MATLAB
- Investigated the secondary effect of EMG signal and oxygen consumption in working environment

## PROJECT EXPERIENCE

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### TIAGo Robot for Expiring Items Picking in Retail Environment

Best Project Award with Ahold Delhaize

Apr.2022 - Jun.2022

- Constructed **ROS behavior tree** architecture containing motion planning module, which dynamically adjusts intermediary goals and performs items picking/placing in sequence.
- Developed the indoor localization method based on Apriltag and indoor exploration algorithm
- Deployed the real-time YOLO v5 model to detect items in store, which reaches a mAP of 0.7

### Autonomous Navigation for Site Inspection with Spot Robot

Part-time at Yes!Delft, Netherlands

Mar.2022 - Jun.2022

- Deployed autonomous inspection module based on Spot SDK including Mapping and Waypoint Planning
- Designed the functional GUI based on PyQt5 and Open3D to accomplish **Camera View Navigation and Visualization** remotely from the point cloud captured by Spot

### Path Planner for Quadrotor based on RRT\* and k-PRM Methods

Course Project

Nov.2021 - Jan.2022

- Deployed RRT\* and k-PRM path planner to generate collision-free path on 3D random obstacle map
- Accomplished trajectory optimization using minisnap and corridor bounding method

### Manufacture of Aluminum Hollow Nested Cubes

Course Project

Feb.2019 - May.2019

- Accomplished the structural design and machining simulation of aluminum nested cubes
- Delivered process planning with the skilled operation of CNC machining center and wire-cut EDM

### AWARDS & HONORS

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- 2016 Freshmen Scholarship | *Excellence Award*
- 2016 The 2nd Shenzhen College Students Thinking and Debate Contest | *Champion*
- 2017 The 3rd Shenzhen College Students Thinking and Debate Contest | *Third Place, Best Debater*
- 2018 National Scholarship Award | *Nomination Prize (Top 1%)*
- 2018 Merit Student Scholarship for Exceptional Performance | *First Class (Top 5%)*
- 2018 Dean's Award for Academic Excellence in College | *(Top 1%)*
- 2018 National College Student Science Contest on Energy Saving & Emission Reduction | *Third Prize*
- 2019 "TI Cup" National Undergraduate Electronics Design Contest | *Provincial Second Prize*
- 2019 Guangdong Entrepreneurship and Innovation Competition | *Excellence Award*
- 2019 Falling Walls Lab Shenzhen | *First Prize*
- 2019 Merit Student Scholarship for Exceptional Performance | *First Class (Top 5%)*
- 2019 National Scholarship Award | *Nomination Prize (Top 1%)*
- 2020 "Challenge Cup" Provincial College Student Entrepreneurship Plan Competition | *Gold Award*
- 2020 "Challenge Cup" National College Student Entrepreneurship Plan Competition | *Bronze Award*
- 2020 Excellent Graduate in Southern University of Science and Technology | *(Top 5%)*
- 2022 Erasmus+ Traineeship Grants

### EXTRACURRICULAR ACTIVITIES

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#### Secretary of SUSTech Student Union

Sep.2016 - Jun.2017

- Organized school cultural activities and coordinated the mission of various departments

#### Senior Counselor for Freshmen of SUSTech

Jun.2017 - Jun.2019

- Advised 60 freshman students via a series of mini-lectures and activities
- Established collaborative and caring community culture, solved daily problems and arranged social activities

#### Debate Team Leader of SUSTech

Feb.2018 - Feb.2019

- Delivered daily training for members in competition and maintained communication with other organizations

#### Volunteer of The Asia-Pacific Regional Seminar on MOOCs for Higher Education

Jun.2018

#### Volunteer of China Hardware Innovation Camp (CHIC2019)

Jul.2019

- Launched by École Polytechnique Fédérale de Lausanne (EPFL)
- Participated in the project **Heptabox** to improve the effectiveness of medication intake

### TECHNICAL SKILLS

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- **Programming:** Python, MATLAB, C/C++, HTML/CSS
- **Software:** ROS, Blender, OpenCV, Open3D, Pytorch, TensorFlow, g2o, Git, LaTeX, SolidWorks
- **Hardware:** Arduino, Mechanical Design, Machining (Milling, Turning, Wire-Cut EDM), 3D Printing