

CHENGHAO XU

Rte Cantonale, 1015 Lausanne, Switzerland

(+31) 613748468 chenghao.xu@epfl.ch <https://kyle-xu001.github.io>

EDUCATION

- École Polytechnique Fédérale de Lausanne (EPFL)** Lausanne, Switzerland
• Ph.D. Student *Feb. 2024 - Now*
- Delft University of Technology** Delft, Netherlands
• M.Sc. in Robotics (GPA: 8.3/10) *Sep. 2020 - Nov. 2023*
• **Courses:** *Dynamics & Control, Planning & Decision Making, Machine Perception, Deep Learning*
- Southern University of Science and Technology** Shenzhen, China
• B.Eng. in Mechanical Engineering (**with Distinction**) *Sep. 2016 - Jun. 2020*
Overall GPA: **3.65** / 4.00, Major GPA: **3.85** / 4.00
• **Courses:** *CAD Engineering Drawing, Machine Design, Theoretical Mechanics, Advanced Manufacturing*
- The University of British Columbia** Vancouver, Canada
• Vancouver Summer Program (Grades: A-) *Jul. 2017 - Aug. 2017*

PUBLICATIONS & PRESENTATIONS

- **C. Xu**, M. Mielle, A. Laborde, *et al.*, "Exploiting Semantic Scene Reconstruction for Estimating Building Envelope Characteristics," Submitted to *Building and Environment*, 2024.
- **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](#)]
- S. Bian, **C. Xu**, Y. Xiu, *et al.*, "ChatGarment: Garment Estimation, Generation and Editing via Large Language Models," 2024. (Under Review)
- E. Bonetto, **C. Xu**, A. Ahmad, "GRADE: Generate Realistic Animated Dynamic Environments for Robotics Research with IssacSim," Submitted to *International Journal of Robotics Research (IJRR)*, 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

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

Lely Technologies, Netherlands

Internship

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

ROKAE Robotics, China

Internship

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

SUSTech Institute of Robotics, China

Advisor: [Dr. Jianwen Luo](#)

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

Milebot Robotics, China

Advisor: [Prof. Yiming Rong](#)

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

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

- 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

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

- **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