

Joshua(Yuchen) Cao

☎ (412) 954-8151 ✉ caoyuchen.joshua@gmail.com 🌐 Github in LinkedIn

⚙️ SKILLS

Programming	C++, Python, C#, JavaScript, HTML/CSS, Matlab, Swift, SQL
Key Knowledge	SLAM, Generative AI, NeRF, 3D Vision, NLP, Distributed System, Database, CG
Develop Tools	Pytorch, OpenCV, OpenGL, AWS, ROS, SwiftUI, React.js, DynamoDB, CUDA, Docker, Git, Spark, k8s

🎓 EDUCATION

Carnegie Mellon University MS. in Computational Design(Computer Vision Track)	Sep 2021 - Now Pittsburgh, PA
University of Chinese Academy of Sciences MS. in Computer Science	Sep 2016 - July 2020 Shanghai, China

💼 EXPERIENCE

APEX(EzPT) Computer Vision Engineer & iOS Developer, Intern	July 2022 - Aug 2022 Remote, USA
<ul style="list-style-type: none">Experimented pose estimation OpenPose and Google MediaPipe, and a KNN method for pose classification and rep counting in Colab.Replanted above algorithms in an iOS app, configured with Firebase and Google Function, to work in real-time with phone camera.Built dataset and groundTruth pipeline with OpenCV and PyTorch, accelerated the process for producing new dataset and exercises.	
Robot Labs, Carnegie Mellon University Research Assistant, Advisor: Prof. Katerina Fragkiadaki	Sep 2021 - Now Pittsburgh, PA
<ul style="list-style-type: none">Used customized dataset to train T5, Retro language models, and MaskRCNN vision model, to enable Alexa Virtual Assistant to parse co-referred language prompts into API-level machine instructions in a simulated virtual household environment.Built Husky ground-robot system with Velodyne-16 and XSens-IMU, configured onboard ROS system with 2D Gmapping and 3D LIO-SAM visual-odometry, Dijkstra* and DWA path planner packages to enable self-navigation and object avoidance.Constructed a simulated environment with Nvidia Isaac Sim and Blender for both pedestrian detection and RL training.	
Mobile Perception Lab, ShanghaiTech University Research Assistant, Advisor: Prof. Laurent Kneip	Sep 2016 - Dec 2020 Shanghai, China
<ul style="list-style-type: none">Developed an On-board ROS-like intermediate OS between UAV SDK and RGB sensor, to run computer vision algorithm.Built a simplified SLAM system with SIFT & Harris Feature Extraction, 7/8 Points Matching, and LevenBerg-Marquardt Optimization.Revised Particle & Kalman filter and MaskRCNN to relocate pose with semantic information under a robot hijack case.Modelled Camera Optical Algorithm to synthesize realistic and semantic SLAM dataset with ground truth and criterion benchmark.Developed a Variational Auto-Encoder with RGBD SLAM to generate complete models from partial continuous observation.	

💡 SELECTED PROJECTS

Computer Science projects website: <https://caoyuchen.github.io/cs/>

Amazon Alexa Prize: SimBot Challenge / Computer Vision & NLP, Human-robot Interaction	Jan 2023 - Now
<ul style="list-style-type: none">Implemented a Weakly supervised object detection model built on AlexNet with SSP and NMS, and a Transformer-based VQA.Enabled the virtual assistant robot with visual navigation, voice-to-instruction and interaction abilities by CloudWatch, Amazon S3, Automatic Sound Recognition API, EC2 and DynamoDB. Improved language parsing ability with NLP models.	
NeRF-based 3D Style Transfer / Computer Vision & Graphics, Deep Learning	April 2022 - Jan 2023
<ul style="list-style-type: none">Built Poisson Blending and Neural Style Transfer to stylize image, Revised CycleGAN & StyleGAN to synthesize content-aware image.Experimented NeRF-W, Mip-NeRF and CUDA-based Instant-ngp, researched Artistic Radiance Fields with 3D style transfer.	

📖 PUBLICATIONS

Incremental Semantic Localization using Hierarchical Clustering of Object Association Sets Lan Hu, Zhongwei Luo, Runze Yuan, Yuchen Cao https://arxiv.org/abs/2208.13210	ACCV 2022 Sep 2022
Representations and Benchmarking of Modern Visual SLAM Systems Yuchen Cao , Lan Hu and Laurent Kneip. https://www.mdpi.com/1424-8220/20/9/2572	Sensors Journal Mar 2020
Dense Object Reconstruction from RGBD Images with Embedded Deep Shape Representations Hu, Lan, Yuchen Cao , Peng Wu and Laurent Kneip. https://arxiv.org/abs/1810.04891	ACCV Workshop Oct 2018