Bo (Bob) Wu

Philadelphia, PA | bobwu@seas.upenn.edu | Website: bobwu1998.github.io

EDUCATION

University of Pennsylvania | Philadelphia, PA **May 2023**
Master of Science in Engineering in Robotics Cumulative GPA: 3.95/4.00
Relevant Courses: Algorithm Theory, Computer Vision, Operating System, Computer Architecture, Machine Learning

University of Pittsburgh | Pittsburgh, PA **May 2021**
Bachelor of Science in Engineering, Minor in Computer Science Cumulative GPA: 4.00/4.00

PUBLICATIONS

[1] **B. Wu**, B. Lee, B. Bucher, N. Matni "Uncertainty Aware Deployment of Pre-trained Task Conditioned Imitation Learning Policies" (CoRL 2023 OOD Workshop)

[2] K. Ashton*, B. Bucher*, **B. Wu**, K Schmeckpeper, G. Georgakis, K. Daniilidis "Navigation to Multiple Semantic Targets in Novel Environments" (Submitted to ICRA 2024)

[3] B. Bucher*, K. Ashton*, **B. Wu**, K. Schmeckpeper, S. Goel, N. Matni, G. Georgakis, K. Daniilidis "Unordered Navigation to Multiple Semantic Targets in Novel Environments" (CVPR 4th Embodied AI Workshop, 2023)

RESEARCH EXPERIENCE

Master's Thesis: The Role of Mapping in Modern Robot Navigation Tasks. Supervisor: Dr. Kostas Daniilidis

Navigation to Multiple Semantic Targets in Novel Environments [2][3] Supervisor: Dr. Kostas Daniilidis
• Deployed panorama sensing for multi-object navigation and improved local stop policy with **groundedSAM**
• Extended single object goal navigation pipeline PEANUT, and added RedNet segmentation support enabling ordered **multi-object goal navigation** and unordered multi-object goal navigation
• complete navigation visualization for debugging and demonstration

Uncertainty Quantification in Robotic Manipulator[1] | UPenn Supervisor: Dr. Nikolai Matni
• Designed **temperature scaling** to adapt to specific output action-space of a pretrained model, generated reliability diagram and examined the language conditioned robotic policy
• Proposed and implemented an action-selection strategy using the calibrated uncertainty to compute **risk-averse action** and improve the success rate of multiple language-conditioned tasks

Scene Graph Representation for Navigation | UPenn Supervisor: Dr. Kostas Daniilidis
• Trained a **Mask-RCNN** model for instance segmentation using **AI Habitat** for input simulation
• Completed egocentric topological map generation from semantic 3D point clouds and agent poses

Vision Language Navigation on Real Robot Platform | UPenn Supervisor: Dr. Kostas Daniilidis
• Implemented machine learning pipeline in Python with **PyTorch** for real-world robot navigation research
• Generated occupancy and semantic maps using depth projection and **DeepLabv3** semantic segmentation
• Coded customizable navigation action taking commands using **ROS** on roomba and **Turtlebot3**

Oil-tank Flaw Detection Robot Project | Sichuan University
• Applied encoder and linear actuator and scanner based on **STM32** embedded system
• Developed **PID control** algorithm to compensate for actuation errors and increase operating precision

WORK EXPERIENCE

Software Engineer Intern | **Kolmostar Inc.** June 2021 – August 2021
• Completed Wi-Fi scan with designated scan interval and wait time with **SPI** and **RTOS** in **ARM Cortex-M4**
• Leveraged an existing **C/C++** microchip SDK to **reduce power consumption of WiFi scanning by 15%**

TECHNICAL SKILLS

Python, C/C++, Java, PyTorch, Linux, ROS, Git, MATLAB, Assembly Language, SolidWorks, AutoCAD, ANSYS

PROJECTS

Customized Shell for Process Control | Operating System Design, UPenn Jan. 2023 – Feb. 2023

- Completed interactive/non-interactive shell and supports for input/output redirection and process pipelining
- Accomplished fore/background process management, terminal control, and job control using **C**

Path Planning on Simulated World Maps | Learning in Robotics, UPenn [Github] Apr. 2022 – May. 2022

- Generated top-down map of 3D environment using **SLAM** in Gazebo simulator
- Implemented and optimized **A*, RRT** path planning algorithm, trained a **DQN** model for path generation

Face Recognizing and Swapping in Videos | Computer Vision, UPenn [Github] Nov. 2021 – Dec. 2021

- Identified and **extracted faces in images** with facial landmark detection techniques using **Python**
- Achieved seamless face swapping with **Delaunay Triangulation** and **Poisson image editing**
- Compensated for motion using **Optical Flow** to keep track of moving faces in videos

LEADERSHIP AND EXPERIENCES

Consultant | Student Advisory Board, MEMS department | University of Pittsburgh Sept. 2020 – Oct. 2021

- Facilitated research participation for underrepresented students in "Research Experience Program"

President | Student Council at Sichuan Univ. Pittsburgh Institute (SCUPI) April 2018 – April 2019

- Organized and arranged SCUPI Student International Forum which hosted over 30 representatives