# Bo (Bob) Wu

Philadelphia, PA | bobwu@seas.upenn.edu | Linkedin | Website

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

[2] 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 EXPERIENCES

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

***Multiple Semantic Targets in Novel Environments [1][2]*** | UPenn Supervisor: Dr. Kostas Daniilidis
• Deployed panorama view for multi object navigation and improved local stop policy with **groundedSAM**
• Extended single object goal navigation pipeline PEANUT, and added RedNet segmentation support enable it to perform ordered **multi-object goal navigation** and unordered multi-object goal navigation
• Provided complete navigation visualization for debugging and demonstration

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

***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 segmentation maps using depth projection and **DeepLabv3** (**PyTorch**)
• Coded customizable navigation action taking commands using **ROS** on roomba and **turtlebot3**

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

## WORKING EXPERIENCES

*Software Engineer Intern* | **Kolmostar Inc.** June 2021 – August 2021
• Completed Wi-Fi scan with designated scan interval and wait time with **RTOS** in **ARM Cortex-M4**
• Leveraged an existing **C/C++** microprocessor SDK to **reduce power consumption by 15%**
• Established **SPI** communication between devices and stored AP info using two space efficient data structures

## 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

## TECHNICAL SKILLS

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