Minghan Wei

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Education

University of Minnesota, Twin Cities (UMN) **08/2016 - 01/2022**
- Ph.D. in Computer Science; GPA: 3.85/4.00
- Advisor: Prof. Volkan Isler
- Thesis: Energy Mapping and Energy-aware Path Planning for Field Robots

Nanjing University of Science and Technology (NUST) **09/2012 - 07/2016**
- Bachelor of Engineering in Computer Science; GPA**:** 3.79/4.0

Academic Experience

Research Assistant: **01/2017 - 01/2022**
- Energy-aware Coverage Path Planning
  - Development of path planning algorithms for robots to cover environments with the minimum energy consumption
- Energy Mapping for energy-efficient Navigation for Ground Robots
  - Used machine learning to efficiently build energy-cost maps from aerial and ground robot measurements for large fields
- Built robotic platforms for precision agriculture applications.

Teaching Assistant: **08/2016 - 01/2017**
- Course: Linear Algebra
- Gave lectures three times on behalf of the professor
- Led recitation sections, office hours, and grading
- Received the Department's Teaching Assistant Award

Invited Talks

Guest lecture **04/20/2022**
- For the course of CSCI 5552 Sensing and Estimation in Robotics, UMN
- Topic: occupancy map inpainting for online robot navigation

Invited Speaker on Behalf of Prof. Volkan Isler **05/25/2018**
- For ICRA 2018 Workshop: The interplay between optimal estimation for improved action and optimal action for improved estimation
- Topic: Robotic Data Gathering in the Wild

Publications

- **M. Wei**, and V. Isler, 'Coverage path planning under the energy constraint', IEEE International Conference on Robotics and Automation (ICRA), 2018
- **M. Wei**, and V. Isler, 'A log-approximation for coverage path planning with the energy constraint', International Conference on Automated Planning and Scheduling (ICAPS), 2018.
- **M. Wei**, and V. Isler, 'Air to ground collaboration for energy-efficient path planning for ground robots', IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2019.
- **M. Wei**, and V. Isler, 'Energy-efficient path planning for ground robots by combining air and ground measurements', Conference on Robot Learning, 2019.
- **M. Wei**, and V. Isler, 'Building Energy-Cost Maps from Aerial Images and Ground Robot Measurements with Semi-Supervised Deep Learning', IEEE Robotics and Automation Letters (RAL), 2020.
- **M. Wei**, D. Lee, V. Isler, and Daniel. D. Lee, 'Occupancy Map Inpainting for Online Robot Navigation', IEEE International Conference on Robotics and Automation (ICRA), 2021.
- **M. Wei**, and V. Isler, 'Predicting Energy Consumption of Ground Robots on General Terrains', IEEE Robotics and Automation Letters (RAL), 2021.

- C. Peng, **M. Wei**, and V. Isler, 'Stochastic Travelling Salesperson Problem with Neighborhoods for Object Detections', IEEE International Conference on Robotics and Automation (ICRA), 2022 (submitted).

Work Experience

Google LLC: Software Engineer **06/20/2022 - Present**
- Developing and improving the localization and tracking algorithms for Google's Augment Reality products.

iRobot: Senior Robotics Software Engineer **01/17/2022 - 06/17/2022**
- Developed and implemented mapping, navigation solutions for robotic vacuum cleaners
- Improve the efficiency of existing vacuum and mopping robots

Internship

3M Company: Data Science intern **06/07/2021 - 08/20/2021**
- Built machine learning models for predicting the future status of chemical or biological processes.

Samsung Research America Inc: Research Intern **01/13/2020 - 08/28/2020**
- Implemented basic functionalities for a ground robot platform, including odometry, occupancy mapping, closed-loop navigation control.
- Conducted the research project: Occupancy map inpainting for robot online navigation
  - Used deep learning to predict the occupancy of unseen parts of a map for robot navigation
  - Tested the network prediction performance with both simulated and real data
  - Applied the prediction network to robot navigation and demonstrate shorter paths to goals
  - Published the results as an academic paper.

Selected Project Experience:

Agricultural Weed Control Using Autonomous Mowers **07/2018 - 01/2022**
Sponsored by Minnesota LCCMR program
- Autonomous robotic mowers can keep fields organic and free from harmful chemicals
- Developed an autonomous robotic mower for agricultural pastures
- Developed a small-sized ground robot to navigate narrow corn rows for weed control
- Worked on the environment perception, planning, and navigation control of this project
  - Designed algorithms to plan energy-efficient paths to cover the field
  - Implemented controllers to guide robots follow the planned paths and avoid obstacles
- Tested the system in pastures and corn fields

Raspberry Picking with a Robot Arm **01/2018 - 05/2018**
Course project of Sensing and Estimation at UMN
- Implemented the controller for a manipulator to pick raspberries
  - Used visual inputs (camera) to move the gripper for picking
  - Closed the gripper for picking and use force feedback sensors to avoid damaging the fruit
- Demonstrated the results in class and submit a project report.

Apple Diameter Estimation using RGB Images **01/2017 - 05/2017**
Course project of Computer Vision
- Developed a method to estimate apple diameters using a pair of close-up RGB images
  - Found the correspondence between two apple images based on epi-polar geometry
  - Estimation accuracy was with two centimeters.
- Presented the results in class and submitted a project report

Vehicle Detection Based on Smartphone-collected Images **06/2015 - 09/2015**
Robotics Institute Summer Scholar (RISS), Carnegie Mellon University
- Implemented a detection and tracking algorithm to detect vehicles in smartphone images
  - The phone was mounted behind the windshield of a car for data collection.
- Published results at *RISS Working Papers Journals* and demonstrated in a poster session