Varad Dhat

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Experience

- **Robotics Software Engineering Intern** — Seattle, WA
  Terraclear Inc. — *June 2024 - Present*
  - Led hardware configuration, software tool development, and field testing of an **Autonomous Rock Picker**.
  - Tuned **PID and Feedforward** gains for different parts of the vehicle like loading and rock-picking arms, and the robot base.
  - Led the integration of **Encoders**, **Inertial Navigation System**, **LIDAR**, and **RGBD-camera** with the robotic system.
  - Integrated a **Computer Vision** model using **Docker** into the robotic stack, reducing latency by **13ms**.
  - Implemented a **GPS** coordinate tracking-based waypoint navigation system that enhanced field testing accuracy by **70%**.
  - Conducted vehicle field tests in diverse farm conditions for robust performance analysis across various operational scenarios.
- **Graduate Research Assistant** — Seattle, WA
  Human-Centered Robotics lab at UW CSE — *June 2023 - Present*
  - Calibrated **Stretch** robot's fisheye camera and applied **OpenCV** image processing techniques to correct distortions and enhance visual data quality.
  - Engineered a robust contact detection algorithm for the robot, using **Point Cloud Data, TF2 transformations**, and effort sensor feedback.
  - Built a faster ROS bag reader in **C++** with **Python bindings** support, making it **50%** quicker to read data

Skills

- **Programming Languages**: C++, Python
- **Data Science and Analytics**: Numpy, Pandas, Matplotlib
- **Machine Learning and Development**: PyTorch, Tensorflow, OpenCV
- **Other tools**: Bash, Linux, ROS/ROS2, Gazebo, RViz, Arduino, Docker, Plotjuggler, RQT, Git, HTML,CSS, Javascript

Projects

- **Gaussian Splatting SLAM For Indoor Environment** — *Mar. 2024 - Jun. 2024*
  - Developed end-to-end pipeline for **Monocular SLAM** using 3D Gaussian Splatting method to achieve stronger environment recognition performance.
  - Built 3D Bounding boxes in the renderer to improve perception using a trained object detection model on **YOLOv7**.
- **Localization, Planning and Control Integration for a mobile robot in** — *Oct. 2023 - Dec. 2023*
  - Implemented **Particle filter** algorithm for precise robot localization.
  - Developed and optimized **PID** and **MPC** controllers for accurate trajectory following based on waypoints provided by the planner.
- **Colostomy Care Robot** — *Mar. 2023 - Jun. 2023*
  - Created Web-interface to teleoperate robot so that users can teach robot using programming by demonstration and implemented different features for human interventions.
  - Implemented and compared **SLAM** techniques like **gmapping** and **slamtoolbox** for autonomous robot navigation and manipulation.

Publications

- *Using 3D mouse to control Robot Manipulator*
  Varad Dhat, Nick Walker, Maya Cakmak **(Accepted as BEST PAPER in Short Contributions at ACM/IEEE International Conference on Human Robot Interaction 2024)** .
- *I Can Tell What I am Doing: Toward Real-World Natural Language Grounding of Robot Experiences*
  Zihan Wang, Brian Liang, Varad Dhat, Nick Walker, Zander Brumbaugh, Ranjay Krishna, Maya Cakmak **(Accepted at CoRL 2024)**.
- *AccessTeleopKit: A Toolkit for Creating Accessible Web-Based Interfaces for Tele-Operating an Assistive Robot*
  Vinitha Ranganeni, Varad Dhat, Noah Ponto, Maya Cakmak (**Accepted at UIST 2024**).

Education

- **University of Washington, Seattle** — Seattle, WA
  Master of Science in Mechanical Engineering (spl. Robotics) — *Sep. 2022 – Jun. 2024*
- **Vishwakarma Institute of Technology** — Pune, India
  BTech in Mechanical Engineering (spl. Robotics) — *Aug. 2018 – July. 2022*
- **Key Courseworks**: Deep Learning, Machine Learning, AI-based Mobile Robotics, Introduction to Self Driving Car, Bio-Inspired Robotics, Automatic Control, Robotics Capstone, Robot Manipulation, Introduction to Parallel Computing