Dheeraj Bhogisetty

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EDUCATION

Worcester Polytechnic Institute   Worcester, MA
Master of Science in Robotics, GPA: 4.0   *Aug. 2022 - May 2024*
Coursework: Control Systems, Motion Planning, Machine Learning, Deep Learning

Visvesvaraya National Institute of Technology   Nagpur, India
Bachelor of Technology in Mechanical Engineering, CGPA: 8.81/10   *Jul. 2016 - May 2020*

SKILLS

Languages & Frameworks: C/C++, Python, Numpy, Matplotlib, Pytorch, Linux, Git/Github
Robotics Tools & Frameworks: ROS/ROS 2, Gazebo, Rviz, OpenCV, MATLAB/Simulink
CAD Tools & Others: SolidWorks (CSWP), AutoCAD, PLM/PDM

EXPERIENCE

Graduate Student Researcher (Legged Robotics)   **May 2023 – Present**
Advisor: Dr Mohammad Agheli, WPI   *Worcester, MA*
- Conducting research on developing optimal control techniques to achieve dynamic walking on a bipedal robot.
- Investigating model-predictive control and trajectory optimization approaches through extensive literature review.
- Developing ROS-based software for planning and control to be tested on a custom Gazebo simulation.

Mechanical Design Engineer   **Jan. 2021 – Jun. 2022**
Oceaneering International Inc.   *Pune, India*
- Collaborated on developing offshore and deep sea oil & gas equipment in a 40-member cross-functional team.
- Designed numerous parts and assemblies, drafted engineering drawings for prototyping and production.
- Engineered a reliable stab locking mechanism to mitigate fluid leakage risk resulting in significant cost savings.
- Led a team to deliver comprehensive technical documentation of a project leading to successful deployment.

Robotics Intern   **May 2019 - Jul. 2019**
Center for Mechatronics, IIT Kanpur   *Kanpur, India*
- Built a mobile manipulator with a differential drive base and 4 DOF arm.
- Developed a control scheme to expend minimum energy for robot motion and simulated the system in MATLAB.
- Carried out a study on impedance control and conducted experiments to determine parameters for control.

ACADEMIC PROJECTS

Quadrotor Sliding Mode Control | *MATLAB, Python, ROS, Gazebo, Non-linear Controls*   **Dec. 2022**
- Designed a sliding mode controller for a quadrotor to track a trajectory.
- Derived the control laws in MATLAB and simulated the quadrotor using the Carzyflie ROS package in Gazebo.
- Successfully tracked the trajectory within a 5 cm error threshold and specified torque limits.

Inverse Dynamics Control of UR5 | *MATLAB, Kinematics & Dynamics, Manipulation*   **Apr. 2023**
- Achieved trajectory tracking of a UR5 robot (6-DOF) by implementing inverse dynamics control in MATLAB.
- Computed kinematics - forward through the product of exponentials and inverse using damped least squares.
- Applied the Recursive Newton-Euler algorithm to obtain torques and simulate the dynamics of the robot.

Agent Motion-Prediction for Autonomous Vehicles | *PyTorch, L5kit, Deep Learning*   **Mar. – Apr. 2023**
- Developed a motion-prediction model to predict future agent (vehicle) trajectories using birds-eye-view images.
- Designed and implemented a novel architecture combining ResNet50 with a sequence-to-sequence-based model.
- Trained the model on Woven Planets' motion-prediction dataset achieving a test MSE loss of 60.39.

Multi-Agent Path Finding (MAPF) | *Python, Motion Planning, Algorithms*   **Mar. – Apr. 2023**
- Implemented CBS & CBSH-CR algorithms to compute optimal collision-free paths for multiple agents in 2-D grid.
- Acheived a success rate of 80% with CBSH-CR and 60% with CBS across various testcases.
- Realized improved efficiency with CBSH-CR being 66% faster than CBS (on average).

Campus Navigator | *Python, Matplotlib, Numpy, Scipy, NetwrokX, Motion Planning*   **Feb. − Mar. 2023**
- Applied various sampling-based motion planning algorithms to navigate WPI's campus map.
- Programmed PRM, RRT-based algorithms for path planning including RRT* and Informed-RRT*.
- Assessed the efficacy of different algorithms by comparing path lengths for different queries.

Pb-Lite Edge Detection | *Python, OpenCV, Computer Vision*   **Aug. 2022**
- Implemented a simplified version of the pb (probability of boundary) boundary detection algorithm for images.
- Implemented various filters and masks like derivative of gaussian, Leung-Malik, Gabor filters and Half-Disks.
- Obtained edges by taking a weighted average of image maps, sobel and canny baselines.

PROFESSIONAL PROJECTS

BP Tortue - Engg. Support   **Apr. − Jun. 2022**
Oceaneering International Inc.
- Provided crucial engineering and CAD support for the deployment of the BP Tortue project.
- Developed comprehensive technical documentation - engineering drawings, operation and maintenance manuals.

Stab Locking Mechanism   **Mar. − Apr. 2022**
Oceaneering International Inc.
- Developed a fail-safe stab locking mechanism to reduce hydraulic fluid risk leakage in flying leads under water.
- Designed a robust latch-based spring-loaded locking mechanism that can withstand high pressures.
- Resulted in a modular design that can be retrofitted to existing hot stabs improving reliability and reducing costs.

ROV LARS - Subframe and Secondary Structures   **Jan. − Feb. 2022**
Oceaneering International Inc.
- Designed subframes and tie-downs to mount LARS equipment and secure them on the ship deck.
- Designed secondary structures - walkways and guardrails, pad eyes and lifting sets for the subframe.
- Ensured designs and drawings were in compliance with industry standards like ABS, DNV & NORSOK.

Shipdeck Modeling   **Dec. 2022**
Oceaneering International Inc.
- Created a 3D model of a small portion of a shipdeck in SolidWorks using 2D AutoCAD deck layouts.
- Helped in visualizing and optimizing the placement of a survey pole, winch and its subframe.