

Chandravarun Venkatasai Kunjeti

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EDUCATION

University of Pennsylvania

Aug 2022 – May 2024

Master of Science in Electrical Engineering

Relevant courses – Principles of Deep Learning, Controls and Optimization for Robotics, Linear System Theory

National Institute of Technology Karnataka, Surathkal

July 2018 – May 2022

Bachelor of Technology in Electronics and Communication Engineering & Minors in Computer Science

CGPA: 9.46/10

Relevant courses - Control of Mobile Robots, Embedded Systems and Robotics, Robotics: Basics and Selected Advanced Concepts

SKILLS

Programming: C++, Python, C, Eigen, Pytorch, Keras || **Path planning:** A*, RRT, RRT*, Bug algorithms, Wall following,

Controls: LQR, iLQR, Non-linear control, Minimum snap || **Robotics:** ROS, Orocos, Sensor Fusion, OpenCV, Open3D

PROFESSIONAL EXPERIENCE

Graduate Research Assistant || Kod*lab, (GRASP Lab) || C++, Controls, Software Architecture

Aug 2022– Present

Dr. Dan Koditschek, University of Pennsylvania

- Presently developing an SDK for quadrupeds, which can be used to control quadruped robots.
- Currently working on packages used to generalize behaviors like, walking and spine twist for the quadruped Twist.
- Implemented a versatile joystick interface that is used to communicate with joysticks like Logitech f710, and Xbox 360.

DAAD WISE Research Intern || Institute for Technical Informatics || Python, Multi Agent, Perception

July 2021– Sept 2021

University of Lübeck, Germany

- Programmed a visualization system that identifies robots and displays the communication between swarms.
- Dispatched swarm robots on Webots that moved based on the light intensity algorithm Beeclust.
- Devised an architecture that increases the robustness of the system allowing the user to switch between 2 platforms, simulation and real-world.

Research Intern || Stochastic Robotics Lab || C++, Linear Control, ROS, Orocos, Sim-to-Real Transfer

Dec 2020– Sept 2021

Indian Institute of Science, Bengaluru India

- Spearheaded a team of 5 for sim-to-real transfer of control schemes for quadruped Stochlite.
- Developed, and diagnosed the software architecture, linear policy, and neural network controllers for the robot to walk 5°, 7°, 9°, 11°, 13° along the x and y axis.
- Enhanced the robot visualization in ROS by developing communication interfaces SPI, UART and RS485 to retrieve data from TOF, IMU sensors, and B3M motors.

CONTROLS AND MAPPING PROJECTS

Gait Transition for Quadrupeds || UPenn || MPC, C++, Mujoco

Aug 2022 – Present

- Created an hierarchical MPC for gait transition, we used discretized foot step and the initial state and final state and then plan into the future. Using the fact that we have multiple final states we fit multiple MPC, we finally pick the one with least cost.
- The project was written in C++ and we used mujoco as a simulation tool to visualize our results.

Robust Navigation System for Quadruped Robots || IISc || C++, EKF, Perception, Controls, Gazebo

Jan 2022 - May 2022

- Constructed a 2 stage odometry data pipeline that takes in RGBD odometry followed by refinement using point to plane ICP algorithm. The localization technique reduced the error to 2% and brought down the computation time to 0.1s.
- Researched a combination of state estimation and point cloud odometry to develop a navigation system.
- Formulated a state estimator using a novel slope estimation technique, IMU and motor feedback data, the state was fused with the point cloud odometry data. Developed an optimized Open3D – ROS bridge for data conversion.

Control of Autonomous Janitorial Robot || C++, Deep learning, Point Cloud, ROS, Laser scan

Mar 2021 – May 2022

- Built and simulated a robot to clean a washroom for the ARTPARK robotics challenge and secured funding of \$5300.
- Wrote the algorithm to enter arena by utilizing wall following and optimal entry point using door detection and 2D projection of wall onto the floor.
- Determined the positions of coke cans, markings and dustbins using YoloV4 with 96% accuracy, followed by identifying the position of tabletop and sink using plane segmentation.
- Calculated the best order of picking the objects and cleaning the washroom that reduced the time of completion by 5mins.

Planner Algorithm for Sahayak Bot || E-Yantra Competition || Python, Object Detection, Graph Theory

Oct 2020 – Nov 2021

- Developed a scheduler algorithm using graph theory to determine the optimal locations to travers for picking and dropping objects, reduced the movement time by 50%. The algorithm updated itself on the fly as all object locations weren't known.
- Trained a model to identify the objects and find their position relative to the base frame to pick them up.

OTHER CONTROLS PROJECTS

- Trajectory Tracking for a drone using Time varying LQR.
- Finding the optimal path from anywhere in a grid using grid value iteration.
- Object avoidance, trajectory generation and tracking for differential flat systems.
- Minimum snap trajectory optimization for drones.

PUBLICATIONS AND CONFERENCES

Mishra, U.A., Samineni, S.R., Goel, P., **Kunjeti, C.**, et. al. (2021). **Dynamic Mirror Descent based Model Predictive Control for Accelerating Robot Learning**. ICRA 2022.

ACHIEVEMENTS

- Received DAAD-Wise Scholarship – 2021, among the **top 100** to be selected across **India**.
- Won **2nd** at Micromouse robotics competition where we simulated a robot to find the shortest path and traverse it.
- Ranked **5th out of 435** Nationally in the E-yantra robotics competition. Created a scheduler algorithm based on graph theory to pick and place objects in different rooms in the least time.

EXTRA CURRICULAR

Vice-Captain at CSD Robocon

May 2020 – May 2022

- Supervised a team of **50 people** to build industrial-grade robots for the ABU Robocon.

Chair of SIGHT Society at IEEE NITK Student Branch

Mar 2020 – May 2022

- Received a funding of \$400 from **IEEE R10 Asia Section** for humanitarian work.
- Led two project teams that received a grant of \$70 from IEEE Bangalore section.

Secretary of Circuits and System (CAS) Society at IEEE NITK Student Branch

May 2020 - Mar 2021

- Won the **CAS Outstanding Large Student Branch Award 2020** by IEEE Bangalore Section.