

Nikhil Chinnalapatti Gopinath

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EDUCATION

- Carnegie Mellon University** Pittsburgh, PA
Master's in Mechanical Engineering - Robotics and Control Systems; **GPA: 4.00/4.00** Aug 2022 - Dec 2023
Relevant Coursework: Intro to Deep Learning, Advanced Natural Language Processing, Machine Learning and Artificial Intelligence, Trustworthy AI Autonomy, Computer Vision for Engineers, and Modern Control Theory
- RV College of Engineering** Bangalore, India
Bachelor in Mechanical Engineering (Honors); **GPA: 9.00/10.00** Aug 2018 - Jul 2022

SKILLS

Programming Languages: C, C++, Python, Matlab, Julia, SQL, HTML, C#, CSS

Tools: Pytorch, OpenCV, GCP, AWS, Solidworks, Ansys, AutoCAD, Arduino, Unity3D, Git, LaTeX

Simulation: ROS, Gazebo, Pybullet, RViz, Simulink, Webots, Carla, Anylogic, Flexsim

EXPERIENCE

- Robomechanics Lab, Carnegie Mellon University** Pittsburgh, PA
Research Assistant Aug 2022 - Present
 - Developed computational design optimization of a Quadruped Robot with a Spine using Pybullet simulation on ROS
 - Devised an end-to-end hierarchical Model Predictive controller for generating joint commands of the quadruped;
 - Worked on grant with **Google DeepMind**
- Airbus India** Bangalore, India
Intern - Industrial System Mar 2022 - July 2022
 - Built a Digital Twin of the FAL using Unity3D; Simulated the motion of a user-controllable avatar, created custom animations and process flow of the FAL of A320, increasing productivity by 20%.
 - Developed the UI/UX for the Digital Twin to be used on a Computer, and Mobile Device, as a visual interface for Discrete Event Simulation and training tool for engineers.

ACADEMIC PROJECTS

- Automatic Speech Recognition using Synthetic Speech - CMU [Github]** Jan 2023 - May 2023
 - Generated 300 hours of Synthetic data using Variational Inference with adversarial learning Text-to-Speech models
 - Created a state-of-the-art speech recognition system using Attention-based Deep Neural Network models trained only on synthetic audio data; Achieved a **Levenshtein Distance of 23.38** and **Loss of 0.14**
- Deep Learning - CMU [Github]** Jan 2023 - May 2023
 - Implemented phoneme recognition model with **89.2%** on Librispeech; Trained CNN models for Face Classification (position-invariant pattern)-**89.9%** and Verification (detectors for novel classes)-**64.3%**; Created an automatic speech recognition model using LSTMs, RNNs and CTCs, with a **Levenshtein Distance of 3.98**; Implemented Bidirectional pBLSTMs for End-to-end Attention based Text-to-Speech DNNs with **Levenshtein Distance of 9.99**
- Multi-Vehicle Racing Line Optimization - CMU [Github]** Jan 2023 - May 2023
 - Created a DIRCOL trajectory optimization-based controller for two autonomous race cars using an IPOPT solver; Visualization using Julia Plot and Meshcat Libraries
 - Simulated using Integrated combined dynamics models - Kinematics & Dynamics and double integrator with repulsion solver.
- Construction Site Hazard Detection using Computer Vision - CMU [Github]** Oct 2022 - Dec 2022
 - Programmed a worker detection model using YoloV7 and Transfer Learning, and computation of 3D global coordinates using transformation matrices; Achieved a **mAP0.5 of 92%** with a **90% precision** and **93% recall**.
- Path planning and control strategies for an autonomous buggy - CMU [Github]** Oct 2022 - Dec 2022
 - Fine-tuned LQR and MPC controllers for lateral and longitudinal control of a buggy; using a bicycle dynamics model.
 - Deployed EKF-SLAM and MPC to navigate a GPS-based trajectory within 120s and 3m deviation in Webots.
- Mars Rover - Astra Robotics (RVCE) [Github]** Jul 2018 - Aug 2022
 - Lead a team of 30 as the Mechanical subsystem head in the design and fabrication of two Mars Rover
 - Implemented a bar differential with a rocker boogie mechanism to traverse rugged Martian terrain, validated using Matlab simulation; developed a 6 DOF robotic arm to lift objects upto 5 Kgs and operate the control panel; redesigned the wheels into honeycomb structures to help stress distribution and increased durability.
- Face Mask Recognition System using Computer Vision - RVCE [Github]** Aug 2020 - Sept 2020
 - Created a Face Mask Recognition System using TensorFlow, MobileNetV2, and OpenCV for classification; Achieved an accuracy of 92% when deployed on low computational consumption devices.
 - Implemented concepts of Image Processing and Deep Learning Models using OpenCV - Viola Jones and LabelImg

ACHIEVEMENTS

Leadership: CMU Mechanical Graduate Student Ambassador; Mechanical Subsystem Head of Astra Robotics

Rover Challenge: Indian Rover Challenge: Rank 7 - Jan 2020; Indian Rover Design Challenge: Rank 12 - Aug 2020

Debate: National Tournaments: IIT Bombay, NLSIU Bangalore, ILS Pune, PES University, Christ University Bangalore