

Nikhil Chinnalapatti Gopinath

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EXPERIENCE

Walmart Inc

Manager, Automation Engineer - Robotics

Bentonville, AR

Jan 2024 – Present

- Spearheaded technical development of an industry-leading vision/perception system for case segmentation using **GroundingDino & SAM2**. Established the entire pipeline for post-processing, collision detection, and robot path planning. Achieved **98%** accuracy and reduced inference latency from **19s → 4s**
- Developed **custom datasets**, enabling model **fine-tuning for accuracy gains and real-time performance**, and a **ROS2-based** integration platform connecting **vision, AMR control, PLC, and Fanuc robotic systems**.
- Led technical development of the **industry-first robotic automated trailer swing door opening solution**, projected to deliver **\$15.1M in savings**, through robotic programming, state of the art vision system, and a custom End-of-Arm Tool (EOAT). Designed a **custom AMR platform** with synchronous control of dual industrial arm for latch and handle manipulation based on direction from vision system.
- Supported the creation of an internally designed **robotic automated trailer unload system**, with potential savings of **\$1.9B**, by evolving the system from **prototype to proof-of-concept (PoC)**. Implemented continuous improvements in robot programming, mechanical systems, and electrical design, achieving **85% case entitlement at 850 cases/hour peak throughput**.

Robomechanics Lab, Carnegie Mellon University

Pittsburgh, PA

Research Assistant

Aug 2022 – Dec 2023

- 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**

PROJECTS

Visual-Word Sense Disambiguation - CMU [Github]

Aug 2023 – Dec 2023

- Created SOTA Visual Word Sense Disambiguation using MetaClip model evaluated against Weighted Average Loss;
- Improved compared to the Baseline on Prominent Word Bias, Semantic Interpretation and Literal Word Preference and achieved **Hit Rate of 0.7235** and **Mean Reciprocal Rank (MRR) of 0.8280**

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**.

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**.

SKILLS

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

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

Simulation: ROS2/ROS, Gazebo, Pybullet, RViz, Simulink, Webots, Carla, Anylogic, Flexsim

EDUCATION

Carnegie Mellon University

Pittsburgh, PA

Master's in Mechanical Engineering - Robotics and Control Systems; **GPA: 4.00/4.00**

Aug 2022 – Dec 2023

RV College of Engineering

Bangalore, India

Bachelor in Mechanical Engineering (Honors); **GPA: 9.00/10.00**

Aug 2018 – Jul 2022

ACHIEVEMENTS

Patent:

- Visual Context Based Semantic Perception for Robotic Manipulation and Planning
- Multi Axial End of Arm of Tool for Robotic Case Manipulation;
- Rigidized Conveyor Support
- SwingBot Efficiency Enhancement: AMR Trailer Door Opening and Closing with Location-Based Prioritization

Publications: Johnson, A.M & Gopinath, N.C - "Where are our robot spines?" - Dynamic Walking (May 2024)

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