Sai Siddarth Nichenametla

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EDUCATION

University at Buffalo- *The State University of New York*, Buffalo, NY, August 2022 – December 2023

- **Master of Science** in *Engineering Science (Robotics)*

Jawaharlal Nehru Technological University-Hyderabad, Telangana, India**,** August 2017 - July 2021

- **Bachelor of Technology** in *Mechanical Engineering*

SKILLS & TOOLS

Programming: Python, MATLAB – Workspace, Simulink, CUDA, TensorFlow, Keras, Pytorch, OpenCV, Linux, Robotic Operating System (ROS), RoboDK, Nvidia IsaacSim, Pybullet, Structure from Motion (SFM), AWS, SQL, CoppeliaSim (V-rep), Gazebo, BeamNG, Pygame, Pygaze, MediaPipe, Sklearns, Pandas, Numpy, Matplotlib, Seaborn, G-Code, RoboDK
Automation & Hardware skills: PLC, Pneumatics, Allen Bradley, VBuilder, Cognex Vision Sensors, Fanuc & UR Robot Programming, Tobii Pro Nano, Creality 3D Printer, Nvidia Jetson Nano, L298N Motor Controller, DC Motors, Linear Solenoids, Linear actuators
CAD: AutoCAD, Catia V5, SolidWorks-CSWP, ProE, Creo, Ansys, Autodesk Sketchbook, NX CAD, Autodesk Fusion 360, 3D Printing and Scanning
Technical Skills: Microsoft Office

WORK EXPERIENCE

Mechanical Engineer-Robotics, SQ4D, Calverton, NY: October 2024 – Present

- Designed and developed automated systems to optimize 3D printing house construction, including a soil excavator for site preparation and a rebar dropper with adjustable sizing and G-code-based control, utilizing Autodesk Fusion 360 for modeling and prototyping.
- Leveraged RoboDK, Rhino Grasshopper, and Python to create customized G-code generation tools, simulate construction environments, and develop efficient path planning strategies tailored for the construction 3D printer.
- Designed detailed 2D house plan geometries, including infill patterns, in Autodesk Fusion 360, imported into RoboDK, and integrated Python scripts to automate G-code generation with precise extrusion parameters and orientation adjustments.
- Led the testing and validation of critical components and automated systems for the construction 3D printer, ensuring reliable operation and delivering high-quality output in real-world scenarios.
- Conducted comprehensive 3D printing trials to evaluate system performance, resolve design challenges, and enhance the overall efficiency of construction 3D printing processes.
- Developed Python scripts to generate G-code modifications for obstacle avoidance and non-extrusion motions, preventing collisions with extruded filament and ensuring seamless operation during printing.

Research Assistant, HILS Lab, University at Buffalo-SUNY, Buffalo, NY: January 2024 – October 2024

- Focusing on autonomous vehicles-driverless trucks, developed a fail-safe system enabling virtual teleop control through steering controllers, using **BeamNG** and **Tobii pro nano** eye tracker with **Python** for realistic environment simulation.
- Designed and implemented a **deep learning neural network** for identifying traffic signs, and or entities, utilizing media-pipeline alongside **CUDA, Pytorch**, **Keras**, and **OpenCV** APIs for comprehensive image recognition.
- Deployed a **UR5 robot** integrated with a Programmable Logic Controller (**PLC**) to oversee a conveyor belt system, employing **Cognex** vision and laser sensors for innovative industrial automation applications.
- Spearheaded development of a cutting-edge application in **industrial automation**, focusing on packaging, segregation, and dynamic pick-and-place, showcasing my expertise in robotics and industrial automation technologies.

Manufacturing Automation Engineer, Xylem, Buffalo, NY: September 2023 – December 2023

- Spearheaded design and implementation of an automated production line for manufacturing of compact coolers utilizing **Fanuc Robots** and Fanuc m710ic/45 robots for simulation purposes using python.
- Integrated **welding**, **testing**, **painting**, and **curing** processes significantly enhanced productivity, assembling, and operating machinery, reducing manufacturing time to **45 minutes**, and **reduced** manual labor requirements by **85%**.
- Engineered sophisticated motion planning algorithm with an **automatic tool switching** feature, significantly improving operational **safety**, and reducing machinery collision risks which led to safer, and more efficient production workflows.
- Directed integration of **conveyor belt** systems and hardware with **PLC** programming, achieving seamless automation and synchronized operations across production line that significantly optimized efficiency and **minimized downtime**.

Assistant Systems Engineer, Tata Consultancy Services, Hyderabad, Telangana, India: July 2021 – July 2022

- Contributed to smart **warehousing automation** project by integrating cage detection modules, obstacle avoidance systems, and leading to optimized autonomous vehicle routing and a **30%** improvement in order fulfillment speed.

- Designed and deployed robotic picking systems using **Fanuc Robots**, vision sensors, and **Allen Bradley RS Logix5000**, which adapted to varying warehouse conditions and contributed to a **40%** reduction in manual labor.
- Served as an **SAP Fiori** Security Consultant, implemented a real-time inventory management system using SAP Fiori and **SAP S/4 HANA**, reducing stock discrepancies in the **ERP** systems by **25%.**
- Enhanced security protocols within SAP Fiori, ensuring data integrity and compliance with industry standards.

Engineer- Intern, Uniscient Engineering Private Limited, Hyderabad, Telangana, India: May 2019 – July 2019

- Specialized in designing a range of heat exchangers tailored to specific customer requirements using **Catia V5** and **SolidWorks**, ensuring precise and functional product development from initial concept to final design.
- Conducted comprehensive Computational Fluid Dynamics (**CFD**) simulations and thermal analyses using **Ansys**, incorporating Finite Element Analysis (**FEA**) to evaluate and optimize **heat exchanger** performance under various operational conditions.
- Finalized and prepared detailed product drafts and documentation in **AutoCAD**, ensuring accuracy and adherence to engineering standards, facilitating a smooth transition from design to manufacturing.

ENGINEERING PROJECTS

***Advanced Vision System for Traffic Recognition for Autonomous Navigation,* 2024:** Python, OpenCV, CNN, TensorFlow, Keras, ROS, Linux

- Engineered a **ROS**-integrated computer vision system within Real Robot in simulated environment, enabling detailed insights into navigation and object **recognition** through detection of various **road elements** and **pedestrians**.
- Achieved remarkable classification accuracy (**98.83%** training, **96.05%** validation) on traffic sign **recognition** by developing and fine-tuning a **CNN** model with a meticulously labeled image dataset, focusing on critical signs like speed limits and pedestrian crossings.
- Streamlined image processing pipeline by establishing a ROS node for real-time image capture via TurtleBot's camera, coupled with a Python script for precise traffic sign prediction, further **refining** model efficacy through **hyperparameter** adjustments and performance tracking to reach a 96.04% success rate.

***Intelligent Radar based Autonomous Navigation for TurtleBot,* 2024:** Python, ROS, Linux, Neural Network, CUDA, Pytorch

- Designed and deployed a **neural network**-based control system for a TurtleBot equipped with a **trio of radars**, achieving **autonomous navigation** within circuit environments with a remarkable accuracy rate of **98.9%**.
- Utilized radars for precise obstacle detection and distance measurement, enabling robots to dynamically adjust their path in real-time, ensuring efficient and uninterrupted circuit **navigation**.
- Implemented strategic logic within control system to optimize robot's movements based on environmental feedback, significantly **reducing collision risk**, and enhancing pathfinding efficiency across multiple circuits.

***Collision Avoidance and Path Planning,* 2023:** MATLAB, CoppeliaSim (V-rep)

- Adapted **autonomous vehicle** collision avoidance concepts to engineer **trajectory** algorithms for a **Powerball robot** manipulator, enabling it to navigate around both static and dynamic obstacles using Probabilistic Road Maps (**PRM**) and Temporal Probabilistic Road Maps (**T-PRM**) with **A*** search.
- Developed three path planning algorithms: **RRT**, **A*** search, and **Dijkstra's** algorithm for static obstacle avoidance and compared m with dynamic cases, concluding that A* search demonstrates most potential when combined with T-PRM.
- Enhanced obstacle prediction accuracy by incorporating a **vision system** and **Kalman filter** into system, achieving a **79%** success rate in dynamic obstacle avoidance scenarios.

***Stereo Visual Odometry,* 2023:** Python, Robotic Operating Systems (ROS), Linux, OpenCV, Structure from Motion

- Engineered a Stereo Camera framework to achieve advanced **visual odometry** for precise **3D pose** retrieval, focusing exclusively on odometry dataset. This project was developed from scratch using computer vision techniques, **OpenCV**, and **NumPy**.
- Performed visual odometry entirely using computer vision techniques to accurately estimate trajectory of **stereo camera setup**. This approach enabled precise **tracking** of vehicle movement through complex environments without relying on **sensor fusion** methods.
- Utilized advanced **camera calibration** and feature extraction methods to enhance **accuracy** and **reliability** of odometry calculations utilizing **RANSAC**, achieving a significant improvement in performance and providing a robust foundation for **autonomous vehicle navigation systems**.

Markov Localization and Path Following for Autonomous Navigation, 2023: MATLAB, Python, Linux, ROS

- Devised a **Markov** localization within a **SLAM** suite using **MATLAB** in 2023, significantly enhancing robot state estimation by integrating **sensor** data with **motion** models. Validated through extensive simulations, demonstrating robustness and dependability.
- Incorporated **PID** and **Pure Pursuit** control techniques into a **Linux**-based **ROS** framework to improve autonomous navigation, focusing on advanced **path tracing** and **motion planning**.
- Applied combined localization and control system to a **F1tenth autonomous race car**, showcasing **adaptability** and achieving an exceptional error margin of **0.2 meters**, illustrating precision in robotic path following.