Ganesh Arivoli

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Summary

Master's student in Mechanical Engineering with 3 years of industry experience in vehicle dynamics and robotics. Specialized in developing real-time simulation tools and dynamic models for autonomous systems, with a strong focus on multibody dynamics, motion planning, and trajectory optimization. Proficient in C++, Python, and CUDA, with experience parallelizing algorithms for improved runtime efficiency. Passionate about building fast and reliable decision-making systems for autonomous vehicles.

Education

University of Wisconsin-Madison Aug 2024 – May 2026
Master of Science, Mechanical Engineering *Current GPA: 4.0/4.0*

National Institute of Technology, Tiruchirappalli Jul 2017 – May 2021
Bachelor of Technology, Mechanical Engineering

Experience

Graduate Research Assistant | *Simulation-Based Engineering Lab, UW–Madison* Aug 2024 – Present

- Developed real-time rigid body dynamic models of loader machinery using Project Chrono, a physics engine (C++) to optimize joint kinematics. Working on motion planning of an autonomous terrain leveling vehicle trained using simulation-generated data.
- Created a simulation framework for a lunar terrain vehicle with airless tires using ANCF formulation, improving structural deformation predictions and enhancing vehicle dynamics modeling using Chrono::Vehicle for navigating lunar terrain while avoiding obstacles.
- Enabled accurate contact force estimation on the excavator bucket by developing a co-simulation integrating MBD with DEM-Engine, a dual-GPU Discrete Element Method (DEM) library for high-fidelity modeling of granular material interaction.

Vehicle Dynamics Engineer (R&D) | *Bajaj Auto, India* Sep 2021 – Dec 2023

- Led the end-to-end development of suspension and steering systems for the Bajaj Auto-Triumph motorcyles from initial concept design to final deployment for mass production, contributing to **100,000+** units sold across **58+** countries globally.
- Improved the **ride and handling performance by 15%** through vehicle-level multibody simulations (MSC Adams) and on-road testing, optimizing suspension geometry parameters, spring rates and damping values informing the design of suspension systems.
- Applied data-driven tuning methods using MSC Adams and Python scripts to bridge simulation and real-world performance, including validation of dynamic responses during lane change maneuvers to ensure stability and predictability under varying terrain conditions.

Projects

Accelerating Path Planning for Autonomous Robots | *CS 759, UW–Madison* Jan 2025 – Apr 2025

- Implemented parallelized RRT and RRT* algorithms using CUDA (for GPU) and OpenMP (for multicore CPU), optimizing collision checking and nearest-neighbor routines for high-dimensional planning in obstacle-dense environments.
- Analyzed computational bottlenecks using NVIDIA Nsight guiding kernel-level optimization for improving runtime efficiency.
- Developing a modular benchmarking suite with integrated physics-based simulation to evaluate planning latency, control feasibility, and trajectory smoothness in 2D/3D scenarios, supporting real-time deployment needs in dynamic and constrained settings.

Robotic Manipulator Simulation and Control Toolkit | *ECE 441, UW–Madison* Jan 2025 – Apr 2025

- Built a MATLAB toolset for simulating kinematics, dynamics, and real-time control of serial robotic manipulators using Euler-Lagrange equations, supporting multi-DOF systems with numerical integration with support for real-time visualization.
- Developed motion planning and trajectory generation modules to compute smooth, collision-free joint-space paths under kinematic and dynamic constraints, incorporating controller bandwidth and actuation limits for execution feasibility.

SAE BAJA Racing Team | *NITT, India* May 2018 – May 2021

- Secured **consecutive 5th place** finishes in BAJA SAE India 2020 and 2021 among **100+** teams by spearheading the powertrain and data acquisition teams in design, fabrication and testing (both simulation and physical) of an All-Terrain Vehicle.
- Improved drivetrain performance by building a MATLAB-based CVT model to tune shift characteristics through simulation-driven calibration, increasing efficiency by 10% and reducing tuning time by 40% using real-time telemetry for validation.

Technical Skills

Programming: C/C++, Python, CUDA, OpenMP, MATLAB, Shell scripting, Git
Tools & Platforms: Linux, NVIDIA Nsight, Docker, ROS (basic), VSCode, Make/CMake
Simulation: Project Chrono, Mujoco, PyBullet, Simulink, MSC Adams, IPG CarMaker