Karthigeyan Ganesh Shankar

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WORK EXPERIENCE

Lead Autonomy Engineer
April 2025 – Present

Ati Motors, India (Website) Bengaluru, India

- Led to widespread adoption of **simulation-first** development and testing
- Kick-started the map-free visual navigation models which are generalized and reliable
- Supported the evaluation of different novel, state-of-the-art VSLAM methods which unconstrained the system and incorporate a learning component based on ingested data.
- **Software/Language Used**: Nvidia Isaac Sim, Nvidia Warp, Pytorch

Senior Autonomy Engineer
April 2024 – Present

Ati Motors, India (Website) Bengaluru, India

- Spearheading a team which is developing an one button press simulation workflow by aligning the current software stack with **Nvidia's Isaac Sim** application. The effort entails setting up **sim2real** environment and emulating existing control, navigation and perception stack of the bots into simulation
- Solely responsible for evaluating different OTS carrier boards (**Jetson**) that controls the entire bot by semi-automating the bring-up process and saving considerable dev and validation time
- Responsible towards building business critical, **production ready architecture** and implementation framework for both the bot and fleet manager application and making factual recommendations
- **Software/Language Used**: Nvidia Isaac Sim, Kubernetes, Bazel, Python, Make, Unix, Embedded C

Autonomy Engineer
Sept 2022 – March 2024

Ati Motors, India (Website) Bengaluru, India

- Revived and optimized the software build systems to catalyse the build process by **40 %** enabling the team to deploy features/bug fixes at speed with utmost reliability
- Developed the software-in-loop (CI/CD) frameworks to **automate** the software release process and reduce process bottlenecks with **bash scripting** and offline testing exigencies
- Enabled the team to use designed systems across all available software architectures increasing their productivity and throughput by **30%** by provided necessary training to use them well
- Supported in code development, robotic **deployment** and gained a working understanding of the industrial market and product development cycle of different products as part of the portfolio
- **Software/Language Used**: Kubernetes, Bazel, Poetry, Docker, C++, Python, Make, Unix, Bash

Research Assistant
Oct 2018 – Mar 2019

Institute for Aerodynamics and Fluid Mechanics, RWTH Aachen (Website) Aachen, Germany

- Devised massively parallel simulations in C++ for **1 million cells through 24 cores** for **100+ core hours** to determine the optimal configuration for a laminar pre-mixed flame propagation. Subsequently, **automated** the visualization pipeline through Python
- Investigated the configuration through grid convergence study to determine minimal number of cells required to capture the physics effectively hence optimizing the simulation core hours
- **Software/Language Used**: C++, Python, ParaView, Unix, Bash, OpenMPI

Research Assistant
Jul 2019 – Mar 2020

Institute for Geometric and Applied Mathematics, RWTH Aachen (Website) Aachen, Germany

- Implemented data fitting models for **250,000+ data points** for **six** different distributions and determined the best fit. The pattern emerged as biased pareto distributions
- Determined the best fit for unemployed data obtained from **Luxembourg Information Centre** for several countries based on the parity and employment scales and wealth index
- **Software/Language Used**: Matlab, Python, Seaborn, Numpy

EDUCATION

RWTH Aachen Oct 2017 – Mar 2020
Master of Sciences in Simulation Sciences Aachen, Germany
* **Coursework**: High Performance Computing, High dimensional Probability theory, Stochastic Numeric, Kinetic Description of Interacting Multi-agent Systems

SRM University May 2013 – May 2017
Bachelor of Technology in Mechanical Engineering Chennai, India

SKILLS

Programming Languages: Python, C++, MATLAB, Bash, Git, Julia
Tools: Dolfin, ScoreP, LaTeX, Gmsh, ParaView, NumPy, SciPy, Docker, Poetry, Bazel, Makefile, Kubernetes
Languages: English (Fluent), French (Intermediate), German (Beginner), Hindi (Intermediate), Tamil (Native)

OTHER EXPERIENCES

Repository homepage: GitHub

Master Thesis: Kinetic Model on Unemployment, RWTH Aachen
* Conceptualized, developed and analysed **mesoscopic models** to spatially and temporally characterize unemployment
* Performed involved **Monte-Carlo simulations** for case scenarios of increasing complexity
* Simulated and characterized the interactive, time-variant complex system and analytically concluded the upper bounds
* Advanced a niche area in transport equations with **minuscule** prior literature and works

Unstructured Finite Element Solver, RWTH Aachen
* Programmed a solver to operate on unstructured meshes using **Python (FeNiCS)**. Gmsh was used to generate unstructured meshes and simulation results were viewed using ParaView. In order to optimize the process, **convergence** studies was held
* Analysed the sensitivity of temperature profiles through **automatic differentiation** (dolfin-adjoint) and optimized it for minimal computation time and complexity
* Enhanced the code further through **parallelization** and smart implementation to calculate the Jacobians quickly

Convection Coupled Simulation, RWTH Aachen
* Developed an enthalpy method for convection-coupled phase change simulation with Python to **reduce the complexity** of the simulation. Reformulated the governing equations and implemented its weak form in Python (FeNiCs)
* Validated the results against a benchmark (Stefan problem) by solving a **non-linear problem** through Newtons method

Board member, Examination Board, Simulation Sciences, RWTH Aachen
* Played an active role in altering simulation sciences curriculum to maintain its correspondence with **current trends** and student requirements
* Assessed **600+ prospective** graduate applications for a year accounting for diversity, inclusion and parity

Steering Committee Member, QIndia
* **Spearheaded a team of 5** to strategise and design outreach initiatives of Quantum Computing across all social channels
* Wrote and edited several copies that led to a surge registration of **200+** leading to an active participation of **70+** attend the workshops

Bachelor Thesis: Fatigue Characteristics of Functionally Graded Materials, SRM University
* Supervised manufacturing of **Aluminium (L24)** with different filler materials (titanium oxide, silicon carbide, aluminium oxide) at **under-engineered locations** based on their stress profiles
* Administered and performed experimental analysis to obtain **natural frequency** of the manufactured material using a tri-axial accelerometer and subsequently fatigue frequency was calculated with respect to the frequency of Aluminium