Adarsh Mathai

Engineer, Digital Engineering Centre of Excellence, EIIC, Pune, India

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EDUCATION

2022	**M.Tech in Mechanical Engineering *(Design Engineering)*** Indian Institute of Technology Bombay	CGPA : 9.85
2020	**B.Tech in Mechanical Engineering & Minor in Design** Indian Institute of Technology Hyderabad	CGPA : 8.89
2016	**Class XII *(Science Stream - PCMB)*** Chavara Public School Pala	97%
2014	**Class X** Chavara Public School Pala	CGPA : 10

PROFESSIONAL EXPERIENCE

Engineer, Digital Engineering Centre of Excellence *[July 2022 - present]*
Eaton India Innovation Centre, Pune, India

Systems Engineering & Simulations

- Performed Model-in-the-Loop (MiL) simulations for commercial vehicles to optimize gear shifting across multiple road conditions and vehicle parameters. Comprehensive Simulink Models are used to simulate the entire vehicle dynamics and driver actions, while complimentary scripts and GUIs are developed to automate the simulations and Design of Experiments.
- Developed a novel gear selection optimization algorithm for AMT to significantly improve fuel efficiency in commercial trucks (3-5%) implemented using Simulink, along with GUI tool.
- Developed and optimized a detailed system level multi-physics Simulink model to predict arc current in common O shot faults with >80% accuracy, aiding in the UL489 standard HIC compliance tests.
- Developed NVH simulation methodologies using Statistical Energy Analysis (SEA) for transmission internal dynamics in conjunction with GUI to enable generation of generic transmission models. Performed static structural and contact mechanics simulations for MCCB & ACB components along with an automated 1D tool for contact stress calculation on generic curved surfaces.

Digital Platforms & Tools Development

- Developed a comprehensive no-code software that provides end to end simulation, optimization, ROM generation and robustness evaluation capabilities for 1D system models such as Simulink/Simscape, FMUs, OpenModelica files etc.
- Developed Robust ETO processing application for enclosures enabling product similarity reaches, CVML based cutout detections, automated CAD generation and high-fidelity cost breakdown calculation & BOM generation accelerating pre-quote generation process by ~80%
- Developed framework for conversion of Simulink Models to CLI standalone applications for license free deployment across platforms.
- Developed a fully integrated and modular python library to streamline and automate the process of managing jobs on the Rescale cloud simulation platform. This library offers a wide range of functionalities that cater to various aspects of job management.
- Developed internal API based server for standardized tracking and logging of various tool usages with scheduled data export, backup, and Oauth2 based user access control capabilities.
- Developed web application framework with user access control, and other data management and automated simulation capabilities. Used for development of multiple automation pursuits for fuses, connectors, contactors, busbars, service valves etc.

AI & Automation Initiatives

- Working as software developer in an Agentic AI initiative to accelerate software development lifecycle for embedded systems and cloud platforms. Implemented agentic-AI Orchestrator for automating: requirements, architecture diagrams, codebase, unit tests, and integration tests generation as well as automated software compilation.
- Spearheaded the development of modular & scalable bot with CLI & GUI interfaces for vehicle dynamics simulations utilizing OOPS paradigm, equipped with structured and hierarchical database, automated preprocessing, postprocessing and analysis modules, decoupled simulation instances as well as parallel processing capabilities, resulting in reduced simulation failures, significant reduction in batch simulation TAT and engineering efforts to modify, debug and add functionalities
- Driving an initiative to automate and standardize test lab data management procedures. Developing a software suite that automates data processing for all test lab experiments, generates standardized reports, and facilitates automated communications. An accompanying Web-based dashboard that significantly reduces lead time in data communications, is also in construction. The standardized process helps in efficient digital twin development, digital prototype validations, ROM generations etc. This long-term initiative is anticipated to generate cost savings of approximately $500k/year by reducing effort costs and software licensing expenses.
- Created multiple Automation tools for pre-processing, post-processing, optimizations, report generations etc. across multiple projects
- Developed standardized frameworks and CLI tools for data extractions from platforms: Confluence, JIRA, GitHub, Enovia, and SAP

Leadership & Mentoring

- Delivered multiple training sessions across teams on MATLAB scripting, MATLAB App Development, OpenModelica System Model & Programmatic development, Python Fundamentals, Python best practices and project developments, etc.
- Contributed as Knowledge Management council core team and organized various technical & business sessions, hackathons, quizzes and other events as part of knowledge week, engineers' day etc.
- Contributed as training lead of the team for 2+ years organizing 50+ internal and external training sessions spanning various technical and non-technical topics as per long-term team development plans.
- Mentored multiple colleagues on MATLAB, OpenModelica & Python and lead projects on Digitalizations, Automations and BOTs

Recognitions & Certifications

- Secured DFSS Green Belt certification
- Received Eaton Leadership Champion Award
- Received Employee Noteworthy Accomplishments Award

ACADEMIC & COURSE PROJECTS

Development and Hardware Implementation of Sensor Fusion Algorithm to Improve the estimation of Aerial Robot Position and orientation - INDUS LAB, IIT Bombay *Dr. Vivek Sangwan [Jan 2021 – May 2022]*

- Developed and implemented a computationally efficient and accurate sensor fusion algorithm that obeys the manifold constraints and outputs the optimally accurate data to calculate the position and attitude of aerial robots. The algorithm leverages low-noise, high-latency Vicon data as well as high-noise, low-latency IMU data as inputs to predict the current orientation of the UAV as quaternions. Specific quaternion-based time-integrations and interpolations are incorporated inside the algorithm to achieve high accuracy and low latency.

Flutter Analysis of a wing with store and flap *Dr. Mahesh M S [Aug-Dec 2019]*

- Performed the analysis of aeroelastic flutter of an aerofoil, to find the modal frequency and modal damping characteristics and calculate the flutter point.

Vibration optimization of a passive suspension system via Genetic Algorithm *Dr. Dnyanesh Pawaskar [Aug-Dec 2021]*

- Calculated the optimal values of passive suspension parameters using Genetic Algorithm, which uses numerical simulation to calculate the cost function value.

Detection of American Sign Language Letters using Machine Learning *Dr. Amit Sethi [Jan-May 2021]*

- Collected and organized a dataset and combined it with available online datasets to train convolutional neural network to recognize sign language letters using webcam and analysed the accuracies.

Spatial Scheduling of Informative Meetings for Multi-Agent Persistent Coverage *Dr. Arpita Sinha [Jan-May 2021]*

- Implemented the algorithms from the paper by Ravi N. Haksar in MATLAB, that enables drones to communicate with each other during aggressive forest fires with limited range and time.

Development of a cost-effective Home Automation Control Hub *Dr. Pradeep Yemula [Jan-May 2017]*

- Developed an affordable Arduino based control hub that that can be operated using app over internet, voice commands as well as manual overrides using physical switches.

Study on Double-paned windows *Dr. Nishant Dongari [Aug-Dec 2018]*

- Performed analysis of heat transfer and temperature distribution of different geometries of double-paned windows and study of the acquired data to find the optimum and most energy-efficient thickness of the air gap for the windows for different parameters.

Analysis of a newer design of MEMS Microphone diaphragms *Dr. Ashok Kumar Pandey [Aug-Dec 2018]*

- Performed stiffness and frequency analysis and study of a novel 'frog-arms' design of MEMS microphone diaphragm with uniform deflection and reduced air damping.

Study on ABS Braking System *Dr. Ashok Kumar Pandey [Jan-May 2018]*

- Modelled a robust ABS braking system on Simulink and found out optimal parameters required according to publicly available Breaking data.

ACHIEVEMENTS

- **Rank 1** in Design Engineering and **Rank 2** in Mechanical Engineering at IIT Bombay
- **National Talent Search Examination Scholar** – received scholarship given to the top 1000 students of India during 10th class.

INTERNSHIPS

- **F.A.C.T.** *May 20, 2019 to June 19, 2019* *Kochi, Kerala, India*

TEACHING & TRAINING EXPERIENCE

Technical Training Delivered	MATLAB Scripting, MATLAB App Development, Python Fundamentals, Python Best Practices & Project Development
Teaching Assistant	Design Optimization (ME Dept., IIT Bombay) *[2022]* Kinematics and Dynamics of Machines Lab (ME Dept., IIT Bombay) *[2021]* Engineering Graphics (ME Dept., IIT Bombay) *[2020]* Solid Mechanics, Fluid Mechanics, Engineering Statics (MAE Dept., IIT Hyderabad) *[2019]*

POSITIONS OF RESPONSIBILITY

Core Team *KM Council, EIIC, Pune [present]*
Design Secretary *ME Association, IITB [2021-'22]*
Club Lead *Aero Club, IITH [2019-'20]*
Design Coordinator *Cult. Council, IITH [2017-'18]*

Team Trainings Lead *CDE EIIC, Pune [2020-'22]*
Design Convenor *PG Cult, IITB [2021-'22]*
Club Lead *Gesture Arts Club, IITH [2017-'18]*
Digital Arts Coordinator *NSS, IITH [2017-'18]*

Open Forums Lead *DE-CoE, EIIC, Pune [present]*
PG Convenor *Design Club, IITB [2021-'22]*
Manager *E-Cell, IITH [2017-'18]*

SKILLS

Software Tools & Platforms	MATLAB, Simulink, Simscape, AMEsim, GT Suite, OpenModelica, modeFrontier, Ansys Workbench, Maxwell, SpaceClaim, Adams, Abaqus, Power BI, MiniTab, SolidWorks, Solid Edge, SketchUp, Docker, Postman, GIT, SAP, Rescale, VMWare, VirtualBox, MS Office Suite, VS Code, LaTeX, RapidMiner
Programming Languages & Tech Stack	Python, MATLAB, C, C++, VBA, SQL, Modelica, Shell/Bash, HTML, CSS, JavaScript, React.js, Next.Js
Co-Curricular	Photoshop, Illustrator, Figma, Adobe XD, Rebelle, Procreate, Figma, Sketchbook, Premier Pro, After Effects, Lightroom, Audacity, Maya, 3Ds Max, Inkscape, GIMP