Suresh Ragireddy

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Education

Program	Institution/Board	% / CGPA	Year
M.Tech. (Aerospace)	Indian Institute of Technology Kanpur, UP	**9.25/10**	2023-2025
B.Tech. (Aerospace)	Lakireddy Bali Reddy College of Engineering, AP	**9.45/10**	2019-2022
Diploma (Mechanical)	VSM College of Engineering, AP	**92.68 %**	2016-2019
10th	ST. Ann Gloria EM High School, AP	**9.7/10**	2016

Experience

1. *Freelance Knowledge Consultant* **July 2022 - Present**
(Part-time | ONLINE) *MyEngineeringBuddy*

- Provide tailored online tutoring, homework assistance, and test preparation by designing targeted study strategies that strengthen students' understanding of engineering concepts while simulating real-world industrial scenarios. Solved 300+ questions to reinforce learning and application.
- Mentored 50+ students, enhancing their academic success and preparing them for industry challenges by incorporating conceptual questions and problem-solving techniques relevant to core industrial applications.

2. *Industrial Training* **Nov 2018 - May 2019**
(Trainee No.trg/31(3)/3579-1118-DT) *Rashtriya Ispat Nigam Limited (**Vizag Steel Plant**)*

- Gained expertise in CNC gas cutting, drafting, designing, and drawing using AutoCAD, Spare parts Manufacturing; skilled in metal arc welding, gas cutting, lathe and milling machine maintenance, forging, and foundry operations.

Key Projects

1. *Cross-Platform GUI TOOLKIT for Evaluating Effective RVE Properties of Composite in Abaqus CAE* **Aug 2024 - Present**
(M.Tech / Guide: Prof. P.M. Mohite) *IIT Kanpur*

- Developed and implemented Python scripts to assign material properties of fiber and matrix, and apply uniform and periodic boundary conditions (PBC) to selected models within the GUI interface.
- Completed 60% of the GUI development, enabling model creation, application of PBC, and exporting of input files for Abaqus across Windows, Linux, and cloud platforms.
- Currently enhancing the Toolkit by developing optimization algorithms for high fiber volume fraction arrangements, integrating additional models, and scripting for automated report generation.
- ***Tools/Libraries (used): Tkinter, Qt Designer, Python Scripting, PyAutoGUI***

2. *Modeling and Meshing of Uni- and Bi-Directional Composites* **May 2024 - July 2024**
(M.Tech / Guide: Prof. P.M. Mohite) *IIT Kanpur*

- Developed and analyzed RVE (Representative Volume Element) models for uni-directional (uniform, zig-zag, random) and bi-directional (plain, twin weave) composites at 60% volume fraction. Created optimized periodic meshes for accurate simulation and analysis.
- ***Tools/Libraries (used): Abaqus CAE, HyperMesh, TexGen, Python, Voxel Mesh***

3. *Experimental Study on Fluidic Thrust Vectoring by Secondary Gas Injection in Supersonic Nozzle* **Dec 2021 - June 2022**
(B.Tech / Guide: Prof. P. Lovaraju) *LBRCE*

- Pressure Distribution Analysis: Analyzed wall static pressure on the M-2 nozzle's top and bottom walls for NPRs of 4 and 5, and SPRs of 0.5 to 1.5, revealing significant pressure asymmetry between the walls.
- Shadow Graph Imaging: Captured shadow graphs at $0.5L_d$ and $0.75L_d$ injection locations, showing variations in flow patterns and shock wave behavior due to different injection positions.

- Flow Deflection and Thrust Loss: Measured flow deflection angles of 5° to 10° at $0.75L_d$ with SPRs of 0.5, 1.0, and 1.5. Recorded an average thrust loss of 8% to 10% with an exit plane elemental area of 1 mm^2, indicating a trade-off between flow control and thrust efficiency.
- ***Keywords: Shock wave, Expansion Fan, Bow shock, ANSYS Fluent, TechPlot, OriginLabs, SolidEdge, shadowgraph, OpenJet***

Course Projects

1. ***Development of a Multi-Material Model for Stress Analysis and Failure Prediction*** **Feb 2024 - April 2024**
*(**M.Tech / Guide: Prof. Abhishek Sarkar**)* *IIT Kanpur*

- Achieved 100% accurate stress calculations across varying boundary conditions and loading scenarios using a 1D Finite Element Model for multi-material composites.
- Utilized 4th order Lagrange interpolation and 3-point Gauss quadrature, along with the Tri-Diagonal Matrix Algorithm, to enhance the accuracy and efficiency of the FEM solver for composite stress and displacement analysis.
- Applied various failure theories to predict damage in composite materials, providing detailed insights into the impact of fiber orientation, boundary conditions, and interface bonds on stress distribution and failure behavior.

2. ***Damage Analysis in Cohesive Zone Elements Using Abaqus CAE*** **Mar 2024 - April 2024**
*(**M.Tech / Guide: Prof. Supratik Mukhopadhyay**)* *IIT Kanpur*

- Simulated damage in the cohesive zone of a double cantilever beam using Abaqus and compared the results with the analytical solution.
- Conducted simulations with varying onset strength parameters (maximum normal stress: 30 MPa and 10 MPa; maximum shear stress: 15 MPa and 5 MPa), and plotted reaction force versus tip opening displacement curves to observe and explain changes in curve shape.

3. ***FEM Solver for Bar and Beam Problems using Bar/Truss Elements*** **Feb 2024 - May 2024**
*(**M.Tech / Guide: Prof. P.M. Mohite**)* *IIT Kanpur*

- Developed an interactive MATLAB FEM solver for bar and beam problems using bar/truss elements, capable of handling complex boundary conditions and featuring an adaptive element adjustment algorithm for accurate point load simulation.
- Verified code results by comparing with analytical solutions and assessing convergence rate, utilizing Lagrange and Hierarchic shape functions up to 7th order with 10-point Gauss integration.

4. ***Comparative Study of 1D Differential Equation Solutions: FDM, FEM, FVM*** **Oct 2023 - Nov 2023**
*(**M.Tech / Faculty: Dr. Ashoke De**)* *IIT Kanpur*

- Implemented a MATLAB solver for a 1D differential equation using FDM, FEM, and FVM, comparing their efficacy and precision against known solutions.

Self Projects

1. Azure Pox: A Microsoft Azure Custom Vision Model for Monkeypox and Skin Lesion Prediction **August 2024**

- **Dataset:** Trained on 9,500+ images from the Mpox Skin Lesion Dataset v2.0, covering 6 classes: Mpox, Chickenpox, Measles, Cowpox, HFMD, and Healthy skin.
- **Performance:** Achieved 93.3% Precision, 91.0% Recall, and a 97.6% AP score, indicating high accuracy and reliability in predicting various skin lesions.
- ***Web Interface:*** Developed and deployed a Streamlit-based web interface for real-time image prediction, featuring instant upload support, sample images for user guidance, and detailed prediction results.

2. GANs-Based Image Generation Projects **July 2024 - Aug 2024**

- Developed a deep learning model using PyTorch and GANs for generating high-quality images across various domains.
- Achieved effective performance with a generator loss of 0.21% and discriminator loss of 98.49%, ensuring realistic image generation.
- Projects include *DeepAnime* (Anime Face Dataset with 63,000+ images), *DeepFashion*, and *Handwritten Digit Generation*.
- ***Keywords: PyTorch, DCGAN, Kaggle, GPU, Fashion Product Dataset, MNIST, torchvision, Colab.***

3. Comprehensive Data Analytics and Visualization of Olympic History **June 2024 - July 2024**

- Analyzed and visualized 128 years (1896-2024) of Olympic data, covering 301,116+ records.
- Integrated datasets for insights on athlete participation, medal trends, and country performance.

- Designed a Streamlit *Web Interface* with dynamic visualizations and filters.

4. Blinkit Data Analysis Dashboard using Power BI — May 2024

- Created an interactive Power BI dashboard analyzing 10 years of data for 8,500+ products, focusing on sales, customer behavior, and inventory.
- Integrated Excel data sources with dynamic filters, charts, and KPIs to enhance decision-making and operational insights.

5. IITK Aero MTech Companion GPT — Aug 2024

- Created an AI chatbot that guided 80% of IIT Kanpur Aerospace MTech students in course and elective selection, integrating instructor profiles and optimizing timetables for 70+ students.
- Enhanced academic planning with intuitive NLP-driven interactions, delivering customized course recommendations and real-time schedule updates based on official data.

6. Subsonic Aircraft Performance Modeling and Analysis Using Python — October 2022

- Developed a comprehensive performance estimation model for subsonic aircraft using Python in Jupyter Notebook, incorporating metrics such as drag polar, level flight, steady climb, range, endurance, coordinated turns, and take-off/landing for precise aircraft capability predictions
- Conducted in-depth data analysis post-model development to derive physical insights from the results, enhancing the understanding of aircraft performance and operational efficiency.

Online Courses

- **Coursera:**
- *Mathematics for Machine Learning and Data Science* (Aug 2024): *Linear Algebra* (Jun 2024), *Calculus* (Aug 2024), *Probability & Statistics* (Aug 2024).
- *Deep Learning with PyTorch: GANs* (Aug 2024), *AI For Everyone* (May 2020), *Programming for Everybody (Getting Started with Python)* (May 2020), *Ferrous Technology* (May 2020)
- **MathWorks:**
  - *Matlab Onramp* (Aug 2024): *Deep Learning Onramp* (Jun 2024), *Computer Vision Onramp* (Aug 2024), *Reinforcement Learning Onramp* (Aug 2024).
- **Internshala:**
  - *Ansys* (Nov 2021): Finite Element Analysis (FEA), Static Structural Analysis, Modal, Thermal, & Buckling Analysis
  - *Advanced SOLIDWORKS* (Jun 2021): Features Bundle, Design Tables and Configurations, Assemblies Advanced Mates, Assemblies Deep-Dive
- **Udemy**: *Finite Element Analysis Training : Altair Hypermesh & Abaqus* (Aug 2024)
- **APSSDC**: *Introduction to CATIA* (Jun 2020), *Advanced Surface Design by CATIA* (Jul 2020)
- **Programming Hub**: *C Programming* (Aug 2024)
- **Great Learning**: *Python Tkinter* (Aug 2024)

Course Work

- **Core Courses**
- Aerospace Structural Analysis
- Composite Materials
- Continuum Mechanics
- Damage Mechanics of Composite Materials
- CAD/CAM (UG)
- Industrial Engineering & Management (UG)
- **Numerical Courses**
- Computational Methods
- FEM
- Applied Numerical Methods
- CFD (UG)
- Machine Learning (online)
- Deep Learning (online)

Technical Skills

- **Languages:** Python, MATLAB, SQL C++, Fortran, HTML, CSS, JavaScript
- **Analysis:** Abaqus CAE, ANSYS (Workbench, Mechanical, Fluent), FEM, CFD
- **Post Processing:** OriginLab, Techplot 360 EX, Matplotlib, Plotly, Pandas
- **Libraries:** Seaborn, TensorFlow, PyTorch, Keras, NumPy, SymPy
- **MLOps:** GitHub, Streamlit
- **GUI Design:** Qt Designer, Tkinter
- **Utilities:** MS Office, Power BI, MS Azure
- **Modelling:** AutoCAD, CATIA V5, SolidWorks
- **Tools:** VS Code, Jupyter Notebook, Colab

Positions of Responsibility

- *Teaching Assistant* for Structural Analysis-1 **AE670**, IIT Kanpur (Jul 2024 – Present): Assisting under Prof. P.M. Mohite.
- *Sports & Gym Secretary* at Hall Executive Committee, Hall X, IIT Kanpur (Jul 2024 – Present): Supervising facilities for 496 members, organizing sports events, and supporting residents in hall/institute-level sports.
- *PG Student Guide* at ICS, IIT Kanpur (May 2024 – Present): Organized 12-day orientation, managed ID cards, campus tours, and welcome kits for new PG students, addressing mental well-being and academic concerns.
- *President* of Telugu Samskruthika Samiti (PG), IIT Kanpur (Aug 2024 – Present): Organizing sports, Food, Cultural activities, and Movie Screenings for 700+ members, facilitating alumni interactions.

Workshops

- Participated in the, *ANSYS Multiphysics Hands-On Workshop* conducted by CADFEM at IIT Kanpur.
- Attended the *Introduction to Aeromodelling*, conducted by by Raven Aerial Technologies PVT LTD, Chennai.
- Engaged in an online webinar on *Importance of Design in Engineering*, hosted by CREC, Tirupati.

Scholastic Achievements

- Honored with the *Academic Excellence Award* for achieving a (9.5 GPA) during the year 2023 at IIT Kanpur.
- Awarded the *Gold Medal and recognized as the Academic Topper* in the Bachelor of Technology program for the academic years 2019-2022.
- Awarded Elite + Silver Medal in the NPTEL *Aircraft Propulsion Course*.
- Recognized for *Exemplary Academic Performance and Awarded* for final semester UG project work.

Co-curricular Activities

- Presented a paper on *Dynamic Behavior and Damage Mechanism of 3D Braided Composite Fan Blades Under Bird Impact.*

Extra-curricular Activities

- Completed a 20-hour *Yoga* and *Table Tennis* certificate course.
- Participated in an industrial visit to HAL (Hindustan Aeronautics Limited) by IIT Kanpur.
- Volunteered for *World Space Week* conducted by SDSC SHAR ISRO, Sriharikota.
- Received a Certificate of Appreciation as a Coordinator for the event *Medical Herbs for Health*.
- Led event management and itinerary design for *Research Scholar Day 2024*, enhancing participant experience and ensuring smooth operations.

Others

- Strengths: Multitasking, Strong Work Ethic, Problem-Solving Skills, Adaptability
- Languages: English, Hindi, Telugu.

Declaration

I hereby declare that all the particulars, facts, and information stated above are true, correct, and complete to the best of my knowledge and belief.

Place: IIT Kanpur, UP (India) (Suresh Ragireddy)
Date: 30th Aug, 2024

Note: Highlighted are link to proofs and validation (if required).