

MARY YOCHANA MALLAVARAPU

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SUMMARY

Aerospace Engineering graduate student with hands-on experience in design, analysis, and research, specializing in Finite Element Analysis (FEA).

EDUCATION

M.S Aerospace Engineering, Arizona State University Dec 2024 | GPA: 3.24
Relevant Coursework: Finite Element Analysis, Aerospace Safety in Complex Systems, Unmanned Aerial Systems
B. Tech Aerospace Engineering, SRM Institute of Science and Technology May 2022 | GPA: 3.7
Relevant Coursework: Aircraft Structures, Applied Structural Mechanics, Experimental Stress Analysis, Aircraft Materials and Production Techniques

TECHNICAL SKILLS

Data Analysis and Statistics: R Studio
Design and Modeling Tools: SOLIDWORKS, Abaqus, AutoCAD, CATIA, Siemens NX CAD, COMSOL, MATLAB
Microsoft Office Suite: Word, PowerPoint, Excel
Soft Skills: Team Collaboration, Project Management, Communication, Adaptability, Time Management
Certifications: Interpersonal Skills in Project Management, ASU
Engineering Project Management, ASU
Forensic Engineering: Learning from Failure, Delft University
Lean Six Sigma, Council for Six Sigma Certification

PROFESSIONAL EXPERIENCE

Yang's Lab: Volunteer | Research, COMSOL Aug 2024 – Present

- **Collaborated** with a fellow graduate student on designing and analyzing **multilayered thermal protection tiles** for aerospace applications using **COMSOL Multiphysics**, enhancing **thermal insulation** capabilities for **high-temperature aerospace environments**.
- **Developed** detailed **finite element models** of tiles incorporating materials such as **Carbon Fiber, Tungsten, Silica Aerogel**, and **Borated Polyethylene**, assessing their **thermal and mechanical responses** under extreme thermal conditions (**1500°C initial environment temperature, 2000 W/m² heat flux**).
- Performed detailed **steady-state** and **transient heat transfer analyses**, determining effective thermal conductivity and temperature distributions, ensuring precise thermal management across tile layers.
- Performed **structural simulations** to evaluate **Von Mises stresses** and **displacement profiles**, identifying **critical stress concentration areas** caused by **differential thermal expansion**.
- Provided comprehensive insights into **thermal protection system design**, proposing improvements in **material configuration** and recommending **experimental validations** to enhance **reliability and structural integrity**.

RCI DRDL, Hyderabad, TG, India: Student Intern | ABAQUS Jan 2022 – May 2022

- **Designed** and analyzed **shear pin components** used in **aircraft towing systems** using **ABAQUS and MATLAB**, achieving **95% correlation** between simulation and theoretical predictions.
- **Developed 2D and 3D finite element models** of U-notched geometries with varying angles and depths, applying **ductile damage modeling** and **Ramberg-Osgood material behavior** for AISI 4340 steel.
- Conducted **mesh refinement** studies using higher-order elements (**QUAD8, TRI6**), improving accuracy in **stress prediction** and **reducing discretization errors**.
- Compared simulation results with **Roark's formulas** to validate **stress concentration factors (Kt)**, identifying optimal notch configuration (**60° angle, low h/r ratio**) for **improved fatigue resistance**.
- Delivered insights into **failure mechanisms** under different loading conditions, informing **design improvements** for safer, more reliable **aerospace components**.

Vaayusastra Pvt. Ltd., Chennai, India: Research and Development Intern | CATIA V5 Jun 2021 – Dec 2021

- Designed a cost-effective **thermal protection tile** using **natural fibers** like **sisal and basalt**, offering a sustainable alternative to conventional high-temperature insulation materials.
- Fabricated polymer matrix composites reinforced with **chemically treated sisal fiber** and varying silicon carbide (SiC) filler content (0%, 5%, 10%) using the **hand lay-up method**.
- Conducted **thermal and mechanical testing**, including tensile strength, thermal conductivity, and degradation analysis; 10% SiC samples achieved a **2.53x improvement** in tensile strength.
- Analyzed basalt fiber-reinforced aluminum composites fabricated via **stir and squeeze casting**, reporting a **41.6% increase** in

compressive strength and **14.4% improvement** in elastic modulus.

- Proposed a multilayer thermal protection tile structure incorporating basalt/Al7075 substrates, sol-gel silica aerogels, and nano-ceramic coatings for enhanced insulation and structural performance in aerospace environments.

OTHER WORK EXPERIENCE

Arizona State University, Tempe, AZ, USA: Teaching Assistant

Aug 2024 – Dec 2024

- **Mentored** and supported **120 undergraduate students**, providing structured academic guidance and additional tutoring sessions, leading to a **20% overall improvement** in class performance.
- Assisted faculty in **curriculum design** and **assessment**, effectively managing grading responsibilities and providing constructive feedback to students, enhancing the learning process.
- Offered regular office hours and personalized mentoring, supporting students in overcoming academic challenges and achieving targeted learning outcomes.

NASA L'SPACE Program: Outreach Officer and Scientist | *Siemens NX CAD, project management*

Jan 2024 – May 2024

- Led a cross-functional student team through real-world **NASA mission design practices**, simulating **Mars exploration**.
- Developed **detailed outreach plans, mission budgeting**, and **scheduling**, replicating **NASA standards** and workflows.
- Conducted landing site analysis, assessing water ice availability and geological conditions at **Mars' Terby Crater**.
- Collaborated **on systems integration** and electromechanical designs, coordinating sensor-actuator and enclosure layouts.
- Presented mission proposals in formal reviews (**MCR, SRR**) aligned with NASA proposal requirements.

OTHER PROJECTS

Multi-robot cooperative surface exploration on extraterrestrial bodies | MATLAB

- Developed a cooperative multi-robot exploration system inspired by **biological swarm intelligence** for navigating **extraterrestrial terrains**, such as Mars.
- Implemented **collaborative autonomy** for optimized exploration, enabling robots to efficiently detect key Points of Interest (POIs) and avoid obstacles.
- Simulated robot operations in a 50x50 grid environment, **applying Breadth-First Search (BFS) algorithms** for efficient path optimization and obstacle avoidance.
- Designed and analyzed a **mathematical equilibrium model** to achieve comprehensive area coverage under constrained communication.
- **Validated system** effectiveness through simulations, preparing for further testing of advanced **bio-inspired** collaboration strategies in **MATLAB**.