Venkata Sai Saran Grandhe

Fourth Year Undergraduate
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EDUCATION

Year	Degree/Examination	Institute	CGPA / Percentage
2024	B. Tech Mechanical Engineering (Micro: AI and ML)	IIT Kharagpur	9.22 / 10
2020	Class XII	Pinegrove Junior College	98.00%
2018	Class X	Montessori High School	10/10

INTERNSHIPS

Designing of Low-Cost Flowmeter for Subsurface Fluxes | Université of Rennes ***May 2023***

Guide: Prof. Alain Crave (Observatorie des Sciences de l'Univers de Rennes, France)

- Pioneered a groundbreaking flowmeter utilizing innovative Mechatronics, incorporating a metal-ceramic heater
- Incorporated thermal techniques featuring a heating source and a thermistor for temperature measurement
- Constructed highly realistic experimental setup replicating underground conditions, varying flow and conductivity
- Validated the precision through COMSOL, successfully demonstrating its practicality using Lost point installation

Oil Droplet Tracking in Oil Spills | IIT Kharagpur ***May 2022***

Guide: Prof. Aditya Bandopadyay (Computational Fluids Lab, Department of Mechanical Engineering)

- Aimed to predict path of oil droplets on water surface, using a wedge body model of solid mechanics
- Examined the droplet trajectory by performing the ripple tank experiment and used image processing techniques
- Simulated the experimental conditions to understand the interference of ripples using COMSOL software
- Evaluated the Droplet Dynamics under different conditions, solving coupled ordinary differential equations
- Achieved development of the final model with factors mimicking the viscosity and radiation pressure validated by experimental results

THESIS

Traverse Compliant Stage for Automated Microscopy | Bachelor Thesis Project ***Aug 2023 - Nov 2023***

Guide: Prof. Aditya Bandyopadhyay

- Developed Compliant mechanisms using FACT and topology optimization to achieve a 10x reduction in output displacement, enhancing precision in automated microscopy
- Conducted non-linear FEA to validate the performance of compliant mechanisms, ensuring their structural integrity
- Confirmed design efficacy through experiments, aligning closely with FEA predictions and assuring the reliability of the compliant stage
- Successfully engineered compliant mechanisms, achieving a remarkable 520-um output motion with just 1 degree of input rotation, demonstrating precision and ingenuity in mechanical design

PROJECTS

Self-Built Quadruped from Scratch | Bio Robotics Research Group **Jun 2022- Present**

- Designed a high reduction ratio back drivable Eccentric Cycloidal Actuator for robot joints, driven by DC Motor
- Implemented PID Control on actuator and obtained fast angular position seeking response, robust to disturbances
- Developed a 3D printed leg prototype modelled by a Five-Bar Linkage with Servo, replicating larger scale model
- Implemented Forward Kinematics and iterative Inverse Kinematics for leg mechanism and made a driver code

Smart Particle Image Velocimetry **Sep 2022- Oct 2022**

- Developed a simple, smartphone scalable software to predict flow velocities of 2D flows with continuous laser
- Analyzed two consecutive frames of flow video using Cross-Correlation and Optical Flow to determine the velocity
- Achieved an accuracy of 92.5% in comparison to Conventional Particle Image Velocimetry, providing alternative

Stress Analysis of Bike Crank under Human Load | Cornell University **Jul 2022**

- Developed a solution to a 3D structural Mechanics problem using Ansys and determined stress distribution
- Applied Theory of elasticity to verify and validate Numerical results and improved design by detecting failure point

Electric Stethoscope | DIY Lab **Feb 2022**

- Designed low-cost, portable electric stethoscope with components – IC 741, capacitors and resistors
- Modelled the casing, with LED indication, volume adjustment, printed using Fused Deposition Modelling
- Used a rechargeable battery and Battery Management System as the power source for stethoscope

COMPETITIONS

Bio-Inspired Robot for Borewell Rescue | Smart India Hackathon **Jun 2022- Present**

- Developed a novel bio-inspired Robot for Borewell Rescue operation inspired by a caterpillar's propagation
- Utilized advanced sensory technology, including RGB-D camera, to create a 3D map for precise child location
- Designed an inflatable balloon gripper for gentle and safe child extraction from the borewell considering durability

RELEVANT SKILLS

Languages: Python, C, C++, LaTeX
Simulation: COMSOL Multiphysics, OpenFOAM, Ansys, ABAQUS
CAD/CAE: Autodesk Fusion 360, Solidworks, Ultimaker Cura, Rhino
Tools: MATLAB, Engineering Equation Solver, LTSpice, Octave
Other Skills: 3D Printing, Design of Experiments, Laser Cutting, CNC Machining

ACHIEVEMENTS

- Secured Branch Change, being within the top 5% of the total students in IIT Kharagpur
- Holding **Department Rank 1** among 170 B. Tech students of Mechanical Engineering Department
- Secured a percentile of 99.039 in JEE Mains and 4266 rank in JEE Advanced all over India
- Received Academic Excellence Scholarship by BSNL, a government telecom company in India

CERTIFICATIONS

- Modelling and Design for Mechanical Engineering with Autodesk Fusion 360
- MATLAB Onramp, offered by MathWorks
- Modern Robotics - Foundations to Robot Motion offered by Northwestern University

POSITIONS OF RESPONSIBILITY

Undergraduate Department Representative | UG Council **Sep 2023 – Present**

- Elected as the Academic Representative for Department of Mechanical Engineering among 1600+ students
- Leading the student body of undergraduate students, taking care of academic and non-academic problems

Coordinator | Mechanical Engineering Society, Mekanika **Dec 2021 — Jun 2023**

- Elected as the Coordinator for Mechanical Engineering Society, IIT Kharagpur for academic session 2021-23
- Initiated a Blog Series named "Core Expedition" to create awareness among students about opportunities

TEACHING EXPERIENCE

Teaching Assistant | NPTEL Swayam **Jul 2022 – Sep 2022**

- Teaching Assistant for Concepts of Thermodynamics Course on NPTEL, a scheme of Govt of India
- Mentored the Students by clarifying their doubts and preparing assignments and question papers

EXTRACURRICULAR ACTIVITIES

•Active Student Member of the **Institution of Mechanical Engineers (IMechE)**, community of Mechanical Engineers
•Member of Silver Winning **Inter Hall Data Analytics**, solving Time Series Forecasting Problem
•Designed a **Self - Balancing, Battery powered Unicycle** for Bharat Cycle Design Challenge 2023
Volunteering •Unit Leader: Managed the group of 40 NSS Volunteers of the **National Service Scheme (NSS)**
Sports and Culture •Member of the Hockey team of Nehru Hall of Residence •Choreography and Dance

- Sketching and Painting

Note: All my Projects and related data can be viewed on my GitHub Profile **saisarangv2002**