

Pavan Kushal Velagaleti

Portfolio link

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EDUCATION

- **Mahindra University** Hyderabad, India
Bachelor of Technology - Mechanical Engineering; CGPA: 7.6/10 *July 2019 - June 2023*
- **Relevant Coursework:** Mathematics - Single and Multivariate Calculus, Linear Algebra, Probability Theory and Statistics, Numerical Methods, Partial Differential Equations, Design of Machine Elements, Transport Phenomenon and Fluid Dynamics and Computational Fluid Dynamics, Flight Dynamics and Performance, Jet and Rocket Propulsion, Time Series Analysis and Forecasting, Control Systems

SKILLS SUMMARY

- **Technologies:** ROS, OpenCV, ANSYS, SciKit, CUDA, spaCy, TensorFlow, Keras, SQLite, Embedded Linux
- **Tools:** GrabCAD, Autodesk PLM, Git, ROS Gazebo, Solidworks, Lotus SHARK, IPG-Carmaker, HSMWorks, Cura
- **Lab and Workshop:** Experience with managing a mechanical workshop and operating various hand and machine tools, including programming, setup and operating of CNC Mill and Lathe.
- **Programming:** Python, C++, JavaScript, SQL, C

EXPERIENCE

NANOFUSION

Intern

March 2022 - May 2022

- **Design and analysis:** To study manufacturability of different geometries, designed an exhaust manifold using Solidworks (surface modelling) to be manufactured using additive manufacturing and used analysis techniques to study both the fitness for intended use (FEM) as well as manufacturability.

AEROSPACE AND CFD PROJECTS

- **High-speed Missiles using Transverse Sonic Injections:** Studied the impact of sonic injections in supersonic flow for control applications in high-speed missiles. Skills and Achievements: Conducted numerical study using Navier-Stokes equations and k-omega turbulence model in commercial CFD software ANSYS Fluent. Verified grid independence and captured key flow features such as shocks, separation, reattachments, and recirculation. Developed parameter (C_p) diff to characterize spatial interference of side jet with cross flow. Achieved good agreement between experimental and computed values. Investigated impact of number of jets on missile pitching moment characteristics.
- **Rayleigh Taylor Instabilities in Space:** Studied the Rayleigh Taylor phenomena from various academic papers. Wrote a CFD code of the phenomena using ANSYS fluent and studying the Rayleigh Taylor, plateau-Rayleigh and the Rehmeier-Menshov instability and their key differences using Atwood number and turbulence models such as K-L Turbulence models. (May '21)

ROBOTICS AND AI PROJECTS

- **Sign Language Detection (Deep Learning, Computer Vision):** Deep learning model to recognize sign languages using LSTM and OpenCV on IPython notebook. Tech: Python, Jupyter, OpenCV, TensorFlow, Matplotlib, Mediapipe (February '23)
- **Home Service Robot:** Built a home service mobile robot that is able to pick and drop objects autonomously navigating itself around the surroundings using localization, mapping, and navigation. Tech: C++, catkin-make, RTABMAP, RGBD-SLAM, SQL, AMCL, Teleop packages, shell scripting (January '23)
- **Reinforcement Learning on Open AI - 2D Autonomous Driving (Reinforcement Learning, Computer Vision):** AI model to solve the Open AI based 2D driving model using a multi-layer perceptron policy on Nvidia-cuda for the GEFORCE GTX 1050 Ti. Stable baselines, swig libraries were used. Conda was used to set the environment. (November '22)

SAE BAJA

- **Chimp:** Worked under the gas monkeys racing for the brakes system for SAE BAJA 2020 on the designed car/buggy called The Chimp. Our primary aim was to build a perfect fluid based brakes system for The Chimp. Also assisted the team in various departmental manufacturing.
- **Gorilla:** Worked under the gas monkeys racing on the ergonomics department as well as assisted in the drivetrain compartment for the event SAE BAJA 2021 which was virtually conducted due to COVID-19 pandemic.
- **Emperor Tamarin:** Designed and Manufactured a 4-wheel drive vehicle, Emperor Tamarin, for SAE BAJA 2021 as Co-Captain. Implemented cutting brakes and open differential setup inspired by the Gorilla model. Designed front "double wishbone" suspension and rear "h-arm" with "camber link" setup for improved performance. Managed team core technical decisions, finances and logistics, ensuring smooth operations throughout the project. Presented DFMEA/PFMEA analyses for vehicle safety and quality during the industry standardised virtual round of the competition.
- **Hanuman:** Developed a full-vehicle dynamics model and workflow to allow repeated iteration and testing of candidate designs for suspension and steering geometries.

PUBLICATIONS

- **Research on Missiles:** Work in Progress to be published on High-speed Missiles using Transverse Sonic Injections.

CLUBS AND SOCIETIES

- **Gas Monkeys Racing**
Student club member *May 2019 - July 2023 (head from September 2021-September 2022)*
 - : started of as a brakes member, moved on to designing and manufacturing of suspension and powertrain components. finally develloped vehicle dynamics and worked as student mentor for the team.
 - **Impact:** Brought to completion 3 projects, a RWD buggy, a 4WD buggy and a Go-kart.
- **Orion Club of MEC**
Student club member *September 2019 - April 2022*
 - **Club member:** Designed and assembled hobby-style RC planes with a mix of traditional (foamboard) as well as modern (3D printed) manufacturing techniques.

ACTIVITIES AND HONORS

- Handled 13 lakh Indian rupees for the SAE BAJA competition 2022 for the Gas Monkeys Racing as its captain
- Awarded People's Choice for Mastershot 2019
- Second Runner's Up for Capture the Flag organized by the Cyber Security Club in 2020
- Played as a right winger/midfielder for the football team of Mahindra University from 2019 to 2022

CERTIFICATIONS

- **University of Michigan (MOOC):** Python for everybody - Coursera (October 2022)
- **Udacity Nanodegree:** Robotic software engineer (January 2023)
- **SAE BAJA-2022:** Student team participation certificate

VOLUNTEER EXPERIENCE

- **Host for the Art Fest Kalakriti-2019** Hyderabad, India
Presented the event and performances for Kalakriti during the freshman semester *November 2019*
- **Event Organizer for the Baja Food Fest-2021** Hyderabad, India
Organized a fundraising event for the Gas Monkeys Racing and raised 2 lakh INR *January 2018 - Present*