Pavan Kushal Velagaleti

Portfolio link
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EDUCATION

- **New York University Tandon School of Engineering** — Brooklyn, NY, USA
  Master of Science in Mechatronics and Robotics — *Aug 2025 – May 2027 (Expected)*

- **Mahindra University** — Hyderabad, India
  Bachelor of Technology - Mechanical Engineering; — *July 2019 – July 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:** Robot Operating system(ROS2), OpenCV, ANSYS, SciKit, CUDA, spaCy, TensorFlow, Keras, SQLite, Embedded Linux
- **Tools:** GrabCAD, Autodesk PLM, Git, ROS Gazebo, Solidworks, Lotus SHARK, Fusion360, IPG-Carmaker, HSMWorks, Cura, Autodesk Vault
- **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:** C++, C, Git, Bash, JavaScript, SQL, Python

EXPERIENCE

- **Articulus Surgical**
  Robotic Software Engineer — *July 2023 – Present*
  - Designed and implemented a CAN-based software architecture, achieving ultra-low latency and enhanced stability for real-time surgical robotic operations.
  - Developed custom libraries for algorithm development, including inverse and forward kinematics, optimizing motion control precision.
  - Achieved 20–30 ms response times between surgical console and robot by implementing multithreading and optimizing real-time communication protocols.
  - Simulated robotic systems using Gazebo and PyBullet, leveraging Fast DDS and Cyclone DDS for middleware integration.
  - Engineered scripts to manage and display system data on dashboards, including simulations, warnings, and data plots, ensuring robust and scalable system performance.
  - Transitioned beyond conventional ROS frameworks to create a tailored architecture for high-precision, dynamic, real-time environments.
  - Spearheaded the development of surgical technology frameworks for seamless integration into operating rooms, ensuring compliance with clinical standards.
  - Collaborated cross-functionally to deliver innovative solutions aligned with the company's mission to provide accessible surgical robotics to underserved Tier 2 and Tier 3 cities.

PROJECTS

- **High-speed Missiles using Transverse Sonic Injections:** Researched sonic injections in supersonic flow for high-speed missile control. Employed ANSYS Fluent to numerically study flow behavior, capturing essential features, and achieving alignment with experimental data. Investigated the effects of jet count on missile pitching moment characteristics.
- **Rayleigh Taylor Instabilities in Space:** Explored Rayleigh Taylor phenomena using ANSYS Fluent, investigating distinct instability types via turbulence models and Atwood number variations.
- **Sign Language Detection (Deep Learning, Computer Vision):** Engineered deep learning model utilizing LSTM and OpenCV to recognize sign languages. Skillset includes Python, Jupyter, TensorFlow, and Matplotlib.
- **Home Service Robot:** Constructed an autonomous robot for object manipulation, integrating localization, mapping, and navigation. Implemented in C++, RTABMAP, RGBD-SLAM, SQL, AMCL, Teleop.
- **Autonomous Drones:** Simulated ROS2-controlled drone docking using micro-ros-agent, establishing effective PX4-ROS2 communication.
- **Reinforcement Learning on Open AI - 2D Autonomous Driving:** Developed AI model for 2D driving using multi-layer perceptron policy on Nvidia-CUDA, leveraging stable baselines, swig, and conda.

SAE BAJA

- **Chimp:** Collaborated on fluid-based brake system, supported tasks and manufacturing.

- **Gorilla:** Assisted in ergonomics and drivetrain development amidst COVID-19 constraints.

- **Emperor Tamarin:** Co-Captain: Led the design and manufacturing of a 4WD vehicle. Innovated a novel suspension system and presented a robust safety analysis using DFMEA approach.

- **Hanuman:** Spearheaded comprehensive vehicle dynamics and steering testing, ensuring performance excellence.

PUBLICATIONS

- **Aerospace Sciences and Technology - August Edition:** Numerical Exploration of Sonic Injection in Supersonic Cross Flow, Paper Code: V75 N3/1218-2023. Accepted as a Student Paper on 05 Jul 2023. Pages 299–308.

CLUBS AND SOCIETIES

- **Gas Monkeys Racing**
  Student Club Member   *May 2019 – July 2023 (Head: Sep 2021–Sep 2022)*
  - **Co-Captain, Suspension, Vehicle Dynamics:** Started as brakes member, progressed to designing/manufacturing suspension and powertrain. Eventually led vehicle dynamics and mentored the team.
  - **Impact:** Delivered 3 completed projects: an RWD buggy, a 4WD buggy, and a go-kart.

- **Orion Club of MEC**
  Student Club Member   *Sep 2019 – Apr 2022*
  - Designed and assembled RC planes using foamboard and 3D-printed parts.

ACTIVITIES AND HONORS

- Handled 13 Lakh budget for SAE BAJA 2022 as captain of Gas Monkeys Racing.

- Awarded People's Choice for Mastershot 2019.

- Second Runner-up in Capture the Flag by Cyber Security Club (2020).

- Played right winger/midfielder for Mahindra University football team (2019–2022).

CERTIFICATIONS

- **University of Michigan (MOOC):** Python for Everybody – Coursera (Oct 2022)
- **Udacity Nanodegree:** Robotic Software Engineer (Jan 2023)
- **SAE BAJA-2022:** Student Team Participation Certificate

VOLUNTEER EXPERIENCE

- **Host for Art Fest Kalakriti 2019**   Hyderabad, India
  Presented the event and performances during the freshman semester   *Nov 2019*

- **Event Organizer for Baja Food Fest 2021**   Hyderabad, India
  Organized fundraising event and raised 2 Lakh for Gas Monkeys Racing   *Jan 2021*