

SAIBERNARD YOGENDRAN

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EDUCATION

University of Pennsylvania

- MSE in Robotics** with entrepreneurship and management courses from **Wharton School** **May 2024**
Courses: 1) Introduction to Robotics, 2) Machine Learning, 3) Machine Perception, 4) Advanced Robotics, 5) F1/10 Autonomous Racing Cars, 6) Engineering Entrepreneurship, 7) Advanced Perception, 8) Control and Optimization with Application in Robotics, 9) Negotiations (Wharton), 10) Idea Generation and Systematic Approach for Creativity (Wharton)

Anna University

- Bachelor of Engineering in Automobile Engineering **April 2018**
Honors: *cum laude*; **Rank 1 in college** with First Class Distinction; Best performing engineering Student in college; Gold medallist

TECHNICAL SKILLS AND AREAS OF KNOWLEDGE

C, C++, Matlab (expert), GD & T, ROS 1, ROS2, Git, LabView, Gazebo, R programming(basic) Python (Open CV, Tensor Flow), Simulink, Atmel Studio, KiCAD, Proteus ISIS, OrCAD Capture, Hyperworks, Converge Studio (CFD), ADAMS Car, Pcan View, Microsoft Office (Word, Excel, Excel VBA, PowerPoint, Project), Catia, Ansys, NEC, AutoCAD

WORK EXPERIENCE

Amazon Robotics

North Reading, MA, USA

Hardware Development Engineer Intern

May 2023 – August 2023

In the Amazon manipulator robot research initiative, I led innovative hardware development efforts, emphasizing the creation of advanced test methodologies and communication with multiple stakeholders for manipulator robot actuators. I pioneered the design, development, and creation of a specialized test bed valuing to \$ 135 k dollars, optimized for thorough evaluation of next-gen actuators, laying the foundation for Amazon's critical advancements in manipulator robot technology and created quip docs, BOM for each steps involved. In the subsequent phase of my internship, migrated to a research scientist intern role where I was pivotal in crafting algorithms for reachability analysis of a 6-DOF robot, implementing collision detection models, and generating capsules for robot link simulations. **Tools utilized:** Python, Brazil, Matlab, C++, Simulink, Agile PDM, Solidworks, Ansys

General Robotics Automation Sensing and Perception Lab (GRASP LAB)

Philadelphia, USA

➤ Research Assistant – Kumar Lab (Tools: C++, ROS2, Python, KiCAD)

August 2022 – Present

Working as a research assistant to **Dean Dr. Vijay Kumar** and Jake Welde in developing aerial robots for pick and place applications using Bidirectional Thrust Quadrotors.

- i) Current work involves testing different motors in test bench, logging data, analysing motor characteristics and creating bode plots.
- ii) Designed, analyzed and manufactured a rigid drone platform with enhanced quadrotor dynamics which is acting as a base platform for all the research activities in Kumar Lab. Executed comprehensive PCB design, simulation, and fabrication, optimizing for efficient bidirectional performance and seamless system integration.

➤ Research Assistant – XLab (Autonomous Systems)

November 2022 – May 2023

Working as a research assistant to Dr. Raghu Mangharam in developing autonomous go kart and doing independent research along with Dr. Raghu Mangharam on "Path tracking on autonomous vehicles at the limit of friction" and "Adaptive autonomous driving on multifriction surfaces". **Tools:** ROS1, ROS2, C ++, Python, Matlab

- i) Deploying an Unscented Kalman Filter for F1tenth autonomous car for accurate state estimation. Calibrated sensors for stereo camera and LiDar; created a Python state estimation script for detailed vehicle sensor data logging. Compared this data with ground truth for filter performance enhancement. Integrated state values with a Multi-Friction Model and MPC to optimize vehicle performance.

Jayem Automotives Private Limited

Coimbatore, India

Program Management – Electric Vehicles and Alternate Fuels (Tools: Agile, Matlab, C++, Embedded C, LabView, KiCAD)

May 2020 – Feb 2022

- Worked as a technical executive to the Managing Director of the company, Mr. J. Anand by handling multiple programs for the company, implemented products through DFM, DFA and developed revenue generating models and offered technical solutions to our clients.
- Managed a team of 8 members and successfully demonstrated a prototype of 100-tonne dumper truck which runs on dual-fuel.
- Managed testing and calibration activities for electric vehicles in dynamometer and on road and analysed data in Matlab, ADAMS for optimal results.
- Part of a team in testing ADAS system for Mahindra XUV 700 vehicle. Tested and validated practically on Adaptive Cruise Control, Lane change and crash prevention.

Technical Engineer – Electric Vehicles & Engines (Tools: Agile, Matlab, C++, Python, PCan, LabView, PTC Creo, KiCAD)

Feb 2020 – July 2021

- Validated performance, stall torque of electric motor in dynamometer and validated thermal performance of battery pack.
- Calibrated dump truck engine (1100 hp) to support dual-fuel (Diesel & LNG) and validated performance on dynamometer.
- Integrated vehicle electronics and dual fuel system in the dump truck and
- Developed GUI using Matlab during research phase of electric vehicle to automate process for complex calculations, leading to time saving of 200 hours.

JA Motorsport

Coimbatore, India

Technical Engineer – Formula Racing and Special Projects (PiToolbox, Matlab, SolidWorks, ANSYS, Embedded C)

July 2018 – Feb 2020

- Responsible for integration of power electronics, development of data logger in formula cars and two-seater racing cars.
- Professional testing driver and data engineer for formula cars.
- Designed aero ducts for rear brakes cooling in a two seater car, optimized dynamics, built gear ratio calculator (circuit based) using Matlab and optimized drivetrain performance of the car during testing with a lap record time of 59.9 seconds, gaining 2.3 seconds from the previous track record in Kari Motor Speedway, Coimbatore.
- Operated engine dyno, chassis dyno, suspension dyno (SPA UK) for formula cars, and engines and validated results.
- Managed a team of 8 members for track testing prototype cars, planned timelines, fuel calculations, and involved in building of ITC (Indian Touring car) as a system engineer.

RESEARCH EXPERIENCE AND PROJECTS

➤ "DESIGN AND DEVELOPMENT OF A BIDIRECTIONAL-CAPABLE QUADROTOR DRONE FOR IMPROVED MANEUVERABILITY IN CONSTRAINED ENVIRONMENTS"

Designed, developed, and programmed a bidirectional-capable quadrotor drone with a focus on greater maneuverability in constrained environments. Worked on the design, hardware, electronics, and currently working on the programming aspects of the project from start to finish, collaborating with Jake Welde and Katie Mao.

➤ "AUTONOMOUS RACING CAR CONTROL SYSTEM: DEVELOPMENT OF LATERAL CONTROL FOR DEFENSIVE DRIVING ([video](#)) ([report](#))" (Upenn, May 2023)

Implemented Python and ROS2-based lateral controller for defensive racing in a F1 1/10 scale autonomous vehicle. Utilized vision for opponent detection, pure pursuit algorithms for path planning, and developed a custom planner using lidar and Intel Real Sense depth camera for safe, efficient race decisions. **Tools:** ROS2, Python, CUDA

➤ "PYTHON PROGRAMMING FOR EFFICIENT CRAZYFLIE 2.0 QUADCOPTER NAVIGATION WITH DIJKSTRA AND A-STAR ALGORITHMS" (Upenn, March 2023)

Programmed and simulated a Crazyflie 2.0 quadcopter using Python, implementing Dijkstra and A-star algorithms for efficient obstacle navigation. Optimized the code to ensure the quadcopter followed the planned path within a specified time frame. **Tools:** Python, Matlab, C++

➤ "AUTONOMOUS PICK-AND-PLACE SYSTEM FOR STACKING BLOCKS USING FRANKA EMIKA PANDA ARM (7DOF) AND ROS FRAMEWORK: ALGORITHM DESIGN AND IMPLEMENTATION TO WIN STUDENT COMPETITION" (Upenn, December 2022)

Developed and integrated sophisticated algorithms such as FK, IK, A-star, and RRT for the Franka Emika Panda Arm (7DOF) leveraging OpenCV, Python, and ROS. Innovated advanced planning strategies, improving the robot's pick-and-place efficiency. Utilized a combination of sensors and algorithms to optimize the stacking approach, resulting in victory in a competitive challenge of 100 participants. This achievement set a new record for the highest stack of blocks in a limited timeframe. **Tools:** Python, Matlab, C++, Rviz

➤ **"LOAN REPAYMENT PREDICTION USING MACHINE LEARNING MODELS FOR SBA-GUARANTEED LOANS"** (Upenn, December 2022)

Project involved analysis and prediction of loan repayment using a combination of financial and non-financial factors for SBA-guaranteed loans. Various models such as logistic regression, random forest, and Tab Net were implemented. **Tools:** Pytorch, CUDA, C++, Python

➤ **"DESIGN OF INTELLIGENT FUEL INJECTION SYSTEM TO CONTROL WHEEL TORQUE"** [thesis](#) (SVCE, March 2018)

Developed weight-based torque control system for motorcycles to increase fuel efficiency and performance. Simulated vehicle parameters using coast down test, tested sprocket, designed AVR microcontroller-based control system to adjust injection pulses based on load cell and EGO sensor input. Analyzed data using MATLAB.

➤ **SAE BAJA** (SVCE, Feb-2016 - February 2018)

Chief Technical Officer of Team Traxion, Suspension team head, Head of R&D, Head of Vehicle Testing

Led vehicle dynamics research, integrating systems and subsystems to improve performance. Conducted testing and validated results using simulations and practical tests.

Developed a suspension algorithm in Matlab for different terrains, resulting in an overall rank of 22.

PAPERS AND PUBLICATIONS

- Saibernard Yogendran, Nilesh Kumar, Sudarsan V, "Yaw Controller And Independent Braking System", International Journal of Advanced Research Methodology in Engineering & Technology, ISSN 2456-6446 Volume 1, ISSUE 3, May 2017, Pages (44-50)
- Saibernard Yogendran, "Estimation of Vertical and Tire Force in a Vehicle," International journal of Information Research and Review, Volume 04, Issue 09, Page No. 4477-4480, September 2017.

PATENT

Saibernard Yogendran, "Smart Interconnect Delivery System," Patent no: 202141012978, Status: Patent Pending. (Feb 2021 Chennai, India)

My concept uses smart electric high speed autonomous travelling boxes in a dedicated rail track suspended and connected between poles to deliver products within cities or a community, charged by solar energy and existing electric poles.

STARTUP EXPERIENCE

Founder & Technical head (2020 – Present, Chennai, India)

Founded a startup to design electronic gadgets (smart systems, Bluetooth enables control system for house) and manufacture 3d printed parts, for customers based on their requirements. Lead a team of 3; > 20 prototypes; >100 units sold. Designed and manufactured low-cost face shield and supplied during covid period.

INTERNSHIPS

RANE TRW STEERING SYSTEMS PVT LTD (2017 Chennai, India)

ENGINEERING INTERN – June 2017 to July 2017

- Groundwork for the company's new vertical on designing semi active suspension system. Designed quarter car model using Simulink, and developed prototype using AVR microcontroller.

MARUTHI SUZUKI SERVICE CENTRE (2015 Chennai, India)

- Utilised semester break and worked in Maruthi Suzuki car service centre as assistant technician to meet the needs of academic project expense. Work comprises engine oil & gearbox oil top up, brake pads changing, electrical diagnostics, general check-up and customer interaction.

HONDA MOTORBIKE SERVICE CENTRE (2015 Chennai, India)

- Utilised inter-semester break and worked in Honda service centre as assistant technician. Work comprises rectifying electrical problems in Honda motorcycle, checking fluid levels and topping up if necessary, cleaning vehicle and test driving.

TVS MOTORBIKE SERVICE CENTRE (2014 Chennai, India)

MECHANIC – April 2014 to July 2014

- During high school vacation, gained hands-on experience in automobile maintenance to gain exposure and pay for college tuition fees. Assisted the main technician with tools, servicing of brake shoes, brake pads, oil draining, and refilling.

AWARDS AND HONOURS

- MEAM 5200 STACKING CHALLENGE COMPETITION WINNER** (Upenn, 2022)
Won first place among 100 students in the pick and place competition using FRANKA EMIKA panda arm robot. Coded, strategized the franka emika robot to pick and place static and dynamic blocks. Won the competition with the highest blocks stacked. Coded using python, simulated using ROS & Gazebo.
- CTS AWARD** (SVCE, 2018)
CTS Award (sponsored by Cognizant) - Best outgoing student of the year 2018 among 1100 students of different disciplines.
- BEST PERFORMING AUTOMOBILE ENGINEERING STUDENT** (SVCE, 2018)
Gold medallist – Rank 1 in department.
- BEST AUTO SOLUTION AWARD** (TAFE, 2018)
"Best auto solution award" presented by TAFE Pvt Limited for my final year thesis "Design of Intelligent Fuel Injection System to Control Wheel Torque," awarded among 1500 students in the competition - "TAFE Innovista."
- BEST PROJECT AWARD** (SVCE, 2018)
"Best project award" presented by TAFE Pvt Limited for my final year thesis "Design of Intelligent Fuel Injection System to Control Wheel Torque."
- INNOVATION AWARD OF THE YEAR - 2018** (SVCE, 2018)
Received innovation award of the year among 850 students at the SVCE "INNOVATES" event for the project "Intelligent Tractive Effort Controller through Pneumatic Suspension."
- INNOVATION AWARD OF THE YEAR - 2017** (SVCE, 2017)
Received innovation award of the year among 920 students at the SVCE "INNOVATES" event for the project "Variable Braking Force System in Two Wheelers."
- BEST MINI PROJECT AWARD** (SVCE, 2015)
Best mini project of the year awarded by SVCE for my project "Troxler effect and its impact" during my freshman year.
- BEST SCIENCE STUDENT OF THE YEAR AWARD** (Chennai, 2014)
Received best science student of the year award during my high school for demonstrating a working model of automatic braking system for cars.

LEADERSHIP

Chief Technical Officer	: SAE Baja Team "Team Traxion"	(Academic year 2017-2018)
Chairman	: SAE COLLEGIATE CLUB, SVCE	(Academic year 2017-2018)
Head of peer mentoring	: SVCE Peer-mentorship program	(Academic year 2017-2018)
Suspension Technical Lead	: SAE Baja Team, "Team Traxion Prithvi"	(Academic year 2016-2017)
Vice-Chairman	: SAE COLLEGIATE CLUB, SVCE	(Academic year 2016-2017)