

SHURENDHER KUMAR SAMPATHKUMAR

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SUMMARY

- Mechanical Engineer with around 2 years of experience in mechanical design, prototyping, and manufacturing.
- Expertise in CAD modeling, rapid prototyping, DFMA, GD&T, and cross-functional collaboration.
- Experienced in structural analysis, thermal management, materials selection, and design optimization.
- Passionate about creating scalable, optimized mechanical solutions from the initial concept through full-scale production.

TECHNICAL SKILLS

- **CAD & Analysis:** SolidWorks, CATIA, PTC Creo, Autodesk Fusion, ANSYS, Abaqus, MATLAB, Python.
- **Manufacturing:** Design for Manufacturing & Assembly (DFMA - Sheet Metal, Injection Molding, CNC, 3D printing, vacuum forming, laser cutting), GD&T (ASME Y14.5), tolerance stack-up analysis.
- **Hardware Integration:** Brushless DC motors (BLDC) control, servo motor, Inertial Measurement Unit (IMU), embedded development (Arduino, Raspberry Pi), LiDAR, camera, communication protocols (UART, CAN, SPI), RFID, soldering, C++.
- **Quality & Reliability:** Root cause analysis, Failure Mode & Effects Analysis (FMEA).

EXPERIENCE

Mechanical and Embedded Systems Intern – *Meteora3D, Cincinnati, OH*

Apr 2025 – Present

- Designed and fabricated mechanical components for 3D printer prototype.
 - Created detailed CAD models, machine drawings and rapidly iterated through prototype cycles.
 - Leveraged FDM and SLA 3D-printing platforms to produce functional prototypes and test fixtures.
 - Assembled and commissioned printer prototypes, troubleshooting mechanical and electrical issues.
- Coordinated with machine shop for precision fabrication, ensuring accuracy and high-quality assembly.
- Developed and optimized embedded motor firmware, achieving a 12.5% improvement in energy efficiency.
- Integrated camera and time-of-flight sensors with the existing system stack.
- Configured the vision system for feature and ArUco marker tracking using OpenCV.
- Devised a calibration routine for sensor less homing and load measurement eliminating the need for end stops and load sensors.

Graduate Researcher - *IASRL University of Cincinnati, Cincinnati, OH*

Jan 2022 – Apr 2025

- Engineered mechanical subsystems and developed overall architecture for robotic test platforms.
- Conducted system-level integration, hardware troubleshooting, and optimized PID-based motor control.
- Performed detailed software and hardware-in-the-loop (HIL) testing for dynamic robotic systems.
- Managed comprehensive Bill of Materials (BOM), procurement processes, and vendor coordination.
- Identified and troubleshoot high angular drift in IMU due to magnetic interference by performing real-time calibration.
- Developed a scalable and robust (98.5%) human-aware navigation framework for ground robots.

Mechanical Engineer - *SmartX Connected Products Pvt. Ltd., Chennai, India*

Dec 2019 – Dec 2020

- Led 5 projects focused on smart medical products, and pet health tracking systems.
 - Reduced weight (47.5%) and volume (72%) of a smart blood transportation device through structural optimization.
 - Designed and validated sealed electromechanical enclosures using FEA simulations in ANSYS.
 - Innovated cost-effective, in-house magnetic power connectors, reducing dependency on costly imports.
 - Transitioned product designs smoothly from early prototypes to full-scale production with scalable manufacturing.
- Developed and analyzed a 3-DOF robotic manipulator with a compliant soft-pneumatic gripper using Abaqus.

EDUCATION

Master of Science (MS), Mechanical Engineering (GPA: 3.74/4)

May 2025*

University of Cincinnati, Cincinnati, OH, USA

Bachelor of Engineering (B.E.), Mechanical Engineering (GPA: 8.8/10)

May 2019

Anna University, Chennai, India

RESEARCH & ACADEMIC PROJECTS

Fault Detection and Diagnosis of Failure Modes in Tapered Roller Bearings

- Detected and diagnosed outer race, inner race, and cage failures for performing predictive maintenance to avoid downtime.
- Employed AI techniques like self-organizing maps and principal component analysis to classify failure types.

Heat Transfer Optimization of Internal Combustion (IC) Engine Fins

- Designed innovative fin geometries achieving a 48% increase in heat transfer efficiency and a 54% reduction in material usage.

Development of Stepper Motor Calibration Routine

- Developed a calibration routine for stepper motors with SPI-based firmware, incorporating active load monitoring, stall detection, and energy-efficient current tuning.

Obstacle Avoidance and Autonomous Navigation of a Mobile Robot Using LiDAR SLAM

- Conducted comprehensive mapping of unknown terrain for the TurtleBot 3 (T3) using ROS and its navigation toolbox.