Nilove Mandal

Jalgaon Jamod, Maharashtra, India
+91 93074 74959 | nilovemandal@gmail.com | nilovemandal.site | linkedin.com/nilove-mandal

PROFESSIONAL SUMMARY

Innovative Mechanical Engineering undergraduate specializing in advanced robotics, mechatronics, and IoT embedded systems. Proven expertise in full-cycle product design, from 3D CAD modelling and explicit dynamic analysis to final physical prototyping and C++ firmware development. Demonstrated leadership in directing an 8-member engineering collective to deliver hardware and software automation solutions.

EDUCATION

Bachelor of Engineering – Mechanical Engineering
Shri Sant Gajanan Maharaj College of Engineering, Shegaon May 2026

- **Key Electives:** Robotics & Industrial Applications, AI, Data Structures & Algorithms.

PROFESSIONAL & LEADERSHIP EXPERIENCE

Founder & Project Lead
Robo Solutions *Present*

- Direct an 8-member multidisciplinary engineering team focused on mechatronics development, robotics research, and software solutions.
- Manage end-to-end project lifecycles for 3+ major automation projects, overseeing hardware sourcing, firmware architecture, and mechanical design.
- Develop and conduct technical robotics workshops to educate peers on practical implementations of embedded systems and IoT architecture.

Design & Automation Intern
Innovative Systems & Robotics India Pvt. Ltd *June 2025 – July 2025*

- Automated the batch conversion of 400+ SolidWorks drawing sheets to PDF using Task Scheduler, reducing manual documentation workload from several days to 45 minutes.
- Designed and modelled a Cylinder Storage Rack with a custom crane assembly, generating comprehensive manufacturing drawings.
- Standardized internal part nomenclature for inventory tracking and updated Bills of Materials (BOMs) for Power Conveyor Systems.

TECHNICAL SKILLS

- **CAD, FEA & Simulation:**
  SOLIDWORKS, AutoCAD, Fusion 360, NX, ANSYS Workbench, Blender, Robotics Simulation.
- **Electronics & Microcontrollers:**
  ESP32, ESP8266 (D1 Mini, NodeMCU), Raspberry Pi, Arduino, Circuit Design, Sensor Integration.
- **Programming & Firmware:**
  C/C++ (Embedded Firmware), Python (OpenCV), HTML, Motion Planning.
- **Prototyping & Hardware:**
  3D Printing, DFMA / DFM, Manufacturing Drawings, Material Property Analysis, Laser Cutting, PCB Wiring, Soldering.

PROJECTS

Industrial Kuli (Synchronized Crab-Steering AGV) *Final Year Project*

- Engineered a single-actuator omni-directional AGV utilizing a 300mm Trapezoidal Single Start Lead Screw, effectively reducing standard actuator requirements by 75%.
- Achieved precise mechanical synchronization of 4-wheel steering angles with <2% error variance, enabling stable lateral crab translation at speeds of 0.3-0.5 m/s in confined spaces.

Vajra 2.1 (Teleoperated Agricultural Rover) *Personal Project*

- Designed a teleoperated, four-wheel-drive agricultural rover with a 110° compound-angle aluminium extrusion chassis, eliminating liquid slosh resonance for a 5-liter payload
- Integrated a 400W MOSFET drive module and ESP32-CAM for precise PWM variable spray control and stable, real-time FPV navigation at operating speeds up to 3 km/hr.

Project Hootie: Biomimetic IoT Companion Robot *Personal Project*

- Programmed a dynamic C++ state machine on an ESPD1 Mini microcontroller, executing seamless transitions between autonomous routines, web-server utility modes, and touch-triggered affective responses.
- Engineered an interactive multi-modal system featuring a flawless snap-fit chassis, OLED animations, and an organic audio engine producing over 30 unique emotional states and live weather updates.

SAE ATVC: Off-Road Vehicle Chassis Design *Team Avibhuj Squad*

- Spearheaded CAE evaluation for an AISI 4130 tubular space frame using CATIA and ANSYS Workbench, optimizing driver safety against 10ft drop impacts and frontal collisions.
- Achieved a front-impact safety factor of 2.97 against a 13,500N load and verified a torsional stiffness exceeding 3.5 kNm/degree, successfully restricting total chassis weight to 30kg.

Trinetra V-Clean: Autonomous Solar Panel Cleaning Robot *Personal Project*

- Conceptualized an autonomous, vision-guided maintenance robot utilizing a proprietary pivoting wheel drive system to execute zero-radius, holonomic-style edge transitions on solar arrays.
- Integrated camera-based edge and hotspot detection algorithms to formulate targeted cleaning pathways, mitigating gap-fall risks and maximizing solar energy output efficiency.

Smart Breathe: IoT-Enabled Adaptive Ventilator *1st Prize HISET-2024*

- Engineered an award-winning IoT ventilator utilizing a Nema-17 stepper motor and lead-screw mechanism to automate a 1600ml Ambu bag, validating an air discharge of 4.28 Liters/min.
- Developed an intelligent bio-feedback loop with a MAX30100 sensor and ESP32 microcontroller to dynamically adjust airflow based on SpO2 levels while transmitting vital telemetry to a ThingSpeak cloud dashboard.

CERTIFICATIONS & ACHIEVEMENTS

ACHIEVEMENTS & AWARDS:

- **2nd Prize Winner (15,000 INR)** | IMPACT Conclave 3.0, IIT Ropar *(Mar 2024)*
- **1st Prize (Best Innovator & Poster Presentation)** | HISET-2024 International Conference, KVVDM Karad *(Jan 2024)*
- **Best Project Title** | ROBOTHON, Sant Gadge Baba Amravati University *(Oct 2023)*

TECHNICAL LEADERSHIP & INITIATIVES:

- **Lead Instructor, AI, ML & IoT Workshop** | Mauli College of Engineering via Robo Solutions *(Mar 2026)*
- **Workshop Facilitator, Gearing with Future Robotics** | SSGMCE *(Mar 2025)*
- **Event Head, RC Race** | Innovo'24, SSGMCE *(Feb 2024)*
- **Instructor, 3D Modelling in AR/VR (Blender)** | Mozilla Club, Pursuit 2023, SSGMCE *(Apr 2023)*

CERTIFICATIONS & TRAINING:

- **Embedded Era: From Silicon to Smart Systems** | Skyy Skill Academy *(Feb 2026)*
- **Automotive Industry Standards** | Skyy Skill Academy *(Oct 2023)*
- **Design of Jigs and Fixtures** | Skyy Skill Academy *(Sep 2023)*
- **Two-Wheeler Plastic Body Parts using CATIA** | Skyy Skill Academy *(Sep 2023)*

EXTRACURRICULAR ACTIVITIES:

- **Competitor** | Aravalli Terrain Vehicle Championship *(ATVC India 2024)*
- **Participant** | Entrepreneurship Summit, E-Cell IIT Bombay *(Jan 2023)*