

SAGAR PATEL

Mechanical Design & New Product Development Engineer | EV, BESS, Vehicle Systems, Robotics, SPM & Digital Engineering

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PROFESSIONAL SUMMARY

Mechanical design and new-product-development engineer with progressive experience since 2017 across electric two-wheelers, LFP battery energy-storage systems, wheel and suspension systems, hub-center steering, robotic dark-store equipment, food robotics, textile machinery, injection-moulding automation and special-purpose machinery. Experienced in converting requirements and benchmarking into calculations, layouts, 3D CAD, detailed manufacturing drawings, GD&T, tolerance studies, DFM/DFA, DFMEA, BOMs, Teamcenter releases, supplier coordination and prototype/manufacturing support. Combines system-level mechanical packaging with hands-on shop-floor, controls, testing and site exposure, plus AI-assisted engineering utilities whose outputs are manually verified.

Career progression: SPM design, CAD/CAM and controls -> project and vendor coordination -> textile-machine NPD and PLM -> industrial automation -> robotic-product team coordination -> EV, BESS and advanced vehicle-system development.

CORE ENGINEERING EXPERTISE

Product Development: Requirements, benchmarking, reverse engineering, concept generation, layouts, detailed design, design calculations, design reviews, revision control and engineering reports.

Design Documentation: 3D assemblies, manufacturing drawings, Geometric Dimensioning and Tolerancing (GD&T), tolerance stack-up, bills of materials (BOM), material specifications, technical specifications and quality/assembly notes.

Design Quality: Design for Manufacturing (DFM), Design for Assembly (DFA), Design Failure Mode and Effects Analysis (DFMEA), risk reviews, interface management and serviceability considerations.

Industrialization: Casting, low-pressure die casting, forging, sheet metal, CNC machining, welding/fabrication, injection moulding, pneumatics, assembly, supplier development, installation and service support.

Cross-Functional Delivery: Coordination with electrical, CAE/CFD, manufacturing, supplier, prototype, assembly, testing and site teams; implementation of analysis and build feedback into design revisions.

Domain Coverage: EV two-wheelers, BESS/ESS, wheels and suspension, vehicle packaging, steering linkages, SPM, conveyors/material handling, robotics/EOAT, textile machinery and automated food equipment.

CAD, PLM, CAM, CONTROLS & DIGITAL TOOLS

Primary professional tools: Siemens NX for part and assembly design, mechanisms, drafting, surface/profile work, CAD motion studies and NX CAM; Teamcenter for release/revision workflows; Microsoft Excel for calculations, BOMs, tolerance studies, costing and engineering utilities.

Additional CAD/data tools: Fusion 360 CAD and ActCAD/2D CAD; SAP exposure at Weavetech. CATIA V5 is certified training rather than confirmed production-project ownership.

Manufacturing & controls: FANUC three-axis VMC and G-code editing; Delta, Siemens and Mitsubishi PLC/HMI logic, control panels and wiring; Arduino Uno/Mega, ESP32, Modbus, Wi-Fi and LAN integration support.

AI-assisted development: ChatGPT, Gemini, Perplexity, Cursor, Ollama, Python, HTML, JavaScript, TypeScript, JSON/REST APIs, FastAPI, Node.js, Next.js, Supabase, Google Apps Script, GitHub, Replit, Vercel and Render; exposure to PyTorch and Hugging Face.

PROFESSIONAL EXPERIENCE

Senior Associate - Vehicle Engineering | Jun 2026 - Present

OLA ELECTRIC TECHNOLOGIES PRIVATE LIMITED | Bengaluru, Karnataka

Senior Design Engineer | Sep 2024 - May 2026 | Copes Tech India Pvt. Limited | Client assignment at OLA ELECTRIC TECHNOLOGIES PRIVATE LIMITED

Role scope: Mechanical design delivery across BESS, wheels and suspension, hub-center steering and robotic dark-store systems; reported to the Engineering Manager and coordinated with specialist functions without direct reports.

Tools & work areas: Siemens NX, Teamcenter, Excel, hand calculations, CAD motion studies and CAE/CFD input/result coordination.

- Owned assigned mechanical-design scopes from benchmarking, requirements and layout development through CAD, detailed drawings, BOM preparation, design documentation and revision release.
- Coordinated interfaces with electrical, CAE/CFD, manufacturing, suppliers, prototype, assembly and testing teams and incorporated their technical feedback into controlled design updates.

BESS Module & Pack Mechanical Design | 8-9 months | Three-person core team

Project maturity: Containerized renewable BESS at detailed-design/DFM level; C&I at benchmarking/prototype-design level; vehicle and residential storage at research/concept level; sodium-ion architecture at study level.

- Owned the assigned mechanical scope from benchmarking and layouts through LFP cell packaging, module/pack architecture, structural frame and enclosure design, covers/mounting and cooling-interface integration.
- Developed mechanical packaging provisions for busbars and electrical components, including packaging space, mounting, routing interfaces and accessibility; electrical architecture and validation were coordinated with the electrical team.
- Studied standard prismatic, blade-format prismatic and cylindrical cell arrangements while completing detailed design primarily around LFP technology.
- Created detailed 3D CAD assemblies, manufacturing drawings, BOM packages and controlled design revisions/releases through Teamcenter.
- Performed module/pack layout, packaging and preliminary mechanical-design calculations using Excel and AI-assisted methods, with manual checking of formulas, assumptions and outputs.
- Provided geometry, boundary inputs and design data to specialist CAE/CFD teams, reviewed structural/thermal findings and converted recommendations into design changes.

- Strengthened and rerouted a supporting frame after static-analysis feedback identified a weak region, then updated the associated CAD and documentation.
- Designed toward an IP65 target and considered structural, thermal, electrical-interface, sealing and service-access requirements at design level.

Wheels, Suspension & Vehicle Packaging | 3-4 months | Eight-member team

Role focus: CAD-design contributor covering benchmarking, concepts, calculations, detailed drawings, releases and supplier/analysis coordination for motorcycle and scooter programs.

- Benchmarked and reverse-engineered physical wheel and suspension assemblies through disassembly, measurement, component study, CAD reconstruction and complete assembly development.
- Developed approximately eight wheel-rim CAD models/concepts across motorcycle and scooter programs, covering front/rear applications, cast-aluminium rims and a sheet-metal scooter-wheel concept.
- Applied casting and manufacturing DFM covering draft, fillets, machining zones, markings, interfaces and supplier requirements for gravity casting, low-pressure die casting, forging, sheet metal and machining routes.
- Prepared detailed GD&T/manufacturing drawings with material, machining, assembly and quality-control notes and released revisions through Teamcenter.
- Performed preliminary wheel-load, rim/hub-strength, bearing-selection/life, tyre-fitment, vibration and tolerance-stack calculations and created Excel-based calculation utilities.
- Evaluated conventional and upside-down front forks, multiple rear-suspension arrangements, triple clamps, mounting geometry and limited swingarm/bush interfaces.
- Performed spring, preload, damping, oil-viscosity, suspension-travel, rake, trail, ground-clearance and front/rear packaging studies and supplied hard-point/interface inputs to the chassis team.
- Coordinated suppliers, CAE/test specialists and a specialist vendor while evaluating a sheet-metal scooter wheel and separately fitted brake-drum-liner arrangement.
- Handled tyre fitment, axle/bearing/hub packaging and modification of existing brake-disc/caliper interfaces for vehicle integration.

Diamondhead Hub-Center Steering | Three-person core team

Development stage: Engineering development and CAD/analysis-backed prototype support for a showcase vehicle; subsequent design iteration completed at design level.

- Generated six to seven hub-center-steering linkage concepts and owned linkage/mechanism design, hard-point definition and kinematic development.
- Developed axle, bearing and hub packaging plus interfaces for the single-sided front-suspension arrangement and chassis mounting.
- Evaluated steering transmission, bump steer, turning radius, suspension travel, mounting positions and rider-load conditions using hand calculations, Excel and Siemens NX CAD motion studies.
- Supplied geometry and input data to a specialist analysis team for steering-ratio evaluation and incorporated the resulting recommendations.
- Integrated modified existing brake-disc/caliper components into the package and checked the steering, wheel, suspension and brake interfaces as an assembly.
- Prepared detailed drawings and BOMs and coordinated with manufacturing and prototype-assembly teams for one showcase prototype.

Robotic Dark-Store System | Four months | Six-person team

System scope: Mechanical design and engineering documentation for an internal prototype; downstream fabrication, assembly, installation and test activities were coordinated through separate teams.

- Designed lifting mechanisms, roller conveyors, pop-up transfer conveyors, sorting mechanisms and multi-level storage arrangements with provisions for six-axis robot integration.
- Developed system layouts and performed conveyor RPM, linear-speed and timing calculations for material-transfer sequencing.
- Performed structural-load checks for a six-tier stacked conveyor arrangement and incorporated load paths, supports and mounting requirements into the CAD design.
- Produced 3D CAD assemblies, detailed GD&T drawings, Excel BOMs, DFM/DFA documentation, DFMEA/risk assessments, technical specifications and engineering reports.
- Designed motor, sensor, guarding, service-access and component-mounting provisions while coordinating sensor selection and electrical interfaces with the electrical team.
- Supported prototype realization through design reviews, engineering hand-off, assembly/testing feedback and commissioning-document preparation.

Lead Design Engineer | Jul 2023 - Sep 2024

Freshot Robotics Private Limited | Bengaluru, Karnataka

Promoted from Design Engineer | Jul 2022 - Jul 2023

Role scope: Mechanical product development for robotic food equipment; coordinated a ten-member cross-functional prototype team across design, fabrication, assembly, IoT and electrical functions.

Tools & work areas: 3D CAD assemblies and manufacturing drawings, Excel calculations, Arduino Uno/Mega, ESP32, Modbus, Wi-Fi, LAN, sensors, wiring and control-panel integration.

- Supported development of two IdliBot prototypes and led assigned mechanical redesign work for cooking, pick-and-place and storage subsystems.
- Redesigned the pressure-sealed cooking arrangement, continuous pick-and-place mechanism and higher-capacity storage architecture for improved sequence flow and maintainability.
- Created 3D models, complete assemblies, manufacturing drawings, BOMs and build/assembly inputs and coordinated corrective design changes during prototype realization.
- Performed motor-torque, speed, belt/pulley, sealing-temperature, closure-force and ball-screw calculations for key mechanisms.
- Supported control-panel design, component selection, sensor/wiring integration and Arduino/ESP32 communication through Modbus, Wi-Fi and LAN.

- Conducted 48-72-hour continuous subsystem cycle tests, investigated failures and implemented design corrections before repeat testing.
- Contributed to a reported approximately 40% complete-machine cycle-time improvement versus Version 1 through mechanism and sequence redesign.
- Supported one prototype through customer-site installation and technical hand-off at prototype/site-installation stage.

Senior Automation Engineer | May 2022 - Jul 2022

All Time Plastics Private Limited | Silvassa

Role scope: Mechanical design and maintenance support for injection-moulding automation, robots, EOATs, packaging lines and automated storage/retrieval equipment.

Tools & work areas: 2D CAD, Excel BOM and payload checks, pneumatic circuits, sensor layouts, fabrication coordination, preventive maintenance and fault recovery.

- Supported a production environment of more than 48 injection-moulding machines, approximately 20-28 three-axis robots, 8-12 five-axis Cartesian robots, 14 six-axis robots and nine automation/packaging lines.
- Designed six end-of-arm tooling (EOAT) systems using aluminium structures, pneumatic cylinders, silicone vacuum cups and PTFE/nylon grippers.
- Checked EOAT weight and robot-payload compatibility and prepared manufacturing drawings, Excel BOMs, pneumatic circuits, sensor layouts and assembly inputs.
- Supported EOAT fabrication, mechanism/line modifications, preventive maintenance, sensor troubleshooting, AS/RS fault recovery and OEM-assisted servicing.

Design Engineer | Oct 2021 - Apr 2022

Weavetech Engineers Limited | Surat

Role scope: Mechanical design of textile-machine modules in a two-engineer team reporting to the Engineering Head, with supplier, assembly and site-installation exposure.

Tools & work areas: Siemens NX, Fusion 360 CAD, Teamcenter, SAP and Excel; CAD assemblies, manufacturing drawings, calculations, BOMs and DFM/DFA documentation.

- Owned assigned design work across approximately eight major assemblies for the WSZ-C2C Filament Sizing Machine and WDW Filament Direct Warper.
- Worked on creel/yarn-feeding, size-box, drying, cooling and winding/beam take-up sections and their mechanical interfaces.
- Created 3D parts and assemblies, manufacturing drawings, BOMs, material specifications, calculations and DFM/DFA documents through iterative design revisions.
- Used Teamcenter for engineering-data control and SAP for role-specific data/process exposure while coordinating technical information with suppliers.
- Supported fabrication, assembly, mechanical-function and sensor checks, electrical-integration guidance, testing and customer-site installation.

Project In-Charge | May 2021 - Oct 2021

Pioneer Herbal | Daman

Role scope: Project coordination, production-machine maintenance and research-stage healthcare/home-use product feasibility.

Tools & work areas: Excel BOMs, cost sheets, supplier comparisons, vendor mapping, reference-sample evaluation and management presentations.

- Coordinated schedules, purchasing, cost tracking, vendors and technical activities while supporting routine maintenance and servicing of production equipment.
- Completed research-stage feasibility studies for eight healthcare/home-use product categories led by an oxygen concentrator and also covering humidification, nebulization, blood-pressure monitoring, vaporizing, mosquito-repellent, heating and orthopaedic-support concepts.
- Prepared preliminary BOMs, cost comparisons, supplier/vendor assessments, market studies and reference-sample purchase/evaluation reports.
- Presented findings and recommendations to management at feasibility stage before detailed product CAD, physical prototype development or commercialization.

Mechanical Engineer | Aug 2017 - May 2021

Creative Automation | Vapi

Role scope: Broad mechanical engineering role in an owner-led SPM/automation workshop, covering design, calculations, CAD/CAM, controls, purchasing, manufacturing, assembly, installation, service and retrofit work.

Tools & work areas: Siemens NX CAD/CAM, 2D manufacturing drawings, Excel BOMs, FANUC three-axis VMC/G-code, and Delta/Siemens/Mitsubishi PLC-HMI systems.

- Coordinated approximately 12 shop-floor workers and one junior engineer across design clarification, material procurement, fabrication, machining, assembly, wiring, testing, site installation and service activities.
- Contributed to end-to-end delivery of approximately 18 new machines and approximately 28 repair, retrofit and upgrade assignments.
- Worked on special-purpose machines, roller/belt conveyors, hydraulic presses, material-handling equipment and recycled-plastic-granule extrusion machinery.
- Converted customer requirements and site constraints into concepts, layouts, 3D assemblies, detailed manufacturing/GD&T drawings, tolerance definitions, BOMs and engineering calculations.
- Designed components and mechanisms using aluminium, hardened EN8, mild steel, stainless steel, plastic inserts, nylon, PTFE and wood according to load, wear, temperature and process requirements.
- Generated NX CAM programs and edited G-code for a FANUC-controlled three-axis VMC and supported machining, inspection, rework and assembly fit-up.
- Developed and modified PLC/HMI logic, control panels, wiring and machine-integration tests using Delta systems and project-specific Siemens/Mitsubishi platforms.
- Coordinated vendors and customers and supported installation, troubleshooting, servicing and design/process improvements for selected new-build and retrofit assignments.

ENGINEERING CALCULATION COVERAGE

Vehicle: Wheel load, rim/hub strength, bearing selection/life, tyre fitment, vibration considerations, tolerance stacks, spring/preload/damping, oil-viscosity study, suspension travel, rake, trail, ground clearance, steering transmission, bump steer and turning radius.

SPM, robotics & conveyors: Motor torque and speed, belt/pulley selection, ball-screw selection, closure/sealing force, sealing-temperature study, conveyor RPM/linear speed/timing, stacked-conveyor structural-load checks and EOAT weight/payload compatibility.

BESS: Module/pack mechanical layout and packaging studies plus preliminary design calculations using Excel and AI-assisted methods with manual verification; specialist structural/thermal results reviewed and implemented through design changes.

AI-ASSISTED ENGINEERING TOOLS

Two-Wheeler Engineering Tool: Vehicle benchmarking, wheel/hub/suspension calculations, packaging studies and concept evaluation.

BESS Packaging Calculator: Battery-module and pack packaging studies, preliminary calculations and busbar-routing/packaging support.

PS3D Hub BOM & Weight Calculator: Automated material-weight calculations and structured BOM estimation.

PS3D CAD Tool: AI-assisted concept development, CAD planning and model-creation workflow support.

Stepper Calculator: SPM and conveyor calculations covering motor sizing, speed and pulley selection.

Personally defined requirements, formulas and engineering logic; researched technical inputs; developed, tested and iterated the tools through AI-assisted coding; manually verified calculation outputs and managed selected deployments. Self-estimated time reduction reached up to approximately 70% on selected personal research, concept, preliminary calculation/CAD-planning and report workflows. Confidential company data was excluded from public AI tools.

EDUCATION, CERTIFICATIONS & LANGUAGES

Education: Bachelor of Engineering in Mechanical Engineering | Gujarat Technological University (GTU) | 2013 - 2017

Certifications: Siemens NX - Design Tech | CATIA V5 - IGTR | Design for Additive Manufacturing (DFAM) - IGTR

Languages: English | Hindi | Gujarati