

# Dr. SANDIP HAZRA

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R&D, NEW PRODUCT DEVELOPMENT, EMERGING TECHNOLOGY LEADER- AUTOMOTIVE INDUSTRY

Program Management, Chassis Design, Powertrain Integration, Electric Vehicle, Mobility Engineering, NVH Head

Ph.D., VIT Chennai, Executive MBA (e-MEP) from IIMK, M. Tech. – Mechanical-Machine Design, IIT-BHU offering 20+ years of transformational leadership in Vehicle Design, Development, Validation, QA and Change Management, Powertrain Integration, NVH, executing large-scale projects / programs and delivering new generation EV and Mobility Solutions, with auto giants like Trelleborg Automotive, Renault Nissan, Maruti Suzuki India and Tata Motors

## EXECUTIVE SUMMARY

**Keen Planner & Visionary:** Presently associated with Tata Motors Ltd., India as DGM; heading Powertrain Integration, Chassis Engineering, Chassis Elastomers, 4X4 e-axle system design and development of EV Applications, working with CFT to resolve issues, facilitate DVP Review, Testing, Validation, Benchmarking, System Engineering (Chassis Suspension, Propeller Shaft, e-axle system & Mounting Systems) and achieve project milestones. **Passionate about Innovation, R&D with the merit of having numerous Patents** and Publications in International Journals. Track record of success in:

- **Adapting Automobile companies, as per rapidly changing global environment and consumer behaviors through Strategic Technology Development** related to Powertrain Integration and Chassis Systems, EV System Design-4X2, 4X4 E-Axle and delivery of 5 EVs in Power train Integration (Nexon EV, Tigor EV and Tiago EV, Altroz EV & Harrier EV), meeting International QA, Safety, Emission & Regulatory Standards
- **Suggesting commercially feasible, high-quality, reliable & cost-effective designs for attaining market leadership**, competitive advantage and customer-satisfaction. Recommending System, Sub-System & Component Level Design for delivery of world-class quality, fuel efficient, defect free products/vehicles to effectively meet global market/customer requirements.

**NPD/ Project/Program Strategist:** Highly skilled in end-to-end Engineering Program/ Project Management from concept to SOP ensuring regulatory compliance, managing project timing and investments, and leading risk assessment and change management initiatives to deliver within time, budget & QA parameters. In-depth knowledge of Next- Gen Technologies across the Globe in Automotive Chassis & Suspension Systems, Elastomers with exposure to different OEM's (Ford, GM, Nissan, Renault, Toyota, and MSIL) design methodologies, standards, and requirements. Experienced in Vendor Development, Supply Chain Management including supplier manufacturing site assessment / up-gradation through audits, capacity development & technical collaborations.

**Result-driven Leader: Recognised for building high-performance teams**, ensuring smooth communication between global stakeholders, technical headquarter & location technical centre for streamlined operations. Drove **Problem-Solving, DFMEA, QFD, DR Reviews VA/VE, RCA, CAPA, Process Improvement /Automation Initiatives** for increased quality, operational efficiency, cost and resource savings. Comfortable in Japanese, European, US style of working, overcame complex challenges using strong problem-solving, analytical and crucial decision-making skills.

## CORE COMPETENCIES & KEYWORDS

**Program & Project Management:** Gateway & Milestone Planning | Project Documentation | Deliverable Management | Investment Coordination | Resource Management | Global PMO Collaboration

**Change Management:** Design Modifications | Production Modifications | Change History Maintenance | Scope Change Request Review

**Risk Management:** Risk Assessment | Mitigation Strategies | DFMEA | Regulatory Compliance | Legal & Safety Standards

**Stakeholder Management:** Primary Contact for Product Planning | Cross-Functional Team (CFT) Leadership | Finance Coordination | Supplier & Vendor Management

## CAREER AT A GLANCE

Mar'02 – Mar'08: Trelleborg Automotive || Dy. Manager - Product Design of NVH Elastomer Parts & Program Management

Apr'08 –Oct'09: Renault-Nissan || Dy. Manager/ Team Lead-Chassis Design (Chassis Components Localization, Program Management)

Oct'09 - Sep'12 Maruti Suzuki || Manager - Engine Mount/Exhaust System Design & Development, Program Management, PT Integration - Engine Div.

Since Sep'12:Tata Motors || DGM Head-Powertrain Integration Team (System Design: Chassis Components, NVH, PT Integration-ICE&EV)

## AREAS OF EXPERTISE

Strategic Planning, Policies & SOPS  
New Product Development (NPD) Lifecycle  
Electric Vehicle Integration/NVH Solutions  
Global Multi-cultural coordination  
RCA, CAPA, Field Issues Resolution  
Supply Chain Management  
Manufacturing Excellence/DFMEA  
Regulatory Compliance  
Team Building / Leadership / Trainings

Project / Program Management  
Product Management/ Launch  
Chassis Engineering/ Component Design  
Engineering Change management  
Regulatory Compliances  
Budgeting /Cost Optimisation  
Stakeholder Management  
Risk Assessment & Mitigation

Automobile Engineering Management  
Product Validation, Testing, QA  
Powertrain Integration/Powertrain Mounts  
2D Drawings /3D Modelling/Design Reviews  
Strategic Alliances /Technology Partnerships  
Vendor Development /Performance Monitoring  
Change Management  
New-Age EV & Mobility Solutions

## INTERNATIONAL EXPERIENCE

Trelleborg USA (1-year System & Product Design Experience on Mount & Suspension Elastomer and Testing)

Trelleborg Germany (3 months Design & Measurement experience on Powertrain Mounting System)

Renault Technical Centre, France (1-month Design Experience of Exhaust & Engine Mount System) Projects: H79, L90

Suzuki Motor, Japan (1-month Program Management, Engine Auxiliary System Design & NVH Testing Experience) YE3 (Alto), YL8 (Ertiga), YP8 (Swift), YL7 (Celerio)

JLR, UK – 1-month experience on System Design & NVH Fine-Tuning

## PROFESSIONAL SUCCESS

### Since Sep 2012: Tata Motors

Providing strategic leadership, technical inputs and engineering support to the team from conception to completion stage of New Product/Automotive Chassis & Suspension Systems Development. Heading all the Tech, Human and Administrative Aspects of Passenger Car EV Platforms. Managing budgets, driving cost /resource optimization for operational and process excellence. Assess material cost impacts of design decisions and drive VA/VE initiatives, Facilitating Engineering Change Management, BOM Preparation, Design of Critical Components, Technical Approval, SOP, Validation (Test Bed / On Road Durability), Technical / Field Issues Resolution, immaculate delivery to meet defined performance, lead technology development projects.

### SIGNIFICANT HIGHLIGHTS ACROSS THE TENURES

#### Deputy General Manager/ Principle Engineer, Tata Motors

Apr 2017 – Till Date

- **Directing a team of Engineers in Automotive Chassis & Suspension Systems for Passenger Cars**- suspension elastomers, bump stopper, dampers and their kinematics including compliance, engine mounting system, exhaust hangers, EV NVH, EV / e axle system design and integration,
- **Lead the Resource Management** for the Chassis and PTI team, ensuring optimal allocation.
- **Managing PT Integration of all Passenger EVs and ICE Engines**, EV Integration for Nexon, Tiago, Tigor, Altroz and Harrier EV's. Leading Chassis Elastomer Design and Performance Evaluation to meet driving dynamics for all TML Passenger Cars
- **Strategizing, planning, and executing Technology Development** related to Chassis & Suspension and Engine Mounting for Projects on Light Weighting, Semi Active/Active Elastomers, as per requirement.
- **Driving innovative & creative idea generation for developing new generation Suspension System/ Semi/Full-Adaptive Suspension Systems.** Executing strategy for New Product Development into the overall vehicle level targets – Altroz, Nexon
- **Administering Project / Program Management;** working as a key part of the team to develop Concept Vehicle Prototypes to engineering sign off for SOP with Advanced Technology to control cost, quality& time targets as per project requirements, plan and execute all project gateways, milestones, and deliverables.
- **Guiding the team in optimizing the architecture layouts of Chassis System** in line with Weight, NVH, Durability and Cost Considerations. Supporting the supplier for Chassis Component Design to meet vehicle level performance.
- **Providing supplier technical guidance** to meet vehicle level targets, review of DVP and ensuring green status against all deliverables such as Durability/NVH/Crash/Weight Targets, RMDV upkeep for PTI Commodity
- **Facilitating cross-functional coordination**, liaison with key stakeholders and suppliers, working with:
  - CFT to resolve issues and with purchasing team to help get the supplier nominated through technical sign off and design to cost solutions.
  - AQ/ Purchasing Dept./ Suppliers to get APQP completed, involvement in PSW activities to get PPAP 3 completed at intended gateway.
  - Global Engineering Teams to align design commonality & develop products meets country specific customer requirements.
  - Act as the primary technical contact for the Product Planning Team, liaising with key stakeholders and suppliers.
- **Spearheading Vehicle Development/R&D /Testing**, entailing:
  - Architecture definition for own group aggregates and components basis overall product cycle plan being worked on
  - Complete Detailed Engineering Design and CAE Validation for aggregates/components with design responsibility
  - System level Design of FSS responsible parts (i.e., detailed specs, interfacial parameters)
  - Full Vehicle Testing (Mule, Proto, Production Vehicle) as per the Vehicle Design Validation Plan (DVP)
  - Homologation Testing and Validation with Regulatory Agencies, providing the necessary technical support.
  - Problem-solving and counter measure identification with vehicle domain groups on any failures/ underperformance vs. design parameters
- **Administering Vendor Development, Assessment**, monitoring the performance of Engineering Service Providers (ESPs)/ Suppliers, driving Capability Improvement at vendor end and guiding them to deliver on the scope, quality and timelines for outsourced jobs
- **Overseeing Systems / Components Designs** considering aspects like design for manufacturability, design for assembly, design for aesthetics & weight reduction. Evaluating Designs by Tolerance Stack-up Analysis, Packaging Studies, Fits, Tool Clearance, and Manufacturability
- **Steering Engineering Change Management**, identification of non-conforming products/ designs. Resolving Field Quality Issues of Chassis Components, and accordingly recommending design enhancements, corrective actions for overcoming the same, maintain comprehensive change history and handle design and production modifications through a robust change management process.
- **Ensuring New Product Quality**, participating in Design Review, DFMEA & PFMEA – integration of current product issue resolution in to new product development phase. Leading the Preparation & Approval of Design Verification Plan & Test Plan and ensure all designs meet legal, safety, and regulatory compliance standards.

- **Managing a multi-skilled workforce** entailing hiring, training, succession planning, career growth, empowering people to deliver their best. Creating and maintaining an aligned and positive work environment amongst all employees for accomplishment of organizational goals
- **Supporting team to achieve VAVE targets** through application of various levers. Driving **Sustainability & Circularity Drive**, participation of various sustainability initiative to achieve net zero emission target at company level

#### Divisional Manager - Chassis Engineering & Powertrain Integration, Tata Motors

Sep 2012 – Mar 2017

- Directed Engine Mounting System Design, as per defined specifications and quality standards.
- Facilitated Vehicle level performance to system level target cascading for chassis and engine mount parts to set-up futuristic performance targets.
- Managed Design of Chassis Components like Rubber Bush, Sheet Metal & Casting, and helped supplier to achieve design and develop those parts.
- Ensured that Vehicle level Performance is like NVH, participated in Drivability and Dynamic Assessment with CFT
- Instrumental in EV Powertrain System Design- Mounts & Cradle, E-Axle and Multilink Suspension Design for NVH and Driving Dynamics
- Front-led Program Management from Kick-off (KO) to SOP as per Project DR Gateways for various Chassis Components
- Effectively resolved Field issues for Chassis Components and guided the team to follow QC Story Approach
- Performed Supplier Manufacturing Site Assessment Audit along with Quality and Purchase Team
- Forged Technical Partnerships with Ricardo, FEV, AVL & Randle Engineering Services for Chassis related performance evaluation.
- Paved the way for Benchmarking at System and Component Level along with Market Trend Analysis
- Proactively participated and applied Cost Reduction Drive- System Approach, Design Efficiency Approach.
- Collaborated with Sr. Leadership in formulating Manpower Recruitment Plan, Capex Plan and Resource Plan, ensuring optimum utilization.
- Conducted Vehicle Validation, Component Validation to ensure the final report meets all technical criteria and sign-off for SOP.
- Leveraged strong technical knowledge in provided solutions for BSR/NVH issues during development.

#### PREVIOUS EXPERIENCE

##### Oct 2009 – Sep 2012: Maruti Suzuki || Manager

Front-led Design of Engine Auxiliary System- Engine Mount, Exhaust, Intake System, Powertrain Mount and Exhaust System Design for all MSIL Passenger Cars- Swift, Ritz, Ertiga and Baleno. Played a key role in Powertrain Packaging of New Projects, Powertrain Dynamic Envelop Study and BOMs, Powertrain Integration, vehicle level testing, Powertrain NVH as well as Supplier Management for Powertrain Auxiliary Components. Led Program Management of complete Engine and Auxiliary System for 3 Projects -YL8, YV4 and YR9 from Design Proto to SOP

##### Apr 2008 – Oct 2009: Renault- Nissan || Deputy Manager

Acknowledged as Local Technical Leader for Chassis System Design by Renault France Team. Pivotal in Design of Chassis Components like engine mount, exhaust system, suspension struts, dampers, knuckle and RTB for Passenger Car. Managed localization of L90 (Logan) Chassis Components and their validation for sign-off. Facilitated Supplier Audit and Assessment to achieve expected level of localization.

##### Mar 2002 – Mar 2008: Trelleborg Automotive || Deputy Manager

Managed Product Design, Testing and Project Execution of 23 Chassis Components for 692N (Inova) Vehicle, of NVH Components for Passenger Car and Commercial Vehicles including engine /top mounts, bolster spring, bump stopper, various suspension bushes, spring seat, exhaust hanger, body mounts, and mass damper for OEMs like Toyota, Ford, GM, Chrysler, Suzuki, Benteler, Tata, VW, and Nissan. Led Program Management, Process review for Sheet Metal, Casting, Forging and Injection Moulded Parts, System and Sub-system level Calculations to meet the RFQ targets.

#### ACADEMIC CREDENTIALS

2025	PhD from VIT, Chennai
2010	Executive MBA (e-MEP) from IIMK, Kozhikode, India; 3.21/4 CGPA
2002	M. Tech. - Mechanical-Machine Design from IIT, BHU, India; 9.43/10 CGPA
2000	BE- Mechanical from Howrah IEST, Shibpore, India; 76.42%

#### Certifications/ Trainings:

- Trained at Suzuki Japan during YE3 Development for Powertrain NVH and Design Assessment
- Trained at Renault, France as Local Technical Leader in Engine Mounting System
- Trained at Trelleborg, South Heaven, US for 1 year in Product Design and System Engineering for NVH Parts
- Trained as Sub-system Level NVH Specialist for Suspension Elastomer and Engine Mounts
- Certified TS Auditor, helped to achieve Ford Q1 and Toyota Quality Standards

#### OTHER ACCOLADES

- Leveraging strong domain knowledge in delivering Expert Talk in various Engineering Colleges including DRDO,
- Acting as Member for Board of Studies at University
- Wrote various articles on EV trend in EV Mobility Newsletter
- Acting as a reviewer of SAE, IEEE papers in international journals.

#### KNOWLEDGE PURVIEW & DOMAIN EXPERTISE

- Powertrain / Vehicle Packaging, Chassis Bush & Engine Mount Design, DMU&CAD Tools, CAE, Vehicle Validation and Sign-Off Process for SOP

- Deft in end-to-end Product Lifecycle of Car and Vehicle Development Process from requirement analysis, concept maturation, design, drawings, prototype development, testing, validation, homologation, assembly, manufacturing, DR gateway reviews, PSW to successful launch
- Powertrain Integration, Primary and Secondary Isolation, Cradle & Saddle System Suspension Components with K&C Target Setting
- Engine Mounting System Design, Exhaust System Design, Driveline Integration including e-axle, Suspension System, Product Development, Concurrent Design and Project Management
- DR, DFMEA, QFD, DOE, DFM, DFS, DFA Design Tools, CAE, CAD & PLM Tools, DVP, RFQ, SOR and Design Specifications Generation
- Design and Development of Sheet Metal, Casting, Elastomer, Optimization, Suspension Kinematics, Powertrain NVH, Engine Mounting System, Elastomer Stiffness & Shape optimization, NVH Tuning
- Engine Auxiliary System Design, Chassis Components Design, ICE& EV system integration, Automotive Chassis & Suspension Systems Design for Passenger Car [Suspension Elastomers and their Kinematics including Compliance, Engine Mounting System and Propeller Shaft]
- Chassis System Design and Integration, Cradle Integration for EV's, EV NVH, EV Transmission, E-Axle System, Multilink Suspension System
- Domain Knowledge of Vehicle Systems & Development Process to control Cost, Quality & Timeline Target as per project requirements, testing, validation, engineering sign off-process and program management.

### PERSONAL DETAILS

**Date of Birth:** 11th Jan'1978 | **Languages Known:** English & Hindi | **Nationality:** Indian **Address:** Pune, India

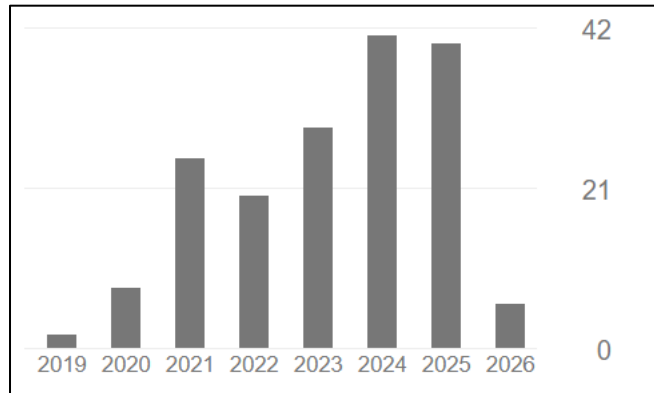
### PAPERS PUBLISHED IN INTERNATIONAL JOURNALS

Totalling 57 publications with an H-index of 158, constituting 11 journal and 38 conference papers, the following are the most highlighted research work:

Sr. No.	Title	Citations
1	Hazra, S., & Ghosh, M. K. (2009). Vibration isolation performance of a vehicle suspension system using dual dynamic dampers. <i>Advances in Vibration Engineering</i> , 8(2), 193-200.	6
2	Hazra, S., and Shital, P., "Cavitation Noise Countermeasure Development Approach in Hydromount," SAE Technical Paper 2011-28-0091, 2011, <a href="https://doi.org/10.4271/2011-28-0091">https://doi.org/10.4271/2011-28-0091</a>	6
3	Ahuja, V., & Hazra, S. (2012). Application of Optimization Techniques in reducing the Weight of engine Mounting Bracket. TC.	3
4	Agarwal, K., Hazra, S., and Kolage, V., "Virtual Analysis of Engine Mount Stiffness and Stopper Gap Tuning for Better NVH Performance," SAE Technical Paper 2017-26-0196, 2017, <a href="https://doi.org/10.4271/2017-26-0196">https://doi.org/10.4271/2017-26-0196</a>	16
5	Deshmukh, S., and Hazra, S., "The Impact of Switchable Hydromount during Idle and Ride Performance of Vehicle," SAE Technical Paper 2017-01-1826, 2017, <a href="https://doi.org/10.4271/2017-01-1826">https://doi.org/10.4271/2017-01-1826</a>	2
6	Agarwal, K., and Hazra, S., "Optimisation of Engine Mounting System for Reduction in Lateral Shake and Drive Away Shudder on Vehicle," SAE Technical Paper 2017-01-1822, 2017, <a href="https://doi.org/10.4271/2017-01-1822">https://doi.org/10.4271/2017-01-1822</a>	8
7	S. Hazra and I. Pathak, "Engine mount design technique to address vehicle level Buzz, Squeak & Rattle," 2017 IEEE Transportation Electrification Conference (ITEC-India), Pune, India, 2017, pp. 1-5, doi: 10.1109/ITEC-India.2017.8333721.	6
8	Design of Engine mount bracket for impact load requirement, SAE Technical Paper 2019-26-0344	
9	Hazra, S., "Engine Mounting System Design Approach for Electric Vehicles," SAE Technical Paper 2019-26-0116, 2019, <a href="https://doi.org/10.4271/2019-26-0116">https://doi.org/10.4271/2019-26-0116</a>	23
10	Hazra, S., Kharade, A., and Thakur, S., "Diagnosis and Elimination of Vehicle Lateral Shake in Passenger Car through Modification of Driveshaft Joints and Engine Mount System," SAE Technical Paper 2019-26-0214, 2019, <a href="https://doi.org/10.4271/2019-26-0214">https://doi.org/10.4271/2019-26-0214</a>	4
11	Hazra, S., "Prediction of Seat Rail and Steering Wheel Vibration at Idle Using Crank Drive and 16-DOF ADAMS Model," SAE Technical Paper 2019-26-0181, 2019, <a href="https://doi.org/10.4271/2019-26-0181">https://doi.org/10.4271/2019-26-0181</a>	2
12	Hazra, S. and Deshmukh, S., "Engine Mount Stopper Design Techniques to Balance Vehicle Level Buzz, Squeak, Rattle and Durability," SAE Technical Paper 2020-01-0401, 2020, <a href="https://doi.org/10.4271/2020-01-0401">https://doi.org/10.4271/2020-01-0401</a>	3
13	Deshmukh, S., Borole, S., Hazra, S., and Gadve, D., "Optimization of Engine Mounting System for First Gear Launch Judder," SAE Technical Paper 2020-01-0416, 2020, <a href="https://doi.org/10.4271/2020-01-0416">https://doi.org/10.4271/2020-01-0416</a>	
14	Hazra, S. and K, J., "Study of Dynamics Stiffness and Shape Factor of Rubber Mounts to Address High-Frequency Resonance Issue in Electric Powertrain Mounting System," SAE Int. J. Adv. & Curr. Prac. in Mobility 3(2):773-779, 2021, <a href="https://doi.org/10.4271/2020-28-0341">https://doi.org/10.4271/2020-28-0341</a>	15
15	Hazra, S. and K, J., "Effect of Driveshaft Angle on Turning Noise in Electric Vehicles and Solution Development Approach," SAE Int. J. Adv. & Curr. Prac. in Mobility 3(6):3115-3120, 2021, <a href="https://doi.org/10.4271/2021-01-0982">https://doi.org/10.4271/2021-01-0982</a>	
16	Hazra, S., and K, J., "Impact of Powertrain Dimensional Variation on Buzz, Squeak and Rattle Noise for Cradle Type Electric Vehicle," SAE Technical Paper 2021-01-0836, 2021, <a href="https://doi.org/10.4271/2021-01-0836">https://doi.org/10.4271/2021-01-0836</a>	1
17	Deshmukh, S., Hazra, S., and Mohare, G., "Automotive Buzz, Squeak and Rattle Attenuation Technique from Front Suspension Assembly in Passenger Car," SAE Technical Paper 2021-01-1087, 2021, <a href="https://doi.org/10.4271/2021-01-1087">https://doi.org/10.4271/2021-01-1087</a>	4
18	Hazra, S., and K, J., "Influence of Powertrain Mount Stiffness Progressivity on Buzz, Squeak & Rattle Noise for Electric Vehicle," SAE Technical Paper 2021-01-1089, 2021, <a href="https://doi.org/10.4271/2021-01-1089">https://doi.org/10.4271/2021-01-1089</a>	1
19	Hazra, S. and K, J., "Challenges and Approaches of Electric Vehicles Powertrain Mount System Optimization for NVH, Buzz Squeak Rattle and Durability," SAE Technical Paper 2021-01-1085, 2021, <a href="https://doi.org/10.4271/2021-01-1085">https://doi.org/10.4271/2021-01-1085</a>	2
20	Deshmukh, S., and Hazra, S., "A Comparative Study of Cradle and Sub Frame Type Powertrain Mounting System on Electric Vehicle," SAE Technical Paper 2021-01-1022, 2021, <a href="https://doi.org/10.4271/2021-01-1022">https://doi.org/10.4271/2021-01-1022</a>	2
21	Deshmukh, S., and Hazra, S., "Virtual Analysis of Engine Mount Stiffness Tuning for Better NVH Performance," SAE Technical Paper 2021-01-1026, 2021, <a href="https://doi.org/10.4271/2021-01-1026">https://doi.org/10.4271/2021-01-1026</a>	1
22	Hazra, S. and K, J., "A Comparative Study of Source Vibration Between the Electric Motor and Internal Combustion Engine Application for Passenger Vehicles," SAE Technical Paper 2021-01-1243, 2021, <a href="https://doi.org/10.4271/2021-01-1243">https://doi.org/10.4271/2021-01-1243</a>	2
23	Kuwar, V., Shinde, V., Pawar, P., Mohare, G. et al., "Multi-Axial Road Simulation for Component Level Validation of Engine Mount Structure and Elastomer," SAE Technical Paper 2021-26-0452, 2021, <a href="https://doi.org/10.4271/2021-26-0452">https://doi.org/10.4271/2021-26-0452</a>	3
24	Engine mount Layout Selection in Electric Vehicle-A Multiobjective Approach	

25	Vehicle elastomers design techniques to avoid vehicle level Buzz, Squeak and Rattle issues, SAE Technical Paper 2021-26-0263	
26	Deshmukh, S., Hazra, S., and Soundarrajan, H., "Engine Mount Stiffness Effect on Joint Integrity and Durability," SAE Technical Paper 2021-26-0514, 2021, <a href="https://doi.org/10.4271/2021-26-0514">https://doi.org/10.4271/2021-26-0514</a>	
27	Deshmukh, Sagar, Sandip Hazra, and NILESH DOIPHODE, "Sensitivity of LCA Bush Stiffness in Judder while Braking for Twist Blade Type Suspension in Passenger Cars," SAE Technical Paper 2021-26-0513, 2021-, <a href="https://doi.org/10.4271/2021-26-0513">https://doi.org/10.4271/2021-26-0513</a>	
28	Hazra, S. and Reddy, J., "A Review Paper on Recent Research of Noise and Vibration in Electric Vehicle Powertrain Mounting System," SAE Int. J. Veh. Dyn., Stab., and NVH 6(1):3-22, 2022, <a href="https://doi.org/10.4271/10-06-01-0001">https://doi.org/10.4271/10-06-01-0001</a>	25
29	Hazra, S. and Reddy, J., "An Aspect of Noise, Vibration, and Harshness Issues in Electric Vehicles," SAE Int. J. Veh. Dyn., Stab., and NVH 6(1):23-33, 2022, <a href="https://doi.org/10.4271/10-06-01-0002">https://doi.org/10.4271/10-06-01-0002</a>	21
30	Hazra, S., & Reddy, K. J. (2022). A comparative study of properties of natural rubber and polyurethane-based powertrain mount on electric vehicle NVH performance. International Journal of Vehicle Noise and Vibration, 18(1-2), 22-40.	6
31	Deshmukh, S., Hazra, S., Soundarrajan, H., and Mohare, G., "Application of Special Rubber Compound to Avoid BSR Issues in Vehicle," SAE Technical Paper 2022-01-0614, 2022, <a href="https://doi.org/10.4271/2022-01-0614">https://doi.org/10.4271/2022-01-0614</a>	
32	Hazra, S., "Engine Mount Bracket Design Consideration for Impact Load Requirement," SAE Technical Paper 2022-01-0758, 2022, <a href="https://doi.org/10.4271/2022-01-0758">https://doi.org/10.4271/2022-01-0758</a>	1
33	Hazra, S., & Janardhan Reddy, K. (2022, May). Design optimization of engine mounting system for a modular electric vehicle platform with different powertrain characteristics. In Journal of Physics: Conference Series (Vol. 2198, No. 1, p. 012014). IOP Publishing. <a href="https://doi.org/10.1088/1742-6596/2198/1/012014">https://doi.org/10.1088/1742-6596/2198/1/012014</a>	3
34	Hazra, S., & Reddy, K. J. (2023). Development of powertrain mounting system for high frequency characteristics optimisation in electric vehicles. International Journal of Electric and Hybrid Vehicles, 15(3), 234-255.	3
35	Hazra, S., & Reddy, K. J. (2023). Powertrain mount layout and stiffness selection in electric vehicle application-a multi-objective approach. International Journal of Electric and Hybrid Vehicles, 15(2), 127-150. <a href="https://doi.org/10.1504/IJEHV.2023.132031">https://doi.org/10.1504/IJEHV.2023.132031</a>	2
36	Hazra, S., and Mohare, G., "The Science of Engine Mounts and its Multidimensional Impact on Noise and Vibrations in Passenger Car," SAE Technical Paper 2024-26-0203, 2024, <a href="https://doi.org/10.4271/2024-26-0203">https://doi.org/10.4271/2024-26-0203</a>	2
37	Hazra, S., and More, V., "Application of Hydraulically Controlled Rear Mount to Mitigate Key on/off Requirement of Passenger Car," SAE Technical Paper 2024-26-0210, 2024, <a href="https://doi.org/10.4271/2024-26-0210">https://doi.org/10.4271/2024-26-0210</a>	
38	Wilson, J., Salgado, D., Matlock, J., Mazur, A., Łowczycki, K., Widera, P., ... & Suleman, A. (2024, March). Powertrain Design For Small Scale Parallel Hybrid-Electric Test Bench. In Journal of Physics: Conference Series (Vol. 2716, No. 1, p. 012019). IOP Publishing.	
39	Hazra, S., and Khan, A., "Modelling and Simulation Approach for Fiber-Reinforced Polymer Components in Passenger Car Engine Mounting Brackets," SAE Technical Paper 2024-28-0016, 2024, <a href="https://doi.org/10.4271/2024-28-0016">https://doi.org/10.4271/2024-28-0016</a>	2
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- Hanging Type Engine Mounting System
- Power Generation by Suspension System to Charge Vehicle Battery
- A Top Mount Assembly for a Strut of a Suspension System
- Variable Length Torque Strut
- Serviceable and Modular PU Engine Mount for better NVH
- Hybrid Engine Mounting System Design for Electric Vehicle
- An Assembly for Mounting a Component of a Vehicle and Method of Operating Thereof
- A Mounting Structure for a Vehicle and a Method for Operating the Same
- An Assembly For Mounting A Component Of A Vehicle And Method Of Operating Thereof
- Active C mount for Key on Mitigation in Passenger Cars
- Slippery Rubber Formulation
- Electromagnetic Mount for Internal Combustion Engine and Method of Dampening Vibrations therefrom