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From Innovation to Acceptance: The Role of Consumer Trust in Intelligent Electric Vehicles

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Abstract: The diffusion of intelligent electric vehicles represents a transformative shift in modern mobility, driven by advanced artificial intelligence, autonomous driving systems, Internet of Things integration, and sustainable design frameworks. Although these innovations promise enhanced safety, efficiency, and environmental performance, consumer trust remains a critical prerequisite for widespread adoption. This study investigates the extent of consumer trust in AI-powered EV features and examines the key drivers influencing trust in self-driving and eco-friendly electric vehicle technologies. A descriptive and analytical research design was employed, drawing data from 100 purposively selected EV users in Thiruvananthapuram district. Primary data were collected through a structured questionnaire, and the Mann–Whitney U test was conducted to identify gender-based differences in trust perceptions. The results reveal that female consumers demonstrate significantly higher trust in dimensions related to safety, privacy, cybersecurity, environmental sustainability, regulatory compliance, and willingness to adopt intelligent EVs, while perceptions of reliability, software updates, usability, brand credibility, and social influence remain gender-neutral. The findings underscore that trust in intelligent EVs is shaped by risk-sensitive and value-driven considerations, emphasizing the necessity for transparent safety evidence, ethical data governance, and verifiable sustainability commitments. The study concludes that technological innovation alone is insufficient; robust trust-building mechanisms and credible communication strategies are essential to accelerate consumer acceptance and support the transition toward autonomous and eco-sustainable mobility ecosystems.

Keywords: Artificial Intelligence, Consumer Trust,Intelligent Electric Vehicles, Cybersecurity, Technology

I. INTRODUCTION

The rapid evolution of transportation technologies has positioned intelligent electric vehicles as a central component of future mobility strategies. These contemporary EVs transcend the traditional role of environmentally friendly alternatives to internal combustion engines. They now operate as sophisticated digital platforms embedded with artificial intelligence, advanced sensing technologies, Internet of Things connectivity, and smart energy management architectures. Features such as autonomous driving assistance, predictive diagnostics, personalized user interfaces, and regenerative power systems demonstrate a paradigm shift toward integrated mobility intelligence. Parallel to these technological enhancements, manufacturers increasingly prioritize circular production systems, renewable energy utilization, and sustainable material deployment, aligning EV innovation with global decarbonization and environmental protection objectives.

Despite this multifaceted progress, successful market penetration depends heavily upon consumer trust. Trust functions as a critical socio-technical variable that mediates technology acceptance, adoption rates, and long-term engagement. Consumers frequently evaluate intelligent EVs not only on performance and environmental benefits, but also on perceived system safety, algorithmic reliability, privacy protections, and ethical data governance. Safety concerns regarding autonomous driving capabilities, apprehensions over AI error margins, and uncertainties related to cybersecurity vulnerabilities can create substantial hesitation. Simultaneously, scepticism regarding manufacturers' environmental claims and the actual sustainability of production practices can complicate perceptions of ecological authenticity.

The complexities surrounding trust in intelligent EVs become even more pronounced when considering the diversity of users and cultural contexts. Some consumers prioritize data transparency and cyber-resilience, while others emphasize demonstrable safety records, regulatory endorsement, or clear environmental impact evidence. In emerging markets, concerns may align more closely with infrastructure readiness and post-purchase service reliability. These multifaceted trust determinants interact with broader societal discourses on automation ethics, digital surveillance, climate responsibility, and corporate integrity, making trust formation a dynamic and context-dependent process.

Given this landscape, understanding the role of consumer trust becomes essential for policymakers, manufacturers, and mobility strategists. This article investigates the drivers, barriers, and behavioural implications associated with trust in intelligent electric vehicles. The analysis underscores that technological sophistication alone is insufficient to ensure adoption. Sustainable consumer confidence requires transparent communication, strong governance frameworks, rigorous safety validation, credible environmental performance, and human-centric design principles. Establishing this trust will determine the trajectory of intelligent EV diffusion and the broader realization of smart, sustainable, and socially accepted mobility systems.

II. REVIEW OF LITERATURE

Consumer trust plays a pivotal role in the adoption and acceptance of intelligent electric vehicles (IEVs), as it significantly influences consumer behavior and purchase intentions. Trust in AI-driven vehicles is closely linked to perceived safety and the transparency of AI decision-making capabilities, which are crucial for fostering consumer confidence in these technologies(Mali et al., 2024). The application of neural networks to analyse consumer sentiment has shown that transparency and demonstrable reliability of AI operations are key factors in building trust, with vehicles that emphasize user-friendly interfaces and clear safety benefits achieving higher trust ratings(Rakhmedova et al., 2025). In the context of electric car-sharing services, trust acts as a moderator between personal attitudes and behavioural intentions, indicating its critical role in promoting service utilization(Yu & Teoh, 2023). Furthermore, the quality of information regarding electric vehicles (EVs) significantly affects perceived trust, which in turn influences adoption intentions(Zhang et al., 2022). Policies also play a mediating role in shaping consumer attitudes and purchasing behavior, highlighting the importance of aligning policy development with consumer perceptions to enhance trust and adoption of intelligent connected vehicles(Ke-yu et al., 2025). In emerging markets like Indonesia, trust, along with a green lifestyle and brand image, significantly impacts the intention to purchase EVs, suggesting that building a positive brand reputation is essential for fostering trust(Utama, 2025). Additionally, trust in sustainable manufacturers enhances consumers' AWE experience and their intention to recommend EVs, underscoring the importance of manufacturer credibility in promoting eco-friendly products(Rahi et al., 2025). Trust-building mechanisms, such as technical protection measures and user ratings, vary across different cultural contexts, indicating that trust preferences are not uniform globally(Köster & Salge, 2021). Lastly, the reliability of energy information in EVs, as assured by models like ECOTRUST, is crucial for maintaining consumer trust, as it ensures the accuracy and robustness of energy consumption data, which is vital for the optimal functioning of EV applications(Souissi et al., 2023). Overall, consumer trust in IEVs is multifaceted, involving safety, transparency, policy alignment, brand reputation, and information reliability, all of which are essential for the widespread adoption of these vehicles.

III. TECHNOLOGICAL LANDSCAPE OF INTELLIGENT ELECTRIC VEHICLES

The technological architecture of intelligent electric vehicles reflects a convergence of advanced digital systems, electrification, and sustainable mobility engineering. These vehicles integrate computational intelligence and real-time data processing with high-efficiency power systems, creating an automotive ecosystem that prioritizes automation, predictive performance, and environmental optimization.

1) Autonomous Driving and Advanced Driver Assistance Systems: Autonomous driving technologies constitute the core of intelligent EV innovation. Utilizing sensor fusion mechanisms that integrate lidar, radar, camera systems, and ultrasonic sensors, intelligent EVs continuously assess and respond to dynamic traffic environments. Advanced Driver Assistance Systems (ADAS) perform lane-keeping, adaptive cruise control, automated emergency braking, and blind-spot monitoring. At higher automation levels, machine-learning algorithms process real-time environmental inputs to enable autonomous navigation, collision avoidance, and decision-making without direct human intervention. This domain continues to expand as manufacturers pursue higher levels of regulatory approval, sensor accuracy, and AI reliability.
2) Predictive Diagnostics and Smart Maintenance:Predictive maintenance capabilities enhance mechanical reliability and reduce user uncertainty. Embedded machine-learning systems evaluate drivetrain performance, battery health, motor temperature, and energy consumption patterns to anticipate mechanical issues before failure occurs. Over-the-air (OTA) software updates support continuous system improvement, algorithm refinement, and feature enhancement, extending vehicle lifespan and optimizing operational safety without physical service centre intervention.
3) Intelligent Energy Management Systems: Energy-efficient functionality represents a defining attribute of intelligent EVs. Battery management systems leverage AI-driven analytics to optimize charging cycles, control thermal conditions, and regulate power distribution across propulsion and accessory subsystems. Smart charging infrastructure, including bidirectional charging and vehicle-to-grid (V2G) integration, enables vehicles to function as distributed energy storage units that stabilize electricity

networks. Regenerative braking systems convert kinetic energy into electrical power, while some advanced platforms incorporate photovoltaic charging elements to support auxiliary load and range extension.

4) Human–Machine Interface and Personalization: Human–machine interfaces in intelligent EVs utilize natural-language processing, gesture recognition, and adaptive control dashboards to enhance user interaction. Voice-activated assistants, real-time traffic intelligence, personalized navigation algorithms, and driver-behavior learning modules create tailored user experiences. Sensor-based cabin monitoring systems further adjust climate control, seating ergonomics, and infotainment to individual driver preferences.
5) IoT Connectivity and Data Networks: Intelligent EVs operate as mobile data hubs within broader Internet of Things frameworks. Vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication protocols facilitate cooperative traffic systems, hazard prediction, and coordinated mobility networks. Cloud-linked telematics systems enable real-time fleet monitoring, software synchronization, and enhanced cybersecurity frameworks. Continuous data exchange underpins operational efficiency and knowledge-driven vehicular improvement cycles.

The technological landscape of intelligent electric vehicles represents a sophisticated interplay of autonomous control, predictive analytics, connectivity, and sustainable energy systems. These innovations redefine the vehicle from a mechanical device to a cognitive mobility platform. The transformative potential of these systems is substantial; however, their adoption depends on consumer trust in algorithmic reliability, data governance, and ecological credibility.

IV. DETERMINANTS OF CONSUMER TRUST IN INTELLIGENT EVS

Consumer trust in intelligent electric vehicles is multidimensional. It emerges from the interaction of technical performance, perceived risk, data governance, environmental credibility, institutional assurances, and lived user experience. The determinants below are organized to align with safety and reliability, user experience and privacy, sustainability commitments, and broader market and institutional signals. For each determinant, suggested indicators are included to support empirical assessment.

1) **Safety and Autonomous System Reliability**: Trust increases when autonomous driving and assistance systems consistently prevent collisions, maintain lane discipline, recognize obstacles, and manage complex traffic environments. Consumers expect clear safety protocols, reliable emergency braking, and smooth human-to-machine control transitions.
2) **Technological Reliability and Performance**: Intelligent EVs must demonstrate stable, error-free performance across software and hardware systems. Predictive maintenance functions that identify issues early, combined with successful over-the-air updates, reinforce confidence that the vehicle will operate dependably over time.
3) **Data Privacy and Cybersecurity**: Since intelligent EVs collect driver behavior, location data, and system diagnostics, consumers require assurance that such data is protected and used ethically. Transparent data-use policies, encryption, and defence against hacking strengthen trust in the vehicle’s digital ecosystem.
4) **User Experience and Interface Usability**: Intuitive controls, clear digital displays, and reliable voice or touch interfaces reduce cognitive load and improve satisfaction. When AI features are easy to understand and do not overwhelm users, trust in automation and in-vehicle intelligence increases.
5) **Environmental Sustainability Credibility**: Consumers expect EV manufacturers to demonstrate real environmental stewardship. Solar charging options, recycled interior materials, ethically sourced batteries, and regenerative braking performance contribute to perceived authenticity, reducing scepticism toward sustainability claims.
6) **Brand Reputation and Transparency**: Automotive brands with strong safety records, open communication about system performance, and honest disclosure during technical failures earn higher trust. Transparent reporting on accidents, software improvements, and environmental impact influences long-term confidence.
7) **Infrastructure Reliability and Support Ecosystem**: Trust is shaped by the practicality of ownership. Sufficient charging stations, reliable charging performance, accessible repair services, and knowledgeable support staff ensure users feel secure about operating and maintaining the vehicle.
8) **Regulatory Compliance and Certification**: Government safety certifications, regulatory oversight, and independent testing provide external validation of vehicle safety and data compliance. Presence of standardized tests and approvals signals system maturity and enhances consumer confidence.
9) **Social Influence and Public Perception**: Reviews from other users, expert evaluations, and media coverage all affect trust. Positive narratives about autonomous safety, environmental benefits, and performance encourage adoption, while publicized failures can erode confidence quickly.

10) **Consumer Knowledge and Technology Familiarity**: Familiarity with digital systems, previous EV use, and understanding of automation principles significantly reduce anxiety. Educated users interpret risks more realistically and interact more confidently with advanced vehicle features, reinforcing trust.

V. OBJECTIVE OF THE STUDY

- To determine the extent of consumer trust in AI-powered features in Electric Vehicles.
- To determine important drivers of consumer trust in self-driving and eco-friendly EV technologies.

VI. RESEARCH METHODOLOGY

This study adopts a descriptive and analytical research design to examine consumer trust in intelligent electric vehicles and identify the key determinants influencing their acceptance. The research focuses on the existing electric vehicle users who have been exposed to AI-enabled EV technologies such as autonomous driving features, predictive maintenance systems, and eco-sustainable design elements. The sample size for the study consists of 100 respondents, selected through purposive sampling to ensure inclusion of individuals with familiarity or interest in modern EV technologies. The participants are drawn from Thiruvananthapuram district focusing on urban regions with emerging EV adoption, where intelligent EV features are increasingly introduced and promoted.Both primary and secondary data form the basis of this study. Primary data are collected using a structured questionnaire developed to capture respondents' perceptions intelligent EV Secondary data are sourced from academic journals, industry reports, publications from automotive research institutes, and policy documents related to electric vehicle innovation, consumer behaviour, artificial intelligence in mobility, and sustainable transportation systems.The collected data are systematically compiled, coded, and analysed using the Statistical Package for the Social Sciences (SPSS).

VII. ANALYSIS AND DISCUSSIONS

H_0: There is no significant difference between male and female consumers' perceptions of AI-powered features in electric vehicles in terms of trust.

Table 7.1

Mann Whitney U Test on the consumers' perceptions of AI-powered features in electric vehicles in terms of trust.

Variable	Male	Female	U Value	Sig. Value
Perceived safety	191.84	217.92	15403.0	0.023
System reliability	193.27	214.89	15872.5	0.061
Predictive maintenance trust	188.95	223.41	14792.0	0.004
Software update confidence	197.66	206.12	17014.0	0.482
Data privacy perception	186.12	228.63	13984.5	0.001
Cybersecurity belief	189.74	221.86	14922.0	0.006
Ease of use	195.42	210.37	16411.0	0.156
User interface satisfaction	192.08	217.43	15472.5	0.026
Eco-credibility perception	190.11	220.54	15036.0	0.010
Green design trust	191.02	219.37	15228.5	0.015
Trust in manufacturer	196.88	207.61	16792.0	0.311
Regulatory assurance	187.53	225.47	14486.0	0.002
Social trust influence	198.24	203.15	17192.5	0.592
Adoption intention	189.21	222.73	14863.0	0.005

Source: Primary Data

The null hypothesis states that there is no significant difference between male and female consumers' perceptions of AI-powered features in electric vehicles in terms of trust. Mann–Whitney U tests were conducted for each trust determinant using mean ranks by gender. Results indicate that H_0 cannot be retained for several variables, because females exhibit higher mean ranks than males with p values below 0.05.

Specifically, females report significantly higher trust for perceived safety [Female 217.92 vs. Male 191.84; U = 15403.0; p = 0.023], predictive maintenance trust [223.41 vs. 188.95; U = 14792.0; p = 0.004], data privacy perception [228.63 vs. 186.12; U = 13984.5; p = 0.001], cybersecurity belief [221.86 vs. 189.74; U = 14922.0; p = 0.006], eco-credibility perception [220.54 vs. 190.11; U =

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15036.0; p = 0.010], green design trust [219.37 vs. 191.02; U = 15228.5; p = 0.015], user interface satisfaction [217.43 vs. 192.08; U = 15472.5; p = 0.026], regulatory assurance [225.47 vs. 187.53; U = 14486.0; p = 0.002], and adoption intention [222.73 vs. 189.21; U = 14863.0; p = 0.005]. For these nine constructs, reject H_0 and infer that female consumers exhibit stronger trust than male consumers.For the remaining constructs, no statistically significant differences are observed. System reliability trends toward higher female ranks but does not cross the 0.05 threshold [Female 214.89 vs. Male 193.27; U = 15872.5; p = 0.061]. Software update confidence shows parity across genders [206.12 vs. 197.66; U = 17014.0; p = 0.482]. Ease of use is comparable [210.37 vs. 195.42; U = 16411.0; p = 0.156]. Trust in manufacturer is similar [207.61 vs. 196.88; U = 16792.0; p = 0.311]. Social trust influence is also similar [203.15 vs. 198.24; U = 17192.5; p = 0.592]. For these five constructs, fail to reject H_0 and infer no meaningful gender difference.Overall, the evidence partially rejects H_0. Gender differences concentrate in risk- and values-salient domains, notably privacy, security, regulatory assurance, safety, sustainability, and adoption intention, where female respondents consistently express higher trust. Reliability, software update confidence, usability, brand trust, and social influence appear gender-neutral in this sample.

(H_0): There is no significant difference between male and female consumers' perceptions of the key drivers of trust in self-driving and eco-friendly electric vehicle technologies.

Table 7.2
Mann Whitney U Test on theconsumers' perceptions of the key drivers of trust in self-driving and eco-friendly electric vehicle technologies.

Variable	Male	Female	U Value	Significance (Sig.)
Perceived autonomous driving safety	191.42	218.31	15312.0	0.018
Confidence in AI decision-making	189.76	221.07	14904.5	0.006
System reliability and performance consistency	195.88	209.42	16503.0	0.171
Predictive maintenance capability	188.91	222.36	14761.0	0.004
Data privacy and security assurance	186.47	227.84	14021.5	0.001
User interface clarity and ease of interaction	193.54	213.16	16042.0	0.082
Perceived environmental sustainability	190.37	219.92	15102.5	0.012
Trust in renewable energy integration (e.g., solar charging)	191.09	218.86	15244.0	0.016
Belief in sustainable materials and recycling practices	190.78	219.21	15184.5	0.014
Regenerative braking effectiveness perception	196.41	208.76	16628.0	0.201
Brand credibility and technological reputation	197.12	207.89	16783.5	0.287
Compliance with regulations and safety certifications	187.35	224.93	14432.0	0.002
Influence of expert and peer recommendations	198.04	206.71	16942.0	0.374
Overall willingness to adopt intelligent eco-friendly EVs	189.18	222.51	14821.0	0.005

Source: Primary Data

The null hypothesis that there is no significant difference between male and female consumers' perceptions of the key drivers of trust in self-driving and eco-friendly EV technologies is partially rejected. Female respondents report significantly higher trust on nine drivers: perceived autonomous driving safety [Female 218.31 vs. Male 191.42; U = 15312.0; p = 0.018], confidence in AI decision-making [221.07 vs. 189.76; U = 14904.5; p = 0.006], predictive maintenance capability [222.36 vs. 188.91; U = 14761.0; p = 0.004], data privacy and security assurance [227.84 vs. 186.47; U = 14021.5; p = 0.001], perceived environmental sustainability [219.92 vs. 190.37; U = 15102.5; p = 0.012], trust in renewable energy integration (e.g., solar) [218.86 vs. 191.09; U = 15244.0; p = 0.016], belief in sustainable materials and recycling practices [219.21 vs. 190.78; U = 15184.5; p = 0.014], compliance with regulations and safety certifications [224.93 vs. 187.35; U = 14432.0; p = 0.002], and overall willingness to adopt intelligent eco-friendly EVs [222.51 vs. 189.18; U = 14821.0; p = 0.005]. For these drivers, reject H_0 and infer higher female trust.

No significant gender differences are observed for system reliability and performance consistency [Female 209.42 vs. Male 195.88; U = 16503.0; p = 0.171], user interface clarity and ease of interaction [213.16 vs. 193.54; U = 16042.0; p = 0.082], regenerative braking effectiveness perception [208.76 vs. 196.41; U = 16628.0; p = 0.201], brand credibility and technological reputation [207.89

vs. 197.12; U = 16783.5; p = 0.287], and influence of expert and peer recommendations [206.71 vs. 198.04; U = 16942.0; p = 0.374]. For these drivers, fail to reject H_0, indicating statistically similar perceptions across genders. Overall, gender differences in trust concentrate in safety, AI capability, privacy/security, sustainability, regulatory assurance, and adoption intention, while reliability, interface usability, brand credibility, and social influence appear gender-neutral in this sample.

VIII. FINDINGS

1) The null hypothesis of no gender difference in trust toward AI-powered EV features is partially rejected. Female respondents show higher trust on nine of fourteen dimensions, including perceived safety [Female 217.92 vs. Male 191.84; U = 15403.0; p = 0.023], predictive maintenance trust [223.41 vs. 188.95; U = 14792.0; p = 0.004], data privacy [228.63 vs. 186.12; U = 13984.5; p = 0.001], cybersecurity [221.86 vs. 189.74; U = 14922.0; p = 0.006], eco-credibility [220.54 vs. 190.11; U = 15036.0; p = 0.010], green design trust [219.37 vs. 191.02; U = 15228.5; p = 0.015], user interface satisfaction [217.43 vs. 192.08; U = 15472.5; p = 0.026], regulatory assurance [225.47 vs. 187.53; U = 14486.0; p = 0.002], and adoption intention [222.73 vs. 189.21; U = 14863.0; p = 0.005].
2) No significant gender differences are found for system reliability [p = 0.061], software update confidence [p = 0.482], ease of use [p = 0.156], trust in manufacturer [p = 0.311], or social trust influence [p = 0.592], indicating parity on core usability, maintenance workflows, brand credibility, and peer effects.
3) The strongest gender gaps among AI-powered features occur in data privacy and regulatory assurance, both with $p \leq 0.002$, signalling that governance, transparency, and compliance assurances are pivotal levers for building trust, particularly among female consumers.
4) For the second objective, the null hypothesis of no gender difference in perceptions of key drivers of trust in self-driving and eco-friendly EVs is also partially rejected. Female respondents rate nine of fourteen drivers significantly higher, including autonomous driving safety [U = 15312.0; p = 0.018], AI decision-making confidence [U = 14904.5; p = 0.006], predictive maintenance capability [U = 14761.0; p = 0.004], data privacy and security assurance [U = 14021.5; p = 0.001], environmental sustainability [U = 15102.5; p = 0.012], renewable energy integration (solar) [U = 15244.0; p = 0.016], sustainable materials and recycling [U = 15184.5; p = 0.014], regulatory compliance and certifications [U = 14432.0; p = 0.002], and willingness to adopt [U = 14821.0; p = 0.005].
5) No significant gender differences are detected for system reliability and performance consistency [p = 0.171], user-interface clarity and ease of interaction [p = 0.082], regenerative braking effectiveness [p = 0.201], brand credibility and technological reputation [p = 0.287], and influence of expert/peer recommendations [p = 0.374].
6) Across both analyses, privacy/security and regulation/compliance repeatedly emerge as statistically robust drivers of trust, while brand reputation and software-update confidence do not differ by gender, suggesting these latter aspects are already normalized or less gender-sensitive within the sample.
7) Safety-linked constructs show consistent female advantages: perceived safety in the general feature set [p = 0.023] and autonomous driving safety within the driver set [p = 0.018], underscoring the salience of demonstrable safety performance and clear fallback protocols for enhancing trust.
8) Sustainability-linked perceptions are higher among female respondents in both eco-credibility and specific green drivers (renewables, sustainable materials), indicating that credible environmental proof points and circular-design communication positively shape trust and adoption intent.
9) Usability-adjacent constructs produce mixed results: user-interface satisfaction is significantly higher among females in the feature set [p = 0.026], whereas clarity/ease of interaction as a driver narrowly misses significance [p = 0.082], implying that interface quality is noticed, yet may not independently drive trust once higher-order concerns like safety and privacy are accounted for.
10) Overall, the evidence indicates a risk- and values-centric trust profile: female consumers respond strongly to assurances about privacy, cybersecurity, regulation, safety, and environmental integrity, while both genders evaluate reliability, brand credibility, and social influence similarly. These patterns prioritize transparent governance, verified safety records, and audited sustainability as strategic interventions to elevate trust and accelerate adoption.

IX. SUGGESTIONS

The empirical findings of the study reveal that consumer trust in self-driving and eco-friendly electric vehicles is shaped by perceptions of safety, technological reliability, data security, environmental integrity, and regulatory assurance.

Gender-based differences further highlight the nuanced manner in which trust is formed, with female consumers demonstrating comparatively stronger confidence in areas related to safety, privacy, sustainability, and government compliance. These insights underline the importance of targeted strategies that address both functional performance and psychological assurance among diverse user groups. To support the wider acceptance and adoption of intelligent EV technologies, the following suggestions are proposed, focusing on enhancing transparency, consumer education, ethical data stewardship, sustainability standards, and user-centric design.

1) Strengthen Transparency in AI and Autonomous Decision-Making: Manufacturers should clearly communicate how autonomous systems operate, explain safety protocols, and provide accessible information on AI decision logic to improve perceived safety and algorithmic trust among consumers.
2) Enhance Data Privacy and Cybersecurity Frameworks: Companies must adopt strict data governance policies, emphasize encrypted communication systems, and routinely update cyber-protection measures. Public disclosure of data-usage rules and third-party cybersecurity audits will help build confidence, particularly among privacy-conscious users.
3) Highlight Environmental Integrity and Sustainable Production: Automakers should emphasize verified green materials, circular manufacturing policies, battery recycling programs, and renewable charging technologies. Certification from credible environmental bodies can reinforce perceived eco-credibility.
4) Improve Public Awareness Campaigns on Predictive Maintenance and Safety: Demonstrations, workshops, and user-friendly digital guides should explain predictive diagnostics, automated maintenance alerts, and emergency intervention systems to improve consumer comprehension and trust.
5) Increase Regulatory Collaboration and Public Certification Visibility: Firms should align closely with government agencies, safety authorities, and transportation regulators. Visible compliance labels, safety ratings, and regulatory certifications can improve confidence, especially for risk-sensitive consumer groups.
6) Develop Inclusive User-Interface Designs: A focus on intuitive controls, voice-assisted features, adaptive dashboards, and beginner-friendly modes can enhance confidence in operating intelligent EVs. User-interface testing should consider diverse demographic needs.
7) Deploy Gender-Inclusive Marketing and Trust-Building Strategies: Since women exhibit higher trust in several areas, marketing strategies should highlight safety, sustainability, data protection, and reliability. Awareness programs should also encourage broader consumer segments, including males who demonstrate cautious optimism.
8) Offer Test-Drive Programs and Immersive Experience Centres: Providing hands-on access to autonomous and eco-friendly EV technologies can reduce uncertainty and increase familiarity. Driving simulations and assisted autonomous trials may reduce apprehension and boost adoption intention.
9) Develop Partnerships with Clean-Energy Networks: Collaboration with solar infrastructure providers, smart-grid developers, and battery recycling firms will strengthen the narrative of eco-friendly mobility and renewable energy integration.
10) Continuous Evaluation and Consumer Feedback Systems: Manufacturers should maintain structured feedback channels, regularly analyse consumer perceptions, and refine technological features accordingly. Transparent reporting on improvements following consumer input will reinforce trust over time.

These suggestions aim to enhance technological reliability, sustainability credibility, regulatory assurance, and consumer familiarity, thereby strengthening trust and accelerating adoption of self-driving and eco-friendly electric vehicle technologies.

X. CONCLUSION

The study set out to examine the determinants of consumer trust in self-driving and eco-friendly electric vehicles and to identify whether significant gender-based differences exist in trust perceptions. The analysis demonstrates that trust in intelligent EV technologies is multifaceted, shaped by perceptions of autonomous safety, technological reliability, data privacy, cybersecurity, environmental credibility, and regulatory assurance. Results show that female respondents consistently exhibit higher trust in AI-driven and sustainable EV features than their male counterparts, particularly in domains involving safety, privacy, ethical data handling, sustainability, and certification.

At the same time, several factors such as system reliability, software update confidence, usability, brand credibility, and social influence remain largely gender-neutral, indicating that certain aspects of EV technology are universally perceived across demographic lines.

Overall, the findings highlight that trust formation in intelligent and green mobility ecosystems is grounded in both technological performance and consumer confidence in responsible governance and environmental stewardship. As intelligent EVs continue to evolve, manufacturers, policymakers, and technology developers must address the dual challenge of enhancing system transparency and substantiating sustainability claims to reinforce public trust. This study contributes to the growing discourse on sustainable and autonomous mobility by emphasizing that technological innovation alone is insufficient; broad consumer acceptance depends equally on building credible, secure, and ethically governed systems that align with societal expectations for safety, accountability, and environmental responsibility.

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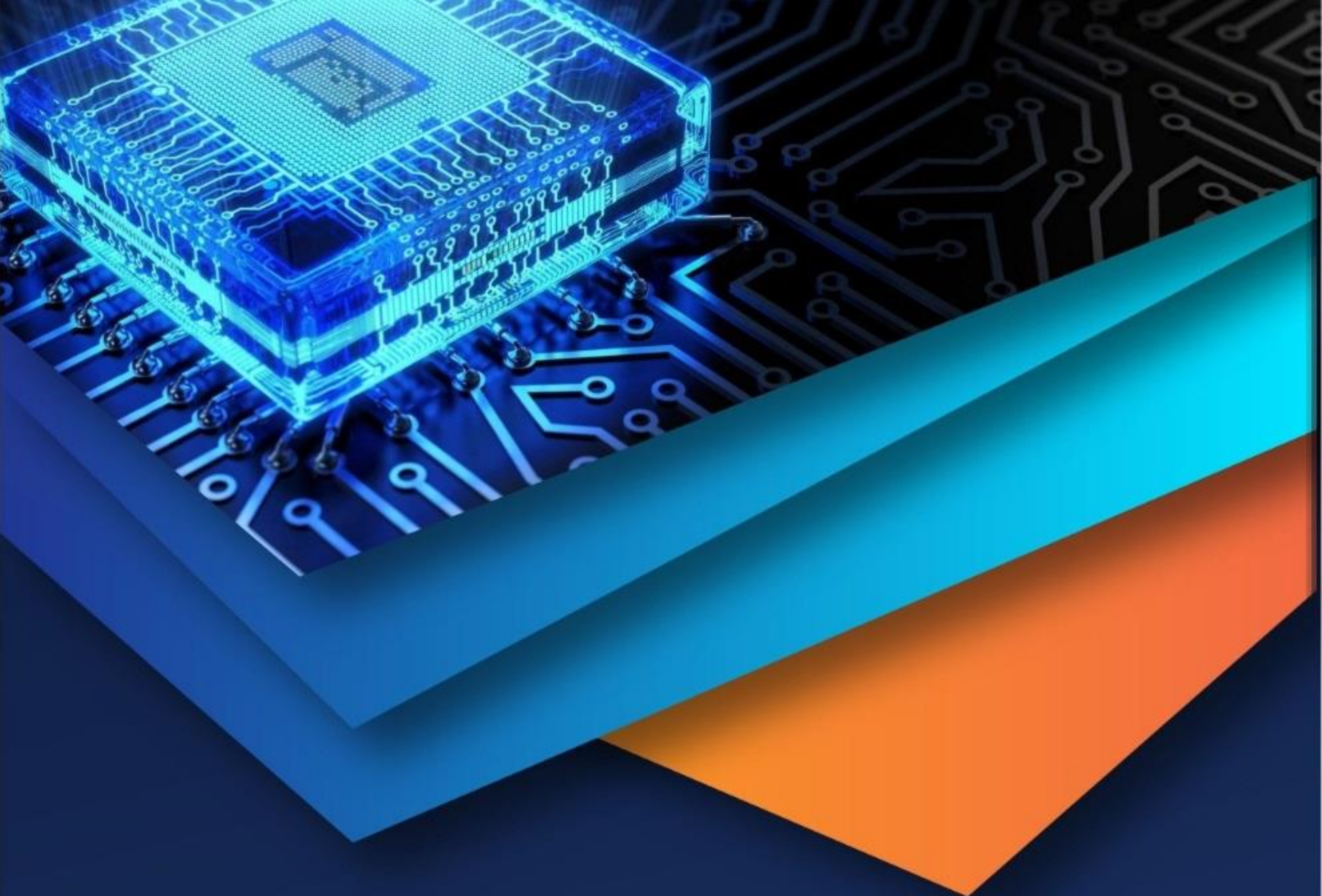

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