



# *“When AI Ethics Goes Astray: A Case Study of Autonomous Vehicles”*

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## **ABSTRACT**

Autonomous vehicles are the future of automobile industry. Human drivers can be completely taken out through implementation of safe and intelligent vehicle which can work using AI technology. This paper shows the core components of AI in autonomous vehicles which involves use of advance algorithms and sensors to facilitate real time decision. The key focus of this paper is illustrate how AI system use advance methods to understand and execute driving decision automatically, without need for human interference. AI algorithm and sensor, vehicles are empowered to navigate, detect obstacles and maintain control for autonomous operation. AI in autonomous vehicle becomes more convenient in path planning and also make the vehicle capable to drive automatically in any complex situation. AI ensure vehicles to make right decision, adapt to changing conditions and drive automatically even in any complex situation. Through advance algorithm and sensor technology AI predict the future where human driver is minimized compare to intelligent and self-driving vehicles.

## **INTRODUCTION**

Autonomous vehicles, commonly known as self-driving cars, represent fusion of advance technology and Artificial Intelligence (AI). Recently, Autonomous vehicle technology attracts a lot of attention in industry and has already implemented by many industries like Uber, Google, Apple, BMW, Tesla and Toshiba. These technology enables autonomous system to replace human drivers in controlling vehicle with better driving skills, which helps to reduce pollution, road accidents and many more. Autonomous vehicles are equipped with cameras, radar, lidar and advanced ultrasonic sensors. These components are eyes and ears of autonomous vehicle which capture the data from the surrounding. AI not only recognize the environment but also make complex decision. With machine learning algorithms, AI has a capability to explore driving scenarios, learning and adapting reliable driver. AI play vital role for path planning and route tracker based on real time conditions.

The big challenge of autonomous vehicle is cyber-attacks and privacy issues. A single failure component can impact the hole vehicle network and lead major safety issues. Additionally, hackers can access sensitive data that is collected and stored in autonomous vehicle. This includes information about location and passwords for connected devices. For this reason, identify attacks and defense against is become one of the major challenges for AV industry.

Although it faces many challenges, the adoption of autonomous vehicles continues to grow because of advance technology, reduce road accident and increase safety in transportation system.

## LITERATURE REVIEW

This Literature Review describes various aspects of AI in autonomous vehicle including decision making, control system and other advance technologies. These Research Papers highlights various advantages and disadvantages of autonomous vehicle, also includes technology which help Autonomous vehicle to drive. These Research Paper also includes the role of AI in autonomous vehicle to improve performance and make real-time decision making.

	Research Paper Name	PROs	CONS	Technology
1.	Artificial Intelligence and Internet of Things for Autonomous Vehicle	Respond like human Data exchange	The sensor, software and architecture of autonomous vehicle become quite Complicated due to difficulty task	Auto dealers, semi-conductor, IT hardware and software, telecom and communication
2.	A systematic literature review about the impact of AI in autonomous vehicle [2]	Pre-crash control Safe navigation Path tracking Manage low level vehicle actuators Fault prevention	Vehicle cyber attack Need to update maps regularly	Sensors, case-based reasoning, Gaussian Mixture Model, Viterbi algorithm
3.	AI in autonomous vehicle-A literature review [3]	Accident decreases Select best path to avoid accident	All the input based on sensors Real time operation required	AI, logic, Artificial Neural Network, laser sensors, GPS sensors
4.	Experimental autonomous road vehicle with logical Artificial Intelligence [4]	Automatic braking and distance keeping. High-accuracy positioning and route recording. Controlling and holding the vehicle on a road lane. Driving through a predetermined trajectory. Real-time dynamic trajectory prediction. Remote control.	if the autonomous car stops in front of a broken-down traffic light with the red light on, the car would remain there for eternity	Ethernet network with two switches Two external side video cameras used by the lane keeping assistance system. Light Detection and Ranging (LIDAR) device GLONASS/GPS navigation receiver

5.	AI application in the development of autonomous vehicle: A survey [5]	Motion planning Decision making Safety validation	Algorithms are time consuming and relatively difficult to implement	High definition, maps, big data, performance computing
6.	Autonomous vehicles and embedded AI: The challenges of framing machine driving decisions [6]	Advanced driver assistance systems	High Costs Security Issues	SynCity
7.	Simulation driven design and test for safety of AI based autonomous vehicle [7]	2D and 3D object detection. automotive safety standards	most likely to collide	sensor, ML models
8.	Autonomous vehicle and intelligent automation: Application, challenges and opportunities[8]	automatic parking	traffic congestion Lack of good intelligent software	SysWeaver, SysAnalyzer, AutoSim, Flow, OpenCV, JESS, FuzzyJ, AuRa, and PaddleCV
9.	Validation of decision making in AI based autonomous vehicles[9]	Object recognition Decision- making Vehicle dynamic	Image based testing costly Algorithms are complecated	OpenSceneGraph, OpenDrive for describe road network
10.	Risk and Trust in AI technology: A case study of autonomous vehicle[10]	less congestion, reduced parking, fewer vehicles per capita	AI is not infallible	ANOVA with a Greenhouse Geiser correction
11.	Intelligence of autonomous vehicles: A concise Revisit[11]	decision-making capabilities object identification Information received from these sensors is then used to make decision like the safest path to reach the destination	data is rare on corner cases (e.g., driving off the lanes), the trained network might give errors when it handles unseen scenarios	phics processing units (GPUs),deep learning ,LiDAR sensors ultrasonic sensors and RADAR
12.	When AI Ethics Goes Astray: A Case Study of Autonomous Vehicles[12]	automate ethical decisions improve transportation by making traffic more fluid, inclusive, ecological, economical, and safer	hacking and threats of Autonomous vehicle use for terrorist ends Losing the possibility to react in critical situations	Sensors, maps, AI
13.	Introducing Ethical thinking about autonomous vehicles into AI course[13]	full self-driving capability make decision to make minimize harm	Trolley Problem	camera sensor, AI, big data

14.	From automation to anatomy and autonomous vehicles: challenges and opportunities for human-computer interaction[14]	human-like sensing ability abilities vary across design scenarios; advanced systems may set self-defined goals, adjust strategy	machine behaviors may evolve in unexpected ways	human-centered AI driving data recorder
15.	Statistics, AI and autonomous vehicles[15]	lower the cost of production greater fuel efficiency no longer needed to drive	quite complex and specific to given subproblems	camera sensors, miscalibrated cameras
16.	Computer vision for autonomous vehicles: problems, datasets and state of the art[16]	path planning detected objects safety, comfort and time for reaching the goal	does not easily generalize to novel scenarios do not reveal when a certain error has occurred	low-level perception, scene parsing, path planning, and vehicle control
17.	Autonomous vehicles security: challenges and solutions using blockchain and AI[17]	Enhanced productivity increase safety precision and accuracy exploration and research healthcare support	Ethical consideration Security and cyber threats Human-robot interaction Adaption to dynamic Unemployment and societal impact	sensing components, ECUs, in-vehicle network and V2X network
18.	Sharing the road: autonomous vehicles meet human drivers[18]	adaptive cruise control, GPS-based route planning autonomous steering Efficiency, Safety, Productivity	Technology adoption Infrastructure Policy switching Light modals	GPS sensor, light sensor, LiDAR
19.	Information, Uncertainty and the manipulability of AI autonomous vehicle system[19]	reduce traffic collisions, improve traffic flow, mobility, relieve individuals from driving, decrease fuel consumption, facilitate transportation and businesses operations	unresolved safety, technology, ethical, social, political, regulatory and legal issues	sensors, radars, laser lights, GPS, odometry, computer vision
20.	The challenges and opportunities of human centered AI for trustworthy Robots and autonomous system[20]	reduce the frequency of road accidents a high level of safety path towards fully autonomous systems	Security and Privacy concerns Scalability High costs Integration with Legacy System	autonomous trading systems, self-managing telecommunication networks, smart factories, and infrastructure

## CONCLUSION

In conclusion, the rapid growth of Autonomous Vehicle (AV) in recent years creates a new era by the adoption of various smart techniques and technologies to enhance the performance and quality of automatic decision-making. AI play important role in autonomous vehicle providing advanced capabilities such as decision making, accident reduction, obstacle detection, path planning etc. The integration of Artificial Intelligence (AI) in Autonomous Vehicle provides high-performance embedded systems that can be utilized in various environment to make more dynamic and robust control systems. Despite these advantages, the development of autonomous vehicle faces several challenges such as complex algorithms, security issues, the need for public acceptance. As AI implementation become more popular, AI role extends in driving tasks. It include various aspects to manage user recommendations, natural language processing and personalized settings to make user-friendly autonomous driving experience. AI contributes in autonomous vehicles to reduce cyber threat and ensure security of the vehicle's system. The ongoing development of AI in the automobile industry reflects not only technological advancement but also contribute to overcome challenges and enhance safety and efficiency of autonomous vehicles.

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