North American Academic Research

TWASP

Review

Autonomous Vehicles in Developing Countries: A Case Study on User's View Point in Bangladesh

Abdullah Al Noman Tamzid[1], Sakib Hasan[2], Golam Nobi Shawon[1], MD Al Hadi[1]

[1] BSc in Electrical Engineering and Automation, Jiangsu University of Science and Technology, Dantu District, Zhenjiang, Jiangsu, China, 212000

[2] MSc in Information and Communication Engineering, Beijing Institute of Technology, Beijing, China

Abstract: Autonomous vehicles are becoming increasingly popular, not only for people who rely on them to get around but also for trend includes a range of self-driving robots used outdoors, primarily on earth or water, on both private property and public roads. This trend focuses on vehicles that are fully driverless or at least highly automated, occasionally controlled by a human driver.

The dream of self-driving cars is decades old. With the rapid development of artificial intelligence (AI), edge computing, and sensor technology, all types of highly automated vehicles have been launched in recent years, and fully automated vehicles were tested for the first time. A startup based in the United States completed the first fully autonomous articulated truck on public roads. A few months later, a Japanese consortium of cargo companies successfully sailed and docked the world's first fully autonomous container ship without a crew. In the logistics industry, manufacturers, owners, and lessees of vehicles of all kinds are looking forward to future developments, not just for transportation, but for all possible use cases along the supply chain.

The trend toward autonomous outdoor vehicles will have a major impact on logistics. Because it will radically transform the operational tasks of human workers and how customers interact with logistics providers. However, there is still a long way to go in realizing this trend. While some use cases on private fenced land have already started to be implemented, self-driving on public roads requires public trust. It will be many years before people trust fully autonomous technologies and regulations allow them to be used unhindered on a global scale.

So far, no significant work has been done to explore user perceptions of self-driving cars in developing countries like Bangladesh. In Bangladesh, several universities such as BUET, BRAC, and North-South University have already started research on self-driving cars. [1]

Keywords: *Autonomous, Electric, Vehicle, Automatic, Obstacle.*

*Corresponding Author: sakibsunny77@gmail.com

Accepted: 28 February 2023; **Published**: 20 March 2023

How to cite this article: *Abdullah Al Noman Tamzid, Sakib Hasan, Golam Nobi Shawon, MD Al Hadi. Autonomous Vehicles in Developing Countries: A Case Study on User's View Point in Bangladesh. North American Academic Research. 6(2), 160-166 doi: https://doi.org/10.5281/zenodo.7753924*

Conflicts of Interest: There are no conflicts to declare.

Publisher's Note: NAAR stays neutral about jurisdictional claims in published maps/images and institutional affiliations.

1. Introduction.

This paper explores user perceptions of the use of self-driving cars, Bangladeshi vehicles. The focus of this study is on the analysis of factor recognition. Reliability, Safety, Convenience, and Comfort of Autonomous Vehicle Systems User's point of view.

2. Background Literature.

A self-driving car is a car that is driven by software. Ride-sharing services such as Uber and Pathao are transforming Dhaka's transportation sector. The business was born primarily in the capital of Bangladesh due to Dhaka's large consumer base and rising incomes. With Dhaka plagued by some of the worst traffic congestion in the world, people are looking for reliable, efficient, and affordable ways to commute, especially for commutes that are underserved by public transport. Now we can think about the adoption of self-driving cars by ride-sharing companies. It will be very effective in alleviating traffic congestion.

Environment Ministry Director General Monoarul Islam said 20 million of the city's 14 million vehicles are powered by CNG. Among all vehicles driving in Dhaka, 3.5 million are private cars. Uber reports that his private car is idle 96% of the time. Also, it's expensive to own and maintain a car that he has only 4% utilization. To reduce costs, you can easily request a car with ridesharing. Also, in the case of self-driving, there is no need to wait for someone to operate it. When it receives a request from the user, it acts as its function and starts the ride. It helps reduce the number of private vehicles on the road, which affects congestion relief. Therefore, it is cheap to use self-driving cars. Using these advanced technologies in your vehicle will save fuel and gasoline for the future. It will also help reduce pollution. The less gasoline we burn, the less air pollution and harmful effects we have. Parking is a big problem in our country due to the lack of roads. Once the car is self-driving, there will be no need to park it empty and wait for a driver, it will move as needed. So, people will gradually stop investing in buying private cars and start using ride-sharing. the very end, we have pursued its goal of it. [2]

Social issues related to autonomous systems include:

- In the future do people trust self-driving cars?
- Is that safe to drive?
- Government will allow driving this car?
- How much it will cost to purchase?

3. Autonomous Vehicle Technology in Bangladesh.

In general, driving automation systems (self-driving cars) are categorized into six different levels (0-5), depending on the capabilities of the human driver and the associated autonomous driving system. A self-driving car refers to a vehicle with a self-driving level of 3 or higher. AV technology is a very complex technology consisting of many subsystems. The autonomous driving architecture can be simplified into three main components: algorithms (including recognition, and decision-making), client systems, and cloud platforms. Since only the algorithmic component of the architecture is used to understand the vehicle's environment, other components are used for internal processing purposes, this article explores the algorithmic part in more detail.

4. Major Challenges in Bangladesh.

Self-driving technology is still new. There are many challenges for vehicles to master Autonomy levels 3-5 used in everyday traffic. Issues in the introduction of autonomous driving technology in developing countries, especially Bangladesh, can be divided into two types: technical and social. This section contains important issues that need to be presented in Bangladeshi AV.

A. Technical Challenges.

a) Challenges for sensors:

Self-driving cars rely on a large number of sensors to understand the environment. The reliability of these sensors often depends on external factors such as Bangladesh is a tropical country with a lot of rain throughout the year, and its capital Dhaka is one of the airiest places. Polluted Cities of the World. Like developing countries, Bangladesh invests in expanding road infrastructure to meet ITS requirements. DSRC provision connectivity had to be built into these designs of Equipment to reduce future investment costs. Similarly, high-resolution 3D maps with existing road information infrastructure functions are essential for self-driving cars fully functional. [5]

b) Cognitive challenges:

This is often a significant issue for AV localization in countries such as Bangladesh. For object recognition and object tracking, model training using Deep learning by analyzing the huge amount of big data I want a natural generic image. Most of this process is conducted in the context of a developed country. Traffic conditions in developing countries are quite Depended on complex traffic conditions, Critical velocity profiles (Fig. 1). Model training using these Had to run more heterogeneous conditions for AV.

Fig 01: The Bangladeshi Traffic Jam That Never Ends - The New York Times.

c) Challenges for action:

Vehicle actions such as start Stopping, following or changing lanes, turning, etc. like that If not, scenarios can confuse autonomous driving systems correctly considered. In Figure 2 you can see a traffic cop giving the go-ahead. With a hand gesture while the traffic light shows red (stop). like that scenarios can confuse autonomous driving systems If not correctly considered.

Fig 2: Traffic Control with Hand Gesture in Dhaka City. (Daily Star)

B. Social Challenges.

As a system to be applied Be safer, involve people in more risky behavior, and enjoy other people's perks instead of maximizing upgrade security. Similar accidents have been observed in semi-automatic vehicles. For example, despite the manufacturer's advice, Considering the vehicle as fully autonomous, the driver of the semi-autonomous car ignores the driving task and Engages in other distracting tasks. Generally, developing Countries' Number of users of new self-driving cars Technology is very low compared to developed countries. As a Consequences inadequate infrastructure for AV. For example, most AV devices on the market are electric. This requires a charging station. as such user Vehicles are relatively few and charging stations have not yet been installed Enough to comfortably use these vehicles. This lack also makes other customers less willing to buy. A new electric AV. [6]

5. Current Coordination at The Policy Level.

These policies need to be studied by developing countries to understand the known issues they need to consider when designing their policies. Likes:

A. Public Awareness:

Based on Cox Automotive 2018 survey results from Evolution of mobility research: self-driving car, public Awareness of self-driving cars soars the demand for autonomous functions is strong. Even when I drive cars, 84% want to be able to drive themselves. 16% would be nice for self-driving cars. [7]

B. Roadmap:

In June 2020, the regulator announced this. European countries, United Nations Economic Commission for Europe (UNECE) Regulations for Automobile Lane-Keeping Systems Japan, France, Germany, possibly China from Jan 2021, but not the US [8]

C. Issue with Congested Roads:

Our car will attempt to maintain a safe distance from other vehicles. As soon as the red light turns on, the automobiles begin to crowd together as much as they can. Our car will be able to discern this, among other things, by comparing the area in front of it to the speed at which the incoming vehicle is honking. This is referred to as "Loose mode," when the vehicle will behave inconsistently and encroach upon space like other cars. Cars in the rear requesting room and individuals utilizing voice cues or hand signals to move their vehicles aside are the triggers. The automobile will utilize its sonar, cameras, and proximity sensors to determine whether it is in a crowded area.

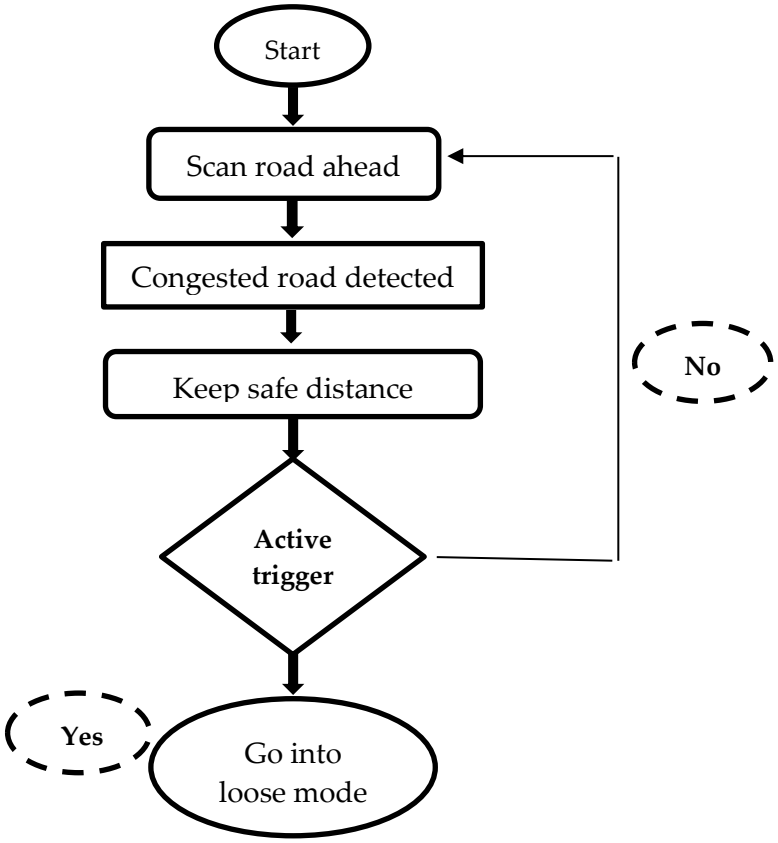

Fig: Loose mode.

D. Infrastructure:

No country can do this without the right infrastructure fully autonomous walking. You can't just focus on your vehicle. Self-drive. improved production processes and new types of Change also require a supply chain. To make current smart city systems suitable Improving AV infrastructure (e.g., roadside sensors, Smart signage, 5G networks, 3D maps, etc.) should be created. [9]

E. Insurance:

As the responsibility of the driver becomes lighter, road safety, manufacturers, product suppliers, A technology company involved in the manufacture of Self-driving cars and the software that controls them Take the risk of higher liability.
there will be good cases of advanced self-driving cars that are not the fault of the driver, etc. Any collisions that occur are the result of product defects. Lack of Substantial Case Law and Proof of Claim Self-driving car accidents are the limiting factor How acceptable is this position to insurance companies? [10]

Conclusions

Every day we see news of traffic accidents that lose our country's hard-working people or in some cases disable them for the rest of their lives. In most cases, the causes of accidents are reckless driving and careless overtaking attach great importance to smart vehicles and have already mandated some of the vehicle's driver assistance features. It is necessary to thoroughly research the achievements of intelligent automobile technology and implement necessary functions in automobiles.

Author Contributions: On the first page.
Approval: All authors have read and agreed to the published version of the manuscript.
Funding: This research received no external funding.
Institutional Review Board Statement: Not applicable.
Informed Consent Statement: Not applicable.
Data Availability Statement: Not applicable.
Acknowledgments: Not Mentioned.
Conflicts of Interest: The authors declare no conflict of interest.

References

[1] DHL, Insights & Innovation, https://www.dhl.com/global-en/home/insights-and-innovation.html
[2] Farjana Alam, L.M (2018). Impact of Adoption of Autonomous Vehicle by Ride-Share Business Over Bangladesh Food Supply Chain. Studocu.com, 1, 1.
[3] SAE J3016 JUN2018, Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles, SAE International, 2018.
[4] S. Liu, L. Li, J. Tang, S. Wu, J.L. Gaudiot, Creating Autonomous Vehicle Systems: Morgan & Claypool Publishers, 2017.
[5] U. Montanaro, S. Dixit, S. Fallah, M. Dianati, A. Stevens, D. Oxtoby & A. Mouzakitis, "Towards connected autonomous driving: a review of use cases", Vehicle System Dynamics, 57:6, 779-814.
[6] M. Masson, J. Lamoureux, E. de Guise, "Self-reported risk-taking and sensation-seeking behavior predict helmet wear amongst Canadian ski and snowboard instructors", Canadian Journal of Behavioral Science. vol. 52, no. 2, pp. 121–130, 2020.
[7] https://www.itsdigest.com/increasing-awareness-causing-public-rethinkautonomous-vehicles (accessed on 29 January 2021).
[8] https://auto2xtech.com/articles/roadmap-automated drivingcars2025/?fbclid=IwAR1I5r3tCXMiMXnH7cNFYWGfKTWJ3TYjLrIS OvbNF76melncbTeQbQzCUXk (accessed on 29 January 2021)
[9] S. Zoria, "Smart Cities: A New Look at the Autonomous-Vehicle Infrastructure", IoT for All, 7 January 2020.
[10] D. T. Carlson, "The Autonomous Vehicle Revolution: How Insurance Must Adapt", Marsh & McLennan Advantage, 2019.

Authors

Abdullah Al Noman Tamzid
BSc in Electrical Engineering and Automation, Jiangsu University of Science and Technology, Dantu District, Zhenjiang, Jiangsu, China, 212000

Sakib Hasan
MSc in Information and Communication Engineering, Beijing Institute of Technology, Beijing, China.

Golam Nobi Shawon
BSc in Electrical Engineering and Automation, Jiangsu University of Science and Technology, Dantu District, Zhenjiang, Jiangsu, China, 212000

MD Al Hadi
BSc in Electrical Engineering and Automation, Jiangsu University of Science and Technology, Dantu District, Zhenjiang, Jiangsu, China, 212000