**Case study Report-1**

(Tesla Auto Pilot Car Crashes- Reflection)

Baby Vennela Kothakonda (101178783)

Software Engineering Management (CSC-770)

Dakota State University

19th April, 2024

**Contents**

[**Title: Reflection on the Tesla Auto Pilot crashes and Lessons learn**ed 3](#_Toc163658247)

[**Introduction:** 3](#_Toc163658248)

[**Case Details** 5](#_Toc163658249)

[**Suggested solution and follow-ups** 7](#_Toc163658250)

[**Outcomes and the noticeable achievements** 7](#_Toc163658251)

[**Satisfying the learning goals of the Reader:** 7](#_Toc163658252)

[**Conclusion** 8](#_Toc163658253)

[**References** 9](#_Toc163658254)

# **Title: Reflection on the Tesla Auto Pilot crashes and Lessons learned**

**Organization**

**Author**

**Goals:** After reading this case study, readers should able to appreciate the need for execution of additional caution, while dealing with new technologies. With a special focus on autopilot systems, readers can appreciate the risk involved and can able to think of solutions that are necessary for averting accidents and life losses with the current level of technology maturity in the current context.

# **Introduction:**

***Organization and Expertise***

The current report is presented as a student of the academic organization, and in the capacity of pursuing graduation studies. Well, the current report is a write-up, based on a critical evaluation of the content and analysis of the facts. The special focus was aimed at safety at first concern and there is also attention and consideration towards the need for embracement of technology for improving the convenience and comfort in life. My key expertise in writing the current report is the technical knowledge advantage and above-average level, critical thinking skills, obtained through my academic activities.

***Audience for the report***

The report is mainly aimed at academicians and students. However, the content is also suitable for any layman with interests and expertise in knowing the technology's advantages and benefits.

***Problem Addressed and people identified the problem***

The current case is that of Tesla and its driverless driving technology aimed at making the car drive autonomous. As per the studies and data collected by NHTSA, since 2019, there have been more than 736 crashes reported. Unfortunately, 17 of these total incidents are fatalities.

***Background information and how it was reported.***

Most of the data reported here about the crashes is from the NHTSA. The data collected from NHTSA since 2019 is reported here and it is already indicated that the increase in the number of crashes and fatalities is also due to the drastic growth in the spread of the technology. Within a time of one year, the total number of vehicles adapting this technology has grown from 12000 to almost 400000 in number. NHTSA has made a detailed analysis of the reported crashes and the indications of the number of types of vehicles involved in the crash, the types and other details was made available in the form of the report from its website. The investigation not only worked for the identification of the total number of crashes, but it also worked to screen the data for the companies, which involved a maximum number of crashes and the models of the particular brands that have undergone a maximum number of accidents. Further the type of vehicles, for instance, the motorbike, the emergency vehicles, and so forth that are subjected to the accidents were investigated here in this report. Also, the likely cause of the escalation in the number of accidents according to the analysis is reported as the removal of radar sensors due to the initiation of Elon Musk, triggered the removal of the radar sensors from a diversity of models once in 2021 and later in 2022 (Kosuru & Venkitaraman, 2023). Anyway in the current context, NHTSA reminds the need and urgency in focussing the attention on the human driver and keeps reminding of the criticality of the human driver in keeping the traction. Also, it indicates the need for reconciliation of the technologies and the changes performed here in the current context.

# **Case Details**

The current case is all about the community of consumers, who are moving for driverless cars for their transportation needs. All classes of consumers, irrespective of the social, and economic differences, gender, and regional differences will fall in this unique category of community that uses autonomous vehicles for their transportation needs. The ease and convenience offered by autonomous vehicles have made this community move for these vehicles for transportation needs. The decisions taken by this community are mainly propelled by the affordability of the vehicles, the ease of operation of the vehicles, and the ease of installation of the software in the vehicles. From all these perspectives, these vehicles have become very much accepted by this community. However, a few issues of concern can be brought to the notice of those early adapters of autonomous vehicle technologies. The key problem is the unreliability of the technology and the over-reliance of users on the technology capabilities is making it dangerous on the roads of the United States of America. It is worth making some decisions on the usage of this vehicle with utmost attention to the safety of the passengers and other members of the vehicle before taking it for a ride and the key reason that prompted this decision is the level of maturity of technology is not upto the mark and still there is need for the technology, maturity, and reliance need to be improved for accepting the technology upto the mark.

**The sequence of the events in the Accident:**

Addressing the problem: the problem is not resolved, however with a focus on the issues and the limitations of the technology making the current set of problems, the key addressing of the problem is to acknowledge the severity of the problem and the need to take into the consideration that limits of the technology in boosting the safety of the users. The user needs to acknowledge the limitations of the technology as well as the concerns and actions expected by the human drivers in these vehicles by policy.

**Details of the occurrence in the chronological order:**

The striking aspects of the incident include that the accident happened due to the inherent flaws in the software clubbed with the negligence of the driver. Firstly, the software is not designed for cross traffic, which is a common aspect on US highways, like the current US441. Secondly, the software is reported to have limitations in the identification of the cases of the semitrailers, which were difficult to identify by the software. Also, the manual involvement in the control of the vehicles, the need for the presence of the driver with his hands on the steering wheel, and the eyes on the road not followed seriously are not taken seriously by Banner, the victim of the accident of Tesla 3(Red). These aspects collectively led to the accident.

**The sequence of the events that happened on that morning on US 441 is as follows,**

Banner, the 50-year-old software engineer on that unfortunate day is moving on the US441 highway in a still dark environment in his Tesla 3 (red) vehicle (Blanco, 2023).

On the way, while moving at about 75mph, the semi-trailer came across the road and the software in Tesla did not identify the trailer's movement.

Neither the driver on the road did notice and applied brakes for the car. The car jammed below the trailer body, the car's top part, ripped off, instantly killing Banner. The car moved ahead for about 1600 feet almost one-third of a mile, before coming to rest.

Release of the software without overcoming its current limitations in identification of the trailer movements, as well as without overcoming the limitations of moving in the cross traffic regions, contributed to the accident and other factors added to the situation, is the negligence of the human driver to follow the instructions, acknowledging the limitations of the software. He did not keep his hands on the steering and well was not watching the road with his eyes.

# **Suggested solutions and follow-ups**

There is a need for a comprehensive review of the limitations of the current software being used and the concerned vehicle traction can be allowed only after reviewing the competency of the software on the roads of the country. Secondly, the drivers of the vehicle need to acknowledge the limitations of the software and they should invariably, need to follow every instruction. So the solution is to first halt the autonomous vehicles and take in necessary steps to renovate the solution and make the drivers educated about the flaws and challenges and letting them accept the vehicles only after acknowledging the risks and accepting them. This is more likely to eliminate similar accidents in the future. People who are not aware of the flaws and the people who are likely to exhibit negligent behavior are likely to get constrained from the usage of these vehicles (Uraizee, 2023).

# **Outcomes and the noticeable achievements**

The outcomes of the investigation are yet to be investigated and the study is suggestive and the actual implementation of the same needs to be enforced by the federal government. The outcomes or achievements with the proper implementation of the solution can be seen only after changing the actual solution implemented here in the vehicles.

# **Satisfying the learning goals of the Reader:**

It is now very much evident, that the current findings and the subsequent suggestions made here in this report are of use for changing the negligent behavior of the consumers, who read this article. Also, they will become more informed decision makers after going through this article, in deciding the purchase or use of the vehicle. Companies like Tesla will be now aware of they will recognize the need to reconcile the decisions that they have taken to remove the radar sensors and also will work to remove the flaws in the current software solution being used. The learning goals of the common reader are to get acquainted with what is happening in this context and the quest for safer knowledge can be achieved here in this context.

# **Conclusion**

The key objective of bringing here to the notice of the readers is the current limitations of the autonomous vehicle software, the specific challenges that they are posting to the users are provided with reliable evidence from authentic sources. Also now the key learning goals of the readers, the safety issues knowledge is shared, and also what actions they need to take to make their journey safer is reported here in this write-up.

# **References**

Blanco, S. (2023, June 13). Report: Tesla Autopilot Involved in 736 Crashes since 2019. *Car and Driver*. https://www.caranddriver.com/news/a44185487/report-tesla-autopilot-crashes-since-2019/

Gupta, A., Anpalagan, A., Guan, L., & Khwaja, A. S. (2021). Deep learning for object detection and scene perception in self-driving cars: Survey, challenges, and open issues. *Array*, *10*, 100057. https://doi.org/10.1016/j.array.2021.100057

Kosuru, V. S. R., & Venkitaraman, A. K. (2023). Advancements and challenges in achieving fully autonomous self-driving vehicles. *World Journal of Advanced Research and Reviews*, *18*(1), 161–167. <https://doi.org/10.30574/wjarr.2023.18.1.0568>

Uraizee, T. T. R. L. I. P. F. S. I. (2023, October 6). Inside the final seconds of a deadly Tesla Autopilot crash. *Washington Post*. https://www.washingtonpost.com/technology/interactive/2023/tesla-autopilot-crash-analysis/