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Evaluation of How Autonomous Vehicle affect Safety on Road

Technology improves our living environment drastically in the past decades, as technology progress, a certain risk of technology begins to submerge in our daily basis. One of them is the safety issue autonomous vehicle has to affect the road environment. More and more autonomous or self-driving cars hit the road each day, as machines take over the place of driver from humans, it is reasonable to concern the safety issue these vehicles cause and prevent. Tests of the probability of safety and rate of incidents happened can help us greatly understands the issue. In the future, the autonomous vehicle will definitely replace human drivers on the road, it is important knowing the safety flaws and advantages of it and conduct implementation in the future.

On the night of 3 September 2010, 33-year-old Brian Wood was driving along a highway in Washington state companied by his wife and child, crashed in an accident, he died instantly, but his wife and child survived (Ong, 2017). It is a tragedy that this accident occurred, but it provokes the thought, can autonomous vehicle prevent this tragedy? It definitely can, according to Mechanical Engineering magazine, by just implement a few autonomous part inside the vehicle would have saved thousands of lives on the road (M.E., 2016). Not only autonomous vehicle benefit humans by saving lives but also benefits the society from an economic perspective, billions can be saved within the U.S.A. if autonomous vehicles are implemented and potential traffic accident can be avoided (M.E.,2016).

Furthermore, an autonomous vehicle can help human drivers react faster when approached in a dangerous situation. As robot computers calculating decisions in milliseconds, human drivers benefit from its processing power and high accuracy on the road. When the car encounter in a dangerous situation, the A.I. system can choose a solution in a reaction time a human driver cannot compete (Dixit, 2016). However, even it seems to have a promising future in the industry of autonomous vehicles, it is still an interdisciplinary challenge, facing obstacle within different parts of the system, either socially or technologically (Koopman, 2017).

The purpose of this research is to evaluate the safety rate of an autonomous vehicle on the road while testing its performance on road, it is also important to know how other human drivers will react to the autonomous vehicle and vice versa. A simulation of an autonomous vehicle on road is required to conduct an experiment on how the vehicle performs in real road conditions facing all other human drivers. We will compare the performance of the autonomous vehicle with a human driver facing the same situation on the road, and conduct test of reaction time and correctness of decision on both the human driver and the A.I. system. Furthermore, test on different road conditions are to be required, with rainy, muddy, and rough road environment, a different driver will react differently, we will compare this set of data with the A.I. responses and determine which one will react more efficiently to harsh road environments. Moreover, this simulation will focus on how A.I. system response to human errors, we will conduct multiple common human errors on the autonomous vehicle, and see how it responses to them, will it avoid the incoming vehicles or will it making other decisions.

The result of this simulation will be compared to other research that is been done by Schlenoff and fellow scientists of the NIST, who states the high-level algorithm have helped the autonomous driving system prevail in a dense road environment. (Schlenoff, 2005). Schlenoff

also states the data of which the AV (autonomous vehicle) has higher performance rate than other TV (traffic vehicle), he also includes the sample situations and dilemmas an AV will face on the road and potential solutions. In their original proposal, an A.I system can make most decisions faster and more efficiency than human system. We are trying to compare the data and prove the data we collect have more variety and looking at this system of processing the emergency situation in different ways. By comparing the data, we can derive the probability of how the autonomous vehicle behave against our human companions.

As a concluding of this research, it will provide us a better look at the autonomous vehicle affect our road environment, and the purpose is to prove current safety value of the autonomous vehicle effect the road environments in our society. In this proposal we have addressed several dilemmas of how to choose between autonomous vehicles and human drivers, our solution is to test the human drivers with the A.I. system. This study will add further to our knowledge, both about this specific application on road and about the decision-making system in general. The replications that are already planned in other situations by independent researchers present an excellent chance for both corroborating the evidence provided in the simulations as well as for understanding the influence of autonomous vehicle on road environments.

Works Cited

- Dixit VV, Chand S, Nair DJ "Autonomous Vehicles: Disengagements, Accidents and ReactionTimes." *PLos ONE*. 20 Dec 2016, Vol. 11 Issue 12, p1-14.
- Koopman, Philip, and Wagner, Michael. "Autonomous Vehicle Safety: An InterdisciplinaryChallenge." *IEEE Intelligent Transportation Systems Magazine*, 19 Jan. 2017, Vol 9, Issue 1.
- Ong, Sandy. "Auto Correct." *New Scientist*, vol. 232, no. 3107, 07 Jan. 2017, p36-39.
- "Robocars Would Save Human Lives." *Mechanical Engineering.* Sep 2016, Vol. 139, Issue 9,p29.
- Schlenoff, Craig, et al. "Performance evaluation of autonomous vehicle navigation in dynamic,on-road environments." *Integrated Computer-Aided Engineering - Performance Metrics forIntelligent Systems.* July 2005, Vol. 12, Issue 3, p263-277.