Artificial Intelligence and Autonomous Vehicles, A Survey to Collect Data and Discover the Moral Dilemmas That are Involved

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**Abstract**

Artificial Intelligence is the capability of a machine to imitate intelligent behavior. Autonomous vehicles are driverless vehicles that use a sophisticated set of sensors to collect and process data in order to make decisions. GPS data, and driving speed is used to accurately determine the precise position of each vehicle, down to a few centimeters all while making smart corrections for things like traffic, road construction, and accidents. The whole purpose of self-driving vehicles is to increase traffic efficiency, reduce pollution, and to reduce the number of accidents.

The whole purpose of self-driving vehicles is to increase traffic efficiency, reduce pollution, and to reduce the number of accidents. Most experts consulted that, technologically, we are about 85 to 90 percent of the way to perfecting the hardware, guidance systems, and software to make vehicles that can reliably and safely drive themselves [1].

Autonomous Vehicles will revolutionize transportation worldwide in numerous ways. One of the individual objectives of this proposal is to determine whether autonomous vehicles can be entrusted to make acceptable decisions, when encountering an unavoidable accident. As self-driving technology advances and is implemented into the daily lives of individuals, we must determine whether their programmed choices are acceptable. There is also focus on whether customers will be willing to purchase AVs, with knowledge of this type of moral programming. A study proved that participants encouraged autonomous vehicle customers to enforce self-sacrifice practices in AV programming. It was however important to note that these same participants, were not willing to purchase AVs which were guided by this self-sacrifice approach [2]. The impact of these decisions will require auto insurance and government regulations to be adjusted.

1. **Background and Significance**

*Significance*: Self-driving vehicles or autonomous vehicles are going to play an important role in the future and though there are already a few on the road, that number will increase substantially in the future. There has been plenty of talk whether or not we as humans trust a vehicle that we have no control over. In several recent surveys on the topic of self-driving vehicles, the public has generally expressed some concern regarding owning or using vehicles with this technology [3]. Conducting surveys talking about self-driving cars plays a huge role for car companies that build them so they can receive feedback from potential customers and see what they need to do to make their product sell. Also, the government can benefit from surveys based off of self-driving car questions to help them regulate laws and to figure out what people prefer.

Moral or utilitarianism programming is a major factor in the design and development of self-driving vehicles. Moral programming involves  the choice an autonomous vehicle must make when there is an unavoidable accident. The issue to protect the occupants or to choose the most utilitarian approach is difficult to resolve. If autonomous vehicles replace gas fueled vehicles then it is important that an acceptable decision be made in regards to the choice the vehicle should make when encountering an unavoidable accident. This is important to address, as a solution must be found to ensure that customers, manufacturers and governments have an agreement, which satisfies all their needs.

Autonomous vehicles will reduce approximately 90% of traffic accidents, which were influenced by human errors [4].  A reduction of 90% will  possibly influence the private and public sector to integrate self-driving technology into their operations.  The usage of fossil fuels for energy to operate vehicles will also be significantly reduced and replaced by autonomous vehicles powered by electricity or other forms of renewable energy.

*Background*: Autonomous Vehicles (AVs) should reduce traffic accidents, but they will sometimes have to choose between two evils—for example, running over pedestrians or sacrificing itself and its passenger to save them. Defining the algorithms that will help AVs make these moral decisions is a formidable challenge [4]. In response to the rapid technological progress in the realm of self-driving vehicles, government both local and national have already begun to develop strategies to address the challenges that may result from the introduction of such vehicles. For example, with the announcement of policies to support self-driving vehicles in the U.K. One city (Milton Keynes) has developed plans for self-driving vehicles within the city as a new form of public transportation by the year 2017, with on- road testing planned to begin in 2015 [3].  In the U.S., the state of California recently enacted legislation to permit testing of self-driving vehicles on public roads, following Nevada, Florida, and Michigan in allowing operation of such vehicles on public roads [3]. As you can see the process of autonomous vehicles has already started in the US, across the UK, and Europe. Self-driving vehicles are going to revolutionize how we travel significantly. The government and these manufactures are going to try and design a self-driving vehicle to fit the needs and preferences of the consumers, the best way to do this is to create a survey with a bunch of questions about moral dilemmas of self-driving vehicles and what people prefer and what they don’t like about the AVs. This is going to help the government and manufactures maximize income by producing autonomous vehicles that people want to buy and feel safe driving in.

**2. Methodology**

To fulfill my project needs I will be carrying out a survey based project to see how many people trust self-driving vehicles. To collect and gather data based off of other survey questions that I will be asking to be able to evaluate what people think of AVs. I might also come up with a couple of different scenarios, where I’ll be asking what a car should do in a certain situation and get feedback from respondents to collect data and analyze it. The first step for me is to create significant and specific questions for respondents to answer that correlate with what the government and manufactures would want to ask in a survey. The timetable for this will happen within the next few weeks, most likely mid-October I will have my survey questions complete. After my questions are complete I will need to set up a survey at surveymonkey.com or somewhere where I can have participants complete the survey. The timetable for this is going to be after I complete and come up with survey questions, which will probably be towards the end of October.

Chad will be utilizing similar procedures to gather and analyze information received from the participants. Focus however will primarily be on the choices participants would want the vehicle to make if there is an unavoidable accident. Participants will provide their answers anonymously through a survey developed on surveymonkey.com, which will include different unavoidable accident scenarios. The case of choice to make whether to harm a group of people or harm oneself will vary based on different factors. I will integrate gender, age and social standing in the different groups of people in the scenarios. The driver for the survey will also sometimes have other passengers (varying in age and sex) in their vehicle, to determine if this will affect their choice. The survey is currently being developed and will be completed for participant usage within the second week of October.

We were also thinking about incorporating different scenarios about what a car should do in certain situations from this MIT website and have people decide what is the best outcome a crash can have. This area of the survey will allow us to better analyze the whether individuals would prefer a vehicle programmed to follow the utilitarian approach or to protect the driver at all costs. To incorporate this into our timetable this would also happen towards the end of October when we have all of the PowerPoint information gathered and our results into it.

**3. Statement of Qualification**

As seniors, pursuing our bachelors  in Computer Science  at Eastern Connecticut State University, we identified autonomous technology as an intriguing area to study and analyze. We have completed several courses such as Programming 1 and 2, Data Structures, Net Centric and various other electives focusing on different specialization areas in computer science. These have assisted us in better assessing information whether technical or non-technical which were obtained from different articles for references in this proposal. We are also proficient in numerous programming languages ranging from Python, SQL, Java and C++, which assist in better understanding the control specified programming will possibly have on autonomous vehicles.

As we continue to learn more in the areas of technology, we will implement skills and knowledge we are currently learning in our final semesters at the university. Senior Research a critical course in understanding how assessments, studies and data collection procedures should be done will be used in the collection of data from our surveys. We will use the skills learned in the course to ensure that data provided by participants are honest, without any bias and without any risks of judgment to the participant. Chad is also currently employed as a Data Analysts at Cigna, through the TECDP program and has used various tools such as Hadoop, Hive and different Agile methods. These skills will be utilized effectively in ensuring that the procedures are effective and can be properly assessed.

We have also ensured that different technical jargons have also been made more relatable and easy to understand for most readers. This we believe is important as autonomous technology continues to advance, resulting in  the need for individuals to understand and prepare for its complete integration into society.

**4. Expected Outcomes**

At the completion of this project Chad and I hope to have understood what people expect and prefer when it comes to self-driving vehicles. We also may try and see what people think is more moral for the autonomous vehicle to do in certain situations. It is hard to predict what the outcome for some of the results we want because they are all opinion based. I would assume that the most moral thing an autonomous vehicle can do is save the most lives as possible (utilitarian approach), which I believe most people will agree on. In one of the research papers I read it was talking about the older population and what they think of self-driving vehicles since they will be the majority of people that benefit from them. They conducted a survey and asked questions to participants and collected data from all different age groups and sexes.  The survey results suggest there may be some hesitation around one’s comforts with full automation among the older adult population who could benefit it the most. The good news, however, is that greater than 50% of the older adult market responding to the survey appears comfortable with the concept of technological innovations that help the driver [6]. This is what I would expect from the older population since they are kind of new to technology and aren’t very tech savy since it hasn’t been around since they were younger. I expect younger participants in the surveys to say they trust autonomous vehicles more than older participants for this reason.

**Bibliography**

[1]J. Plungis, “Self-Driving Cars: Driving Into the Future,” 28-Feb-2017. [Online]. Available:

https://www.consumerreports.org/autonomous-driving/self-driving-cars-driving-into-the-future/

[2] A. Shariff, J. Bonefon and I. Rahwan, "Autonomous Vehicles Need Experimental Ethics: Are We Ready for Utilitarian Cars?", no. 1, p. 15, 2015.

[3]B. SCHOETTLE and M. Sivak, “A Survey Of Public Opinion About

Autonomous And Self- Driving Vehicles In The U.S., The U.K., And Australia,” Jul-2014. [Online]. Available:

https://deepblue.lib.umich.edu/bitstream/handle/2027.42/108384/103024.pdf?sequence=1&i sAllowed=y. [Accessed: Sep-2017].

[4]T. Litman, "Autonomous Vehicle Implementation Predictions Implications for Transport Planning", p. 23 pages, 2017.

[5]J.-F. C. A. Bonnefon, A. Shariff, and I. Rahwan, “The social dilemma of autonomous

vehicles,” 24-Jun-2016. [Online]. Available: https://arxiv.org/pdf/1510.03346.pdf.

[6]H. Abraham, “Autonomous Vehicles, Trust, and Driving Alternatives: A survey of consumer

preferences,”2016.[Online].Available:http://agelab.mit.edu/files/publications/2016\_6\_Autonomous\_Vehicles\_Consumer\_Preferences.pdf.