Human Sensitivity towards unpredictable behavior of Autonomous Cars

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1 Motivation

There has been a growing research on the trust of humans in Autonomous Vehicles, where various surveys have been conducted to evaluate the experience, likeability and trust of humans on self-driving cars. Most of these work focus on examining different factors that determine human trust and reliability on autonomous cars e.g frequency of use, knowledge, ease of learning etc. There also exist studies evaluating ways to help improve human trust on AVs for e.g making the autonomous car talk to its passengers, displaying UI to help passengers see what the car sees etc.

However, there has been no research so far on comparing tolerance towards errors/unexpected behavior of human-drivers versus robots in the self-driving scenario. It is likely that humans are naturally more intolerant to mistakes made by an autonomous car. This is probably because we can relate better to other human drivers who missed the red light or weren't wearing seat belts, who made critical yet human errors.

In this work, we aim to determine the gap between leniency towards human drivers and autonomous cars by recording human responses towards mistakes made by both the agents.

2 Proposed Methodology

We will be focusing on a futuristic ride-hailing autonomous taxi scenario in our research, where the taxi will be fully-autonomous. In order to get a close representation of the passenger's perception of the autonomous taxi, we will be modelling various driving scenarios and recording responses for the same.

We will use AirSim, a simulator meant for testing autonomous vehicle algorithms. Certain situations will be presented to the AV which elicit unpre-

dictable behaviors such as moving to other lanes, speeding up or down, taking a longer route to destination, sudden jerky movements etc. Such scenarios will be recorded from the passenger's point of view inside the car.

Given the driver is not human, we want to determine if the response to a scenario will be different. To accomplish this, we will be labelling some of the videos as "Human-driven" and the rest as "AI-driven", even when all the videos come from AV simulation. These videos, with labels visible on them, will then be presented to a group of subjects. Their responses to a questionnaire about the performance of the driver will be recorded and evaluated.

3 Proposed Evaluation

The recorded data will be pre-processed to filter out invalid data. We can then evaluate the results and make a comparison between sensitivity to unpredictability of both the agents.

4 Proposed Grading Rubric

System Component	**Grade %**
1. Setting up AirSim environment and AV	5
2. Creation of relevant scenarios	50
3. Conducting participation studies and data collection	15
4. Data analysis and results	15
5. Final Presentation and Report	15

Table 1: Grading Rubric

5 References

Bosch, Natalie Baumann, Viktor. (2019). *Trust in Autonomous Cars.*

Kanwaldeep Kaur, Giselle Rampersad. (2018) *Trust in driverless cars: Investigating key factors influencing the adoption of driverless cars.*

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Shital Shah, Debadeepta Dey, Chris Lovett, Ashish Kapoor. (2017) *AirSim: High-Fidelity Visual and Physical Simulation for Autonomous Vehicles*