

Insights into Virtual Reality Simulation for Understanding User Acceptance of Autonomous Vehicles



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Introduction

Advances in technology have increased the capability of artificial intelligence. Autonomous machines, such as self-driving cars, are no longer a thing of the future. As autonomous vehicles are being integrated into society, there is a dearth of understanding as to how humans will accept this innovative technology. In order to understand user acceptance of autonomous vehicles, we created a virtual reality simulation of 5 self-driving car scenarios. We then conducted a pilot study to explore how people reacted to the experience with each scenario to gain insight into how to further design such simulations to assess user acceptance of autonomous vehicles.

Methods

Participants: A convenience sample of 9 participants.

Research Design: A pilot study in which participants experienced a virtual autonomous vehicle simulation of 5 scenarios. Participants were asked to respond to surveys at three time-points. A pre-survey was given to capture initial beliefs and experience with autonomous vehicles. During the simulation, after each scenario participants responded to questions about their experience and reactions. After the simulation, participants took a post-survey to capture any change in beliefs about autonomous vehicles in which they provided a rank-order of the scenes on various criteria, such as which ones made them feel the most nervous.

Results

Scene	Simulator Screenshot	On a scale of 1 to 7, how likely is this scenario to occur in real life?	On a scale of 1 to 7, how accurately was the scenario portrayed by the simulation?	On a scale of 1 to 7, how realistic was the autonomous vehicle response to the scenario?	Noteworthy Findings and Additional Reactions
1					<ul style="list-style-type: none"> Lowest average for accurate scenario portrayal by the simulation
2					<ul style="list-style-type: none"> Lowest average for likely to occur in real life Lowest average for realistic AV response In the post-survey rank order, consistently ranked: <ul style="list-style-type: none"> Least realistic, least liked, and least likely to occur Made them the most nervous, and most want to take control of the vehicle
3					<ul style="list-style-type: none"> Highest average for likely to occur in real life Lowest average for realistic AV response In the post-survey rank order, ranked as most liked
4					<ul style="list-style-type: none"> In the post-survey rank order: <ul style="list-style-type: none"> Lowest ranked for making participant nervous and lowest ranked for participant wanting to take control of the vehicle
5					<ul style="list-style-type: none"> Highest average for realistic AV response to the scenario Highest average for accurate scenario portrayal by the simulation In the post-survey rank order, ranked as: <ul style="list-style-type: none"> Most realistic and most likely to occur

Discussion and Future Directions

Conclusions: Broad results of this study indicate that participants had the strongest responses to Scene 2 and Scene 5. There was variation in responses as to how likely participants found the scenarios to occur in real life and to whether people wanted to take control away from the vehicle.

Future Directions: There are several intended next steps for this research including: developing additional scenarios to further elicit variation in participant reactions as well as expanding the study to further explore which scenarios make people more and less accepting of autonomous control and to determine at what point users would like to resume control of the vehicle. Finally, we aim to further assess how this type of VR simulation can impact user acceptance of autonomous vehicles in society.