

Design of In-car Context to Assist in Trust Development for Autonomous Driving Systems

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Motivation

Autonomous cars are vehicles that are capable of sensing the environment, navigate, and drive without human input [1]. The idea of full autonomy has been popularized recently and it aims to liberate people's hands from the steering wheel. However, without an appropriate level of trust people are less likely to use or adopt autonomous systems [2]. Therefore questions arise about how designers could design to improve trust of autonomous systems.

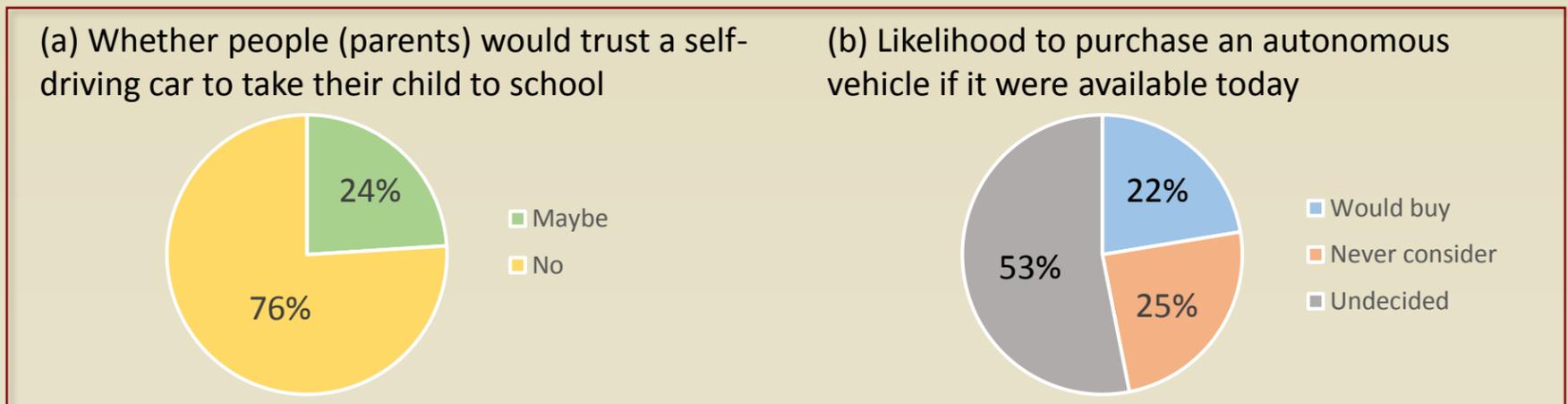


Figure 1. Pie charts of (a) people's trust and (b) purchase likelihood for autonomous vehicle [3]

Background

Users construct their preference according to phrasing context in which survey question is given [4]. This idea of forming preference based on contextual environment could be extended to physical stimuli and applied to the area of trust development.

Objective

- Investigate how in-car context affects users' trust level of autonomous driving system
- Provide design suggestions for auto designers to increase trust and ultimate adoption of autonomous vehicles

Experiment Design

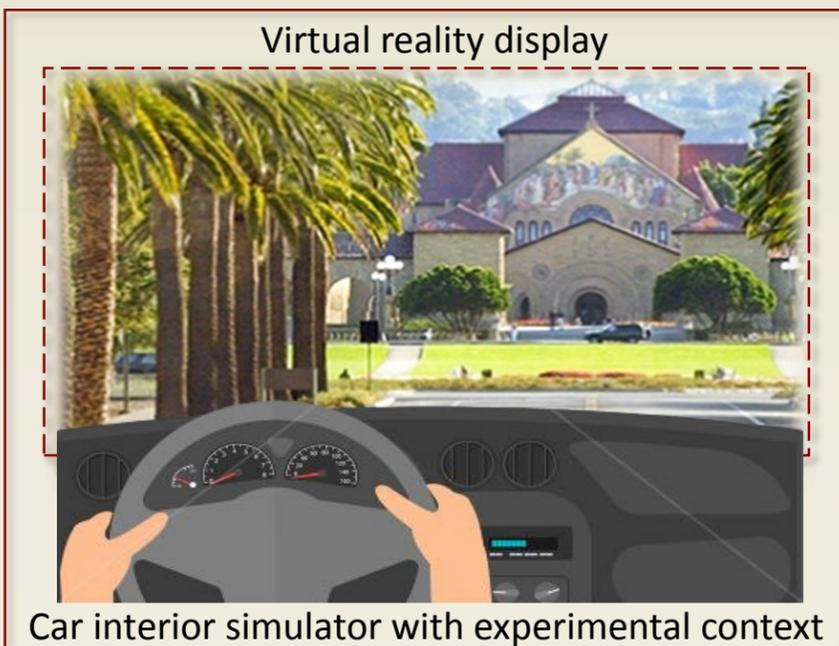


Figure 2. Illustration of experiment set-up

- Set-up: a virtual reality display to simulate autonomous driving view and a physical car interior simulator that provides experimental context (see Fig. 2)
- Experiment conditions:
 - Experimental condition: within to be determined in-car context (e.g. lighting condition, background sound, and lighting color)
 - Control condition
- Participants: Licensed adult drivers
- Measurements: Users' trust level for autonomous driving system
- Measurement tools: survey and physiological data (e.g. heart rate, eye gaze pattern)

Reference

- [1] Gehrig, S. K., and Stein, F. J. (1999). "Dead reckoning and cartography using stereo vision for an autonomous car". IEEE/RSJ International Conference on Intelligent Robots and Systems. Kyongju. pp. 1507–1512. doi:10.1109/IROS.1999.811692. ISBN 0-7803-5184-3.
- [2] Carlson, M. S., Desai, M., Drury, J. L., Kwak, H., and Yanco, H. A. (2013). "Identifying Factors that Influence Trust in Automated Cars and Medical Diagnosis Systems." AAAI Symposium on The Intersection of Robust Intelligence and Trust in Autonomous Systems.
- [3] Autonomous cars: Will you be a co-pilot or a passenger? Retrieved March 8, 2016, <http://www.insurance.com/aut-insurance/claims/autonomous-cars-self-driving.html>
- [4] MacDonald, E. F., Gonzalez, R., and Papalambros, P. Y. (2009). "Preference inconsistency in multidisciplinary design decision making." *Journal of Mechanical Design*, 131(3), 031009.