Autonomous Taxis

The Future of Public Transportation

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Introduction

While it is common in many Chinese cities to see driverless taxis on the roads, most countries in the world do not yet permit such vehicles. However, there is a current development in the Rhine-Main area, where the Rhein-Main-Verkehrsverbund (RMV) and Deutsche Bahn (DB) are testing driverless minibuses as part of the „KIRA“ project (AI-based regular operation of autonomous on-demand services). This test highlights the current relevance of autonomous taxis. KIRA demonstrates that autonomous vehicles in public transportation are no longer just a vision of the future but are already being tested. Autonomous taxis, also known as robotaxis or driverless taxis, are vehicles that operate on public roads on behalf of providers without human intervention. They use advanced technologies such as sensors, cameras, and artificial intelligence to perceive their surroundings, analyze traffic situations, and make decisions.

Autonomous taxis offer the potential for 24/7 availability, without the limitations of driver working hours. This ensures continuous service, which is particularly beneficial in areas with limited public transport. By eliminating driver costs, operating costs are significantly reduced, potentially leading to lower fares for passengers. Advanced sensor technologies and AI algorithms can reduce human error and thus decrease the likelihood of accidents.

Although autonomous taxis have the potential to revolutionize mobility by making traffic safer, more efficient, and more sustainable, their introduction is not without challenges. One of the biggest hurdles is gaining people‘s **trust** in this new technology.

Gaining Trust and Increasing Acceptance

Despite the potential benefits, the introduction of autonomous taxis faces significant trust issues. Passengers may be skeptical about the safety of driverless vehicles, fearing system failures or cyberattacks. It must be ensured that autonomous systems can handle unpredictable

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road conditions and comply with traffic rules. Clarifying liability in the event of accidents and ensuring ethical decision-making by AI systems are critical issues. Additionally, there are reputational risks for providers regarding how they position themselves on these questions and take responsibility. All these concerns occupy potential customers and can lead to a lack of acceptance, resulting in delays in introductions and offerings and costing involved companies a lot of money. The relevance of the lack of trust in new technologies is also currently evident in the case of electric cars, where potential customers in Germany show far too little interest. Therefore, it is essential to present the new offer in a way that as many people as possible positively receive it. Only with broad acceptance, which then leads to usage, is an investment in vehicles and approvals worthwhile.

Trust as a Key Factor

Trust is therefore crucial for the acceptance and use of autonomous taxis. People need to trust that these vehicles are safe and reliable and that their personal data is protected. To this end, we conducted a study with 208 participants in Germany, who could potentially be users of autonomous taxis. Our current study from the universities of Marburg and Rostock has shown that trust in autonomous taxis is a multidimensional construct influenced by various factors, as illustrated in the following diagram.

The study identifies seven dimensions of trust in autonomous taxis:

1. **Dispositional Trust:** describes a person's general tendency to trust an automation technology, regardless of context.

2. **Situational Social Trust:** refers to trust in interactions with other road users and pedestrians.

3. **Situational Data Trust:** Encompasses trust in the autonomous taxi's ability to collect and process data.

4. **Situational Technical Trust:** describes trust in the technology and the autonomous taxi's ability to navigate safely.

5. **Learned Social Trust:** based on similar experiences with autonomous vehicles.

6. **Learned Data Trust:** describes trust in data processing based on similar experiences.

7. **Learned Technical Trust:** Describes trust in technical funtions based on similar experiences.

While all dimensions influence trust in autonomous taxis, the relevance of situational technical trust is comparatively highest. In general, the situational trust dimensions have a comparatively higher impact on whether users are willing to take the risk of using autonomous taxis. Therefore, it is important to educate potential users, especially in the immediate situation before or during the use of the vehicles, particularly about the technical functionality and safety. However, the study also shows that, in addition to trust, the general personal risk tolerance towards automation technologies has a strong influence on whether people are willing to use autonomous taxis.

Recommendations for Companies

To strengthen trust in autonomous taxis and increase their acceptance, companies should consider the following recommendations, which target the various dimensions of trust and personal risk tolerance.

1. A positive image and partnerships with trustworthy actors such as transport associations or car manufacturers can strengthen dispositional trust. Early adopters, who have lower risk aversion and influence as opinion leaders, can enhance the trust of other potential users.

2. Establishing communication channels (e.g., displays in the vehicle) for feedback and passenger questions during the ride promotes situational social trust.

3. A transparent data policy and data minimization during registration and use increase situational data trust.

4. Providing easily understandable information about the functionality of the technology, such as through interactive displays in the vehicle that show real-time data like speed, braking distance, distance to other road users, and activation of safety systems, strengthens situational technical trust. Another option is safety certifications on the vehicles or developing an interactive quiz before the ride that playfully explains the vehicle‘s technical safety aspects and addresses possible concerns.

5. Test drives and pilot projects can lead to stronger positive learned social trust. Public relations with education about the technology and its societal benefits play an essential role in this.

6. Regular information about data usage and its benefits for the service promote learned data trust. This also includes the possibility for users to provide feedback on data usage.

7. Publishing safety reports and involving users in the development and improvement of technologies strengthen learned technical trust.

8. Additionally, it is important to consider users‘ risk tolerance. Gradual introduction of autonomous taxis, starting with less risky environments (e.g., enclosed areas, marked lanes), is possible. Communication and marketing strategies should be aligned with segmentation by risk tolerance.

Conclusion

Autonomous taxis have the potential to shape the future of mobility. To fully realize this potential, it is crucial to gain people‘s trust in this technology. Through transparency, saf-

ety measures, positive user experiences, and education, companies can help increase the acceptance of autonomous taxis and pave the way for safer and more efficient mobility.

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