

# Quantifying the safety perception of AV occupants with respect to the interactions with cyclists and pedestrians



## Problem description:

Cyclists and pedestrians, collectively referred to as Vulnerable Road Users (VRUs), including motorcyclists, skateboarders, and equestrians, present a unique challenge to the safety and comfort perception of autonomous vehicle (AV) occupants. The interaction between AVs and VRUs is a key determinant of occupant trust, comfort, and overall well-being. Currently, AV motion planning and decision-making algorithms do not account for AV occupant safety perception, potentially leading to stressful and uncomfortable rides. Recent studies suggest that AVs adopting altruistic behaviors in their interactions with other road users can maximize comfort, trust, and well-being. However, the specific interaction dynamics between AVs and cyclists/pedestrians and their impact on AV occupant safety perception remain unexplored. Furthermore, the quantification and mathematical modeling of safety perception are lacking. Addressing this knowledge gap can facilitate the development, testing, and optimization of AVs with realistic safety perception algorithms, enhancing passenger well-being and contributing to a safer and more harmonious transportation ecosystem.

## Assignment:

The study comprises three phases. The first phase involves reviewing literature on passenger risk and safety perception, as well as relevant Human Factors theories, with a focus on understanding how safety perception varies for Vulnerable Road Users (VRUs) compared to other road entities. This phase includes the simulation and testing of safety perception mathematical models using the Waymo Open Dataset.

The second phase involves conducting a driving simulator experiment to gather subjective data on AV occupants' perceptions of VRUs. This data helps identify coefficients for VRUs in the safety perception models.

The final phase entails presenting the research findings in a master's thesis.

## Information:

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