

Safety of new e-vehicles for personal mobility



Background

The traditional urban traffic system has recently been disrupted with the rise of micro-mobility. Specifically, electric personal mobility vehicles (e-PMVs), such as e-bikes, e-scooters, Segways, etc. are becoming increasingly popular due to their benefits in terms of size, maneuverability, affordability, and the existence of ride-sharing services [1]. However, with their rapid introduction into the market, current infrastructure and regulations are challenged. The new mix of mobility in cities has already resulted in partly severe injuries [2]. Previous work has shown that e-PMVs may be behind other mobility forms in terms of stability and braking capabilities [3]–[5]. However, conclusive evidence from a larger set of participants has been lacking so far.

Objective

This thesis aims to collect conclusive evidence for or against the safety of modern e-PMVs in terms of stability, maneuverability, and rider comfort. The thesis will leverage available equipment and test protocols at the Vehicle safety division of Chalmers and Autoliv Research [4], to further develop a set of e-PMVs, instrumented with sensors (IMU, speed, steering, LIDAR) and conduct a data collection with about 20-30 participants. The results may contribute to a scientific publication, and to product development at Autoliv.

Preliminary plan

- Literature study on state-of-the art e-PMV safety research
- Assess and further develop the available vehicle instrumentation and test protocols
- Plan the data collection with participants
- Conduct the data collection
- Analyze the collected data
- Write the thesis report

Candidate profile

We are looking for (ideally two) candidates who have a solid background in electrical/mechanical or mechatronics engineering. Candidates should be excited to work with practical problems related to hardware (vehicles, sensors) and software (data logging, analysis), as well as testing outside. Experience with MATLAB, Python, ROS, and Ubuntu is beneficial.

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References

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