WatchOut: A Road Safety Extension for Pedestrians on a Public Windshield Display

❖ Research Question

Are public windshield displays usable as an additional digital road safety warning sign? To which extent is the installation accepted among pedestrians? Is it sufficient to raise awareness of the current traffic situation? To which degree is it considered as usable? Which other use cases are conceivable?

❖ Experimental Setup: Wizard-Of-Oz-Study

[car position, way for pedestrian crossing 1]

[car position, way for pedestrian crossing 2]

[laptop, projector, canvas inside the car]

[visualization view for pedestrians from outside/behind the car]

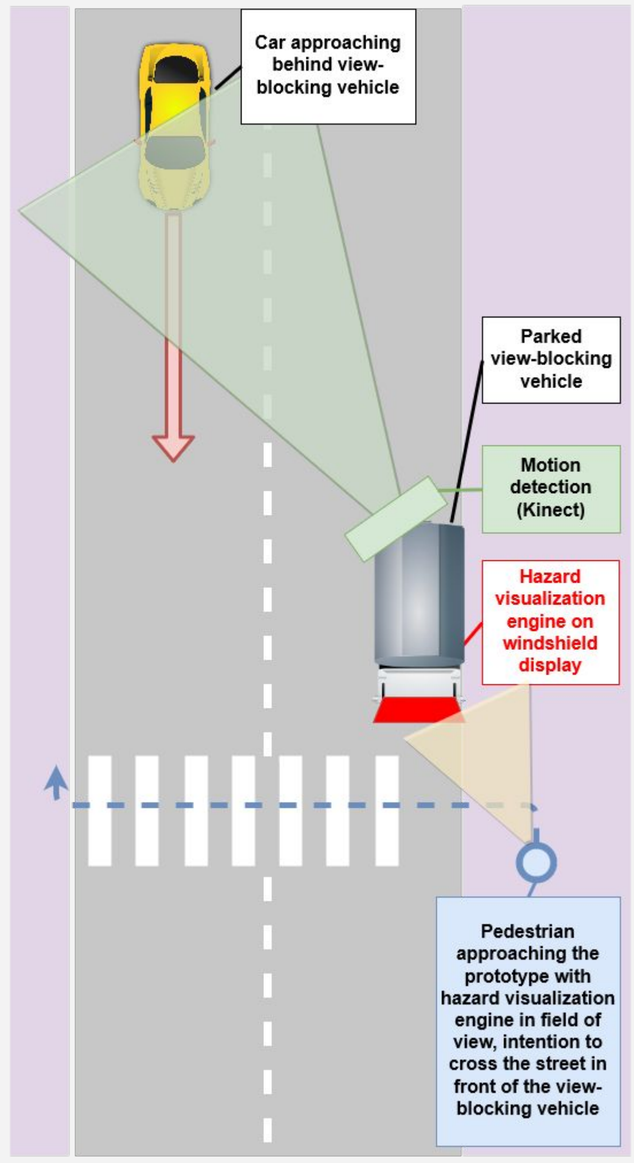
[controlling the visualization from inside the car]

[video observation of the scenario]

[interview situation 1]

[interview situation 2]

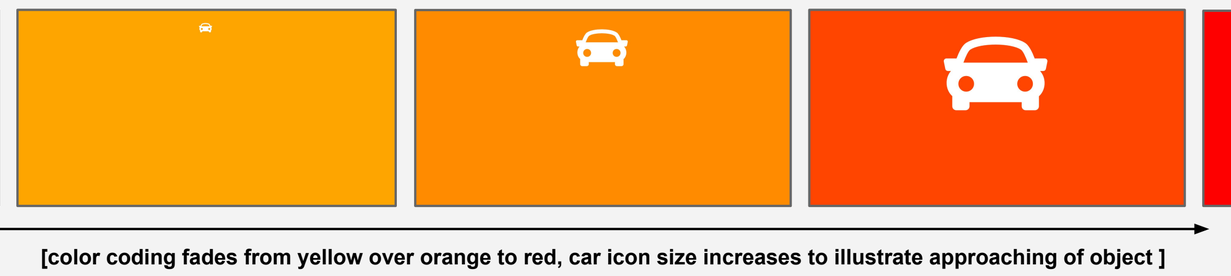
❖ Use Case in Theory



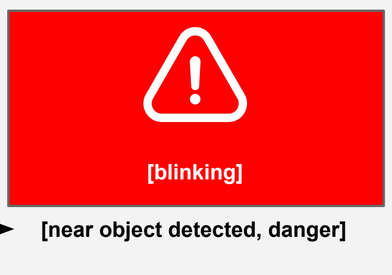
❖ Hazard Visualization Engine

[no object detected, no danger]

[object detected in far distance]

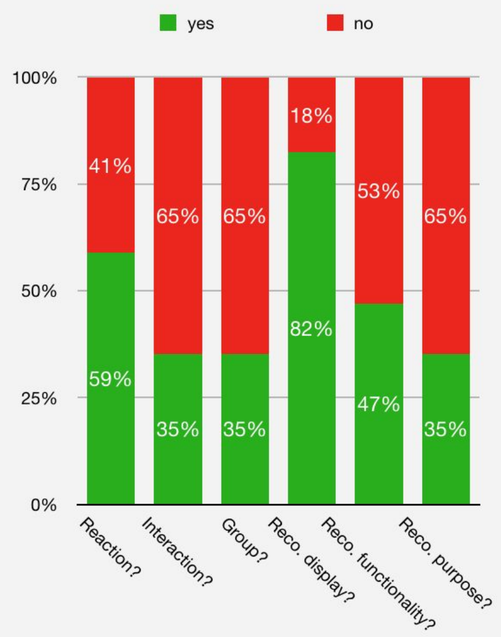


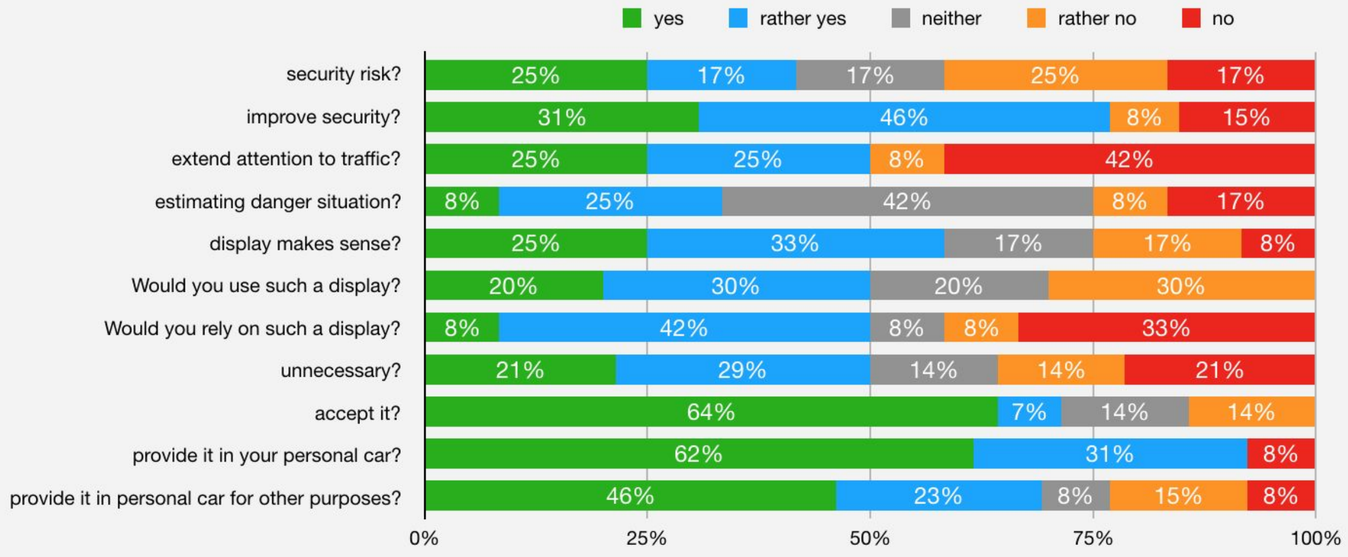
[color coding fades from yellow over orange to red, car icon size increases to illustrate approaching of object]



[near object detected, danger]

❖ Study Results





Pedestrian awareness: 17 participant groups (6 group people, 11 individuals (7 male, 4 female)), 58.8% showed reaction; 60.0% of reaction people showed interaction with the display; 50% of people who showed interaction was in a group; 82.4% recognize the display; 35.3% recognize the purpose.

Pedestrians subjective usability: Participants has neutral opinion on this installation (approx. 50% vs 50%) and doubt the estimation accuracy (42% neither).
Pedestrians acceptance: Most of the participants (>70%) are accepting this installation and willing to install this to their personal cars if it works well.

❖ Challenges

- XBOX Kinect motion detection range and measurement quality at daylight wasn't sufficient for detecting cars in a real-life scenario
  - ➔ After adjusting influencing parameters of the implementation, we switched to "Wizard-Of-Oz" study
- Finding an appropriate location for testing "in-the-wild", that provides sufficient conditions for a reliable scenario
- Need of random pedestrians around the installation

❖ Conclusion & Future Work

Most people confronted with the display in our field experiment showed a reaction. Due to the novelty of the approach, users were confused at first regarding the use of the display but showed a vigor interest in the course of the interview. They predominantly thought of the display as a potential security improvement to traffic situations while they had difficulties to imagine it as a security risk.

Since the display is a prototype and a novelty that is not established in traffic situations yet, people showed a low level of trust in the system and would rather prefer to solely rely on their own senses when crossing the street. If the system would be well tested and the technology established, most people could imagine to rely on the display as well. People unanimously found the display to be useful and showed a high level of acceptance for the display in their environment. The vast majority would permissively provide a display in their personal car under the condition that it is free of charge and promotes the overall safety in traffic situations.

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