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Publication date
2021

Citation (APA)
Berge, S. H., Hagenzieker, M., Farah, H., & de Winter, J. (2021). *Do cyclists need HMIs in future automated traffic?*. Abstract from ISCS 2021 International Cycling Safety Conference, Lund, Sweden. https://www.icsc-2021.net/conferences/09-lund-2021/

Submission ID: 142

Do cyclists need HMIs in future automated traffic?

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Keywords: Human-machine interface, automated driving, cyclists, cyclist safety

Cyclists are expected to interact with automated vehicles (AVs) in future traffic, yet we know little about the nature of this interaction and the safety implications of AVs on cyclists. On-bike human-machine interfaces (HMIs) and connecting cyclists to AVs and the road infrastructure may have the potential to enhance the safety of cyclists.

In this study we aimed to identify cyclists' needs in today's and future traffic, and explore on-bike HMI functionality and the implications of equipping cyclists with devices to communicate with AVs. Semi-structured interviews were conducted with 15 cyclists in Norway and 15 cyclists in the Netherlands. Thematic analysis was used to identify and contextualise the factors of cyclist-AV interaction and on-bike HMIs. From the analysis, seven themes were identified: Interaction, Bicycles, Culture, Infrastructure, Legislation, AVs, and HMI. These themes are diverse and overlap with factors grouped in sub-themes.

The results indicated that the cyclists prefer segregated future infrastructure, and in mixed urban traffic, they need confirmation of detection by AVs. External on-vehicle or on-bike HMIs might be solutions to fulfil the cyclists' need for recognition. However, the analysis suggested that cyclists are hesitant about being equipped with devices to communicate with AVs: Responsibility for safety should lie with AV technology rather than with cyclists. A device requirement might become a barrier to cycling, as bicycles are traditionally cheap and simple, and additional costs might deter people from choosing cycling as a transport mode.

Future studies should investigate user acceptance of on-bike HMIs among cyclists on a larger scale to test the findings' generalisability, and explore other, perhaps more viable solutions than on-bike HMIs for enhancing AV-cyclist interaction.