Live Demonstration: In-Vehicle Auditory Signal Evaluation Platform in A Driving Simulator

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***Abstract*—Advanced driver-assistance systems (ADAS) are generally used to support a safe drive. However, if all the services in ADAS rely on visual suggestions, the driver becomes increasingly burdened and exhausted. As a solution, in-vehicle auditory signals to inform the driver of inattention have been appealing as another approach to altering visual suggestions in recent years. In this paper, we show our developed in-vehicle auditory signal evaluation platform in an existing driving simulator.**

I. Introduction

Advanced driver-assistance systems (ADAS) are a prevailed system that supports a safe drive. Since most accidents are caused by the inattention of a driver, general ADAS provides a service that detects the inattention and ineffective visual search pattern and visual suggestions such as more suitable eye fixation locations [1]. However, if all the informing services in ADAS rely on visual-based technologies, the driver becomes increasingly burdened and exhausted. To alleviate its burden, in-vehicle auditory signals have been recently attractive as another approach to altering visual suggestions. Although the auditory warning has been classically employed, the auditory signals have the potential that intuitively inflames a variety of feelings by taking advantage of auditory effects derived from timing, tones, and volumes.

The auditory signals exploit the potential of encouraging the driver to pay attention and conjecture the risk of accidents. Generally, the impression of even the same auditory signal strongly depends on driving situations such as time of day, congestion, visibility, etc. Unfortunately, to the best of our knowledge, no platform that aims to flexibly evaluate the user interface and user experience of various in-vehicle auditory signals is proposed. Therefore, this work[1] has developed a platform for evaluation of in-vehicle auditory signals.

II. Demonstration Setup

Fig. 1 shows a flow from inputting driving behavior to a PC to outputting simulated results. The driving simulator installed in the PC is developed and provided by SmileBoom, a game development company in Japan. Fig. 2 represents the driving simulator's appearance. A headphone and display are connected to the computer, and our developed auditory signals output throughout its headphone. In-vehicle auditory signals are created in dependent on a situation, and it make a driver feel how to drive the vehicle.

[1]This work is a reproduced version of the paper presented in SISA [2].

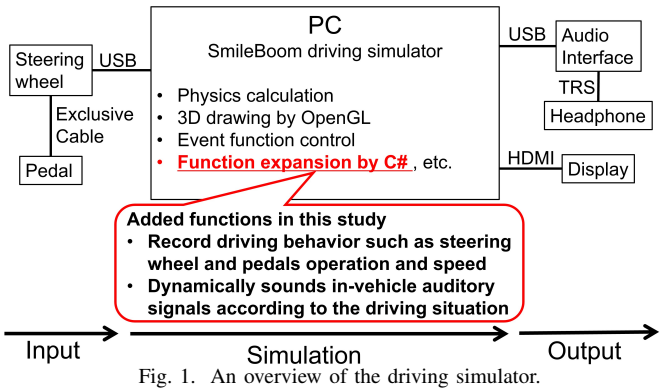

Fig. 1. An overview of the driving simulator.

Fig. 2. Appearance of the driving simulator.

III. Visitor Experience

Our demonstration aims that visitors experience the potential of in-vehicle auditory signal throughout intuitive sounded interaction. Specifically, visitors try to adjust a speed not with speed meter but an auditory signal based on beats. In addition, visitors can also enjoy intuitive feelings against objects approaching to the driver by virtually localized auditory signals.

References

[1] J. Xu, K. Guo, F. Menchinelli, and S. H. Park, "Eye fixation location recommendation in advanced driver assistance system," *Journal of Electrical Engineering & Technology*, vol. 14, no. 2, pp. 965–978, 2019.

[2] F. Sawa, Y. Kamizono, W. Kobayashi, I. Taniguchi, H. Nishikawa, and T. Onoye, "Development of in-vehicle auditory signal evaluation platform in a driving simulator," in *Proc. of International Workshop on Smart Info-Media Systems in Asia (SISA)*, 2022, pp. 37–40.