

# Diminished Reality Method to Improve Visibility for Driver of Following Vehicles in Heavy Vehicle

Yamada Junya <sup>1)</sup> Sugimachi Toshiyuki <sup>1)</sup> Nakano Kimihiko <sup>2)</sup>

*1) Tokyo City University  
1-28-1 Tamazutumi, Setagaya, Tokyo, 158-8557, Japan (E-mail: g2181053@tcu.ac.jp)*  
*2) Institute of Industrial Science, the University of Tokyo  
4-6-1 Komaba, Meguro, Tokyo, 153-8505, Japan*

**KEY WORDS:** Safety, Intelligent vehicle, Combustion analysis, Image processing/information Processing, Diminished Reality [C1]

Prior research has reported that when the vehicle ahead is a large vehicle, the driver of the following vehicle is more likely to feel stress because his or her view is greatly obstructed. Therefore, ensuring visibility for drivers of following vehicles of large vehicles is an important issue. There is a technology called Diminished Reality (DR) that uses multiple cameras to make objects visually transparent as a means of securing the driver's field of vision. Since there is no established method of hiding and displaying large vehicles to ensure visibility for drivers of following vehicles, it is necessary to consider this method.

In this study, for the purpose of securing the visibility of the driver of a following vehicle of a large-sized vehicle, the image taken from the preceding vehicle is used to do diminished reality method the preceding vehicle in the image taken from the following vehicle.

Figure 1 shows the arrangement of the vehicle and cameras in this experiment. A situation in which two vehicles exist in the same lane is assumed, but in reality only the preceding vehicle is placed.

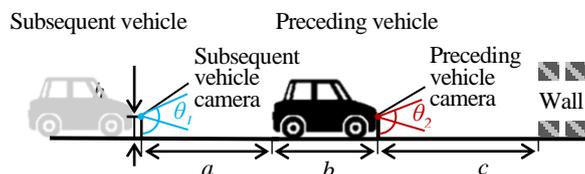


Fig.1 Experimental Diagram

The procedure for creating a hidden vanishing image is shown below.

Hidden vanishing images were created for the ground, wall, and landscape images, respectively. An object detection system was used to obtain the coordinates of the hidden area from the rectangular area of the preceding vehicle in the image of the following vehicle. The hidden vanishing image was superimposed on the coordinates of the hidden area obtained by the object detection system in the image of the following vehicle.

To create a hidden vanishing display image, the preceding vehicle image must be divided into ground, wall, and landscape regions. In this experiment, the coordinates of the region were obtained by setting each component of the HSV color space of the region to be extracted.

The following vehicle image with no preceding vehicle and the hidden vanishing display image are shown in Figure 2. Although the preceding vehicle image was divided into regions using HSV color space, the landscape regions in the hidden vanishing display image could not be accurately hidden because there were regions between the landscape and wall regions that could not be extracted. This is thought to be due to the presence of areas that should be recognized as landscape areas but are not in the set HSV color space. Therefore, it is necessary to incorporate a system for more accurately segmenting regions in the image.

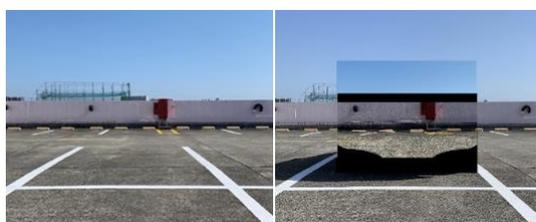


Fig.2 Experimental Result