

# The Human-Vehicle Interface System for Integrating the Interaction based on the in-Vehicle Information Level

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## ABSTRACT

The purpose of our system is to manage the interaction between the in-vehicle electronic devices and the driver. We evaluate the in-vehicle information level to decide the information delivery priorities. The information levels are determined by the attribute and the importance of the information. We will apply the interaction management method in the HVI(Human-Vehicle Interface) system, the our system to integrate the in-vehicle interaction.

## Keywords

HVI(Human-Vehicle Interface), In-vehicle information level

## 1. INTRODUCTION

As advances in technology and improved living standards, the in-vehicle electronic devices provide the useful information to the driver. It is the useful information but it can make the driving workload. So it is needed to manage the interaction between the in-vehicle devices and the driver.

According to the related work, the causes of increasing the driving workload are the pattern of the driver, the internal status of the vehicle, and the external environment of the vehicle. The related researches derived the reason of the driving workload and suggested their own interface and recommended the avoidance from the factors of the driving workload. However, the avoidance from the in-vehicle interaction is not the best way, because the driver needs the useful information from electronic devices. Therefore, we evaluate the in-vehicle information levels and decide the priorities to order the information delivery.

## 2. THE INFORMATION LEVEL

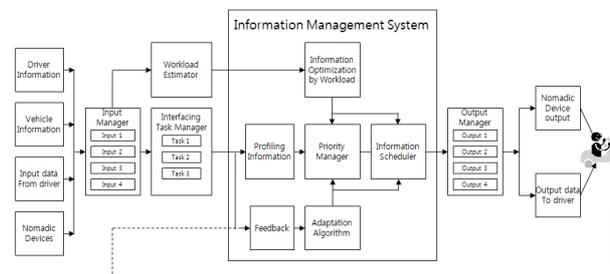
The information is classified by the attributes as the constancy, urgency, and the term of timeliness. First, the constancy of information means that the information is always provided to the driver. Next, the urgency of information is that the information is urgent and the driver must understand the information, immediately. And the term of timeliness means that the information should be provided to driver at the proper moment according to the driving situation.

The set of the information that has the same attribute,  $INF = \{inf_1,$

$inf_2, \dots, inf_n\}$ , and the driver and vehicle information  $T = \{T_1, T_2, \dots, T_n\}$  has the relationship. The relationship is represented as the weight,  $W_i$  that means the strength of the connectivity between the information providing to driver and the status of the driver and the vehicle. The information set  $INF$  and  $T$  make the information level network with the weighted relationship. The information levels are calculated from the information level network as the sum of the weights, the average of the weights, the weighted mean, and the significant mean.

## 3. THE HVI SYSTEM

The HVI System manages the driver/vehicle information, and the data between the electronic devices, and interaction with the driver. The workload optimization module decides the efficient modality to provide information. Priority manager orders the information by the information level. Information Scheduler decides the proper moment to provide the information



## 4. CONCLUSION

We are developing the HVI system to integrate the interaction in the vehicle. Because there is a lot of in-vehicle information, the HVI system needs the method to provide the information appropriately. We classified the information based on the attribute, and determined the importance using the relationship between the information and the in-vehicle status. We will apply the prepared method in HVI system, and verify to optimize the driving workload.

## 5. ACKNOWLEDGMENTS

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