
HUD - AR: Enhancing Communication between Drivers by Affordable Technology

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Abstract

Driving is a social activity. Previously, the “social car” topic, which attempts to enhancing communication between drivers, received much attention by the Auto UI community. However, due to the limitation of the infrastructure, accuracy of the GPS, the popularization of the V2V technology etc., it is difficult to realise these social applications on the road at present. We proposed a prototype “HUD-AR”, which utilizes camera of smart phone and computer vision technology to recognized other road users and transfer social information. “HUD-AR” is an affordable solution to connected drivers, and provides insights and inspiration to the industry.

Author Keywords

Social car; augmented reality; social communication; connected vehicles; computer vision.

CCS Concepts

• **Human-centered computing**~**User interface toolkits** • *Human-centered computing*~*Displays and imagers*

Introduction

Drivers need to coordinate with each other to share the road infrastructure and the social relationship between

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drivers also influences the driving behavior. However, when we sit in our "iron cages", there are only a few channels to deliver information on the road. The HUD-AR utilizes the camera of a smartphone to recognize other cars' identity; then social information is transferred between drivers and presented in an augmented reality way. The hardware part of HUD-AR was designed with attention to details and realized with different techniques such as modeling, laser cutting, and 3D painting. The software part has been tested and validated for several versions. The prototype was tested in real life settings and was proved to be robust.

HUD-AR consists of three components: 1) an AR application of smart phone; 2) a small periscope; 3) a heads-up display hardware; 4) AR markers (might be integrated into license plates in the future). For using the *HUD-AR*, firstly, launch the AR App which could recognize AR markers; Secondly, attach periscope to the smart phone to revised the camera direction to the front. Thirdly, put the smart phone on the HUD device, image of the phone will be reflected on the filmed PMMA. Fifthly, attach the unique AR marker on the rear of the car as ID. Then, the driver's smart phone application will recognize front vehicles and back vehicle can recognize him as well. Social information will be transferred.

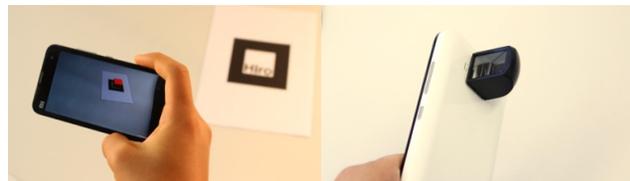


Figure 1: The AR APP and periscope which could be attached to the camera of a smart phone.



Figure 2: The heads-up display device.



Figure 3: Each driver will have an unique AR marker as ID (later might be replaced by license plates).



Figure 4: Transferring data in real time and displaying information on the HUD