

## Abstract

Compared with normal drivers, ride-sharing drivers have a higher risk of traffic accidents caused by phone use distraction. This paper summarizes previous research on driver distraction and in-vehicle interaction, aiming to reduce the secondary in-car tasks' visual demands while driving at work in the ride-sharing community. After collecting the quantitative and qualitative data, I built a car infotainment prototype and create a simulated driving scene to conduct an experiment with six participants. The outcome shows that it decreased the visual distraction and shorten the operating time of the in-car tasks compared to the use of regular smartphone applications.

## Study Methodology

### Literature Reviews

Literature reviews help to refine the topic and frame research questions, I divide the related research into four sections: Road safety and distraction to understand the effects of digital device use on driving in a multi-task scenario, Ride-sharing systems to explore the opportunities and challenges of ride-sharing applications in transportation, in-car interactions such as gesture, and relevant enabling technologies.

### Quantitative Research

I conducted an online survey using ride-sharing drivers through some ridesharing forums (e.g., Uber.net) and Facebook groups (e.g., Uber driver in London). I received 30 available responses, which shows that 46% of drivers are employed by more than one ride-sharing company, and more than half of them have checked/typed the message and then look away from the road.

### Qualitative Research

Phone interviews explore the reasons drivers are frustrated with the existed apps and understand the distracting situation they experienced before which caused safety issues or traffic fines. To get closer to the actual working conditions of drivers, I took 3 rides through Uber and Freenow in central London. I recorded the process of how they worked, observed the driving habits of each driver, and asked a few questions to understand potential safety concerns and distracting issues about driving on the road.

Based on the quantity research and quality research, I make the proposals to these problems encountered by the drivers and do deeply secondary research on the relevant thesis and specific technology.

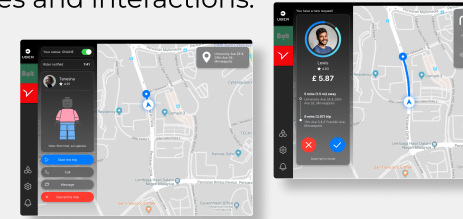
## Background

Due to the flexibility of work location and hours, an increasing number of people join the ride-sharing industry. Rideshare platforms use a mobile app to connect drivers with passengers. The driver needs to log into the app to set their status to online, so it is unavoidable for the driver to use the smartphone while driving. However, the research shows that there are 4 times more likely to be in a crash if using the phone, and reaction times are 2 times slower if texting and driving using the phone than if drinking drive. Even careful drivers can be distracted by a call or text – and a split-second lapse in concentration could result in a crash.

## Design & Experiment

I built a prototype of in-vehicle infotainment and compared it with the current Uber Driver App in a simulated driving environment with the same scenario. The user has to complete the secondary tasks in different interfaces and interactions.

**Highlights:** Integrate different apps / Display rider's clothing colour / Lager screen size / Swiping gesture to accept the request / Voice control: read-aloud and speech-to-text functions



## Testing & Evaluation

The task completed time of separate platforms has shown that in-vehicle has a higher efficiency workflow than the current mobile apps. And following are the user feedbacks of NPS Score on different functions and interactions:

**66 NPS:** The larger screen in the vehicle can work more smoothly and reduce visual distractions.

**33 NPS:** The new system effectively integrates different app platforms to facilitate the management of their respective online status.

**17 NPS:** When receiving a new request, if the system can read passenger information aloud visual distraction can be reduced.

## Conclusion & Future Work

In this research, the outcome indicates that in comparison to using smartphone applications, a larger screen of in-car user interfaces combined with gesture and voice control can reduce the visual distraction to the secondary task of ride-sharing drivers. However, distracted driving is a multifaceted problem, and multimodality in car design is also involved in complex connected technologies. In future studies, experiments including technology with practical implications will more effectively optimize the driver's experience and improve road safety.