A Networked Multi-Drivers Simulation Prototype For Interactive Driving Behavior Study
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Background
All drivers on the road have to use the same traffic system with other drivers and road users. The perception of ambient traffic subjects would likely change a driver’s performance or behavior, and each driver also influences other drivers’ behavior.

Individual Driving Behavior

Single-User Driving Simulator

- Whether they can give a realistic impression of driving in real life with high fidelity and validity;
- Simplified autonomous driver models lack human judgment, intention, adaptability, flexibility, and logic.

Objectives
- To achieve an understanding of the interaction process among drivers and road users and the interrelationship between individual drivers’ behavior.
- To explore a high fidelity driver-driver interaction prototype by replacing driver models with real human drivers to conduct the interactive behavior studies.

Methods

Exploratory Phase
- Interactive Driving Behavior Theoretic Framework
- Indicators to describe the interactive process between two drivers. (e.g. Headway Distance)

Experimental Phase

Apparatus & Resources:
- High Fidelity Net-Driving Simulation System
- Eye Tracking System
- FlexComp Biofeedback System
- N-back Secondary Cognitive Task, NASA_TLX

Data Acquisition:
- Self-report Questionnaire: Simulator Sickness , etc.
- Physiological Response: HR, SCL, Respiration Rate, etc.
- Driving Performance: V, Lane-Dev, Response Time, etc.

Networked Multi-Drivers Simulation System
- Simultaneous use of several drivers in the same simulated environment
- Drivers’ performance information can be measured and transmitted on real-time.

Broader Impact
- Increase the knowledge of the interaction process between road users for improving driving safety;
- Apply on Car-Car Communication System and Advanced Driving Assistance System; the driving behavior studies for Cross-platforms and Cross-regions can be realized easier.

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