HIRAOKA LAB.

[Design Methodology of Human-Centered Systems]

Vehicle Dynamic Control and Strategy of Automated Driving

Human-Machine Systems

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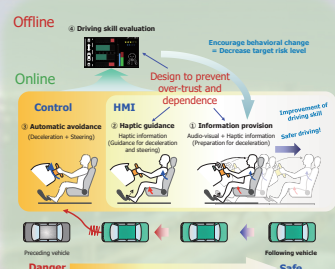
One of the most representative human-machine systems in daily life is a driver-vehicle system. To achieve a safer, more comfortable, and more efficient traffic environment, we have to optimize the whole system including driver-vehicle-road in addition to improving vehicle performance. Consequently, my current research goal is to **establish a design methodology of the driver-vehicle system to improve QOM (Quality Of Moving).**

Vehicle Dynamic Control

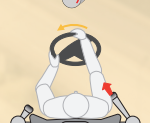
- **Control System Design Robust to Disturbances and Modeling Errors**
  - Automatic Path Tracking Control for Four-Wheel Steering Vehicle
  - Active Four-Wheel Steering Control
  - Active Pitch Control by Driving/Braking Force Distribution

HMS (Human-Machine System)

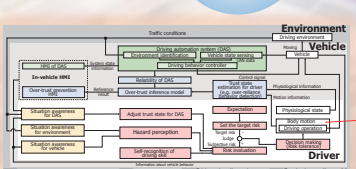
- **Advanced Driver-Assistance System (ADAS)**
  - Eco-Driving Support System
  - Safe Driving Evaluation System
  - Wakefulness-Keeping Support System
  - Smooth Driving Assist System
  - Expressway Driving Game
- **Analysis of Interaction between Driver and AD (Automated Driving)/ADAS**
  - Modeling of Trust Generation Mechanism for AD/ADAS
  - Impact of Trust in AD/ADAS on Driving Behavior
  - Countermeasures to prevent over-trust in AD/ADAS
- **Haptic Shared Control**
  - Direct HSC (D-HSC)
  - Indirect HSC (I-HSC)
- **Collision Risk Indices**
  - Deceleration for Collision Avoidance (DCA)
  - Lateral Acceleration for Collision (LACA)



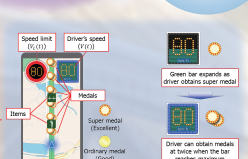
ADAS concept to encourage spontaneous behavioral change



Haptic Seat (example of I-HSC)
Upper: to encourage deceleration
Lower: to encourage collision avoidance steering



Trust generation mechanism model for AD/ADAS



Expressway Driving Game