Computer Vision, Human Computer Interaction, Deep Learning

Ee402

HIRAOKA LAB.

[Design Methodology of Human-Centered Systems]

Vehicle Dynamic Control and Strategy of Automated Driving

Human-Machine Systems

Department of Mechanical and Biofunctional Systems

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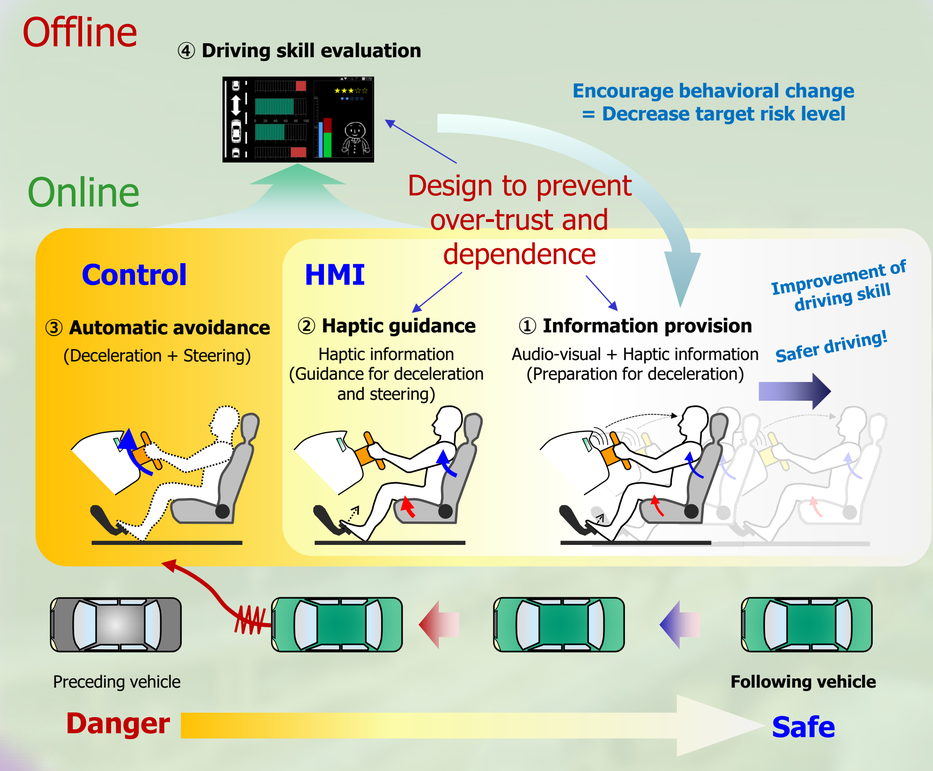
One of the most representative human-machine systems in daily life is a driver-vehicle system. To achieve a safer, more comfortable, and more efficient traffic environment, we have to optimize the whole system including driver-vehicle-road in addition to improving vehicle performance. Consequently, my 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

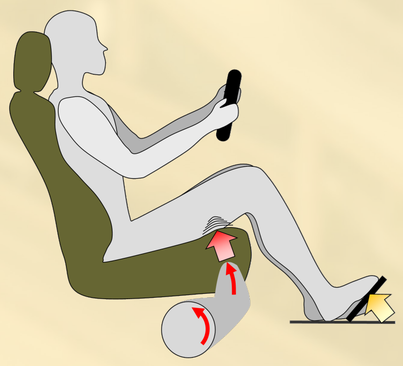
Aim for high level integration

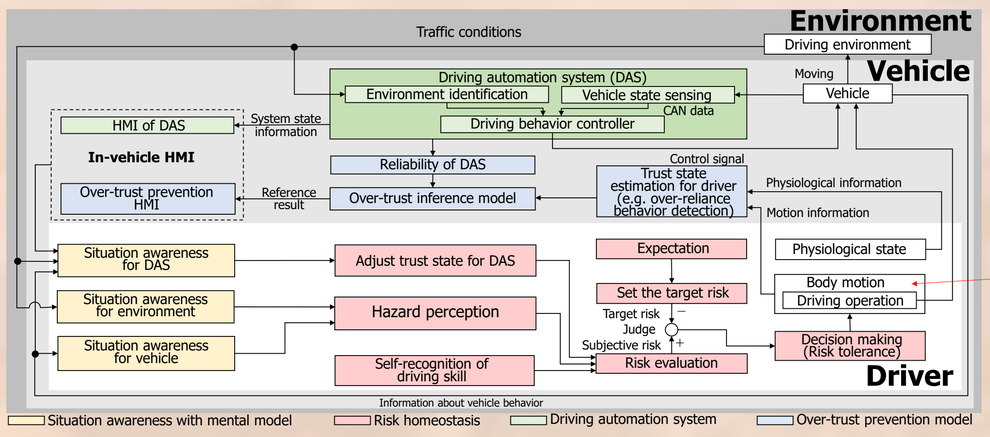
Smart Drive for better QOM (Quality Of Moving)

Safe

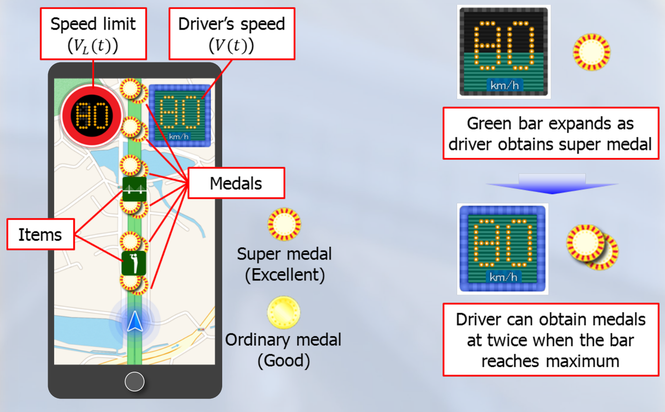
Green

Smooth flow

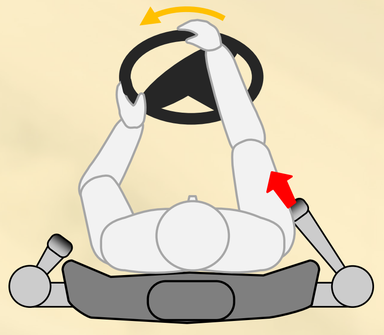




Trust generation mechanism model for AD/ADAS



Expressway Driving Game



Haptic Seat (example of I-HSC)

Upper: to encourage deceleration

Lower: to encourage collision avoidance steering

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