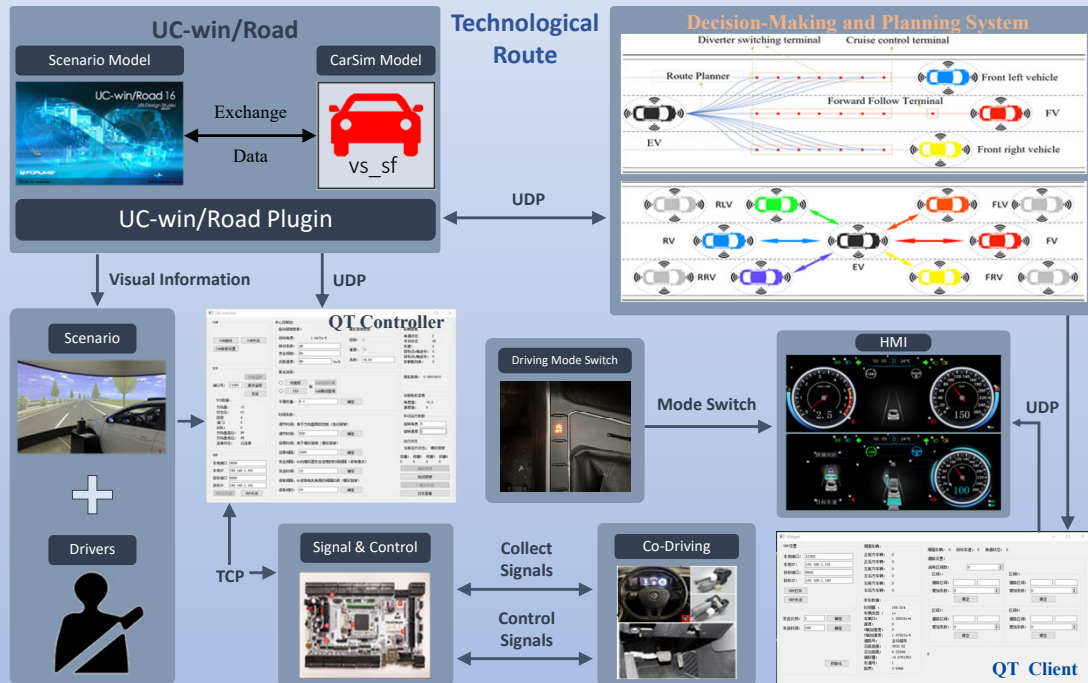




Autonomous Driving and Human-Machine Interaction Systems for Learning Driving Styles

Overview

The research is based on Internet information technologies such as UC-win/Road, autonomous driving and human-computer interaction. Based on C++ and user-defined plug-ins, we develop CAN, TCP and UDP network communication module, learning module to learn driver's driving style, decision-making module based on game theory, planning module considering driving style, horizontal control module with LQR + feed-forward control, and vertical control module with cascade PID; we develop human-machine interface based on LUA script, and we integrate the autonomous driving system and human-machine interaction system, and build an autonomous driving simulation platform based on the existing driving simulator.



Background and Significance

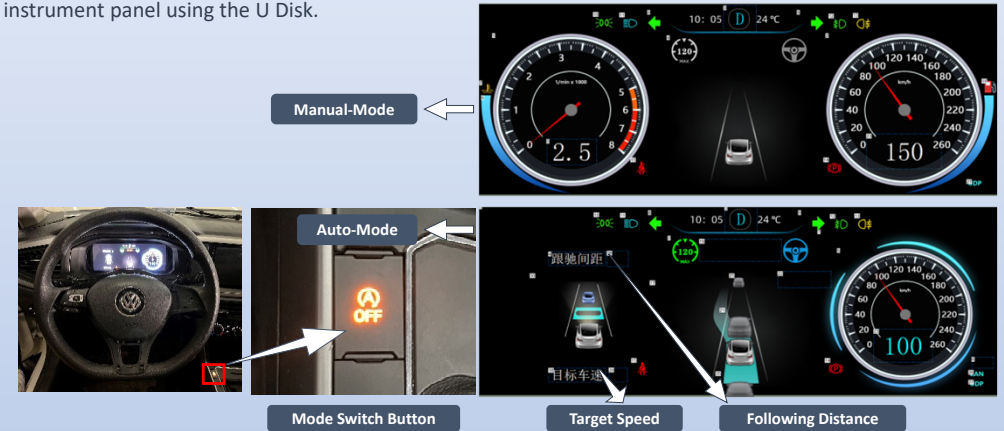
Development of Autonomous Driving and HMI Systems Using Driving Simulation.

1. Autonomous driving R&D needs to be 'fed' with huge amounts of data.
2. Extreme scenario testing is not available.



HMI System

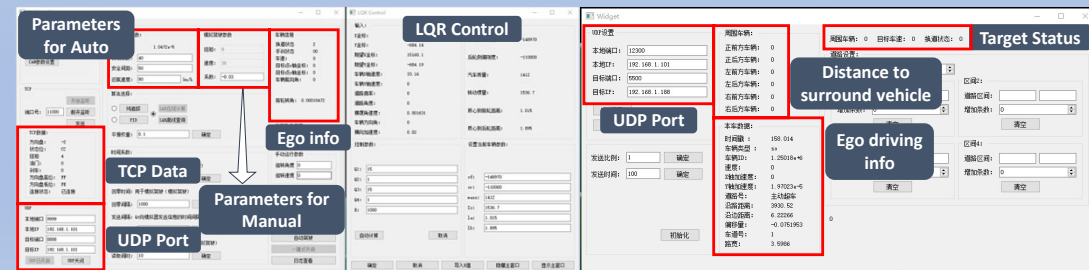
In order to achieve human-computer interaction under autonomous driving conditions, VisualTFT.exe is used to design the interfaces in automatic driving mode and manual driving mode, based on LUA scripting is written for obtaining CAN bus data and UDP data, compiling the project file and downloading it to a U Disk, and uploading it to the instrument panel using the U Disk.



QT Controller

In order to reduce the pressure of data transmission and calculation of the UC custom plug-in, the related program written in Qt is used, in which Test.exe receives the planning path from UC via UDP to realize vehicle following and transmits the control information to the driving simulator via TCP, and the UDP is transmitted back to the UC plug-in, and Qt_Client.exe transmits the data transmitted from UC to the HMI interface via UDP. Real-time display.

- QT Controller : Trace the path after getting the path planned by the UC Plug-in.
- QT Client : Acquiring the information and driving decisions of the ego and surrounding vehicles.



Future Task

1. In UC-win/Road, real background traffic flow is generated based on natural driving trajectory data.
2. Optimized autopilot system that can weave in and out of real traffic streams, with HMI displaying real-time trajectory.