Design of Interactive Simulation System for Autopilot Vehicle and Pedestrian

FORUM8 9th CPWC

Team : TRANSer

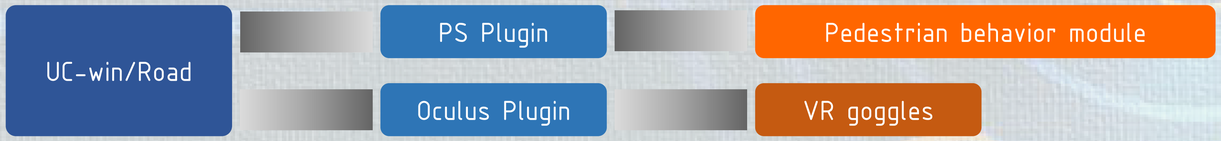
Overview

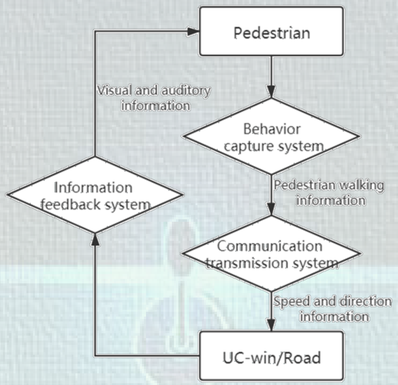
We developed a pedestrian simulator, an intelligent bracelet, and an eHMI early warning system based on UC-win/Road 15.0. The pedestrian simulator consists of three parts: pedestrian motion capture, information transmission, and information feedback. Pedestrian motion capture module uses keli to write MCU program and installs MCU module into a 3D printed shell. The information transmission module is realized by a UDP transmission tool and a python script. The feedback module is implemented based on the VR plugin of UC-win/Road, and feeds back the information in the scene to pedestrians through VR glasses of Oculus. The data of intelligent bracelet comes from UC-win/Road, and Arduino programs the specific functions. The eHMI early warning system is modeled by 3ds Max, and its specific functions are realized based on plug-ins written by UC-win/Road 15.0 SDK.

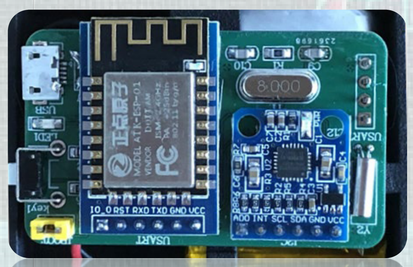
Background

Driving automation systems are becoming increasingly popular in modern automobiles. Due to the absence of drivers, explicit communication with pedestrians will become cumbersome or impossible.It is critical to examine how external Human machine interface (eHMI) can smoothly interact with pedestrians, substituting communication with the driver, particularly in complex urban environments.

Pedestrian simulator







Intelligent wristband

The intelligent wristband uses LILYGO TTGO T-Wristband as the carrier and is developed for the second time based on UC-win/Road. It is mainly composed of three modules: data packet receiving and analyzing module, main judgment module, and vibration module.

External Human machine interface

We export the vehicle model file from UC-win/Road, and used 3ds Max to develop the vehicle model with eHMI signals.

We switch the eHMI signal in front of the vehicle from "Please wait" to "Please walk" when the vehicle is approaching pedestrians, so we carry out secondary development and change the vehicle model to realize the smooth switching of the sign.

Function display

The simulation system consists of three parts:

① Pedestrian simulator

② Intelligent wristband

③ eHMI : warning prompt

Future work

Pedestrian simulator based on UC-win/Road

We will do more research on the conflict between people and Vehicles by pedestrian simulator based on UC/winRoad.

Study on pedestrian crossing safety

By using the pedestrian simulator, we explore the intelligent wristband and eHMI when vulnerable traffic participants crossing the road in the future automatic driving environment.

More eHMI concepts

The eHMI should ensure efficiency and safety.