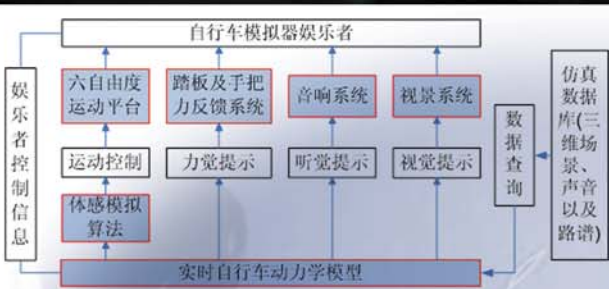


交互式自行车模拟器 Interactive Bicycle Simulator



The interactive bicycle simulator is an integrated system with software, hardware and virtual scene, this system is also developed based on General Virtual Reality Development Platform . The interactive bicycle simulator is based on a motion generation system consisting of a Stewart platform to provide 6-DOF motions, handle and pedal resistance system which are attached to the handlebars and the rear wheel respectively to provide force feedback; a scene generation system include three projectors to create realistic virtual riding scene. It can give the rider on board impression as if he/she rides an actual bicycle by predicting bicycle motion, which is caused by the rider's active maneuver and feed back corresponding to the visual and the cues imposed on the rider. Also in the simulator, the rider can experience the same physical sensations as that perceived during the riding of a real bicycle on various roads. The modeling of bicycle dynamics, motion cueing algorithm, and force feedback and 6-DOF motion platform development are key technologies solved. The bicycle simulator can be used for scientific education, entertainment, indoor physical exercise and athlete training. This general interactive motion platform and those key technologies also act as the foundation for the future research on driver behavior analysis and virtual driving etc.

交互式自行车模拟器是基于通用虚拟现实开发平台（VRF）进行自主开发的集成软件、硬件和虚拟场景的模拟器系统。

该系统其由一个六自由度的Stewart运动平台、手把及脚踏板力反馈系统、视觉系统以及听觉系统组成。通过骑车者与自行车模拟器的交互，使骑车者在虚拟环境中，获得真实骑自行车过程中的全身心感受，包括身体的摇动感、加速度感、手和脚的力触觉感受、视觉以及听觉感受；并给骑车者带来不同路况下骑车的娱乐性以及刺激性。

该系统解决了自行车动力学建模、体感模拟算法、力反馈生成以及六自由度运动平台开发等关键技术，建立了通用的交互式动感平台。该自行车模拟器可以用于科普、娱乐、健身、运动员训练行业。也为下一步虚拟驾驶平台的建立和驾驶行为分析等研究奠定了基础。