# Abstract

Racing simulators attempt to transfer the emotional and physical roller coaster of piloting a vehicle over the racetrack and competing against the best drivers of the world into the living room. Although driving simulators have become very popular in areas besides racing (e.g. teaching, entertainment, automotive development), only a few studies have investigated the behaviour and emotions of drivers. This work has two main contributions: the Virtual Rival Framework and the Virtual Rival Ghost.

The Virtual Rival Framework is an attempt to design a 3D racing simulation that allows testing new concepts that increase and measures driver Engagement, Education and Performance. The main objective of the Virtual Rival Framework is to provide a sandbox for researchers and game developers with a focus on psychological and performance evaluation of players. The Virtual Rival Ghost is a special virtual competitor for players on the track. To enhance the drivers Engagement, Education and Performance the Virtual Rival adjusts automatically to the current skill level of the driver.

The practical work includes the development of the Virtual Rival Framework and the Virtual Rival Ghost. The development is based on the Unity game engine. The resulting race simulation can be run in different browsers: Edge, Chrome and Firefox. Driving data is stored in the cloud and can be accessed and analysed online. The developed framework integrates all questionnaires needed for the evaluation of the Virtual Rival Ghost. A study on Amazon Mechanical Turk was conducted to evaluate the framework and to measure the effectiveness of Virtual Rival Ghost. The relationships between the Sensation Seeking personality measure and risky driving behaviour identified in previous research on real-world drivers were confirmed for virtual drivers. The result indicates: (1) players are not able to estimate their own skill level and (2) racing against a Virtual Rival is generally more satisfying in close races.