

Development of a new data input interface for Driving Simulator

Michele Di Vito
University “La Sapienza”
Rome, Italy
divito.michele@gmail.com

Driving simulator is useful tool used to perform experimental studies on driver behavior having technical and operative purpose. This technology is in some cases able to join experimental studies on real roads, and provides a safe experiments under equal conditions for all test drivers. The increasing number of publications about simulation techniques and experimental results attests that a several number of research centers are involved in this research context.



Figure 1: Driving Simulator of the Department of Hydraulics, Transportations and Roads of “La Sapienza”

The most important finality that this methods are the previous verification of designed roads and the following study of alternative solutions of possible problems concerning road design.

The research, presented in this work, regards driving tests that were performed by means of the Driving Simulator of the Department of Hydraulic, transportations and roads of the Rome University “La Sapienza”. The simulator is an interactive fixed-base driving simulator that includes steering wheel, seat, pedals and gear levels of a real vehicle. A projection system is used to visualize the image sequence of the virtual scenes. The simulator includes a vehicle dynamics model based on the non linear vehicle dynamic analysis made by a Personal Computer connected to a ADDA (Analog-Digital, Digital-Analog) converting board that makes a real-time acquisition of the complete Mechanical parameters like the cinematic and dynamic characteristic of the vehicle motion that was obtained by tests. To use the Simulator a particular interface was realized; it is a special procedure that allows the data input, realizing the exact definition of the road geometry. It is possible trough a punctual input of the three-dimensional coordinates of a series of points that

defines the cross section of the testing roads: this operational way permits the realistic representation of planimetric and altimetric parameters of the roads in the virtual reality.

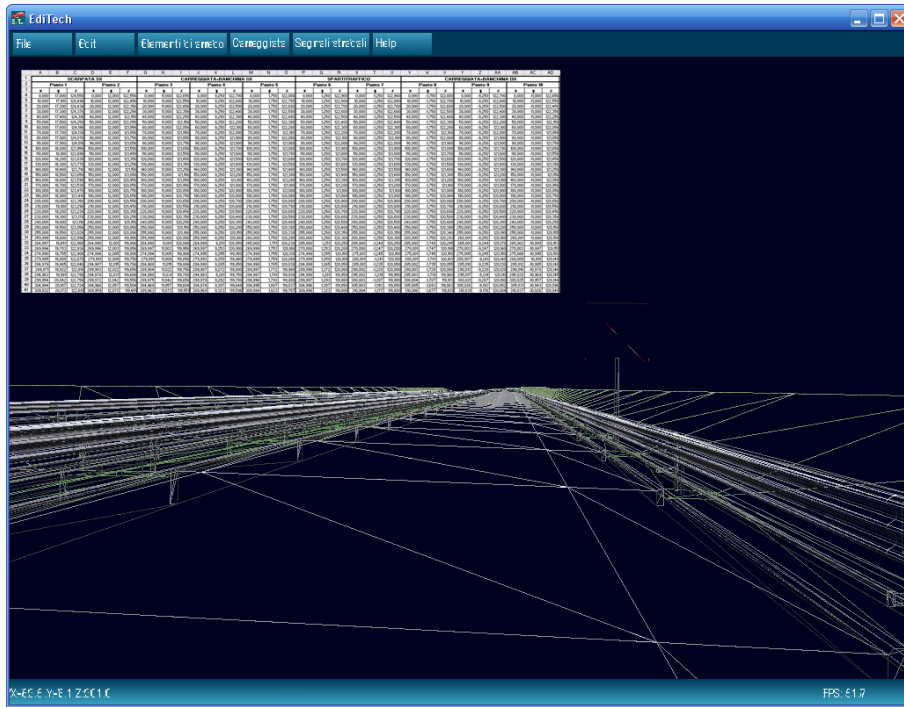


Figure 2: Punctual Road design model in wire frame representation

This operation also permits to thicken locally the distribution of the sections to have a better approximation when the curvature is most important. Moreover the interface permits a complete design of road environment and structures like bridges, natural and artificial tunnels and in addition a complete definition of traffic signals.

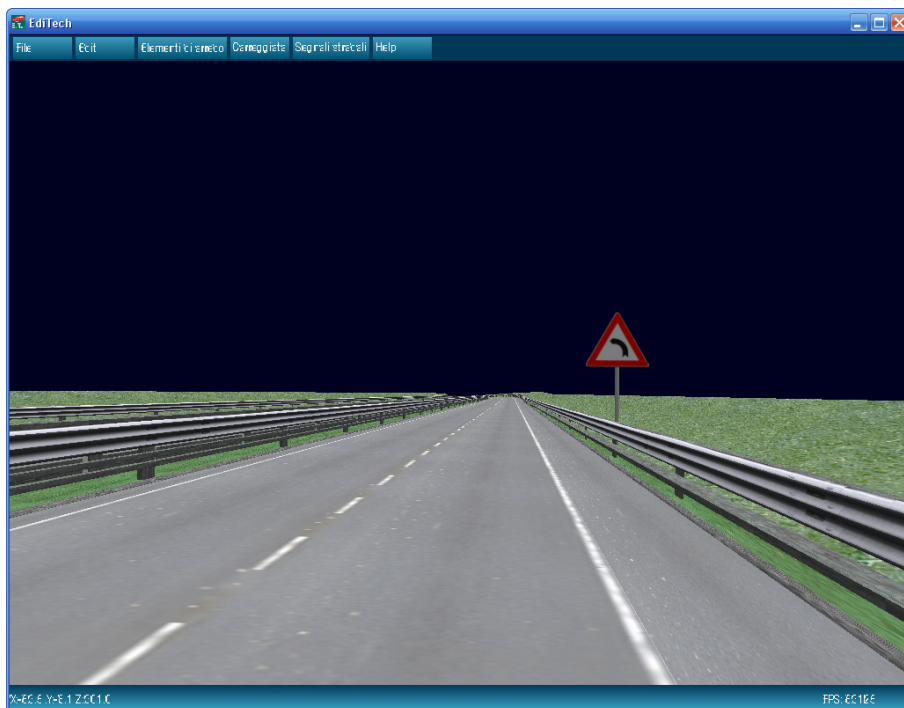


Figure 3: Representation of road environment and traffic signal

This new concept guarantees a realistic representation of road geometry and permit to have a better correspondence with the reality.

The creative idea of the new point of view for the input interface, however, permits a great experience into driving simulation use context; by use consistent geometric representation of the road environment it is possible to perform a first result concerning the relationship the mechanical aspect of the driving experiences with the road environment and with the most fleeting aspect: the human factor.