Architecture for an Interactive Motion-based Traffic Simulation Environment
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Objective
In simple words, the objective of this research is to identify the effect of human behavior on traffic.

To enhance the traffic simulation modeling realism by involving actual human beings navigating the system along with simulated entities in an immersive environment.

Introduction
This study proposes an architecture for an interactive motion-based traffic simulation environment.

Integrates: a motion-based driving simulation, a pedestrian simulation, a motorcycling and bicycling simulation, a traffic flow simulation.

The interaction between human, actual, and background traffic has tremendous implications. For example, in the real world, an accident as a consequence of a human error, can affect a large portion of the traffic system.

Studies that can be done:
- Evaluation of driver and pedestrian behavior for traffic safety projects.
- Simultaneous study among interactions between the drivers, pedestrians, bikers and their interaction with the infrastructure and environment.
- Training for first responders, emergency personnel and teen drivers in safe and controlled environment.

Implementation faces significant challenges, ranging from multi-platform and multi-language integration to multi-event communication and coordination.

Virtual Reality – Layered Architecture

Network Generation
- Load GIS data
- Load lane and signal timings information

Landmarks
- Locate all landmarks on Google Earth and save
- Upload the 3D models of landmarks (Google SketchUp or Blender)

Generation of other Modules
- Buildings and trees generated randomly in empty region
- Street lights are generated as per specifications defined initially.

Light Conditions
- Shadow and lighting generated as per weather and time of day settings.
- 3D object destroyed once its out of field of view.

Traffic Models
- Intersection objects are placed as required.
- Medians are placed as required.

Traffic Generation
- Hybrid simulation models generates traffic in 3D.
- Vehicle 3D objects destroyed outside of driver’s visibility limit.

Pedestrian Generation
- Pedestrians generated as per data/pedestrian simulation models.
- Pedestrian 3D objects destroyed outside of driver’s visibility limit.

Graphics
- Vehicle 3D objects destroyed outside of driver’s visibility limit.

System Architecture – Proposed Approach

Data-flow Diagram

Concluding Comments

- Existing modeling frameworks focus on a particular component of the real-world system; the remaining components are ignored or modeled using artificial entities.
- The proposed architecture increases the realism of existing alternative modeling approaches by explicitly and simultaneously including actual drivers, pedestrians, and bikers - not attempted as per our knowledge.
- Implementation of the architecture will provide the unique capability to study countless traffic problems using actual human beings.

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