I-4 CORRIDOR TRAFFIC SIMULATION AND VISUALIZATION (PHASE TWO)

PROBLEM STATEMENT

Tremendous advancements in simulation technology have brought about new capabilities in modeling transportation systems. Current simulation technologies are able to model individual vehicles and pedestrians in a large area. However, their data is generally available as large tables that must be analyzed statistically, and it is difficult to interpret the impacts of these phenomena upon the rest of the transportation system. A parallel advance in visualization systems, capable of operating on ubiquitous personal computers, makes possible the rendering of the transportation system in 3-D, virtual reality. By utilizing this technology, researchers, analysts, and planners can view the transportation system through virtual traffic cameras, traffic-monitoring helicopters, or first-person from an individual driver or pedestrian viewpoint. Thus, impacts of traffic changes could be visually demonstrated. Other potential applications include simulation and visualization of work zones on freeways, the addition of a rail system in the median of a freeway, and the status of the network due to some natural disasters like hurricanes and floods.

OBJECTIVES

The objectives of this research project were to do the following:

1. Develop a procedure for integrating a traffic simulation package (WATSIM- Wide Area Traffic SIMulation) with high fidelity visualization of traffic flow along the I-4 corridor in Orlando, Florida, to extend the current simulation (Phase 1) of the I-4 corridor, which runs between Kaley and Lee Road to the 528 interchange (west) and Maitland interchange (east).

2. Simulate a scenario showing the addition of truck lanes on the I-4 corridor.

3. Evaluate the utility of the developed tool for decision-making and public hearings.

FINDINGS AND CONCLUSIONS

The integration of WATSIM with the 3-D visualization tool MAYA was successfully accomplished in this project. The output file from WATSIM was converted to an XML file and fed into 3-D visualization engine as an input. With this technology the user has the ability to attach to or detach from a vehicle and fly around the database, zoom in and zoom out, freeze the simulation, and resume. Researchers, analysts, and planners can view the transportation system through virtual traffic cameras, traffic-monitoring helicopters, or first person, from an individual driver or pedestrian viewpoint, and look at the congestion points.

The WATSIM results showed that I-4 operates at congested conditions in both directions during peak period. The WATSIM analysis indicated that vehicle delay time and person delay time are more for the corridor with exclusive truck lane than without exclusive truck lane. And the vehicle miles and person trips were reduced significantly with the exclusive truck lane, all of which argues against exclusive truck lanes on the existing I-4 lanes.

BENEFITS

This high fidelity 3-D visualization of traffic flow immerses the users through virtual, real-world viewpoints (i.e., traffic camera, helicopter, driver, pedestrian) and allows them to view the I-4 corridor through various perspectives in a very rich virtual environment that contains high-fidelity terrain and structures representative of the metropolitan area of Orlando.

City planners, traffic engineers, and other decision makers can apply this technology to various problems or purposes, such as the following:

- congestion/choke points
- the effectiveness of new technologies and highway improvements such as high speed rail and other ITS deployments
- the effects of construction phasing and lane closures (allowing for 'what if' analysis for a variety of traffic conditions)
- the development of commercial or residential sites (e.g., value of visualization)

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