PROJECT NUMBER: 03102

PROJECT TITLE: GIS Display and Analysis of Crash Data

PRINCIPAL INVESTIGATORS:
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PROJECT OBJECTIVE:
This research will map vehicle crash locations stored in the CARE® database using a geographic information system (GIS), will map multi-year crash data sets associated with both urban and rural areas in Tuscaloosa County, and will identify and analyzed patterns and “hot-spots” of similar crashes.

PROJECT ABSTRACT:
Although the state of Alabama stores vehicle crash data in a database, this system has weaknesses, like limited capability to visualize the data spatially. Two companion projects, the present project and UTCA project 03304 by Gholston and Anderson at UAB, will investigate issues associated with a GIS application for CARE® data.

Previously, the CARE® system cannot correlate a crash location with roadway features such as bridges, cross roads, curves, rail-road grade crossings, etc. This project will map multi-year crash data from Tuscaloosa County, and then spatially compare these crash locations with existing roadway features. This GIS map will be based on node, link, and route-mile post locations. These data will be coded into a commercially available ETACK base map. The results produced from this project will be compared to the complementary project by Gholston and Anderson, who will employ a base map produced for the U.S. census.

Once the ETACK map is geocoded with node, link, and route-milepost data, spatial analysis and “hot spot” identification will be performed. Hot spots will be identified by: 1) thematic mapping, where nodes and links will be highlighted based on crash frequency, 2) buffering, where all crashes within a specified distance from a feature are identified, and 3) route impedance, where high accident routes are identified by assigning an impedance based on the number of crashes.
TASK DESCRIPTIONS AND MILESTONES:
1) Kick-off meeting with Drs. Gholston and Anderson to coordinate the two research projects. (Jan 2003)
2) Assemble an advisory committee GIS users at the Alabama Department of Transportation and the City of Tuscaloosa, and CARE® system experts at the University of Alabama. (Feb 2003)
3) Collect and analyze CARE® location data, CAD maps, paper node-link maps, and GIS base maps for Tuscaloosa County. (Feb – Mar 2003)
4) Code the Tuscaloosa County GIS map with CARE® descriptive location data. (Mar – Sep 2003)
5) Develop procedures for displaying and analyzing GIS crash data. (Jun – Nov 2003)
6) Write a final report including a “Go-Forward” strategy for statewide implementation. (Oct – Dec 2003)

TOTAL BUDGET:
Twelve month project; UTCA funds $44,935; total budget $88,980.

STUDENT INVOLVEMENT:
Two graduate research assistants and one undergraduate student will work on this project.

RELATIONSHIP TO OTHER PROJECTS:
There are at least three projects involving GIS that might contribute to this project: (1) UTCA project 03304, “Study of a GIS Accident System to Accompany CARE®,” by Gholston and Anderson; (2) UTCA project 99115, “Improving Crash Location Display and Analysis by Combining CARE® and GPS Technology,” by Graettinger and Anderson, and (3) UTCA project 01112, “A Maintenance System for Storm Water Infrastructure,” by Durrans and Graettinger.

TECHNOLOGY TRANSFER:
Presentations will be given at regional conferences and symposia, and a paper will be submitted for presentation at Annual Meeting of the Transportation Research Board. In addition, the results of this project will be posted in the UTCA web page.

POTENTIAL BENEFITS OF THE PROJECT:
This research directly supports both the management and safety components of the UTCA’s theme. This project addresses a data management need that will result in improved crash analysis and traffic safety. By identifying spatial patterns through GIS, and investigating the high crash locations, safety can be improved in a similar manner to the Early Warning System currently in place through CARE®. It is anticipated that traffic engineers will be able to visualize entire crash data sets, not just identify high crash frequency locations. Comparisons of crash frequency associated with nodes, links, routes, areas, and geographic features can be made. All of these analyses can be normalized by traffic volume or compared to other traffic variables such as number of lanes or speed limit.

TRB KEYWORDS:
GIS, database, vehicle crashes, CARE®