UTC PROJECT DESCRIPTION

PROJECT NUMBER:
03309

PROJECT TITLE:
Expert System for Drilled Shaft Construction Inspection

PRINCIPAL INVESTIGATOR:
Vijaya Gopu
The University of Alabama in Huntsville
S 201 Olin B. King Technology Hall
Huntsville, AL 35899
(256) 824-6117
vgopu@cee.uah.edu

PROJECT OBJECTIVES:
The objective of the proposed project is to develop an expert system for inspection of drilled shaft construction to provide inspectors training and understanding of the various facets of the construction process, and enable them to develop responses on a real-time basis. The expert system features will incorporate the know-how of experienced engineers, so inspectors will be able to better insure the integrity and safety of the drilled shaft foundation.

PROJECT ABSTRACT:
Construction inspection is one of the key tasks performed by the Alabama Department of Transportation Construction Bureau staff to verify that construction conforms to the project specifications established by the Department. Inspectors must provide proactive inspection to avoid nonconformance issues. The inspection of drilled shaft construction is both challenging and critical since an improperly performing drilled shaft can cause serious damage to the superstructure and become a serious hazard to driving motorists.

The focus of this research effort is development of an expert system that provides significant resource material on drilled shaft construction inspection, which incorporates an “Ask the Expert” feature that captures the knowledge of highly experienced engineers and inspectors. The expert system will include tests, visuals, videos and electronic versions of the forms used to document construction. This expert system can be easily installed on a laptop and accessed on the web, and will by available on a CD/DVD disk. The results of the project effort will provide an important technology transfer tool for construction inspectors in city, county and state agencies charged with the responsibility of verifying that the construction of drilled shafts is in conformity with the specifications established by their respective agencies.

PROJECT TASK DESCRIPTIONS:
1) Selection of expert system shell
2) Development of resource material for drilled shaft construction inspection
3) Development of expert knowledge for the system
4) Testing and workshop
5) Preparation of final report.

MILESTONES
Task 1: Jan 1 - 31, 2003
Task 2: Jan 1 - Jul 31
Task 3: Apr 1 – Sep 30
Task 4: Jul 1 - Nov 1
Task 5: Nov 1 - Dec

TOTAL BUDGET:
One year project; UTCA $37,460; total budget $74,960.

STUDENT INVOLVEMENT:
One graduate student will be working on this project. This student will be assisting the PI in developing the web-based framework for presenting the resource material. This framework will enable the user to access the expert system either from a CD/DVD or from a remote web site.

RELATIONSHIP TO OTHER RESEARCH PROJECTS:
The Principal Investigator is currently completing a UTCA project 01332, “Multi-media Resource for Bridge Construction Engineers.” While it is not directly related to the proposed effort, it uses the same types of web-based instructional techniques that will be used in project 03309. The current project will include more advanced features pertaining to expert systems and can be considered as the next generation in the development of training tools.

TECHNOLOGY TRANSFER ACTIVITIES:
The project has a significant technology transfer component for bridge construction inspection professionals, who will be major beneficiaries of the end product of the project. AL DOT is extremely interested in the proposed project and will assist in the dissemination of the project results. Workshops and seminars will be held to introduce the expert system to professionals involved with various aspects of drilled shaft construction inspection. Both public and private sectors will be represented, including ALDOT, county and city agencies, consulting engineering firms, and construction companies. The expert system developed in this effort will be of interest to every state department of transportation in the nation and as such can have a national impact.

POTENTIAL BENEFITS OF THE PROJECT:
The availability of the multi-media resource material will significantly enhance ALDOT’s ability to train its young engineers in the area of bridge construction supervision. The steep learning curve of these engineers will reduce overall training costs. Also, easy access to the resource material will significantly improve the safety of the bridge structures by promoting better understanding of the construction by the involved engineers. The results of the proposed effort will provide an important technology transfer tool to the city, county and state agencies dealing with bridge construction. UTCA’s technology transfer goal is addressed in the proposed project.
TRB KEYWORDS:
Expert system, drilled shafts, foundations, bridge structure, bridge substructure, construction inspection