ABSTRACT

Bridge inspections are tedious, time consuming and complex tasks in the field which require highly specific information pertinent to the decisions at hand. Most bridge inspections are currently conducted in a rudimentary manner with manually documentation and little support from Information Technology. Bridge inspectors assess the condition of bridge components based on standard rating guidelines and previous bridge inspection reports, making errors and inconsistencies inherent to the inspection process. Context-aware computing promises reduction in time and effort involved in conducting such bridge inspections by facilitating bi-directional flow of information between the database management system and on-site inspectors. This paper presents the research that investigated and implemented a context-aware computing platform that facilitates bi-directional flow of information and supplements field inspectors with relevant data to support their operations. Methods to map and store the geometric representation of the bridge-inspection elements in a database management system are presented. A context-aware computing framework that interprets the spatial-context of the bridge inspector based on the inspector’s position and head orientation is described. The paper also presents a context-aware computing application that coordinates the inspector’s spatial-context with the bridge model in the database management system in order to streamline data that is relevant to the inspector’s context and facilitates bi-directional communication between the inspector and the bridge inspection database management system through appropriate channels. Finally, the characteristics of context-aware computing supported bridge inspection routines are compared against the traditional (manual) approach to bridge inspection routines.