Kansas Department of Transportation

TECHNICAL SUMMARY

Design of a 3-D Magnetic Mapping System to Locate Reinforcing Steel in Concrete Pavements

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Introduction

This report outlines the design, fabrication, and testing of a 3-D magnetic mapping system used to locate reinforcing steel in concrete pavements developed at Kansas State University (KSU) in 2006. The magnetic sensing functionality is based on the principles of magnetic tomography which use time-varying magnetic fields to induce magnetic returns from nearby ferrous objects. The purpose of this device is to provide a process for inspecting the depth and orientation of embedded steel bars. The device provides real-time feedback and detailed reports that can be archived and geospatially referenced.

Magnetic Sensing Cart

Project Description

The mapping device extends the work previously done with versions that incorporated single sensors. Multi-sensor capability was added to enable determination of spatial orientation with a single data pass over a pavement joint. Additional reporting features such as GPS and in-field calibration techniques were used to streamline the data collection and report generation process.

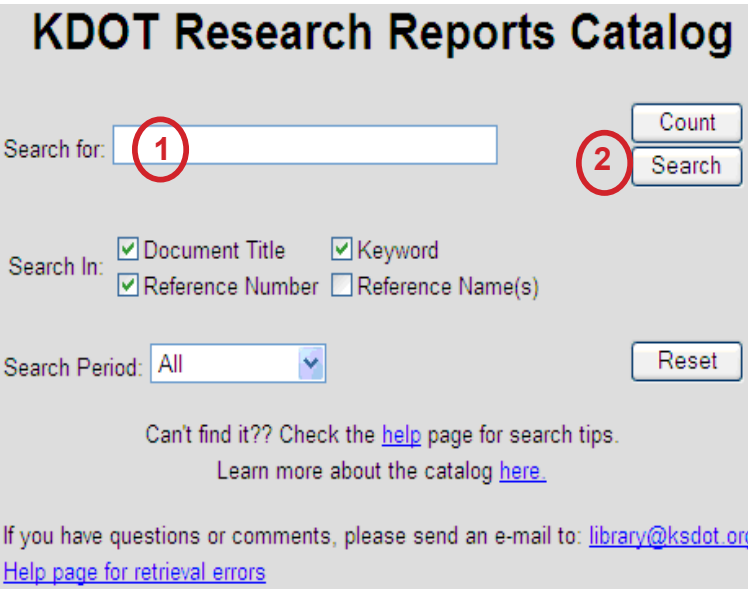
An embedded microprocessor communication interface between the peripheral sensing devices and the data collection computer was designed to offload some of the data compilation and manipulation from the laptop. This new interface alleviated speed issues encountered with the user interface programs running too slowly and allowed greater extensibility for adding more sensors or changing the platform architecture in the future.

Project Results

Verification and field testing was performed on all functional components of the system and the results from these tests are presented. The functionality of this device makes it attractive for commercial use by both construction companies and Departments of Transportation (DOTs) for inspection and archiving purposes. At the time of writing this report, the mapping device was at the stage of being prototyped and hardened for possible production.

Project Information

For information on this report, please contact Cliff Hobson, P.E., Advanced Technology Research Engineer, Bureau of Research, Kansas Department of Transportation; 2300 SW Van Buren, Topeka, KS 66611; (785) 291-3843 phone; Cliff.Hobson@ks.gov.



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