DRISI
Caltrans Division of Research,
Innovation and System Information

Research Results

Enhancing MTLS Data Management and Visualization

Supporting Caltrans District 4's Information Technology infrastructure upgrade and enhancement efforts towards Mobile Terrestrial Laser Scanning data management and visualization

Right of Way and Land Surveys

MAY 2019

Project Title:
Enhancing MTLS Data Management and Visualization

Task Number: 2996

Start Date: October 1, 2015

Completion Date: September 30, 2016

Task Manager:
Arvern Lofton, P.E.
Transportation Engineer, Electrical
arvern.lofton@dot.ca.gov

WHAT IS THE NEED?

The California Department of Transportation (Caltrans) owns two Mobile Terrestrial Laser Scanning (MTLS) systems, the Trimble MX8 and the Riegl VMX-1HA. A previous MTLS research study contributed towards successful implementation of the MTLS systems into Caltrans business practices, which resulted in an exponential increase in data collected from the systems. Current Information Technology (IT) infrastructure systems (both hardware and software) were insufficient to store and transfer this additional data. Prior to Caltrans District 4's (D4's) IT upgrade, D4 stored and backed up MTLS datasets onto several external hard drives. The implementation of a NetApp data storage system enabled D4 Surveys to store MTLS data in a central location. However, the first challenge involved locating all raw and processed MTLS datasets on external hard drives and copying the data to the NetApp system. Furthermore, D4 needed a directory structure developed in order to organize the MTLS datasets to facilitate future retrieval of the data for additional feature extraction such as roadside assets. D4 Surveys management desires to reuse the MTLS data when possible. Using existing software tools to catalog the MTLS data coverage into a Geographic Information System (GIS) database is time consuming and labor intensive. D4 needed an automated tool to collect MTLS project metadata and coverage into a GIS database.

WHAT WAS OUR GOAL?

The research goal supported D4 Surveys in their upgrade and enhancement efforts for MTLS data management and visualization by accessing and understanding D4's data management situation and needs and by developing software

tools for automated data cataloging of MTLS data for availability through a web-based GIS portal. The upgrade and enhancement efforts include MTLS data storage solutions provided by NetApp.

WHAT DID WE DO?

Under D4's guidance, the University of California - Davis Advanced Highway Maintenance and Construction Technology (AHMCT) Research Center assessed and identified D4's MTLS data storage and IT infrastructure needs. D4 surveys and IT teams procured a NetApp data storage system for MTLS data storage with a grant from the Federal government. The NetApp data storage system enabled D4 to consolidate all of their MTLS collected and backup data from different external hard drives in various locations into one central and secure NetApp unit. Centralizing all of the MTLS data simplifies the location and accessibility of the data and reduces the risks of lost and corrupted data. In addition, the AHMCT researchers assisted D4 with organizing, cataloging, and extracting MTLS metadata with the development of AHMCT's software tool LidarCrawl, which efficiently automates the cataloging and outputs the data into a PostGIS database. The PostGIS database, an open standard format, enables web visualization and GIS analysis using multiple GIS software suites such as Caltrans' ArcGIS and ESRI. This offers controlled availability of MTLS data to general Caltrans personnel. Moreover, the researchers investigated and compared different alternatives with pricing for cloud-based data storage for offsite data backup solutions. AHMCT provided D4 with recommendations for improved MTLS data management practices.

WHAT WAS THE OUTCOME?

The research assisted D4 surveyors to locate MTLS data stored on external hard drives throughout various locations and centralize the data into one master storage device. Caltrans received recommendations on improving MTLS data management in D4. However, some of the recommendations offer potential solutions to other Caltrans districts' MTLS data management needs. In addition, this research provided D4 a software tool that automatically catalogs existing MTLS data. The tool offers a web-based viewing mode that allows general Caltrans users to check availability of MTLS data at given geographic locations.

WHAT IS THE BENEFIT?

The IT infrastructure enhancement, including the NetApp implementation, benefited D4 with managing vast amounts and sizes of MTLS geospatial data and opening the opportunity to share customizable components of the data for various applications and projects. The developed software tool improves D4's ability to properly manager their MTLS data asset and automates MTLS GIS data extraction in complex workflows, which significantly reduces extensive time and labor vs. manual extraction practices. The LidarCrawl tool could be useful for MTLS data management throughout Caltrans.

LEARN MORE

Review the complete report.
http://www.dot.ca.gov/research/researchreports/reports/2016/CA17-2996_FinalReport.pdf

IMAGES

FIGURE 1: MX8 mobile terrestrial laser scanner system mounted on a Caltrans vehicle

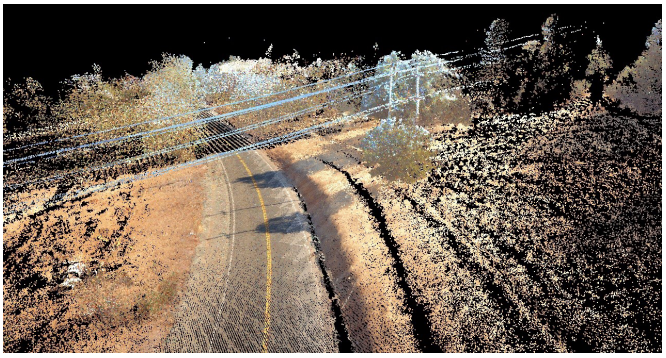

FIGURE 2: Scan data for Highway 20 in Yuba County

FIGURE 3: NetApp MTLS data storage system