UTC Project Information

Project Title	MPC-606 – Image-Based 3D Reconstruction of Utah Roadway Assets
University	University of Utah
Principal Investigator	Abbas Rashidi, Ph.D.
PI Contact Information	Professor Dept. of Civil and Environmental Engineering University of Utah Phone: (801) 581-3155 Email: abbas.rashidi@utah.edu ORCID: 0000-0002-4342-0588
Funding Source(s) and Amounts Provided (by each agency or organization)	USDOT, Office of the Assistant Secretary for Research and Technology $24,000 Utah Department of Transportation $30,000
Total Project Cost	$54,000
Agency ID or Contract Number	69A3551747108
Start and End Dates	February 18, 2020 to July 31, 2023
Brief Description of Research Project	LiDAR (Light Detection and Ranging) is a mature and efficient technology currently used by various transportation agencies for highways asset management and data collection purposes. While effective, there are some limitations in using LiDAR as a common engineering tool: The technology is pretty expensive; certain levels of expertise and training are required to use LiDAR scanners for data collection and processing results, and finally it might not be available to all units and individuals. Close-range photogrammetry is another emerging technology that could be considered as a potential alternative for LiDAR scanning devices. The technology is based on processing images and videos simply captured by off-the-shelf cameras or smartphones. Unlike LiDAR, close-range photogrammetry is very cost effective, simple, and easy-to-use. This project is an attempt to study the feasibility of using photogrammetry for highway asset management purposes within the state of Utah. The project includes two major components: 1) evaluating available photogrammetric software packages in terms of generating high-quality point clouds of highway assets and 2) developing and evaluating necessary hardware settings (type and resolutions of cameras, using existing image repositories such as google street views, etc.) for data collection purposes.
Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	The evaluation of the implemented system has shown that an image-based system can provide accurate pedestrian access ramp and traffic sign data. The research outcomes are specifically proved effective when tested at six sections of roadways and six pedestrian access ramps within the state of Utah. Off-the-shelf digital cameras are used to test the close-range photogrammetry method compared to the expensive

	LiDAR-based method, which is beneficial for cases where there is a cost limitation and asset counts are essential.
Impacts/Benefits of Implementation (actual, not anticipated)	Roadway assets are scattered on a large scale across the country. As a result, monitoring the condition and statistics of the existing assets is a huge problem for asset management divisions at transportation agencies for fair allocation of funds. The departments of transportation (DOTs) can use 3D modeling technologies as an automated tool for their asset inventory. Using this technology, DOTs can access 3D point cloud models of the assets' data, thereby providing them with valuable information such as assets' as-is conditions and their geospatial data.
Web Links • Reports • Project Website	• MPC Research Report – Image-Based 3D Reconstruction of Utah Roadway Assets • Journal Paper – Feasibility Study of Using Close-Range Photogrammetry as an Asset-Inventory Tool at Public Transportation Agencies • Journal Paper – Highway Asset and Pavement Condition Management using Mobile Photogrammetry