Automated Localization and ADA Functional Condition Assessment of Curb Ramps using Mobile Lidar

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Background

Curb ramps are an essential component of a safe, accessible, and efficient mobility for all transportation users. To make sure the curb ramps are able to function as intended, design and construction should follow Americans with Disabilities Act (ADA) standards and guidelines, given that those with disabilities are most adversely affected by improper construction. Missing curb ramps as well as those that do not meet the requirements may cause accessibility barriers for persons with disabilities. One of the primary challenges that transportation agencies face is that assessing the quality of a curb ramp is time-consuming and labor intensive, especially considering the fact that every corner at an intersection includes multiple curb ramps. Mobile lidar provides detailed 3D geometry information in the form of 3D point clouds that can be used to extract various characteristics and metrics to determine the ADA compliance of curb ramps. However, manual processing of mobile lidar data can often still be tedious and time-consuming and requires specialized software and training. These barriers prevent agencies from using it for curb ramp ADA compliance assessment. Additionally, a more rigorous accuracy assessment needs to be conducted to evaluate the effectiveness and reliability of a mobile lidar based curb ramp assessment.

Research Project

This project will create a novel framework for curb ramp ADA compliance assessment using 3D point cloud data to extract curb ramps and sidewalks in addition to the road surface. Curb ramps will be extracted from at least 100 intersections from mobile lidar datasets to produce both training and validation dataset identifying their key geometric characteristics. The curb ramp detection and assessment results obtained will be added to a geodatabase in GIS for easier access to the results and improved data management. The corresponding field survey data will be used as ground truth to compare against for further evaluating the effectiveness and accuracy of the proposed methods. The anticipated outcomes of this research will be to A) develop an algorithm that enables to automatically identify curb ramps and assess their ADA compliance in mobile lidar data; B) provide a guideline on the accuracy and reliability for utilizing mobile lidar data in curb ramp assessment; C) increase the adoption of mobile lidar technology for transportation projects. All of these factors should help assist in maintaining U.S. transportation network in a state of good repair, thus help ensure its safety, mobility and inclusiveness for persons with disabilities.

ABOUT THE AUTHORS
The research team consisted of Yelda Turkan of Oregon State University.

EXPECTED DATE OF COMPLETION
August 2022

FOR MORE INFORMATION
http://depts.washington.edu/pactrans/research/projects/automated-localization-and-ada-functional-condition-assessment-of-curb-ramps-using-mobile-lidar/