

<b>UTC Project Information</b>	
Project Title	MPC-615 – A LiDAR-Based Approach to Quantitatively Assessing Streetscapes
University	University of Colorado Denver
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Start and End Dates	February 18, 2020 to July 31, 2022
Brief Description of Research Project	<p>Roadway design guidebooks are defined by precise measurements regarding lane widths, shoulder widths, superelevation, curb heights, paint markings, etc. The so-called aesthetic qualities of a streetscape – tree canopy, building frontage, seating, etc. – receive less attention and measuring them has been an arduous and subjective endeavor. The existing literature is beginning to show that that such factors can play a role in active transportation, road safety, health, and economic outcomes. Yet, researchers remain conflicted on these associations. This lack of consensus is partially due to our inability to objectively measure these street elements on a large-scale basis.</p> <p>This research will examine the use of LiDAR (Light Detection and Ranging) technology to measure urban streetscapes. LiDAR is a highly precise remote sensing technology that uses light pulses to measure distances to objects. Using 3D volumetric pixels, known as voxels, we will test two quality levels of LiDAR to objectively measure how well various streetscape features can be assessed and measured. The intent is to devise new methods for objectively measuring streetscapes and</p>

	<p>features within streetscapes and to understand what streetscape features can be derived and analyzed with each LiDAR quality level. We also seek to use these methods develop a LiDAR-based measure that represents street enclosure – and the degree to which a street feels smaller via a combination of horizontal and vertical definition – which is hypothesized to be a significant factor associated with how people perceive and behave within the built environment, including with respect to vehicle speeds and road safety outcomes.</p>
<p>Describe Implementation of Research Outcomes (or why not implemented)</p> <p>Place Any Photos Here</p>	<p>All of the following research objectives were implemented:</p> <ol style="list-style-type: none"> <li>1) Conduct literature review</li> <li>2) Investigate current LiDAR technologies</li> <li>3) Gather conventional streetscape built environment data</li> <li>4) Collect aerial Q1 LiDAR data</li> <li>5) Develop and evaluate streetscape measures using Q1 LiDAR data</li> <li>6) Collect mobile LiDAR data</li> <li>7) Develop and evaluate streetscape measures using mobile LiDAR data</li> <li>8) Create street enclosure measure</li> <li>9) Advance knowledge by carrying out analyses to answer our research questions</li> <li>10) Advance policy and practice with respect to objectively measuring cities</li> <li>11) Advance education through the training of students</li> <li>12) Build an evidence base by disseminating findings through publications and presentations</li> </ol>
<p>Impacts/Benefits of Implementation (actual, not anticipated)</p>	<p>The LiDAR datasets studied can measure and quantify nearly all features found in a standard streetscape. The methods presented in this report for classifying and quantifying streetscape features into voxel height zones ultimately allows for comprehensive tabular descriptive statistics to be generated for any single or multiple features within a streetscape. With LiDAR’s high precision and accuracy, this project suggests that the methods discussed provide the most objective 3D spatial location of streetscape feature data, which can ultimately be applied to transportation outcome studies and studies that measure streetscape/built environment perceptual qualities.</p>
<p>Web Links</p> <ul style="list-style-type: none"> <li>• Reports</li> <li>• Project Website</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">MPC Research Report</a></li> </ul>