

<b>UTC Project Information</b>	
Project Title	MPC-680 – Non-Contact 3-Component (3C) Displacement Measurements with a Dual-Stereo Vision Enabled Uncrewed Aerial System (UAS)
University	Colorado State University
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Funding Source(s) and Amounts Provided (by each agency or organization)	<p>USDOT, Office of the Assistant Secretary for Research and Technology \$55,000</p> <p>Colorado State University \$66,000</p>
Total Project Cost	\$121,000
Agency ID or Contract Number	69A3551747108
Start and End Dates	December 17, 2021 to July 31, 2024
Brief Description of Research Project	<p>Measuring dynamic displacements is valuable for identifying dynamic properties of a bridge, abnormal patterns of structural response, and/or excessive loading. However, despite the benefit of providing critical information and maintenance guidance, displacement are typically not measured due to the logistical issues of sensor placement and maintenance and the impracticality of instrumenting contact-based sensors across all significant bridges. In this context, this project aims at developing a novel UAS-based dual stereo vision system. The system employs four total optical sensors; two cameras are directed toward a specific region of interest to capture the displacement of the bridge, while the other two cameras are aimed at a fixed reference point to track and compensate the UAS's movement. The proposed UAS-enabled dual-stereo vision measurement technique will enable remote dynamic displacement measurement by hovering a UAS next to the structure. This MPC project is intended to provide bridge managers with a resource efficient method to provide understanding of existing asset condition so they can better plan for maintenance and renewal activities.</p>

<p>Describe Implementation of Research Outcomes (or why not implemented)</p> <p>Place Any Photos Here</p>	<p>This research is exploratory research on this novel system for dual stereo vision to measure dynamic displacement of structures with a UAS platform. Further research is needed to refine the system and narrow down parameters.</p>
<p>Impacts/Benefits of Implementation (actual, not anticipated)</p>	<p>The research could have a significant impact on real-world structural monitoring and maintenance. By using a dual stereovision-enabled UAS for dynamic displacement measurements, it provides a portable, non-contact solution for assessing the health of civil structures such as bridges, dams, and tall buildings. The system’s ability to measure three-component (3C) movements without the need for artificial targets or fixed sensors makes it ideal for hard-to-reach or hazardous locations.</p> <p>Overall, this innovation could improve the safety, maintenance, and longevity of critical infrastructure, benefiting public safety and resource management.</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>• MPC Final Report – <a href="#">Noncontact Dynamic Three-Component Displacement Measurement with a Dual Stereovision-Enabled Uncrewed Aerial System</a></li> </ul>