

UTC Project Information	
Project Title	MPC-535 – Development of Unmanned Aerial Vehicle (UAV) Bridge Inspection Procedures
University	Colorado State University
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Funding Source(s) and Amounts Provided (by each agency or organization)	<p>USDOT, Research and Innovative Technology Administration \$57,000</p> <p>Colorado State University \$57,000</p>
Total Project Cost	\$114,000
Agency ID or Contract Number	69A3551747108
Start and End Dates	November 2, 2017 to July 31, 2022
Brief Description of Research Project	<p>This research is expected to provide the bridge management sectors (e.g. state DOTs) with a highly efficient, cost-effective, quantitative and safe proof-of-concept for bridge inspection. The ultimate goal of this research theme is to develop an automated and quantitative bridge inspection procedure that requires minimum human intervention. The automated procedure includes data (images) acquisition using the UAV, 3D reconstruction of surface models of bridges, identification, localization and quantification of structural damage and documentation of the geo-referenced bridge inspection data in database. This end goal will be achieved in two phases of</p>

	<p>studies. The first phase is the feasibility study, while the second phase is the development of machine learning tools to fully automate the data post-processing and damage identification process. This proposal will address the first phase of this research theme.s</p>
<p>Describe Implementation of Research Outcomes (or why not implemented)</p> <p>Place Any Photos Here</p>	<p>The proposed UAV-based infrastructure inspection system has been implemented to two bridges in Colorado.</p>
<p>Impacts/Benefits of Implementation (actual, not anticipated)</p>	<p>In current UAS-based inspection, the data analytics techniques of tracking changes of damage growth and locating the damage location in structure were lacking. This research addresses these gaps by advancing the state-of-the-art technology. The new image computation and machine learning algorithms developed through this project are effective for damage quantification, tracking and localization. These developed data analytics tools allow more quantitative condition assessment (enabling identification of damage location, severity and type), which is superior to the existing practice. The tools are expected to be useful for inspection industry and state DOTs.</p>
<p>Web Links</p> <ul style="list-style-type: none"> • Reports • Project Website 	<ul style="list-style-type: none"> • MPC Research Report • CSU Master's Thesis • Oct 2021 Journal Article – Automated Site-Specific Assessment of Steel Structures through Integrating Machine Learning and Fracture Mechanics • Nov 2020 Journal Article – Streamlined Bridge Inspection System Utilizing Unmanned Aerial Vehicles (UAVs) And Machine Learning