**UAV Applications for Bridge Inspection**

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**Abstract**

Conventional bridge inspection procedures regulated by the Federal Highway Administration’s (FHWA) Bridge Inspection Manual [1] can be relatively subjective, unsafe, time consuming and costly. For difficult to access bridge elements, roping rigs, scaffolding, or ‘‘snooper trucks” are often employed to bring inspectors ‘‘within- arm’s-reach” of bridge elements according to the requirements of FHWA and AASHTO, which may endanger the inspector. Inconsistency in ratings due to the subjectivity of human inspectors is very common [2]. Variations of ratings in routine, bi-yearly inspections of ±2 points or greater have been reported for 32% of bridges [3]. Recently, unmanned aerial vehicle (UAV) based remote sensing technology has emerged as a promising tool to address these shortcomings and improve bridge inspection practice. With rapid technology developments, many state DOTs are using or planning to use UAV in bridge inspection. however, these studies only used the obtained photographs to aid the inspectors by providing ‘‘eyes- in-the-sky” without locating, quantifying, or measuring damage to assess bridge condition and the bridge condition assessment still largely relies on manual inspection of the obtained photogrammetric models by inspectors without the aid of any in-depth data analytics tools. Detecting and measuring defects, such as cracks and spalling in concrete from images can be challenging due to the low luminance of the defect and small widths of the cracks. Recently Convolutional Neural Network (CNN) have made tremendous progress in image classification and recognition. The authors aimed to integrate UAV-based field inspection with advanced analytics tools such as CNN to provide streamlined decision-making support for bridge managers.

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Figure a) Original image b) Detected cracks using CNN

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