

## **Deep learning-based digital crack map establishment of a high-rise bridge pier using a climbing robot system**

Keunyoung Jang<sup>1)</sup>, Hyun Jin Bae<sup>2)</sup>, Byunghyun Kim<sup>3)</sup>, Soojin Cho<sup>4)</sup>  
and \*Yun-Kyu An<sup>5)</sup>

1), 2), 5) *Department of Architectural Engineering, Sejong University, Seoul 05006, Korea*

3), 4) *Department of Civil Engineering, University of Seoul, Seoul 02504, Korea*

1) [jj99137@sju.ac.kr](mailto:jj99137@sju.ac.kr)

2) [bberry25@sju.ac.kr](mailto:bberry25@sju.ac.kr)

3) [shdik2002@uos.ac.kr](mailto:shdik2002@uos.ac.kr)

4) [soojin@uos.ac.kr](mailto:soojin@uos.ac.kr)

5) [yukyuan@sejong.ac.kr](mailto:yukyuan@sejong.ac.kr)

### **ABSTRACT**

This paper proposes an automated digital crack map establishment technique for a high-rise bridge pier using a climbing robot system. The visual inspection of bridge piers by experts is often difficult and unreliable especially in inaccessible areas. To overcome the limitations, we develop the climbing robot incorporated with multiple vision cameras for evaluating cracks of a high-rise bridge pier. By spatially scanning the climbing robot system along a target bridge pier, high-quality vision images are continuously obtained. Then, a feature extraction-based image stitching algorithm is newly developed and applied for establishing the entire region of interest (ROI) images. Finally, cracks in the ROI image are automatically detected and precisely quantified. The proposed technique is validated using in-situ test data obtained from Jang-Duck bridge located at Gangneung city, South Korea. The test results reveal that the proposed technique successfully creates bridge pier crack maps with precision of 90.92 % and recall of 97.47 %.

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1) Ph. D Student

2) M.S Student

3) Ph. D Student

4) Professor

5) Professor