Computer Vision-Based 6DOF Motion Measurement using 3D marker
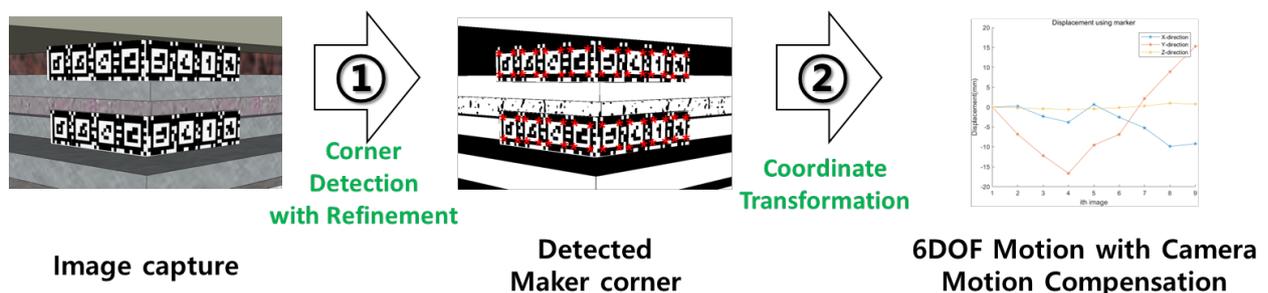
Jonghwa Hong[1),], Junhwa Lee[2)] and *Sung-Han Sim[3)]

[1), 2), 3)] *School of Civil, Architectural Engineering and Landscape Architecture, Sungkyunkwan University (SKKU), Suwon 16419, Korea*
ssim@skku.edu

ABSTRACT

Bridge bearings are serving key roles such as accommodating thermal expansion and rotation under bridge loading conditions. Measuring displacement of bridge bearing is one of the most important indices to assess structural health of bridge structure. Several studies are conducted to measure in-plane displacement of bridge bearing by computer vision-based methods. However, for long-term monitoring, camera motion can be occurred and induce measurement error. This research proposes computer vision-based 6DOF motion measurement system using 3D marker. As compared with conventional planar marker, 3D marker enables accurate out-of-plane measurement. Two 3D markers are installed to bridge bearing. One target marker is attached to target point to measure 6DOF motion and the other marker on the surface of pier is used as reference for camera motion compensation. 6DOF rotation and translation of target marker are computed based on reference marker with camera motion compensation. In order to evaluate proposed methods, lab-scale experiments were conducted about 6DOF motion cases.

Image capture → ① **Corner Detection with Refinement** → **Detected Maker corner** → ② **Coordinate Transformation** → **6DOF Motion with Camera Motion Compensation**

Acknowledgement

[1)] Master course student
[2)] Postdoctoral Researcher
[3)] Professor