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The structures and infrastructures are decaying, and they need regular monitoring for performance and safety assessment. One of the factors that can be indicator of the poor performance of the structures is vibrations exceeding acceptable values specified in the safety codes. However, current existing methods require inspectors to climb the structures to install sensors on these critical zones. These sensors are contact sensors and they need a reference point from where to measure. Installation of the sensors can be unsafe for inspectors, take time, lead to huge expenses, and sometimes these critical structures don't even have access. Drones are used along with the cameras to inspect condition of the structures and infrastructures with the images captured from the structure. But they only provide image-based information and decisions. The data are visual and does not provide any physical of data like displacement that can be obtained by contact sensors. In order to be able to monitor structures safely, accurately, and inexpensively, this research develops a new drone-laser-computer aided system to collect the displacement values from the structures remotely. In this project a camera-drone-laser system is built with wireless communication between the added sensors and the computer system. This wireless communication system helps the system to fly without tether. New computer vision algorithm is developed to obtain the reference-free displacement values by integrating both the laser and the camera dynamic measurement of the structure while correcting the drone hovering in a full, integrated system. This research introduces the new generation for SHM which enables reference-free monitoring of structural dynamic responses of structures, increasing safety and accuracy of operations.