News applications of UAVs for infrastructure monitoring: contact inspection systems.

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Abstract: In recent years the use of UAVs (Unmanned Aerial Vehicles), as known as drones, has increased exponentially for infrastructure monitoring, usually using remote sensing payloads. The drop in prices of these systems, the improvements in their specifications and the change in the regulations for their use have made more and more people use them for both recreational and professional uses. In some hard-accessible structures, such as bridges or dams, these vehicles are a powerful tool to carry out different types of inspections using remote sensors, such as different types of camaras, LiDAR sensors or RADAR sensors. The data acquired by these vehicles can be used by SHM (Structural Health Monitoring) methods, to acquire the 3D geometric model of the structure to be used by a DT (digital twin) or to detect different pathologies, such as cracks. Also, new UAV systems have been developed in the last years to perform a physical contact between the UAV and the structure, enabling the use of these systems to perform other NDT (Non-Destructive Testing) inspections that use sensors that have to be in contact with the structure to perform reliable measurements, such as ultrasonic sensors. In this work, four different intelligent payloads for contact inspection tasks with UAVs are going to be presented. The first three payloads are focused on maintaining continuous contact between the UAV and the structure while measurements are performed by the contact sensor. Instead, the fourth has been designed to fix the payload to the structure, in this way the UAV only fixes it to the structure without maintaining continuous contact while the measurements are performed. The results of each payload are going to be compared and analysed, defining possible improvements and future work.

Keywords: NDT inspections, contact inspections, UAV payload, SHM.

Funding

This study was funded by the Recovery, Transformation, and Resilience Plan of the European Union–Next Generation EU (University of Vigo grant ref. 585507).

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