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A semi-autonomous mobile robot for bridge inspection

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Highlights

- â€¢ A mobile system is proposed performing semi-autonomous bridge inspections.
- â€¢ The mobile robot takes pictures of hidden parts of segmental, slab, girder and arch bridges.
- â€¢ The mobile robot can perform an inspection while traffic is maintained on the bridge.
- â€¢ Pictures are located in the CAD model of the bridge for further visual inspection.
- â€¢ Cracks detected by inspectors are automatically measured and reported.

Abstract

A semi-autonomous robotic system dedicated to road and train bridge inspection is presented in this paper. So far, bridge inspections have been performed manually by workers who either climb and rappel or use so-called mobile negative cherry pickers or specific mobile assemblies. This is a dangerous and tedious task which must be carried out during night time or when the traffic on the bridge is stopped, for safety reasons. The installation of mobile assemblies is costly, time consuming and they become not compliant with recent structures. Moreover, manual inspections require counting, measuring, locating and taking pictures of small cracks. The quality of these manual operations depends not only on the experience but also on the level of fatigue of the workers. The robotic inspection system proposed in this paper consists of three main components: a customized truck, a mobile robotic mechanism which takes pictures of the entire area of interest, and a software which automatically associates these pictures with the CAD model of the bridge.

Afterwards at office, users browse the pictures of the surfaces of the bridge with the help of the CAD software and a dedicated plugin to detect, measure and comment the bridge defects to process later. The result is summed up into a report generated by the software. The requirements and the mechanical design of this system are described and an overview of the inspections realized so far with it is provided.

Graphical Abstract





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Keywords

Mobile robotics; Bridge inspection

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