

Robotic Intelligent Vision and Control for Tunnel Inspection and Evaluation - The ROBINSPECT EC Project

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Abstract — Recent developments in robotics and the associated fields of computer vision and sensors pave the floor for automated robotic solutions, exploitable in the wider field of inspection of civil infrastructures and particularly transportation tunnels, the latter ageing urgently requiring inspection and assessment. Currently, tunnel inspections are performed via visually by human operators. This can result into slow, labour expensive and subjective process often requiring lane shutdown during the inspection, parameters that need to be lowered while having safety requirements and tunnel uptimes increasing.

ROBINSPECT is an EC research project (FP7 - ICT - 611145) driven by the tunnel inspection industry, that adapts and integrates recent research results in intelligent control in robotics, computer vision and active continuous learning and sensing, in an innovative, integrated, robotic system that automatically scans the intrados of tunnels for potential defects on the surface while at the same time inspects and measures radial deformation in the cross-section, distance between parallel

cracks, cracks and open joints that impact tunnel stability, with mm accuracies. Intelligent control systems and robotics are integrated to set an automatic robotic arm manipulation and autonomous vehicle navigation so as to minimize humans' interaction during tunnel inspection. This way, the structural condition and safety of a tunnel is assessed automatically, reliably and speedily. The robotic system will be evaluated at the research infrastructure of tunnels of VSH, at three road tunnels of the Egnatia Motorway and the rail tunnel of London Underground.

This paper will focus on the ROBINSPECT EC project first year activities starting from the requirements, specifications and system architecture as well as the technologies that will be integrated and overall technological solution. Also it will provide the current status of implementations and following steps as well as its expected European and International impact.

Keywords— *robotics, structural health monitoring, tunnel inspection*