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PERFORMANCE EVALUATION OF BRIDGES USING VIRTUAL REALITY

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There are approximately over 2.5 million bridges throughout the world, built to withstand massive forces and last for decades or centuries but very unlikely to last forever. According to a recent survey there are more than 64,000 bridges in the US that have been declared as structurally deficient *(Holcombe, 2017).* Moreover, recent bridge collapse incidents in Italy, South Africa, United States and India have resulted in unplanned bridge closures affecting the economy of a state, traffic congestion, negative impact on day to day activities and in some extreme cases led to loss of life due to complete structural collapse. Therefore, law making agencies are pushed into paying greater attention to structural rehabilitation. Performance evaluation of bridges includes visual inspection, destructive and non-destructive testing. It is stated as *"Regardless of the fact that many structure testing methods have so far been developed, visual inspection is likely to remain the most significant aid for bridge condition assessment, especially for smaller typical structures" (Radic, 2012).* Results from inspection serve as a foundation for engineers to suggest if further testing (destructive or non-destructive) is required. However, precision and accuracy greatly vary with qualification, motivation and equipment of persons conducting these inspections. This paper emphasizes the use of modern day technology by presenting a workflow of bridge inspection namely, visual inspection to address limitations and difficulties faced by engineers in assessing performance of bridges. It involves the use of lidar to capture, on-site, an image of the structure with all its imperfections such as cracks, corrosion, spalling, signs of corrosion, seepage marks, weathering, segregation, honeycombing etc. The processed image is displayed in an immersive 3D virtual reality environment for assessment. Visual inspection through virtual reality (VR) promises to be a highly efficient and highly powerful inspection technique. Evaluation will become more reliable and accurate which will make engineers capable of effectively deciding the next step of rehabilitation. This technique is critically analysed, interpreted and compared with traditional inspection methods to highlight the potentially improved efficiency of the proposed workflow. It is intended that the research findings will greatly contribute to industrial development by raising standards and efficiency of bridge performance evaluation.

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