Automated Risk Assessment in Construction: Combining Novel Concepts with Cutting Edge Technologies

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Abstract

Although, an issue that applies to all aspects of a construction project, risk has always been primarily related to workers safety. The risk of accidents requires appropriate identification, assessment and response in all phases of a construction project's life cycle. This, in turn, is achievable by applying a systematic approach that can effectively measure the right indicators of an emerging risk. In this paper, the novel concept of "risk component" is defined and shortly described through different examples that correspond to different risks. From another starting point Automated Data Collection (ADC) technologies are briefly reviewed, in order to investigate their appropriateness for measuring risks components. A comparative presentation of the main ADC technologies highlights their advantages and disadvantages and indicates the most effective among them in assessing risk through risks components measurements. Through this presentation, it is concluded that vision-based tracking methods are the most effective in quantifying risk components. This result is validated with a case study that simulates the operation of a proposed simple system for construction site monitoring by the use of vision-based tracking methods. The application example clearly demonstrates the effective combination of theoretical and technology innovation in construction risk assessment.

Keywords

Risk Analysis, Construction, Monitoring System, Automated Data Collection, Vision-based Tracking Methods

1. Introduction

Construction is among the most risk-intense industries. This is due to several reasons including: a) the demanding requirements of modern, complex technical projects coupled with the improper training of workers, b) the low level of automation in the construction process, c) the dynamic environment of work that, often, requires the execution of dangerous tasks and d) the inappropriate implementation of health and safety measures, either due to incomplete design or due to negligence and non-compliance of workers with them. While, these risks, i.e. the risks related to health and safety in the construction site is the predominant type of risks when talking for the construction industry, other types of risks such as legal, financial or managerial risks are also of great importance, since the response to them has a direct impact to any construction project's success (Xenidis, 2006). Therefore construction risk management is a highly demanding endeavor that requires proper training and the use of the appropriate tools and techniques.

Among the most important requirements for a successful implementation of risk management is the understanding of the risk from the risk analyst (Fung *et al.*, 2009). Unless the risk analyst has a clear idea of what are the sources and the constituents of a potential risk any approaches and measurements used are susceptible to false assumptions and subjective judgments and expectations, which lead to ineffective risk