



Waleed UMER

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Supervisor

Professor Heng Li

Area of Research

Construction Ergonomics, biomechanical analysis, prevention through design

Research Scope

Construction workers have been known as sufferers of musculoskeletal disorders (MSDs) because of the labor intensive nature of their work tasks. The possible risk factors for development of MSDs in construction workers include but are not limited to awkward postures, forceful pulling and pushing, manual material handling and repetitive work tasks. In order to alleviate the risk of development of MSDs in construction workers, the first step is to analyze construction tasks biomechanically and to find out possible risk factors, creating a need to do quantitative biomechanical evaluation of construction tasks. Such assessment methods offer better understanding of the potential risk factors inherent in the construction tasks and assist in objective evaluation of the ergonomic interventions. My research is focused on rebar work as literature highlights it as one of the most MSD prone construction tasks.

Research Methodology

Considering the scope, this research entails the use of surface electromyography (sEMG), motion sensors and other equipment. The idea is to capture the construction tasks from biomechanical point of view, hence analyzing the changes in muscle properties and body kinematics while doing rebar work. Rebar workers may opt various methods for rebar tying and analyzing these different methods will give us kinematics and kinetics perspective of the rebar work. The data collected during the experiments will be analyzed using appropriate statistical techniques. This will lead us to better understanding of probable risk factors which cannot be captured using other assessment techniques. Finally, this evaluation will lead us to suggest better ergonomic interventions for rebar workers which is the current need of the construction industry.

Publication List

1. **Umer, W.**, Li, H., Szeto, G. P. Y., and Wong, A. Y. L. (2017). "Identification of Biomechanical Risk Factors for the Development of Lower-Back Disorders during Manual Rebar Tying." *Journal of Construction Engineering and Management* 143(1).
2. **Umer, W.**, Li, H., Szeto, G. P. Y., and Wong, A. Y. L. (2017). "A Low-Cost Ergonomic Intervention for Mitigating Physical and Subjective Discomfort During Manual Rebar Tying." *Journal of Construction Engineering and Management* 143(10)
3. **Umer, W.**, Antwi-Afari, M. F., Li, H., Szeto, G. P., and Wong, A. Y. (2017). "The Global Prevalence of Musculoskeletal Disorders in the Construction Industry: A Systematic Review and Meta-Analysis." (under review)
4. **Umer, W.**, Li, H., Szeto, G. P., and Wong, A. Y. "Towards proactive safety measures: Quantifying the upright standing stability after sustained rebar tying postures." (under review)
5. **Umer, W.**, Antwi-Afari, M. F., Li, H., Szeto, G. P., and Wong, A. Y. (2016). "The Prevalence of Musculoskeletal Disorders in the Construction Industry: A Systematic Review." *International Conference on "Innovations in Public Health Sciences"* 23-26 September, Hong Kong (Poster presentation)
6. Mahmood, S., Anwer, S., **Umer, W.**, Niazi, M., Alshayeb, M. "Towards Task Allocation in Global Software Development Projects." *ICSEA*, October 2014, ISSN: 2308-4235, ISBN: 978-1-61208-367-4, Location: Nice, France.

Reviewership

Journal of Construction Engineering & Management, ASCE (since 2016)

Awards

Dean's Award for Best Presentation, 13th International Postgraduate Research Conference 2017, Organized by the School of the Built Environment at the University of Salford

Hobbies

Playing squash, table tennis, hiking

Updated in Sept 2017