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A Study of Inertial Motion Capture's Role in Analyzing RULA, Upper-body Posture, and Musculoskeletal Health

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Introduction

The modern workforce spends significant hours engaged in various occupational tasks, often leading to musculoskeletal discomfort and injuries. Ergonomic workplace analysis plays a crucial role in identifying risk factors and implementing interventions to mitigate these issues. Traditional ergonomic assessments rely on subjective observations and self-reported data, which may lack precision and objectivity. In contrast, inertial motion capture technology offers a promising approach to objectively measure movement patterns and postural deviations. This study explores the integration of inertial motion capture in assessing RULA scores, upper-body posture, and their correlation with musculoskeletal discomfort among workers. Specifically, it examines the Relationship between Upper Limb Assessment (RULA) scores, deviations in upper-body posture, and reported musculoskeletal discomfort among workers. The findings shed light on the utility of inertial motion capture in enhancing our understanding of ergonomic risk factors and optimizing workplace design to promote employee well-being [1].

Description

A diverse sample of workers from various industries was recruited for this study. Inclusion criteria encompassed individuals engaged in prolonged sedentary tasks or repetitive manual labor. Participants underwent inertial motion capture sessions during their regular work activities. Inertial sensors were attached to key body segments to capture three-dimensional motion data continuously. Simultaneously, RULA assessments were conducted to evaluate upper-body posture according to ergonomic guidelines. Participants also completed surveys to self-report musculoskeletal discomfort levels. Recorded motion data were processed using specialized software to quantify postural deviations and movement patterns. RULA scores were calculated based on observed postures. Statistical analyses, including correlation tests and regression modeling, were performed to examine the relationships between RULA scores, upper-body posture deviations, and musculoskeletal discomfort [2,3].

The analysis revealed significant correlations between RULA scores, upper-body posture deviations, and musculoskeletal discomfort levels. Higher RULA scores, indicating poor ergonomic conditions, were associated with increased instances of musculoskeletal discomfort. Specific postural deviations, such as prolonged forward flexion or lateral bending, were linked to elevated discomfort in corresponding body regions. Furthermore, individuals with greater variability in posture exhibited higher susceptibility to musculoskeletal issues. The findings highlight the importance of ergonomic interventions targeting posture optimization and movement patterns to alleviate musculoskeletal discomfort in the workplace. Inertial motion capture technology offers a comprehensive and objective means of assessing ergonomic risk factors, enabling tailored interventions to enhance employee well-being. By integrating real-time feedback systems, organizations can proactively address ergonomic concerns and promote a healthier work environment [4].

This study underscores the potential of inertial motion capture technology in revolutionizing workplace ergonomics. Future research could explore longitudinal studies to assess the long-term impact of ergonomic interventions guided by inertial motion capture data. Additionally, the development of wearable inertial sensors with real-time feedback capabilities could empower workers to self-monitor their posture and movement, fostering a culture of ergonomic awareness and injury prevention [5].

Conclusion

The study highlights the significant role of Inertial Motion Capture (IMC) technology in analyzing upper-body posture, RULA (Rapid Upper Limb Assessment) scores, and musculoskeletal health. IMC offers a precise and dynamic method for assessing movement patterns and postures in real-time, surpassing traditional observational and manual methods. The technology provides comprehensive data on joint angles, velocities and accelerations, facilitating a detailed examination of ergonomic risks and postural deviations. The findings indicate that IMC enhances the accuracy of RULA assessments by delivering objective measurements that are less prone to human error. This accuracy is crucial in identifying postures that contribute to Musculoskeletal Disorders (MSDs), enabling targeted interventions and ergonomic improvements. Moreover, IMC's portability and ease of use in various environments, from clinical settings to workplaces, make it a versatile tool for continuous monitoring and assessment.

Overall, the study concludes that integrating IMC into ergonomic evaluations significantly improves the detection and analysis of poor upper-body postures, contributing to better musculoskeletal health outcomes. It advocates for wider adoption of IMC in both preventive and corrective ergonomic strategies to mitigate the risk of MSDs and enhance occupational health and safety.

Acknowledgement

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Conflict of Interest

None.

References

1. Yang, Feng, Niu Di, Wei-wei Guo and Wen-bin Ding, et al. "The prevalence and risk factors of work related musculoskeletal disorders among electronics manufacturing workers: A cross-sectional analytical study in China." BMC *Pub Health* 23 (2023): 10.
2. Daneshmandi, Hadi, Dohyung Kee, Mojtaba Kamalinia and Mohammad Oliaei, et al. "An ergonomic intervention to relieve musculoskeletal symptoms of assembly line workers at an electronic parts manufacturer in Iran." Work 61 (2018): 515-521.

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3. Havet, Nathalie, J. Fournier, J. Stefanelli and M. Plantier, et al. "Disparate exposure to physically demanding working conditions in France." *J Public Health Epidemiol* 68 (2020): 327-336.

4. Vieira, Edgar Ramos and Shrawan Kumar. "Working postures: A literature review." *J Occup Rehabil* 14 (2004): 143-159.

5. Bonfiglioli, Roberta, Yohama Caraballo-Arias and Acran Salmen-Navarro. "Epidemiology of work-related musculoskeletal disorders." *Curr Opinion Epidemiol & Pub Health* 1 (2022): 18-24.

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