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A person with narrow vision has a restricted horizon; a person with wide vision has plentiful opportunities

From clipboard to camera: an online video-based ergonomic assessment system for New Zealand workplaces

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Keywords

Risk Assessment; video-based; musculoskeletal disorders

Abstract

Background: Musculoskeletal disorders account for over 30% of work-related health harm in New Zealand (WorkSafe NZ). For forty years the response has rested on observational assessment (RULA, REBA, the NIOSH equation, and WorkSafe's NZMAC, NZRAPP and NZART), applied with a clipboard, a printed score sheet and a trained assessor: expert-dependent, slow, and hard to repeat.

Objective: To develop an online video-based ergonomic assessment system that analyses workplace tasks from a single standard video, and to establish how closely its outputs agree with laboratory reference methods.

Methods: A single video, uploaded or recorded by webcam, is processed using markerless pose estimation (MediaPipe BlazePose), removing the need for markers, wearable sensors, force plates or a laboratory. Four modules run from the same video: RULA and REBA postural scoring; NIOSH Recommended Weight Limit and Lifting Index; static joint moments and L5/S1 spinal compression; and dynamic biomechanics across full movement cycles. Outputs include risk cards, time-series charts, intervention recommendations and an exportable PDF report. The first three modules were validated against laboratory motion capture and 3DSSPP.

Results: Trunk moment and L5/S1 compression matter most for manual handling, and both showed moderate agreement with 3DSSPP (ICC 0.74 and 0.58). REBA risk categories agreed with the reference in 84% of 132 trials, and the NIOSH Lifting Index showed a mean absolute error of 0.13. Agreement was lower for RULA categories and for distal upper-limb moments, and this reflects the reduced upper-body model.

Application: Ergonomic assessment is moving towards a form that any practitioner can run, on any task, as often as needed. The system will be demonstrated live during the session. Practical evaluation with expert end-users is the next stage, and HFESNZ members working in ergonomics, occupational health and safety, physiotherapy or manual handling assessment are warmly invited to take part.