

**Title**

Wearable Insole Pressure Sensors for Automated Classification of Construction workers' Slip-Trip-Loss of Balance Events

**Abstract**

The objective of the current study was to develop a method to detect and classify slip, trip, and loss of balance (STL) events based upon foot plantar pressure distribution data captured using wearable insole pressure sensors. Twenty young healthy participants participated in experimental trials involving falls on the same level due to STL events experienced by construction workers. Foot plantar pressure distribution data acquired during the STL events were input to supervised machine learning classifiers [e.g., decision tree (DT), artificial neural network (ANN), *K*-nearest neighbor (KNN), and support vector machine (SVM)]. The results show good accuracy, sensitivity, and specificity of the classifiers, confirming the feasibility of detecting potential fall risks effectively. The implications of this study are of value to researchers and practitioners because the method quantitatively measures the type of events and provides a computational tool that records automated foot plantar pressure distributions, which can help understand fundamental causes of fall-related injuries in construction workers.

**Keywords**

Construction worker, Loss of balance, Pressure sensor, Slip, Trip.

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