**Objective:**

Falls among the elderly is an important health issue. Fall detection and movement tracking are therefore instrumental in addressing this issue. This paper responds to the challenge of classifying different movements as a part of a system designed to fulfill the need for a wearable device to collect data for fall and near-fall analysis. Four different fall trajectories (forward, backward, left and right), three normal activities (standing, walking and lying down) and near-fall situations are identified and detected.

Falls are a serious public health problem and possibly life threatening for people in fall risk groups. We develop an automated fall detection system with wearable motion sensor units fitted to the subjects’ body at six different positions. Each unit comprises three tri-axial devices (accelerometer, gyroscope, and magnetometer/compass). To reduce the computational complexity of training and testing the classifiers, we focus on the raw data for each sensor in a 4 s time window around the point of peak total acceleration of the waist sensor, and then perform feature extraction and reduction.