Objective: Prevention of fall and fall-related injuries for vertigo patients is a critical patient safety issue. In this study, we developed a fall detection system by using a tri-axial accelerometer module.

Methods: We recruited 26 healthy and 12 vertigo patients for this study. The accelerometer module used a tri-axial ADXL330 accelerometer; the signals were transmitted by a radio frequency transmit module and then concealed in a small light rigid plastic case.

RESULTS: Each accelerometer module uses a tri-axial ADXL330 accelerometer (range: ±3g, sensitivity: 300mV/g, typical bandwidth: 1600Hz, noise density: 238g/√Hz, rms, operating voltage range: 1.8-3.6 V). Accelerometer was connected to an ADXL018-1B-U-based radio frequency (RF) transceiver module and then concealed in a small light rigid plastic case. The accelerometer signals were transmitted wirelessly by a 2.4G Hz wireless link to a PC-side receiver via a radio frequency transmit module. The functional blocks in the fall detection system are shown in Figure 1.

CONCLUSIONS: Tri-axial accelerometer module with AAC algorithm is able to produce norm-discriminative information for daily activities from fall incidence. The accelerometer-based fall detection processes have become a critical concern for patient safety. Patient falls during daily activities are major contributing factors to hospital-acquired infections, among other adverse health effects. This study has demonstrated that the accelerometers are capable of detecting falls and daily activities with high sensitivity and specificity.