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**Title:**
Early detection of fall risk and mitigation strategies: Leveraging novel wearable technologies and advanced statistical approaches to inform decision-making on fall prevention

**Abstract:**
In most industrialized nations more than 80% of the trauma incidents in the hospitals are due to falling. Needless to say, injurious falling is a massive socioeconomic and health care burden. Importantly, this issue will continue to burgeon given the disproportionate shift in demographics towards older adults. One of the key modifiable risk factors for falling is impaired gait and balance. In our laboratory of Neuromuscular Biomechanics affiliated with the Institute for Biomechanics at ETHZ, we have previously identified balance and gait related features that predispose individuals to fall risk. In a series of scoping reviews we have also benchmarked these features to identify optimal performance. Currently we are upscaling our feature engineering and modeling approaches in a large (> 2000) cohort of participants, via the Future health technologies program funded by the National Research foundation in Singapore, in both clinical and real-world settings. Here, uniqueness in our efforts on mitigating the risk of falls lies in informing decision making on fall prevention program. By effectively incorporating benchmarks on the set of features collected via wearables, we are working closely with clinicians in personalizing therapy. In this manner we hope to maximize the potential of prevention programs.
Interestingly, hearing impairment is another modifiable risk factor for falling. Despite the fact that individuals suffering from hearing loss also have high risk of falling, the relationship between hearing impairment and deficits in gait is not properly understood. Within our lab we are investigating the effects of introducing auditory stimulations during standing and walking tasks. We envision informing decision making with our industry partners on potentially mitigating the risk of falls in those that suffer from hearing impairment.