

# A NOVEL WEARABLE SENSOR AND METHOD OF USING IT TO PROMOTE SENIORS' PHYSICAL ACTIVITY AND TO PROVIDE ALERTS OF HOW THEIR GAIT MAY INDICATE ELEVATED FALL RISK

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## ABSTRACT

We employ a novel wearable sensor to provide accessible measurement of the amount of physical activity for seniors, while assessing the risk of falling using gait quality. We will investigate the acceptability and effectiveness of this wearable sensor-based system in promoting activities and fall prevention practices through a field study. Successfully translating the advances in wearable and sensor technologies to health benefits for the elderly users can significantly improve older adult's quality of life and independent living.

## MOTIVATION

- ▶ Elderly living alone are exposed with higher risk of falling, which negatively impact their quality of life
- ▶ At TAGlab we created the InTouch communication platform for seniors, caregivers and families to combat social isolation faced by older adults
- ▶ Can we extend InTouch to help seniors track their activities and their risk of falling to encourage exercise and fall prevention practices?



## EPIDEMIOLOGY OF FALLS

- ▶ Falls and Fall Related Injuries
  - Approximately 20% to 30% of seniors aged 65 and over experience a fall every year
  - 10 to 15% falls result in serious injuries
  - 0.2 to 1.5% falls result in hip fracture
  - Mental burden: fear of falling, reduction in activity, and social isolation
- ▶ Cost of Falls
  - \$8.7 billion CAD in 2010 = 32% of total injury cost
  - This cost is projected to double by 2025
  - There is a demand for technological interventions and low-cost solutions against falls

## OBJECTIVES

- ▶ Design, implement and evaluate an ambulatory sensor-based activity tracking and fall risk assessment solution
- ▶ Integration with InTouch for information delivery, fall risk warning and activity summaries
- ▶ Field study involving elderly participants to evaluate its effectiveness and acceptance in a medium-term trial

## DESIGN (WHY WEARABLE)

- ▶ Compared to other alternatives such as camera and smart-home applications, wearable sensors are very cost-effective and can be easily deployed
- ▶ Evidence of higher user acceptance: mobility is appreciated
- ▶ Designed as a belt extension to be worn near body centre of mass for consistent motion data
- ▶ “Invisible” when worn

## SYSTEM OVERVIEW

