Wearable Technology for Fall Detection in the Rancho Yolo Community

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Wearable Technology for Fall Detection in the Rancho Yolo Community
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Abstract

- **Problem Statement:** Community members have shared concern about leaving their home due to their fear of falling. This fear of falling decreases social, occupational, and community engagement.
- **Category:** Accommodations and Consumer Access, Priorities, and Benefits over the Lifespan
- **Overview:** Wearable assistive technology devices that assist in the incidence of falls to increase independence and promote engagement in a fulfilling life.
- **Solution:** Fall detection wearables provide medical help at the push of a button, including low and high technology devices for detection of falls.

Introduction

Occupational Therapy (OT) doctoral students from the University of the Pacific are interested in promoting safety and increasing the independence of the residents of Rancho Yolo: Rancho Yolo Senior Community: Located in Davis, CA w/ 267 manufactured homes that house 360 community dwelling residents over the age of 55 (Rancho Yolo, 2021).

We are here to propose Fall Detection Devices to solve the problem of residents not leaving their homes from fear of falling.
- Falls are a public health concern: ~36 million falls reported each year in older adult population (CDC, 2020).
- $50 billion medical costs of non-fatal falls in 2015 (increases annually)
- $29 billion paid by Medicare, $9 billion by Medicaid, $12 billion by private/out-of-pocket-payers

Two Categories:
- **The Consumer Access, Priorities, and Benefits over the Lifespan:** Investment for their health since it will improve QOL and aging in place.
- **Accommodations:** We want to accomodate to what matters to YOU by not changing what you do on a day to day basis, we are just adding a safer buffer when they engage in these activities.

Literature Review

There are several types of wearable devices that range from sensing, motoring, and both, and can be used for monitoring physiological measures and tracking physical activity (Patel et al., 2012).

- **Low tech** options have been shown to be effective. These include safety monitoring devices such as devices similar to Life Alert. These devices are wearable (e.g. pendant) and have a single button. They serve the purpose of alerting an individual’s caregiver or emergency services in the event of a fall (Patel et al., 2015).
- **High tech** wearable devices may include motion sensors that help detect falls. These devices can perform multiple actions such as automatically alerting emergency services and/or caregivers in an event of a fall (Mrozek et al., 2020).
- Specific high tech devices may even take preventive measures to address the event of a fall, such as the Tango Belt. This wearable device on an individual’s hip uses an app and airbag technology in the even of a fall (Quigley & Tarbert, 2021).
- **Internal and external factors influence use of wearable devices among older adults.** These factors include the user’s openness to using the device, the user’s motivation, successful integration into daily life, and the device’s features (Moore et al., 2021).

The use of wearable technology may be accepted by the Rancho Yolo community if the internal and external factors that influence use are addressed in the device that is proposed.

Methods

Wearable devices detect falls and alert medical responders, decreasing time between incidence and medical treatment. While they do not prevent falls, they help identify adults at higher risk of falls. This information will show medical necessity for additional healthcare services (OT, PT) and support for environmental modifications.

**Alert 1 In the-home → Fall detection device**
- Single buttoned bracelet/necklace with fall detection sensors
- In home monitor with 600 foot radius; GPS for on the go detection

**Cost**
- $399.50: Individual unit cost for 10 months
- $119,850: Cost of 300 devices for 10 months

**Tango Belt**
- Discreet wearable belt, uses sensors to detect a fall and deploy airbags
- Can be used with partnering physicists for balance metrics.
- Reduces fall impact and lowers potential for hip fractures

**Cost**
- $1,499.00: Individual unit cost for 12 months
- $449,700: Cost for 300 devices for 12 months

**Funding**
- HHS-2022-ACL-AOA-FPSG-0031: 2022 Empowering Communities to Deliver and Sustain Evidence-Based Falls Prevention Programs, Administration for Community Living Grant (ACL) – Award ceiling: $600,000
- Archstone Foundation Grant: varying amounts ($15,000 - $300,000+)
- HHS-2021-ACL-AOA-FPSG-0015: 2021 Empowering Communities to Reduce Falls and Falls Risk, ACL – Award ceiling: $300,000

![Fall Detection Devices](image)

**Results**

- According to the literature, about 80% of people accepted a low tech device and about 45% of people accepted a high tech device (Puri, 2017).
- Anticipate half of the residents to accept the wearable devices.
- Expect more of the residents to accepted the low tech versus the high tech wearables devices option.
- According to the survey, about half of the residents are living with other people in their home. Therefore, some of the residents already have a support system in place, 24 hour care or on-call support from a family member, friend or caregiver.
- The grants covered around 300 devices which allowed every owned home in the Rancho Yolo community to be able to have access to one.
- The low and high tech wearables devices helped about half of the residents at the Rancho Yolo community which equates to about 133 owned homes and about 180 older adults.
- According to the literature, 40% of older adults always wear wearable devices (Gaskins, 2020). The purpose of these grants were to increase the number of older adults to always wear wearable devices which about half of the residents at Rancho Yolo have accepted.
- **Occupational impact** → The residents are able to engage and participate fully in their meaningful activities knowing that they are medically supported.
- **Social impact** → According to the survey, socializing with family and friends was what gave life purpose and meaning. Residents are able to socialize with family, friends, and other residents in the community with ease knowing that there is help in case of a medical emergency.
- **Community impact** → Residents could educate each other and create a support group to teach each other and provide the positive impacts that the wearable devices had provided them in their life.

References