

AirSave

Fall Injury Prevention

Jun Lu
Gabriel Fresch
Borhan Vasli
Aida Shahi



Intro

Effects of Aging:

- Reduced bone density
- Reduced Motor function (slower reflexes)
- Sarcopenia (Muscle Loss w/Aging)
-



“I dislocated my left hip while taking a brisk walk and tripped. Not long after,, i just fell off a step ladder fracturing my right shoulder”

“Two family elders in their 90s...falls led to death”

Fall-Related Injury Statistics

National Institute of Health:

- The leading cause of death due to injury among the elderly
- Over **1.6 million** admitted to ER annually
- 87% of all fractures in the elderly are due to falls.



Our Mission

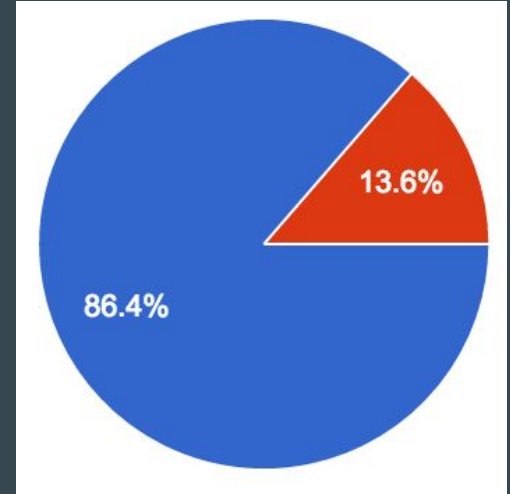
“Falls can be fatal, Let Air Save You”

- Protect seniors against fall-related injuries
- All day protection for fundamental bone structures
 - Hip, Spine, Neck and Head
- Lightweight and Comfortable
 - Wear it, and Forget it.



Population Survey

- In person interviews with 45 Seniors
- 86% believe this item addresses an urgent need
- 50% willing to wear it daily, if it's
light/comfortable enough



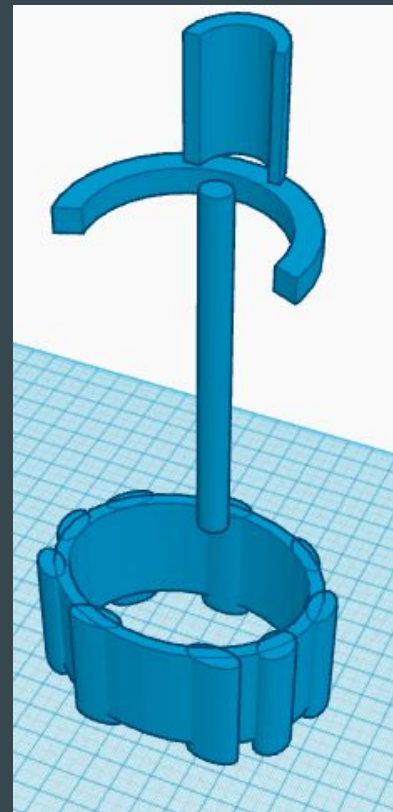
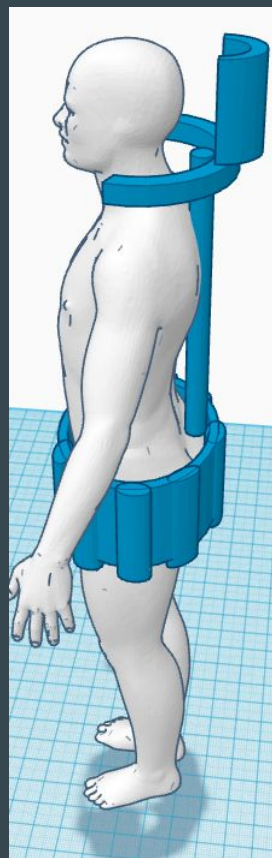
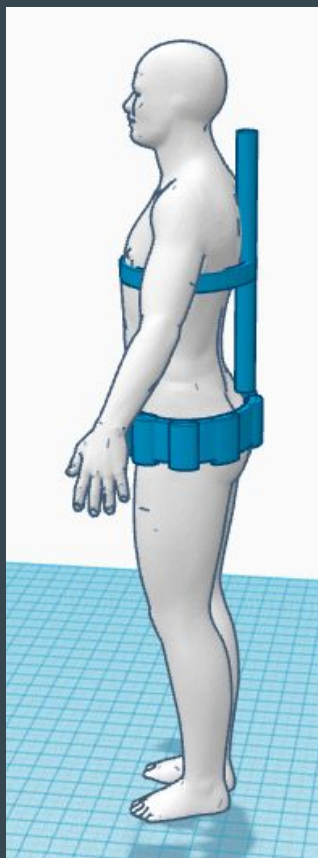
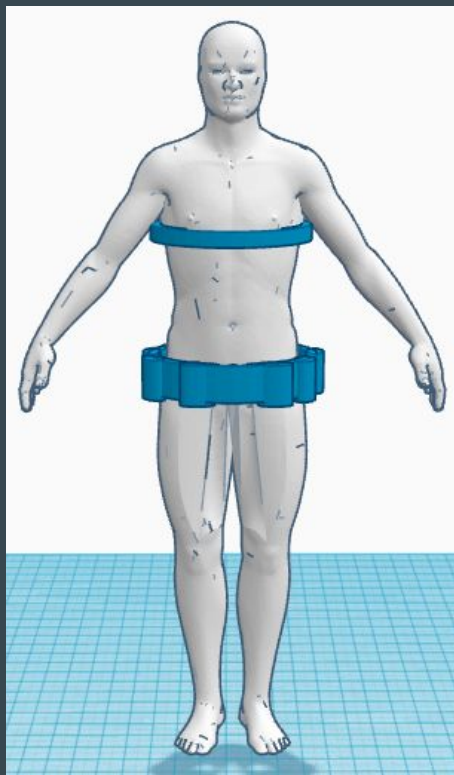
Existing Products

ActiveProtective Belt: Made to protect against hip injuries. However many fall-related injuries and fatalities occur at the spine, neck, and head.

Cost per belt is approximately \$300

Insufficient in protection, and high-cost.

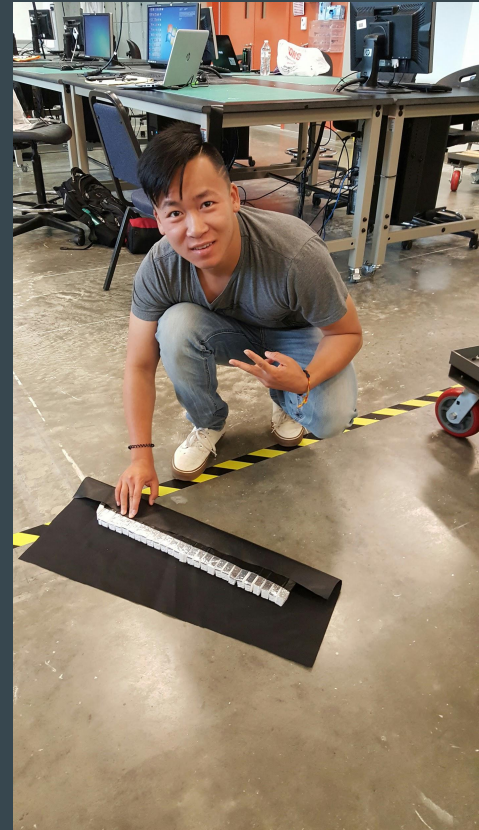
Our Product



Our Product

Components:

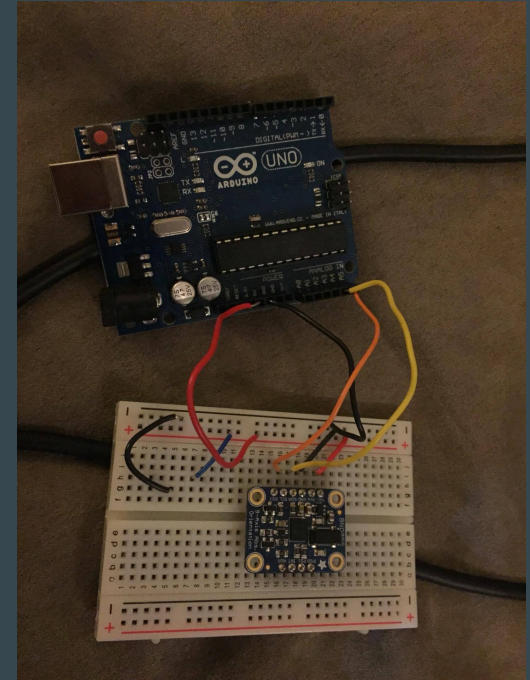
- Fall Sensing System
 - Arduino Uno microcontroller
 - Accelerometers and Gyroscopes
- Hybrid Air-cushion and Impact Foam System
 - Foam frame
 - 5 airbag protection around hip
 - 1 large one protecting head and neck
 - Powered by CO₂ Cartridges

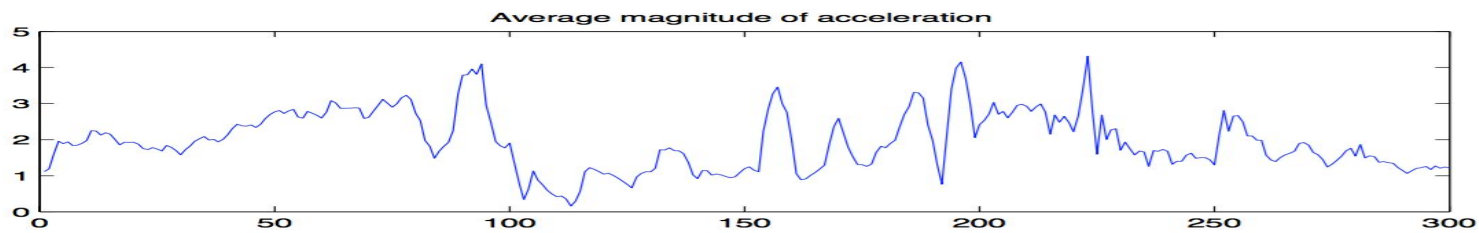
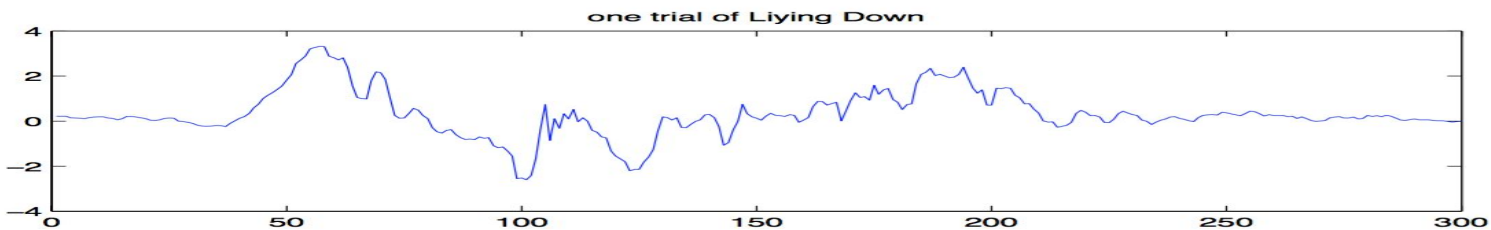
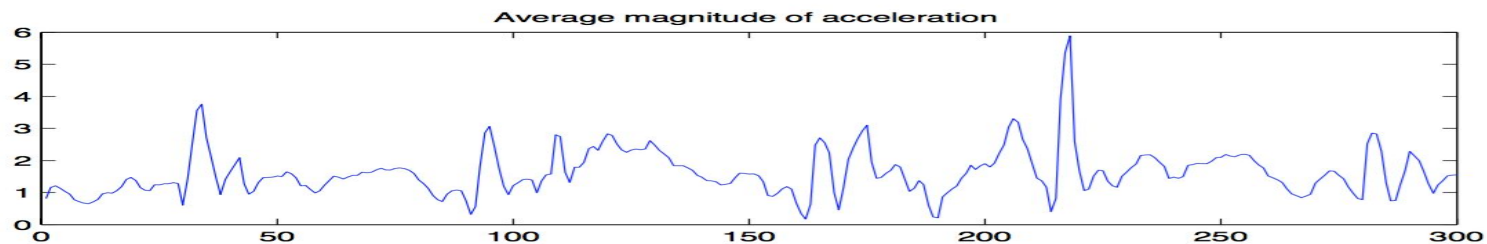
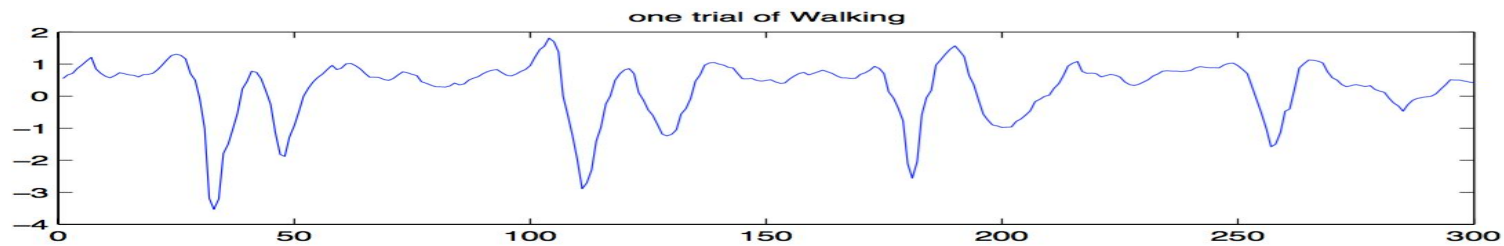


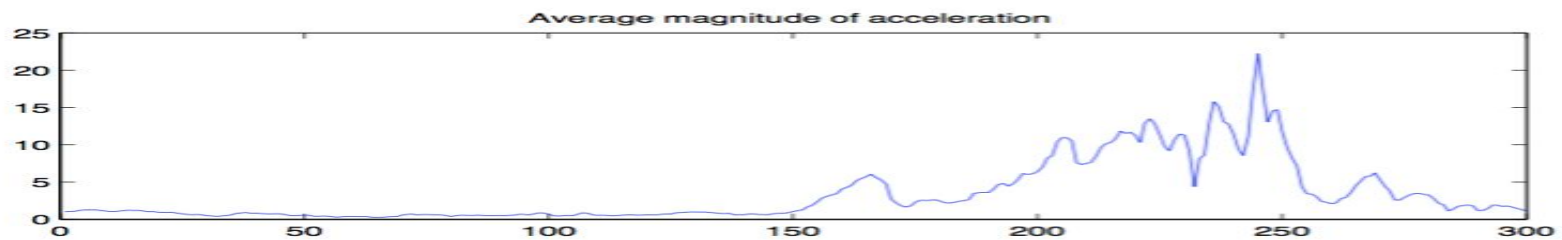
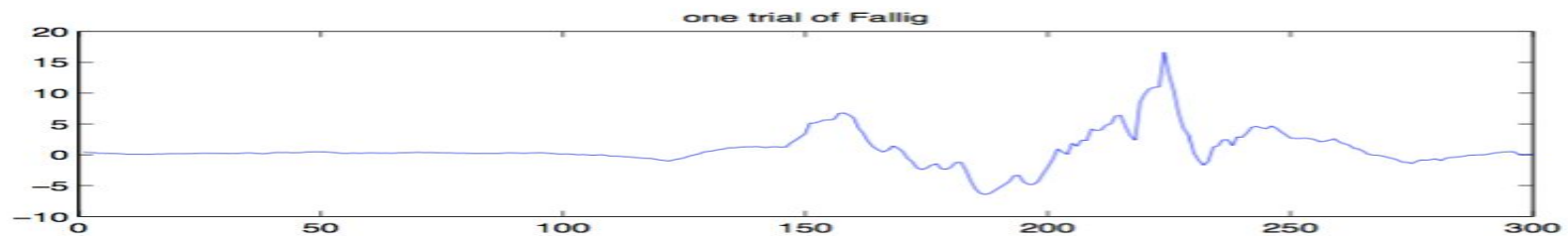
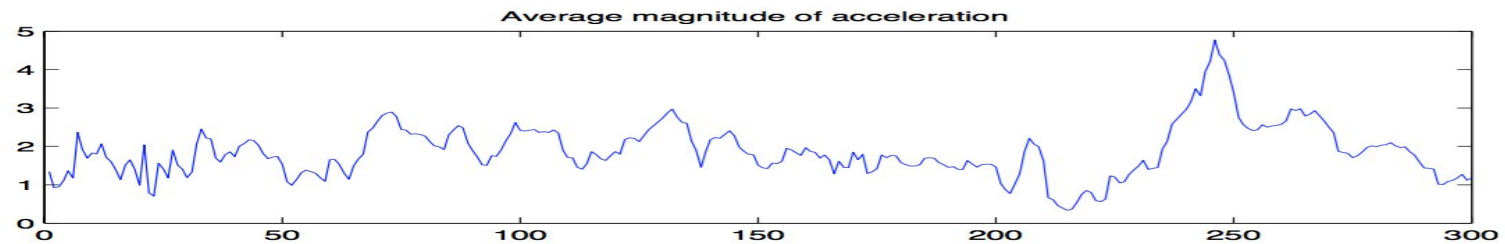
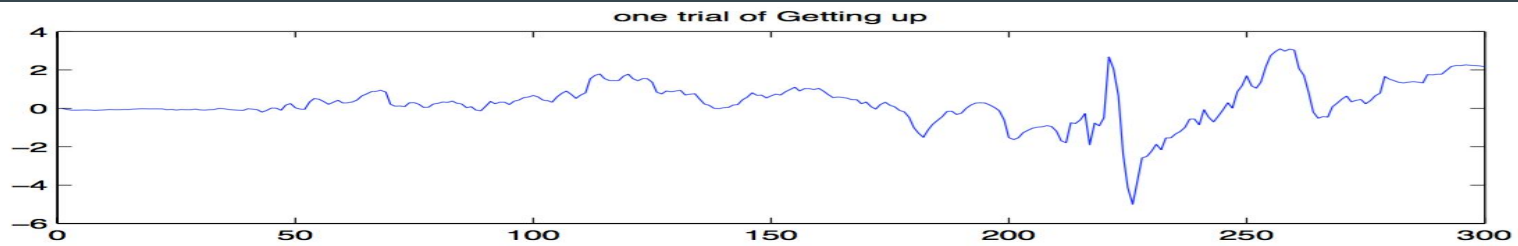
Methodology- Detection

Detection:

- Adafruit BNO055 - 3-Axis Accelerometer + Gyroscope
- 8 activities were categorized
 - 2 for Falling
 - 6 for Normal Activity
 - Walking, jumping, lying down, sleeping, getting up
- Thresholding Algorithm
- SVM algorithm





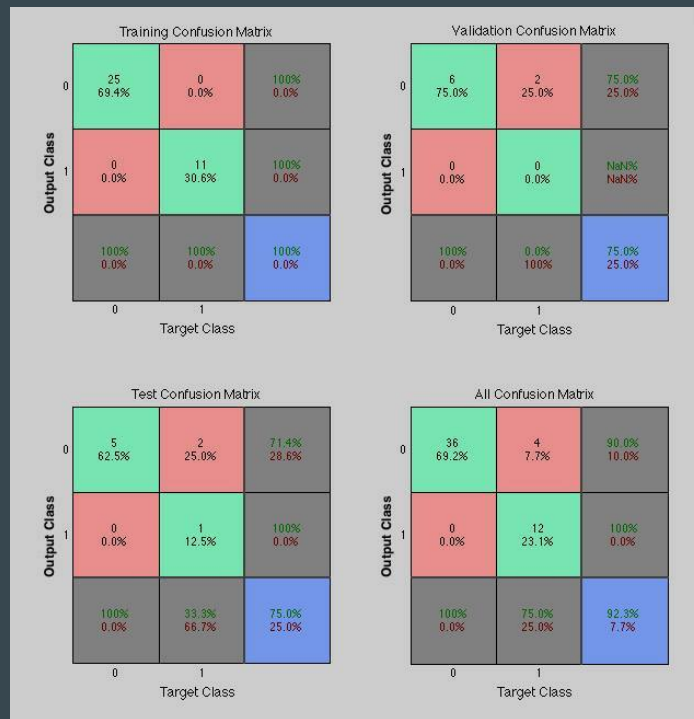


Results

Success in Detecting Falling
Against:

- Walking Motion
- Sitting Motion
- Laying Down Motion
- Squatting Motion
- And More to come..

SVM Training Result



Demonstration...



Future Plans

- Collect thousands more sets of data to optimize algorithm
- Bridge the two systems of sensing and inflation
- Demonstrate the product at senior homes
- Make available to the senior community