

Stair Guidance System

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Problem Statement

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Elderly people are at heightened risk for tripping and falling. Given that their bodies are increasingly fragile, a fall may lead to extreme injury or death. The elderly are 8 times as likely as younger people to die from a fall.¹

Market Potential

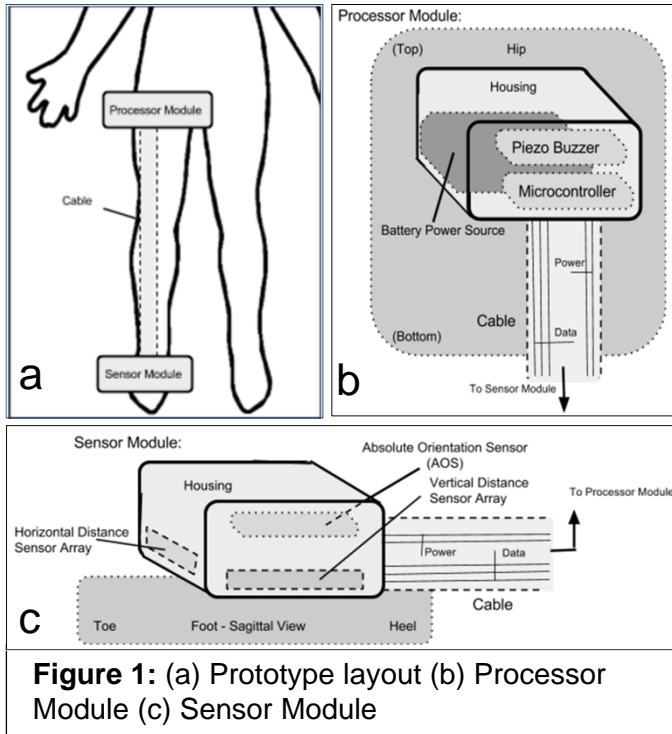
- 2.5M ER cases a year are geriatric fall patients²
- 2 existing companies: Hip-Hope™, B-Shoe™

Goal of our Project

Develop a device to prevent elderly people from tripping on stairs.

Proposed Solution

PHYSICAL LAYOUT



Proposed Solution (cont.)

THRESHOLDING AND LOGIC

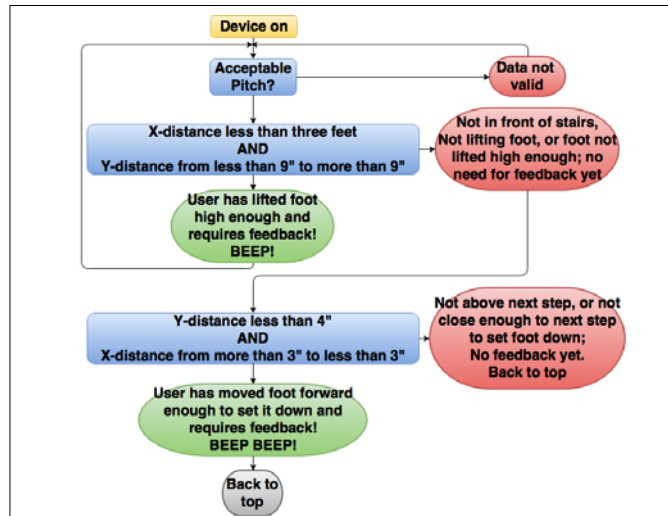
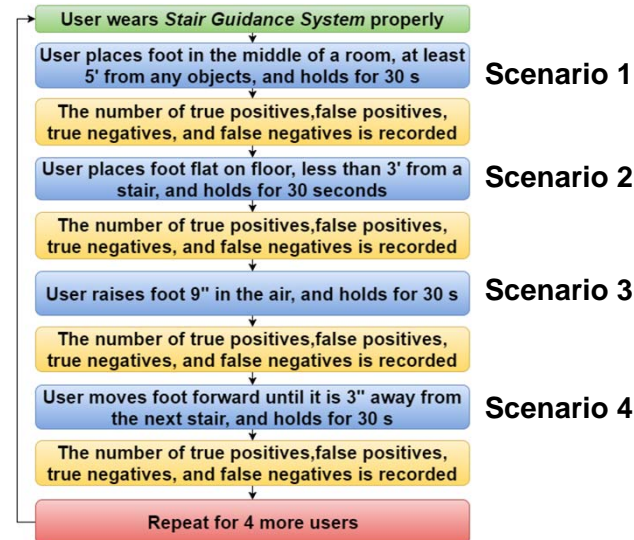


Figure 2: Prototype feedback algorithm

Studies and Results

Methods



Studies and Results (cont.)

Results

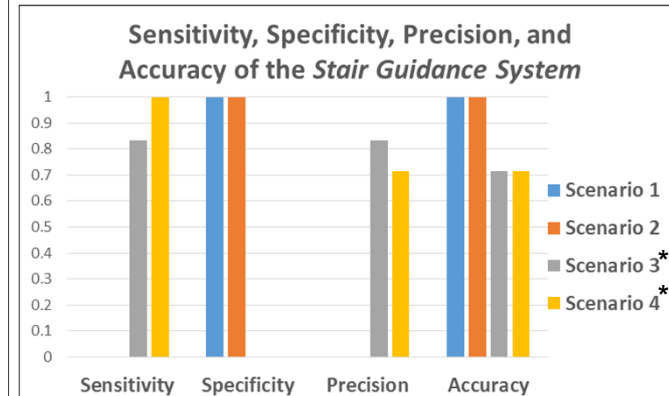


Figure 3: Results of prototype testing.

* indicates presence of positive in a scenario.

The *Stair Guidance System* prototype had 100% accuracy in scenarios 1 and 2, and 70% accuracy in scenarios 3 and 4. One to two false positives or false negatives occurred in scenarios 3 and 4.

Conclusions

- The device is not close enough to 100% accuracy yet. It is not yet ready for clinical trials.
- Next step: Conduct a study in a gait lab with seniors who meet our patient criteria to determine whether this therapy is truly helpful.
- Future improvements: The final design iteration will embed all components inside user's shoe.

References

1. Alexander, B H, F P Rivara, and M E Wolf. "The Cost And Frequency Of Hospitalization For Fall-related Injuries In Older Adults." *American Journal of Public Health* 82.7 (1992): 1020-023. Print.
2. "Important Facts about Falls." Centers for Disease Control and Prevention. Centers for Disease Control and Prevention, 21 Sept. 2015. Web. 8 Oct. 2015.