4Sight: Guidance for the Visually Impaired

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Problem Definition

The visually impaired use either blind canes or guidance dogs for guidance while completing daily tasks, but encounter difficulties while facing obstacles that are above the waist.

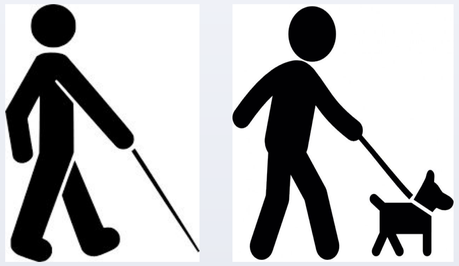

Figure 1. Current types of guidance methods

The occurrence of accidents due to obstruction by objects above the waist can result in serious injury, as well as financial consequences with the required treatment for injuries.

4 in 10 legally blind/blind users experience head-level accidents at least once a month.

Need Statement: To aid the visually impaired in identifying obstacles not detectable by current treatments.

Design Inputs

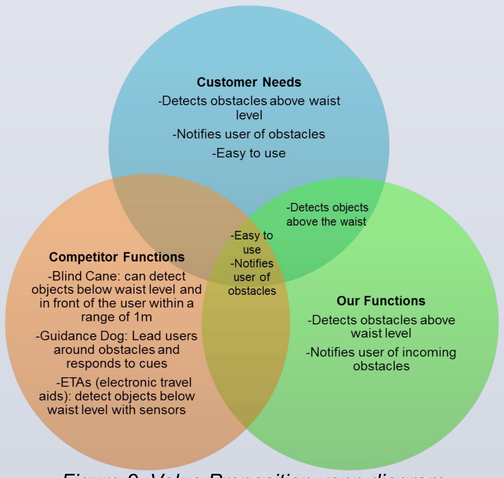

Figure 2. Value Proposition venn diagram.

Functional Requirements	The device must detect and notify the visually impaired of above-the-waist impediments.				
Constraints	Portable	Range	Easy-to-use	Non-invasive	Battery Life
Desired Specification	<1 sq ft & <5 lbs	> 1m	No Special Training	No surgery	>24hrs

Figure 3. Constraints and desired specifications.

Engineering Design Solution

Figure 4. Image of prototype.

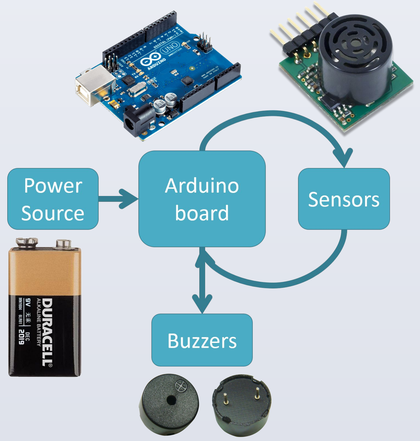

Figure 5. Block diagram of our device and its components.

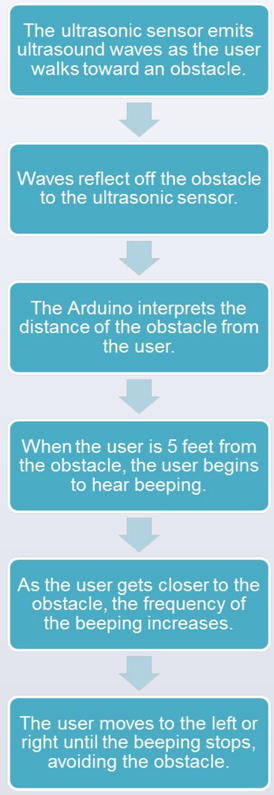

Figure 6. Flow chart describing how our device is used.

Prototyping & Testing Outcomes

Contingency Table	Is Block Detected?		
		Yes	No
Is the path blocked?	Yes	45	5
	No	4	46

Figure 7. The contingency table shows the sensitivity and specificity of the device.
Sensitivity : 90% Specificity : 92%

Figure 8. The graph demonstrates the correlation between the actual length and the detected length of an object.

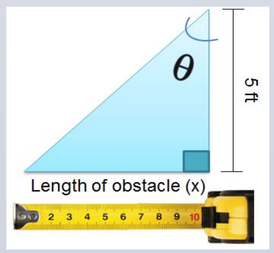

Figure 9. We used an electronic protractor to find angle θ and used trigonometry to find the length(x).

Business Model & Future Work

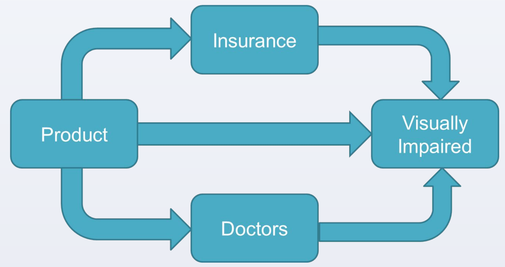

Figure 10. Channels of distribution.

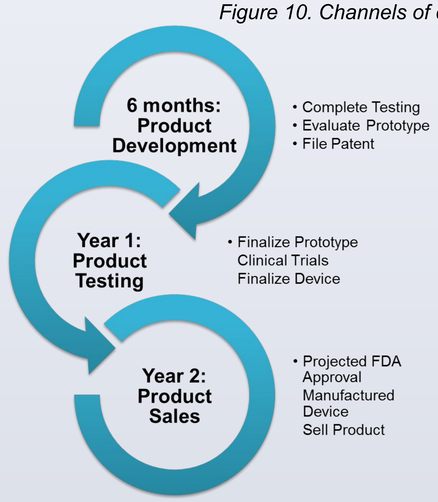

Figure 11. Future plans.

Conclusion

- ✓ **Portable** (0.4 lb)
  - ◆ Wearable as glasses
- ✓ **Detects** above waist obstacles
- ✓ **Easy to use**
- ✓ **Notifies** user with piezo buzzer that beeps
  - ◆ Changing frequency of the beeping informs user of changing distance to obstacle

Acknowledgements

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