AIM
(Awareness Innovative Mobility)
a device used in conjunction with
your cane to improve your mobility!

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Problem Statement/Research Question and Background

The United States is home to roughly 285 million visually impaired people. The most common technology used to assist mobility is the walking cane most notably referred to as a white stick. Although this may seem sufficient, other problems may arise while traveling that would impair someone to reach their destination safely. This came to mind after one of the authors saw a visually impaired student walking. The student had just been released from class and he proceeded by walking down a very congested hallway. In less than a minute he walked right up to a young woman that had her back faced to him. Had he had a device that would have warned the people around him that he was coming their way, this would have all been avoided. So we went ahead and researched what was currently on the market. What we found shocked us… the only devices available on the market are white sticks such as smart canes. The prices for said white sticks ranged anywhere from $1,000-$2,500.

With that in mind we went ahead and brainstormed a cheaper alternative that would still be able to accomplish the goal of getting a visually impaired person from point A to point B in a safe manner. We ultimately came to the conclusion of creating a universal white stick attachment that would emit a noise in the direction the user is heading. The noise would be an ongoing pulsing frequency.

We were able to ask our test subject vital questions and gather data.

1. **WHAT IS THE LEVEL OF YOUR VISION?** About 3% of vision, he says he can sometimes see certain objects due to the lack of light.

2. **HOW LONG HAS YOUR VISION BEEN IMPAIRED?** For about 5-6 years, his condition worsened over time.
3. **WHAT DO YOU RELY ON MORE WHEN NAVIGATING THE HALLS, YOUR CANES TOUCH OR HEARING?** He mainly relies on his can and his hearing. He can hear people's footsteps or people talking. The cane is used to feel any objects around him.

4. **DURING YOUR SWEEPS DO YOU FAVOR A CERTAIN DIRECTION?** You're supposed to move it left to right. We have a pencil tip which is used by tapping. A rolling tip it used to sweep.

5. **DO YOU PREFER A LONGER CANE? OR A SHORTER ONE?** They're supposed to be 10 inches shorter than you, but some prefer it longer.

6. **DO YOU PREFER A SOLID CANE OR A COLLAPSIBLE ONE?** Collapsible, because it's a less than a hassle .

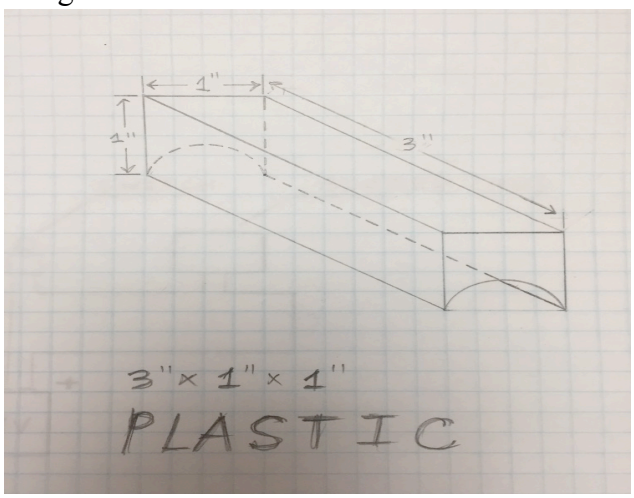
7. **HAVE YOU EVER IMPLEMENTED ANY TECHNOLOGY OTHER THAN YOUR CANE, WHILE WALKING?** No, because the best options are the cane or a walk dog.

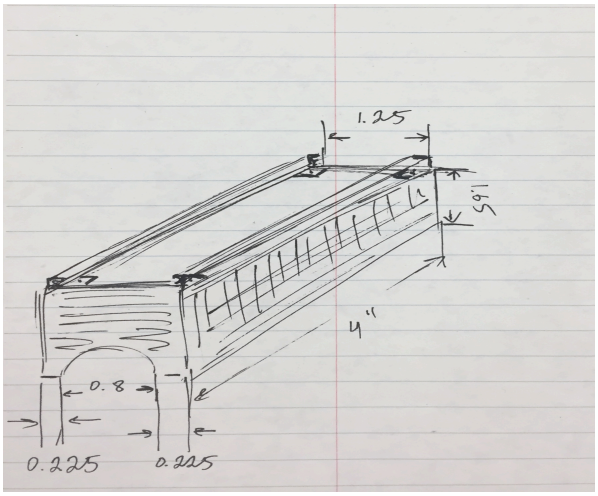
Methods/Approach/Solutions Considered

We had two goals in mind when designing the AIM system. Keep it user friendly and cheap to manufacture, thus passing the savings on to the consumer. We started with basic sketches that would house the components. From there our team started taking measurements and started calculating the dimensions to our envisioned housing unit. Once the task was completed, we proceeded to input the our information into a digital model through SOLIDworks. After accomplishing a rough draft of our design we went ahead and 3D printed our prototype to give us further input into our design. From there we elongated our design to give us more internal space. All while this was being completed, our team was also constructing the internal components that would allow for the device to work. Our design consisted of a button that would turn on the on going frequency and turn off when pressed a second time.We designed the AIM system with one goal in mind, improving awareness of the user.

We took into consideration if our product could potentially harm our consumers. We found that noise level emitted averaged at 50 decibels. After creating our second 3-D printed prototype we finalized it and went with a curvier sleeker look making it aesthetically pleasing for market. As for the internal material, we decided on adding a frequency component that would put the final touch to the end design. Other safety hazards include the battery itself which is a 9 volt. Since the system has such low voltage it poses very little hazard to the consumer. The AIM system also poses a choking hazard for small children but if we coat the AIM systems electronics in a bittering agent (Denatonium Benzoate) that should assure this problem is fixed. If our product goes to market we would make a safety guide showcasing these small hazards.

Rough sketches

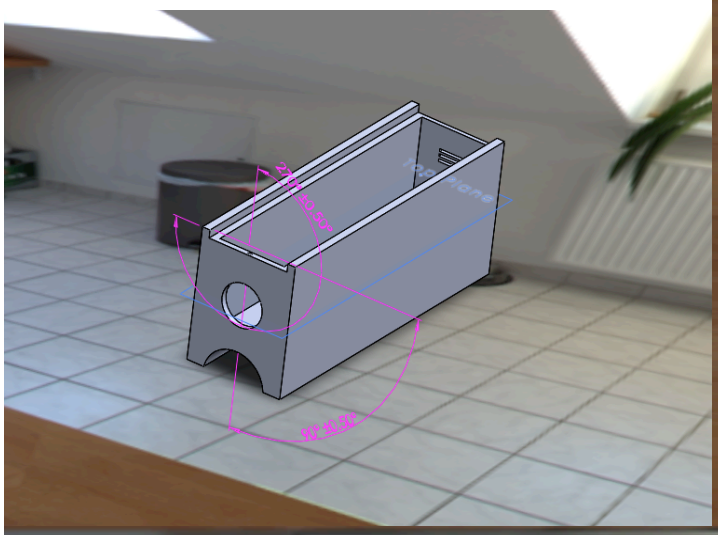


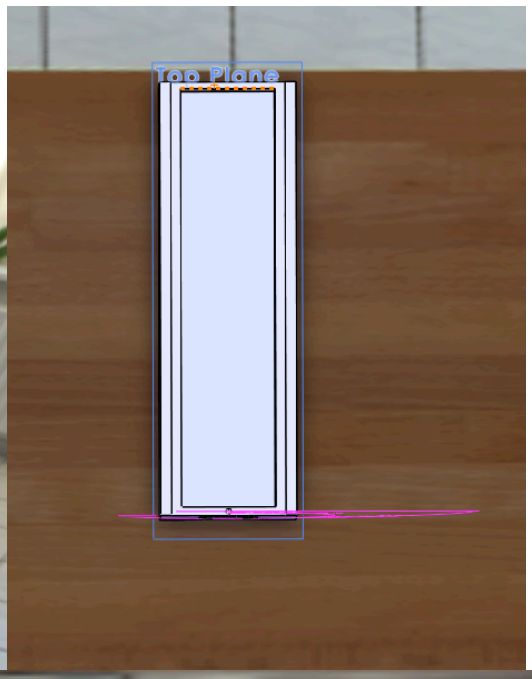


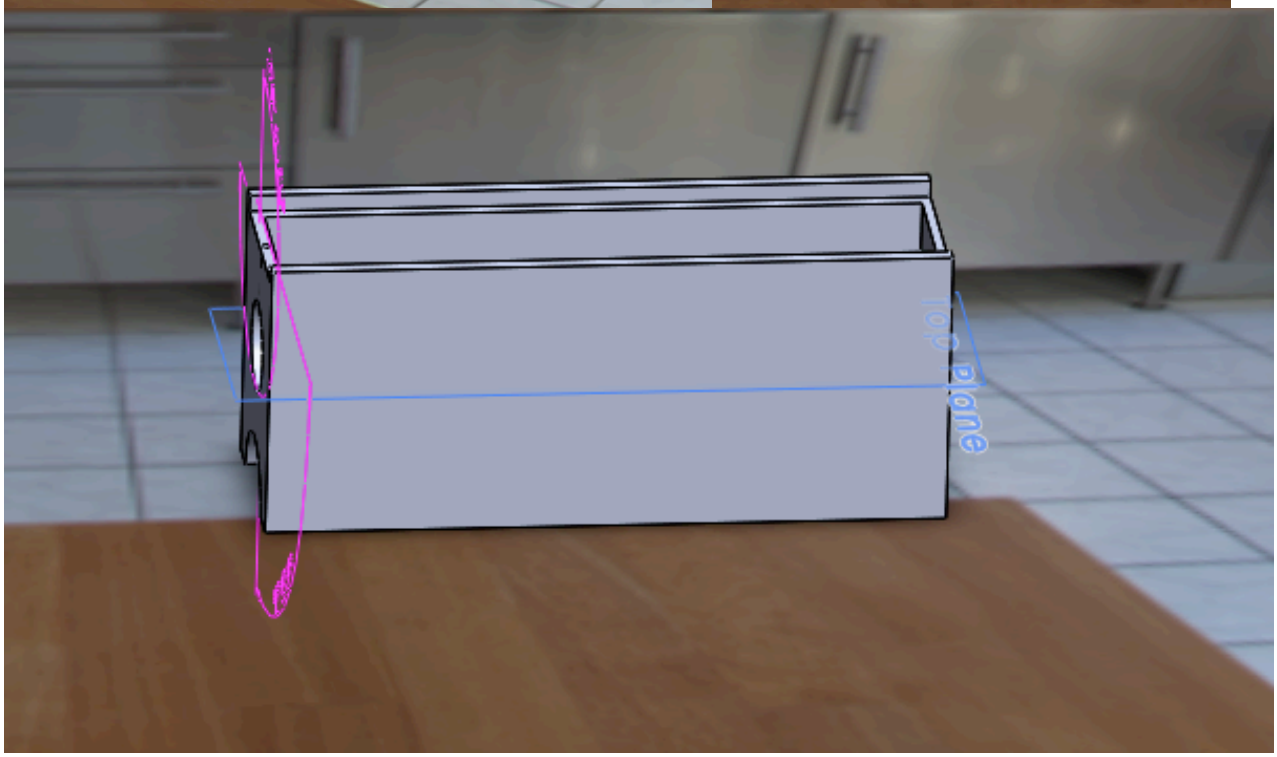
Description of Final Approach and Design

We set out to make a much more affordable device that will serve as an improvement to a white stick alone. It's a simple design that is small and very impactful. The device sits in a 4”×1” housing unit that attaches to the sick via straps. It has gone through various iterations to ensure the best quality while keeping the device lightweight. Another goal was to make the AIM system flexible. Those radar systems that we mentioned in the problem statement only work with a stick provided by the manufacturer. Our AIM system attaches to the cane via velcro straps. This design element may be simple but it was designed with the user in mind. Access to the system itself is accessible via taking off the lid. Here consumers can change the battery.

Here are the final versions of the housing unit for the AIM system done in SOLIDworks.







Future Improvements

The housing unit for the AIM system still needs minor tweaks. The cap for the system is held in place via a screw. This is is counterintuitive to our consumers so we would like to have the cap slide on and off with pressure, similar to changing a battery in a t.v. remote.

Outcome (Results of any outcomes testing and/or user feedback)

With our project we had one student by the name of Jose Mendez to test out our design.

He suffers from vision impairment and thought it was a great idea to create. After we had completed our first prototype, we went ahead and shared our results with him, he gave us more input into what our design should also include. After we had our second design built, he tried it out (not in a hallway) and said it was great and that he couldn't wait to try out the final design. We had communicated to him that our final design was going to feel better due to the fact that we were going to remove all the rough edges the previous designs had. He concurred with our idea and gave feedback for the final design.

Cost (Cost to produce and expected pricing)

Components	Price
Walking stick	$14.93
9 volt battery plug	$1.69
Push button with LED light	$3.99
Mini buzzer	$3.39
9V battery	$0.99
Total	$25.29

This means we could sell the AIM system for about $99.99. This would make the product affordable for the average consumer yet keep our profit margins very high, but this would include a collapsible cane. Since most consumers already have a stick they use everyday and prefer we would offer the AIM system without the cane for $49.99.

Significance

With this item out in the market, not only are we bringing something new to the table, we are also helping those in need. With that being said, we are also making it affordable for the consumer. The design itself, has been made to its simplest form to assure the user an easy time while handling the device. Even if this device makes it to the market or not, knowing that we've created a device that makes life easier for someone whom faces a challenge everyday makes our team feel proud and successful.

Acknowledgements and References

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