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# Homework 20.2

# **1. Hypotheses**

* Some people do not use white canes due to stigma.
* Making the cane less visible could eliminate some stigma.
* The white cane is useful because it acts as a signifier of visual impairment.
* White canes are inconvenient to carry because the users only have 1 free hand.
* When an individual begins to experience visual affects how they will adjust to using a cane.
* Vibration is a more useful signifier than sound.
* It is possible for the CyberCane to detect obstacles using a sensor.
* It is possible for the CyberCane to detect obstacles above waist-level.
* There are other mobility aids for blind people, but they are not as widespread as the white cane.
* The aesthetic of the design will not be very important to our customers because they will not be able to see it very well.
* Since people can outgrow canes, they need to buy different sizes and adjusting to the new size is annoying.
* There are some teachers at Collins Center for the Blind that would be interested in becoming early adopters.
* People typically hold their canes in their non-dominant hand, but handedness is not a significant factor in cane design.
* Customers will want wireless charging. It will be more convenient (no fumbling with a plug) and will allow them to use it while it is charging.
* Wireless charging will be more expensive to implement than regular charging with a cable.
* Customers will want the cane to pair to their phone via BlueTooth.
* A “find my cane” function might be helpful. The phone could cause the cane to emit a tone or vibrate so the user can find it.
* Younger people will be more likely to use the CyberCane.

# **2. MVPs**

* We Interviewed Jerry Chiarelli, store operations coordinator at the Carroll Center for the Blind. He was very knowledgeable about the use, limitations, and design of white cane.
  + We hypothesized that there is a stigma that comes along with using a white cane. This hypothesis was proven slightly true because the stigma exists in small children because they do not like the color of canes. Also, we learned there has to be a visual aspect to the cane because the onlooker needs to know that the cane user is blind.
  + We hypothesized that having to use one hand to operate the white makes it difficult to use. However, this was disproven because this more of a situational issue.
  + We hypothesized that the time in which an individual starts experiencing blindness does have an impact on how quickly they adapt to using the white/red cane. This was proven true because younger cane users adapt to the cane easier. This also implies that younger people are more likely to use our product.
  + We hypothesized that the white/red cane is 100% safe for users. However, this is not true because white canes sometimes cause splintering or explode completely (due to the loose elastic that holds the cane together.)
  + We hypothesized that there were features cane users wanted that the white cane lacked. He verified this hypothesis by mentioning that some people put LED strips on their canes so sighted people could see them in the dark.
  + There are many types of cane tips, so we hypothesized that each type had tradeoffs. He confirmed this. Thinner tips are more sensitive, fragile, and prone to getting stuck in cracks on the ground. Thicker tips are less sensitive, but less fragile and not as prone to getting stuck in cracks on the ground.
  + Not many alternatives for mobility aids, white cane is the first go-to. When there are other assistive devices, they usually supplement the white cane instead of replacing it.
* We interviewed a Carroll Center student who had experience using a SmartCane.
  + We hypothesized that individuals would prefer to use a SmartCane over using a white cane. However, this was disproven because the student said that he did not like to use his SmartCane since it had a lot of technical difficulties. For example, he could not hear the sound that indicates obstacles. This also reflects that tech support and accessible help lines could be beneficial.
* We contacted Charlie Squires, an engineer and roboticist, for the feasibility of our SmartCane design.
  + We could use a laser beam and sensors to detect obstacles. This was partially disproved because lasers are used to detect distance. However, we could rotate the laser to detect obstacles on a plane.
  + We hypothesized that it would be possible to use the cane to detect obstacles above waist-level. He confirmed that it was feasible.
  + We hypothesized that BlueTooth integration was feasible. He confirmed this.
  + We suggested that cane users might find value in a button that would contact emergency services, but he disagreed. We later disproved the hypothesis by confirming that virtual assistants could contact emergency services by voice command.
* Concierge MVP- We simulated the use of our SmartCane by having people go through an obstacle course; we texted them when they approached an obstacle. When they felt a vibration, they would stop until told to continue. (Test 1: Individual does the course without their glasses (simulate having low vision) Test 2: An individual does the obstacle course blindfolded (simulated being blind)
  + We hypothesized that delaying the vibrations would impact the user’s reaction time. This was proven true because the test subjects needed to be warned ahead of time of the obstacles in front of them. If they were warned too late, they ran straight into the obstacles.
  + We hypothesized that the pace in which an individual walks affected their ability to use our cane. This was proven true because the individuals needed time to react to the vibration. When they went too fast, they were more likely to run into obstacles.
* Working model (see section 5)
  + We hypothesized that people would like our design and they would think it is simple to use. This was proven true because the people we asked thought our design looked cool, but they wished it included a strap that would prevent them from accidentally dropping it.
  + We hypothesized that people would personally like that the trigger is on the top so that they do not accidentally hit it. This was proven true because these people thought they would accidently turn the laser off/on if the trigger was placed in another location on the handle.
* Landing page (see section 6)
  + Hypothesis: if we offered a 30 day trial of our CyberCane, individuals would be more likely to take the survey and subscribe for future information about our SmartCane. This was proven true.
* Usability test with 3D print
  + Currently in progress. One of us completed 3D printing training and now has access to the MakerLab.
* Talk to an instructor to see if our SmartCane could be used in his classes. This MVP has not yet been tested.
  + Hypothesis: he would be initially reluctant about our SmartCane since he was used to using a white cane.
  + Hypothesis: He would find our CyberCane easy to use because it is used like a traditional white cane.
* Talk to parents of visually impaired children to see how much money they spent on replacement canes. This MVP has not been tested yet.
  + We hypothesize that parents have to spend a lot of money on canes for the children because they are constantly outgrowing their whites canes.
* We contacted Brandeis Accessibility for a meeting, but we were told that they do not usually schedule meetings with students.

# **3. Elevator Pitch**

The current white cane being used by those who are visually impaired presents a lot of issues and leaves a gap for accessibility for Users. These issues include the durability of the cane from the cane cracking or splintering, or the cane getting stuck in cracks. The white cane is also bulky and heavy, they spotlight the Users as visually impaired and feed into stigma. To solve this, SmartCane has come up with a high-tech and advanced engineered solution, that uses laser technology to fill in the accessibility gaps that the white cane lacks. It is technology that presents Users with options and variability in designs, allowing for customization and a more flexible usage of the cane.

# **4. Value Proposition**

For our value proposition, we put an emphasis on quality. Our product is priced premium for this reason, we offer a product that has superior quality compared to the rest of the products in the market. We will use schools and teaching centers to distribute and test our product. The value of the product will allow our product to grow through word of mouth and support from credible sources. (Value proposition canvas attached below and again separately on LATTE)



# **5. Mockup or Visuals**

We used the sketch above to explain our design to Charlie Squires. We have summarized his feedback in Section 2.

We will base our 3D printed prototype on a design like this. We will print other variations to determine which mechanism people without sight find the easiest to use. (For example, a copy that has the switch at the bottom of the hilt, or a trigger at the on the underside of the handle.)

# **6. Landing Page**

Link to Landing Page: <https://aerionnas.wixsite.com/mysite-1>

* Hypotheses
  + See part 2.
* We sent the sent landing page out on all of our social media and also sent it personally to specific people. Most of the people that went to our landing page were not visually impaired, so we plan to send it out also to visually impaired people once we return to the Carroll Center for the blind to see if there are any changes to our results.