

Appendix

Design Brief Template:

School: Churchill Junior High

State: Utah

Division: Middle School

Team Members' Names: Marco DalCanto, Nina Mankouski, Andrew Larson, Hayes Roller

Project Title: Readers should have a glimpse at what the project is about and want to read more. (25 word maximum)

The Helping Hat - Allowing Visually Impaired to Navigate Smoothly and Discreetly

Project Purpose: In one or two sentences simply identify the inequity being addressed and explain what this project intends to do. (50 word maximum)

Assisting the visually impaired in navigating modern hallways, streets, and life. The Helping Hat uses echolocation to “see” low-hanging branches, signs, and cabinets. This is a modern solution to current designs (sighted friends, white canes, and service dogs.).

Abstract: Briefly introduce the people who will benefit from the project and the challenges they face. Discuss the inequity they face and explain how the proposed solution addresses it. (100 Words Maximum)

Interviewing blind students at the Utah School for the Deaf and Blind we found four major problems: 1) Trying to include them in a game of catch when the blind cannot see the ball. 2) Difficulties getting to work because they cannot drive. 3) Difficulties with detecting high-up objects like low-hanging branches or low doorways. This is because their white canes can only “see” obstacles on the ground. 4) Feeling that people can be ignorant regarding their abilities.

User Research: Discuss key information about the users gathered through your research, interviews, and discussion with the user throughout the project. What did you learn about the user and the barriers they face? (200 word maximum)

Discovering solutions to common struggles the visually impaired face was our main goal. There are three main struggles that blind people face. To travel from home to a job, most people have the luxury of driving. However, for obvious reasons, the sightless cannot drive and can have a challenging time finding bus stations or friends who can drive them. The second problem is that when walking around with a white cane, people often assume that the user needs assistance. They will grab the blind person and try to help them. However, this is quite annoying to most visually impaired. The actions and thoughts are well intended but not appreciated and helpful. One of the main tenets of this is that the sightless are so often underestimated, and when they are bothered for unneeded help by people who do not know how capable they are. The third major issue is that white canes can only detect things on the ground. If there is a low-hanging tree branch or a low doorway, then the blind person may run into it.

User Insight: Discuss your team’s understanding of the experiences, emotions, and motivations of the users, i.e., share the struggles, fears, and frustrations the inequity causes the user. What did you learn about how the barriers affect the user? (200 word maximum)

Visually impaired individuals are much more capable than many people give them credit for. Most manage to lead normal lives and get along without much assistance. There are some challenges, like walking and driving, but with practice, they can end up much more successful and remarkable than most people think. One of the people we interviewed informed us that as she got older the cane became a 6th sense. She let us know that this is a common feeling amongst the blind community. Many blind people can use a form of echolocation to determine the size, shape, or proportions of a room or hallway. They can even often determine what object is in front of them (ie. mailbox, bike rack, bike, car., etc.). Problems with the cane include it being bulky, hard to travel with, and conspicuous. Echolocation is hard to learn and does not tell the user everything about what they are inspecting.

User Needs: Develop a specific list of the user’s needs produced from the insight. Include specific functions or features required by the user. What does the user want to help them with the barrier? (100 word maximum)

Designing a worthwhile cane alternative has a few necessary components. First, it needs to effectively help the user navigate crowded or cluttered areas. It also needs to be discreet to dissuade other people from feeling that they need to help the user. Finally, it must assist in detecting branches or other floating objects not detectable by a cane. It also needs to be user-friendly and practical.

Project Goals: List specific goals you want your project to address. Describe how they will meet the user's needs and address inequities faced by the user. Meeting these goals should be reflected in the key features and graphic(s) provided. What do you want the project to do to help the user? (100 word maximum)

Using mechanized echolocation will enable the visually impaired to walk around without running into obstructions. Ideally, this occurs whilst remaining discrete. Users should be able to avoid walls and other people. Avoiding obstacles is one of the most pressing disadvantages of being visually impaired, and though the technology exists (walking canes, service dogs, sighted friends, etc) to help the visually impaired, it can take a long time to learn how to use these, they are often inconvenient and can be expensive. The Helping Hat assists the visually impaired avoid obstacles, costs less than \$100 to make, and is very user-friendly.

Key Features of Design: List key features, illustrating that the design will adequately meet project goals. How will the project help the user? (200 word maximum)

The Helping Hat has several components valued at \$50 which work together to assist the visually impaired navigate walls, other people, and various objects. The brain of the Helping Hat, an Arduino, sends a signal through wires to an ultrasonic sensor. The sensor sends a signal and starts a timer. This signal tells the sensor to send out a pulse of sound. That sound then gets reflected off any object within a 4-foot to 15-foot range and is received by the sensor. When the sensor receives the signal it tells the Arduino, and the timer stops. Based on how long the timer was running, and based on the speed of sound, the Arduino can deduce the distance the sensor is away from the object. If that distance is less than 4 feet, then the Arduino turns on a vibrating motor. The vibration of the motor alerts the user in time for them to react, and not run into a wall. All electrical components are packaged neatly in a small and discreet hat to avoid suspicion.

Impact: Discuss how the design helps the user overcome the inequity. Include impact statements from the user. Does the project help the user? How? (200 word maximum)

Having an impact on the lives of the students we interviewed was our main goal. The students we interviewed were excited and believed the thought of this invention could be extremely useful for discretion, and for avoiding low-hanging objects. The teacher said that if the hat was detecting something, but their cane was not, they would know that a high-up object was in their way. They also thought that it was nice that it was small and easy to take

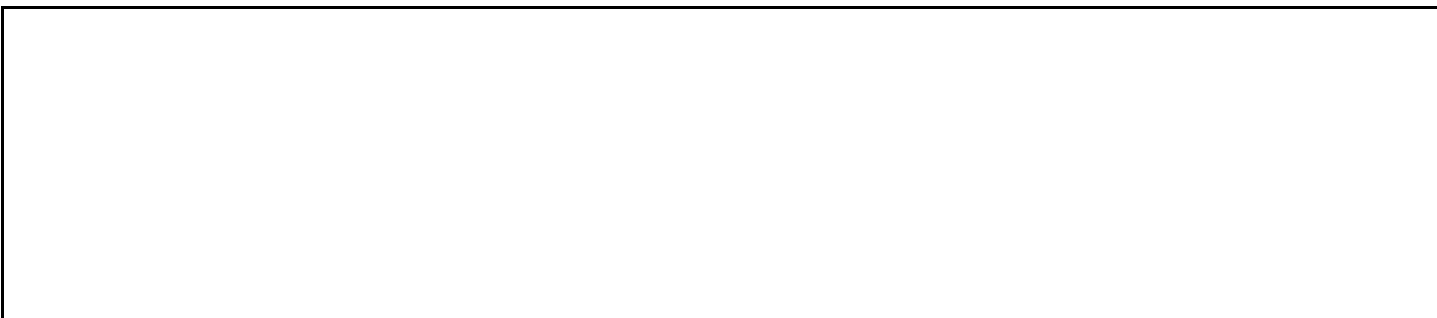
with you. One of the interviewees stated, “Even though white canes can fold, they are still a bit bulky and can be hard to carry”.

Status of Project: Describe the current status of the project, including feedback on design from the user, and discuss potential next steps. What does the project do now? What would you like to work on in the future? (200 word maximum)

Currently, the Helping Hat is a fully functioning prototype. There is a website that is fully functional. It explains who the team members are, what the hat is, and the process undertaken to complete this challenge. The website also helps to fight the ignorance the blind community feels is all too common. This can help prevent uneducated people from trying to give assistance and failing because help is unnecessary. Our future iteration of the hat will include 360 degrees detection and motors around the hat, adding a type of peripheral vision. Adding different vibrations depending on the distance sensed, and possibly even vocal commands to increase accuracy. Another thing to add in future models would be a more discreet way of hiding the sensors, as currently, they stick through holes in the hat. Improving the hat could include using compact electronics. This would allow users to wear it comfortably in a discrete baseball cap, or sunhat.

Reflection: Show that your team has an increased understanding of human-centered design. Examples of personal growth and insights gained about designing for others and helping them overcome challenges should also be included. What did you learn about designing for others? (200 word maximum)

Interviewing the students at the Utah School of Deaf and Blind was an amazing experience that pleasantly shocked us by their tight-knit community and normality. “Our Vision has no Limits” is their school motto and you could see that on display as you walked through campus. The visits and interviews helped to educate us about the visually impaired. These opportunities provided us with deep insights into the world of blind people and gave us a better understanding of their abilities, as well as ideas that we can use to improve our design, and issues with current solutions. Interviewees collectively agreed that “even though white canes can fold, they can still be bulky and hard to carry”. One of the people that we talked with said, “I bet a million dollars that if you can do something like that, you’ll be able to help a lot of people” and we will certainly try.



Prototype Graphic: A single graphic with key features adequately labeled. It should be easy to understand and the reader should have a general understanding of how the prototype functions by looking at the graphic.

Include graphic on next page.

Prototype Graphic:

