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Touch Mug: for the Blind

Visual impairment and blindness caused by various diseases has been hugely reduced, but there are many people who are at risk of age-related visual impairment. Visual information is the most important for any navigational tasks, so visually impaired people are at disadvantage because necessary information about the surrounding environment is not available. With the wide development in inclusive technology it is possible to extend the support given to people with visual impairment during their mobility. In this content, I was looking for daily problems may be difficult for those people with visual impairment and blindness.

With a chance to visit Heights and Hills, an organization for supporting Brooklyn's older adults, I became a volunteer to help a 98-year-old woman, Nancy, with the age-related visual impairment. Although she has a companion at home 24/7, her life is still complicated. However, she is so optimistic and funny which changed my expectations of people her age. I wanted to design something can make her life easier and happier.

With my observation, Nancy has a hobby drinking tea everyday. But there is a problem for her and for those who are blind or other visually impaired people: **It isn't easy to see how much water is contained or what temperature water is in the cup.** It is hard for blind to check the volume of water or the temperature of the water, when pouring water into a cup. For that reason, in many cases, water overflows, and they have no choice but to weigh the volume of water up by putting a finger into a cup, or listening to water to be filled. However, if the water is boiling, it may burn the blind's finger or tongue. This the problem those who are blind or other visually impaired people are facing right now. So I design on mugs in order to solve this problem by other senses rather than sight.

FIG.1

It is a result of how the product design satisfying the healthcare and making patient's life easier. Based the observation, I started to research on the functions on different materials and patterns of braille. At first, I was trying to use material deformation by water pressure.(FIG.1 - v1.0) The cup is made of two different materials, a plastic rigid structure material and a deformable rubber-ish material for tactile sense. So every time the water is pouring, users can feel the deformation of rubber due to the water pressure to check the water level and feel the temperature as well. I had interdisciplinary participation in the development of the Touch Mug. I met with people from other disciplines about my design. Based on the flexible and deformable materials, I went to meet with a materials expert about the best materials for fabrication at Canal Rubber Supply. I asked them about the how to cast a flexible rubber in a mold and the food safety on different foam and rubber materials. Then based on the function of v1.0, I refined the pattern on the rubber material in order to make it sensitive for blindness to read.

Then I set up meetings with "client" Nancy with visual impairments and her companion who takes care of her every week during a month. Every meeting I showed them the refined prototypes and ideas to get advice from, so that I can have user experience feedbacks to work with later on. The feedback for both of them is that users can only check water level by only three slots, where the deformable patterns are, and the problem of sealing ports of two materials. So v3.0 came out with a longitudinal pattern on the side of the mug. Right now it is an inner surface whole-covered rubber layer and a cup structure with an open slot for touch pattern. This makes the product well sealed and better functional. But the cost and difficulty of producing are way more than before. The deformation of the cup could also cause

injury if the water or other liquid splashed out. Then I re-thinked for new solutions by using two different heat conducted wall thickness as v4.0. I found different wall thicknesses allowed heat conduction to different levels. Through trial and error, I determined the best wall thickness for the mug and for the thin heat zone. The final design worked well and is easy to mass produce. After final refinement The Touch Mug (v5.0), was finished.

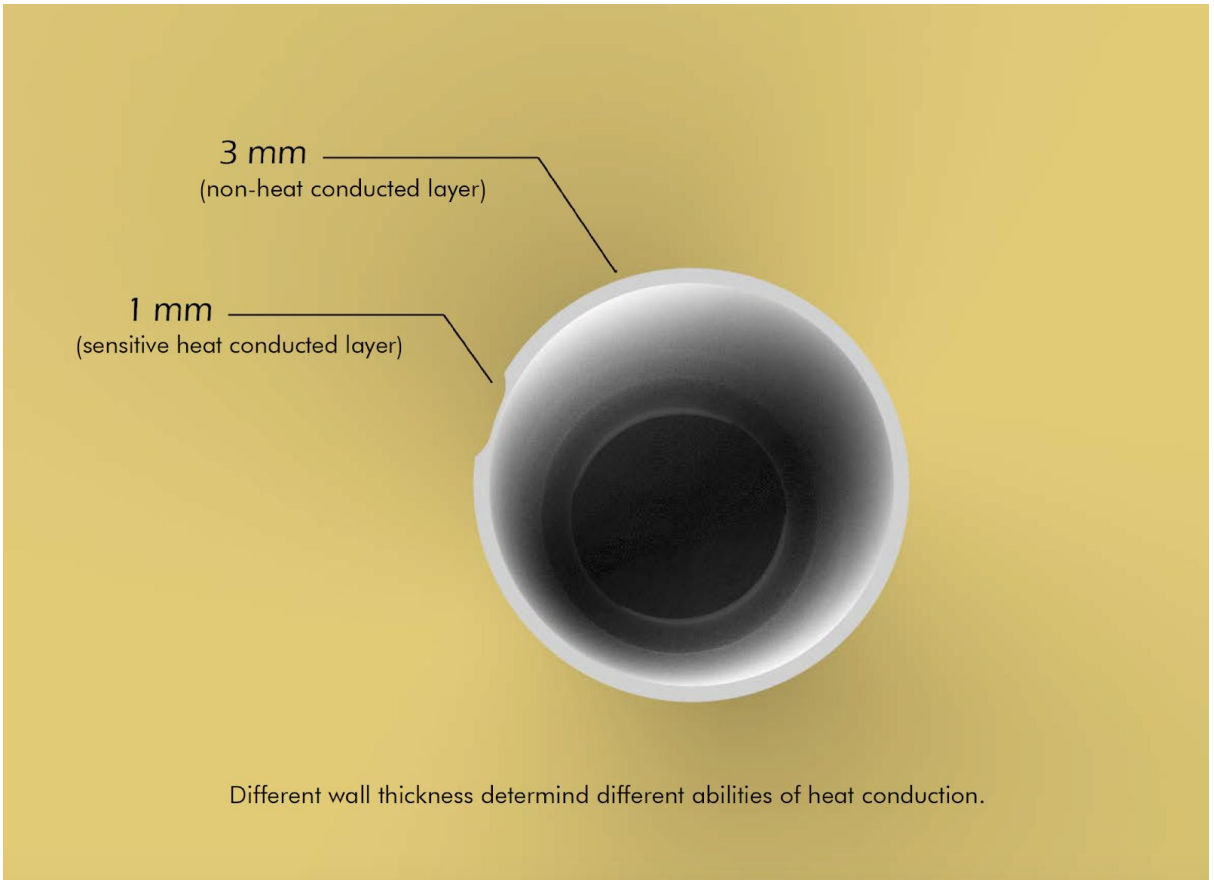

FIG 2

Touch Mug is simple mug design for those who are visually impaired. It is made with one heat conductive material with different wall thickness. Shown on FIG 2. Different wall thicknesses create different heat conduction. Due to wall thickness, it creates a special region for users which is the touch zone. This mug will provide

assistance to those who are blind so that they can pour water effectively and feel the level of the water in the mug by touching the thin heat zone.

This product has a lot of potential due to simple mass production methods and low cost materials. As prototype, I 3D printed the Touch Mug for about $20. It works well. I think the Touch Mug can be produced at a very low cost and a very fast production rate. I think the fabrication cost will be less than $5 each and expect the market price to be no more than $10 each. What is more, this design and underlying principle can be used on other shapes of bottles and kitchen ware for people who are visually impaired, like water bottle, bowl or cup. It has a lot of possibilities with this simple idea.

As a result, Touch Mug will provide assistance for those who are blind so that they can pour water effectively and feel the temperature of the water by touching thin heat zone. Touch Mug produces a safe and considerate experience for users while tea time.