Downtown Alpharetta and Its Citizens with Physical Disabilities

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Innovate: IA Project Showcase

Problem Statement: Individuals with visual impairments can struggle with transportation and/or mobility in downtown Alpharetta due to the lack of verbal or accessible sidewalks and crosswalks.

Research Question: How can Downtown Alpharetta be improved to be more easily accessible for individuals with physical disabilities?

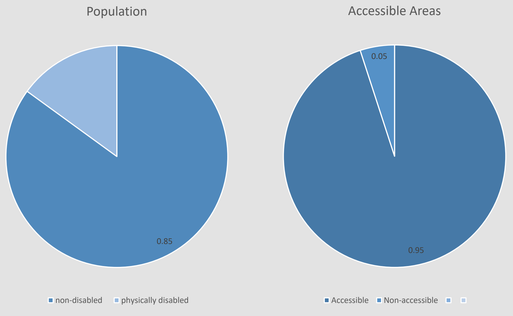
Abstract

Purpose - to experiment with prototypes to find a new technology that will make the lives of those living with physical disabilities in Downtown Alpharetta easier.

Goal - to find a way to improve or modernize current technology used in downtown Alpharetta at crosswalks to improve them to help individuals that live with physical disabilities.

If I can design a new technology to implement in crosswalks to notify a blind person of when they are able to cross by using minimal effort, then the lives of the blind population in downtown Alpharetta will be improved. This design thinking study has potential to improve lives of individuals with physical disabilities, or impairments, in Downtown Alpharetta that may also be implemented in other cities in Georgia if successful.

Background



A report from The Chicago Lighthouse in 2015 explained how visually impaired people get around cities. Individuals living with visual impairment usually rely on a guide dog, a cane, or another human to navigate cities whereas individuals that do not live with visual impairment use memory or their own mobility skills to navigate (The Chicago Lighthouse 2015). While these are often found as the best solutions, they are expensive and not readily available to everyone who may need them. ABC News reported in 2018 that those with physical disabilities in major cities in Australia use google maps to plan their routes ahead of time to make sure there are ramps, elevators, or staff to help them.

Materials

- Arduino Uno
- Foam core
- Plastic Filament
- LED's
- Servo Motor
- Buzzer
- LCD Screen

Method and Process Steps

My prototype of the crosswalk signaled was made on SolidWorks and 3D printed. The city model is made from foamcore and uses an Arduino to move the arms of the crosswalk. The buzzer makes 3 quick beeps to alert the pedestrian that is it safe to walk and the arm has lifted. I used a servomotor to control the arm and LEDs for the stoplights. In addition, I wanted to add an LCD screen to simulate a countdown timer for the crosswalk, but the model is too small, and I could not find a small LCD. I also wanted to implement a sign with braille that explains the buzzes as well as gives directions. However, the model is too small to make it into the model.

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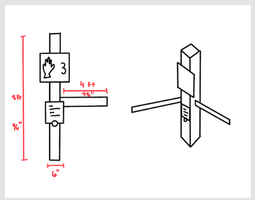
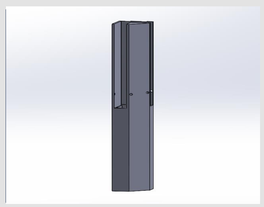
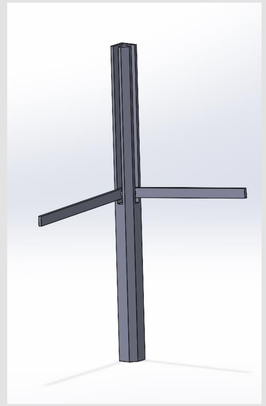


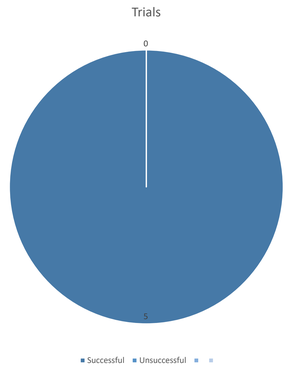




Criteria for Success

- Must produce sound that alerts pedestrian when it is safe to walk
- Must be visually pleasing
- Must lower bar for the last 5 seconds before the light turns yellow
- Must have braille on the post for directions and information
- Must pass 5 successful trials (stoplight rotations)

Results



Out of all 5 trials, the prototype simulation succeeded. The arm successfully lifted when it was supposed to for 5 trials and simulated a traffic rotation. The buzzer also worked as needed, however, I could not implement the LCD screen due to lack of space and I could not create a braille sign onto the actual model.

Conclusion

The prototype was successful in moving the arm up and down on a looped timer. It was also aesthetically pleasing and resembled the intersection of Main Street and Milton Avenue in Downtown Alpharetta. However, it was not successful in implementing an LCD screen because the LCD screen is too large for the model. The sign with braille is also not able to fit on the model, but I have a large version of what I imagine it to be. The sound was also successful in alerting the pedestrian that it is safe to walk.

Next Steps

Using the results, I aim to pitch the idea to the city of Alpharetta and see if the prototype could be implemented in Downtown Alpharetta based on their guidelines and budgets. In a scaled prototype, I would like to implement the LCD screen and sign as well as an ultrasonic sensor that senses when a pedestrian is at the crosswalk. When it senses the pedestrian, it would announce "Safe to cross" or "Do not cross. Oncoming cars."

Acknowledgements

(2015, August 13). The Chicago Lighthouse. https://chicagolighthouse.org/sandys-view/getting-around/

Kim, S. (2022, March 30). Www.aljazeera.com. https://www.aljazeera.com/features/2022/3/30/new-york-what-is-the-megacity-like-for-people-with-disabilities

(n.d.). Www.youtube.com. https://www.youtube.com/watch?v=tloBMf_KmX4

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