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Decreasing the Poverty Gap of the Impaired through Assistive Technologies

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Unemployment for disabled people has been persistently high in Virginia. According to the Bureau of Labor Statistics, the unemployment rate for people with disabilities was 9.2% in Virginia, over 2 times as high as the general population, which is 4.2%. One of the main reasons for this disparity is the lack of education opportunities. Special education schools are more sparsely located around Virginia, therefore if an individual is not located near these schools, they may not be able to receive an education that fits their needs. This lack of access greatly affects the amount of education that impaired people receive. According to the University of Virginia, only 20% of the disabled population can attain a bachelor's degree, compared to general population's 40%. With fewer education opportunities, Virginians with disabilities will have fewer job opportunities down the road.

Assistive technologies have sought to fix this problem by augmenting the way that impaired people interact with the world, and have had varying success in doing so. For example, such as wheelchairs and prosthetics have had great success in giving more mobility to paraplegics and amputees. However, the white cane is one assistive technology that has seen stagnating innovation. The traditional white cane excels at providing information about objects immediately in front of the user's footpath but falls short in providing information side-to-side or above the user. Because of this, white cane users have less mobility in complex areas and are prone to receiving injuries while walking. Low ceilings or overhanging branches pose the most risk for visually impaired people, as the cane cannot provide information about that obstacle, and their other senses cannot either. Therefore, according to the Association for Education and Rehabilitation of the Blind and Visually Impaired, over 80% of visually impaired people suffer from mobility-related head injuries. Most of these issues can be fixed by augmenting the white cane with sensors.

Smart canes therefore, have been developed to combat the issues of traditional white canes, but they still fail to provide the same freedom of mobility that other assistive technologies have enabled for other disabilities. Smart cane designs, such as the WEWALK prioritize providing navigational information instead of providing detailed information about the user's surroundings. With the widespread adoption of smartphones and

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accessibility settings, navigational information is already widely available to visually impaired people. Furthermore, these canes force the user to hold the cane at an awkward angle, hampering their ability to use the smart cane as a traditional white cane. Therefore, a new smart cane has been designed with a focus on providing the user with spatial information, and an ergonomic grip that allows the user to use the cane as a traditional white cane. This design uses Time of Flight sensors, a type of depth-sensing sensor, to provide spatial information in front, side to side, and at head height of the user. Localized haptic feedback is sent to the user through motors that are embedded inside of the grip. With the motors embedded into the cane, the grip is able to keep a low profile, making it easier for use as a traditional white cane.

Moving on from the development of the smart cane, we will launch a small fundraiser and campaign in Virginia. The campaign will help us reach prospective users, and also attract donors. The money raised through the fundraiser will be used to produce the first batch of smart canes, which will be donated to people in need in Virginia. In conjunction with the campaign, we will launch a blog to raise awareness online about the new smart cane, reaching new prospective users. After this, we plan to expand outside of Virginia, launching several campaigns across the US, working with various nonprofit groups. We also hope to expand our campaign out of the US across the world. We have already have partnered with a Korean nonprofit to launch a campaign in Korea. Furthermore, we plan to sell canes to individuals at production cost if they are not able to get one through a campaign. The mobility that smart canes provide to visually impaired people allow them to secure more education and job opportunities, which can improve life quality.

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