

BlindSight - Market Analysis

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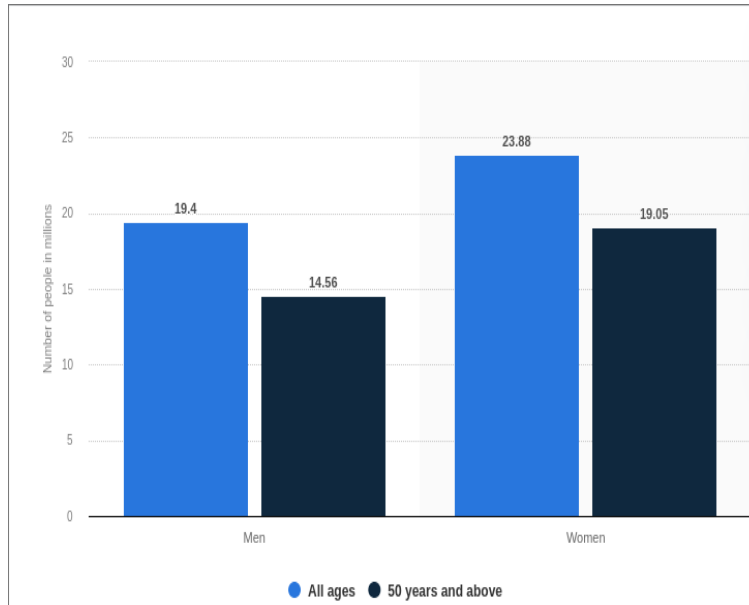
Chapter 1

Market Analysis

The target market of our product mainly consists of individuals who are considered legally blind, i.e. people whose vision cannot be corrected to 20/20 with traditional visual aids. Furthermore, our outreach can extend to those who are visually impaired to such an extent that they are inept at accomplishing everyday tasks independently. According to the 2018 National Health Survey, 32.2 million American adults report suffering from significant vision loss.

Globally, Statista reports that there are a total of 43.28 million who are considered blind. The majority of the target market is aged 50 years or older (they account for roughly 78% of all blind people). Older people are disadvantaged by a plethora of age-related factors such as slower reaction time. Coupled with the loss of vision, an elder person is rather vulnerable to external dangers, from crossing the road to tripping over a pot-hole in the ground. Moreover, there are many cases of poorly thought-out infrastructure which is inaccessible for those without vision. Navigation is essential for everyday work and it sub-consciously adds to our perception of self-worth. The absence to roam independently could lead to feelings of anxiety, which could further spiral to other insecurities.

Figure 1.1: A graphic from Statista showing the number of visually impaired people in the millions.



In Europe, it is estimated that on average 1 in 30 people experience sight loss. This translates to a total of 30,000,000 visually impaired individuals. What is more troubling is the unemployment rate of such persons of working age is over 75%.

Yet another factor to consider is all the resource that go in supporting people with vision loss. The WHO estimates that the financial burden of vision loss tallies to US\$ 411 billion. The high price tag can be attributed to not only the costs of supporting blind people, but also the loss of productivity due to the disability.

The final problem our product seeks to tackle is the difficulty many visually impaired people face when trying to read a text, or more generally when they interact with objects. While solutions for making written text accessible to the target market do exist, they are either limited in number or rather hard to acquire. Braille books, for example, are more costly than their non-braille counterparts as they are more costly to produce. It must be acknowledged that devices such as reading pens aim to fix this issue, however they are not without their cons. Namely, they are skill-dependent; their accuracy depends heavily on the user's ability to move the pen reliably without too much shaking. Moreover, these pens are ineffective when it comes to reading street signs and other similar forms of written communication. The internet, an alternate source of in-

formation and entertainment, can be similarly inaccessible to visually impaired people, as the interface of most webpages rely heavily on sight. What makes things worse is that it is not uncommon for developers to neglect the accessibility aspect of their web app. This leaves our target audience with a lackluster selection of sources with which they can educate and entertain themselves. The lack of vision furthermore hinders object interaction. People living with blind people have to be extremely careful to leave everything in its rightful place, otherwise the blind person would be unable to navigate comfortably inside their own home.

The sizeable population with impaired vision is severely disadvantaged in today's world, and their disability afflicts heavy losses to the global economy. Meanwhile, the current solutions on the market are not suitable for all the complex needs of our target market. Clearly, the market is in need of a brand new, innovative product that will alleviate the weight that blindness imposes on society.

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Chapter 2

Competitor Analysis

With the rising popularity and prominence of artificial intelligence, it is expected that it could be used to tackle obstacles such as disabilities. However, the market for blindness-assisting technologies remains fairly unsaturated. Nevertheless, the few noteworthy products listed below have a relatively good track record and are rapidly evolving. Despite this, there are some gaping holes still left unfilled, which BlindSight could provide a solution for.

2.1 Competitor 1: Envision

A product with such a wide array of features such as Envision will surely be a worthy match to BlindSight. Their business offers worldwide shipping for their three models. Envision's glasses have a slick, lightweight design making them suitable for a full day's usage. The features of the Envision glasses vary based on the model:

- Envision Glasses Read Edition: Instant Text, Scan Text, Batch Scan (€2499 + Tax)
- Envision Glasses Home Edition: Instant Text, Scan Text, Batch Scan, Call an Ally, Call Aira, Describe Scene, Detect Light, Recognize Cash, Detect Colors, Find People, Find Objects, Teach a Face and Explore (€3499 + Tax)
- Envision Glasses Professional Edition: Instant Text, Scan Text, Batch Scan, Call an Ally, Call Aira, Describe Scene, Detect Light, Recognize Cash, Detect Colors, Find People, Find Objects, Teach a Face and Explore (€4599 + Tax)

Strengths

Envision is an established player in the global market and their products are the most feature-full out of our other competitors. Their glasses mainly include image scanning, functionality for environment description, facial recognition and navigation. They are equipped with Wi-Fi, Bluetooth and fast-charging technology and are water and dust resistant. The design is slick and lightweight making it exceptionally effortless to carry around for a full-day's use. Additionally, consumers with the Envision Reading Edition and the Envision Home Edition can receive new updates and functionality of up to a year after a purchase. The Envision Professional Edition, targeted more for enterprises, offers a free lifetime subscription to such updates. Customers of the Envision Glasses also have the option of renting the Envision Glasses via the Envision Subscription Edition. The Envision Subscription Edition provides a cheaper alternative (US\$150 monthly) to the Envision Home Edition and the Envision Professional Edition, as it includes all the features available to the other two models.

Weaknesses

The downside of the Envision Glasses is their premium price. The base model, the Envision Reading Edition, comes out to a hefty €2499 without tax. Being a base model, the Envision Reading Edition is missing many key features of the more expensive models; it only contains features dealing with interpreting scanned text. The subsequent model, the Envision Home Edition, possesses all the features, but it is €1000 more expensive to the Envision Reading Edition. The Envision Professional Edition, which as a reminder has the exact same features as the Envision Home Edition, will set back a buyer northwards of €4599. The concern with high prices such as these of the Envision models is that they price out many visually impaired customers out of the market. Moreover, they only come with a year's worth of warranty and for such a pricey product many potential buyers could easily be deterred by the limited coverage period. A year's worth of warranty might not provide adequate protection, especially for high-value items that could require more extensive coverage over a longer period. As for the Envision Subscription Edition, it is only available in the contiguous United States, making it inaccessible to potential consumers on the international market. Furthermore, despite the rental model saving the consumer money in the short-run, over the long-run the Envision Subscription edition could easily out-price the Home Edition and the Professional Edition. Over a two-year span, the Envision Subscription edition will have cost the consumer US\$3600 which would then increase to US\$5400 over a 3-year span. While there could be instances where one's blindness could be temporary, for many the disability will last for their entire lives. Hence, it is important that they have available an inexpensive alternative such as BlindSight that will serve to help them without putting a strain on their wallets.

Opportunities

Despite Envision's head start in the market, they are focused on providing a premium product which leaves the door open to an alternative that would concentrate on making such technology more accessible to the international market. The success of Envision could serve as a blueprint to BlindSight as they are a proof-of-concept that smart glasses could have a substantial impact on the lives of those living with visual impairments. Moreover, Envision's products rely on voice feedback to the user which is much slower than the haptic feedback that the BlindSight bracelets would provide on top of voice warnings. BlindSight will have all the functionality of Envision's most premium products in addition to a better danger warning system during navigation, all the while providing a product that is ten times cheaper than Envision's base model.

Threats

Envision's head start is a considerable advantage when it comes to market dominance, as they have established a strong foothold. They are a trusted brand with generally positive reviews, and they provide free worldwide shipping for most of their products. BlindSight can combat this by providing a cheaper alternative which will be more accessible to the global market. To rival the user-friendly design of the Envision models, BlindSight will have to rely on a third party for the manufacturing of glasses with micro cameras and microphones.

2.2 Competitor 2: Be My Eyes

Be My Eyes is an app that helps connect visually impaired people with volunteers, who can provide aid in discerning what is in front of the blind person. The app works by establishing a video call between the visually impaired individual and the volunteer. The volunteer can then describe what he sees in the video to the visually impaired person.

With the advent of ChatGPT-4, Be My Eyes has incorporated the AI into its product. Now, users can take a picture and record a message which is consequently transcribed to text and sent over to ChatGPT for analysis.

Strengths

Be My Eyes prides itself on its wide accessibility (all one needs to use the product is a smartphone and an internet connection). The product can help alleviate some of the troubles that visually impaired people go through in a quick and free manner. Moreover, Be My Eyes provides the functionality of analyzing a live video with the help of a volunteer.

Weaknesses

Be My Eyes is a rather versatile tool considering with the added bonus that it is free of charge to use. However, a drawback is that in order for the video functionality to work, a volunteer is required to be online which renders the feature unreliable. As for the ChatGPT-powered AI image detection, that is a rather arduous process for the user, who besides first opening the app, must then take a picture, record a message and only then can they send it for processing.

Opportunities

BlindSight's features an upgrade to the ones Be My Eyes currently has. Furthermore, BlindSight understands the importance that conducting tasks independently has on one's perception of self-worth. Hence, all of BlindSight's functionalities will be entirely reliant on AI which will always be readily available, as opposed to the unreliable factor of whether there are any volunteers available to help. Finally, BlindSight's myriad of features will aid the visually impaired in more tasks throughout their day in a quicker, more user-friendly way. This will be possible via the BlindSight hardware which will consist of vibrator bracelets and smart glasses.

Threats

The main advantage that Be My Eyes has over BlindSight is that it is free to use. However, BlindSight's many other utilities justify its higher price point as the features will unlock new possibilities for the users which could not be accomplished using Be My Eyes.

2.3 Competitor 3: .lumen

A new competitor to the market, .lumen still does not have a product available. Their main area of focus is helping the visually impaired navigate through AI depth detection and image recognition software. Unfortunately, not much is known about the company or how much they will charge for their product.

Strengths

By the looks of things, .lumen's headset will host an AI model locally. This provides them with two unique advantages over the competition. Firstly, their product will be useful in areas where internet is not available. This is due to the fact that the product will not be relying on an external server hosting the AI model. Stemming from this, is the second advantage in that the headset should be incredibly responsive as all the data is processed in near real-time within the headset. Clearly, .lumen's main goal is to enhance the ability of visually impaired people to navigate safely and independently.

Weaknesses

The scarcity of information regarding the product, makes any weakness analysis purely based on speculation. It is reasonable to assume that users will be notified of any dangers by a voice assistant embedded in the headset. This can prove to be rather ineffective if the danger is fast-approaching and the user needs to react quickly. Furthermore, the headset itself looks fairly heavy and there exists a possible concern that a user will not be able to wear it for extended periods of time due to the eventual exhaustion on the neck area.

Opportunities

The company has not entered the market yet, giving BlindSight an ample chance to catch up. Their product will surely require powerful processors in order to utilize the AI tool set locally. This implies that the product will most likely have a premium price, making it inaccessible to poorer consumers. Rather than fitting all the technology into one bulky and awkward headset, BlindSight will utilize the user's phone and third-party smart glasses as to accomplish similar functionality to .lumen, all the meanwhile providing a more lightweight solution. Furthermore, one of BlindSight's core features is its network which will allow friends, family and emergency services to know the whereabouts of the user in case of any mishap. Additionally, BlindSight's bracelets will guide the users as

to which way to turn in case of an approaching danger. This solution will be far more effective in increasing the reaction time than a simple voice message.

Threats

The company has had time to research and develop their product giving them a head start over BlindSight. The possibility that their AI will work offline and will be able to analyze the video recordings faster is an area that BlindSight could potentially rival .lumen in by hosting a less powerful AI into the mobile app, for cases where the main server is not easily reachable.

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Chapter 3

Product Description

The technology behind BlindSight has been selected to provide developers with the ability to iterate fast, while providing efficient solutions to numerous problems that visually impaired individuals face in their daily lives. BlindSight's ability to move and innovate quickly will be key in developing a minimal viable product and catching up to the competition.

The ultimate goal of BlindSight is to enable blind people to achieve higher levels of independence, thereby enabling them in achieving their personal and professional goals. The technology in use can be divided into 3-sections: the hardware, the mobile app, and the backend.

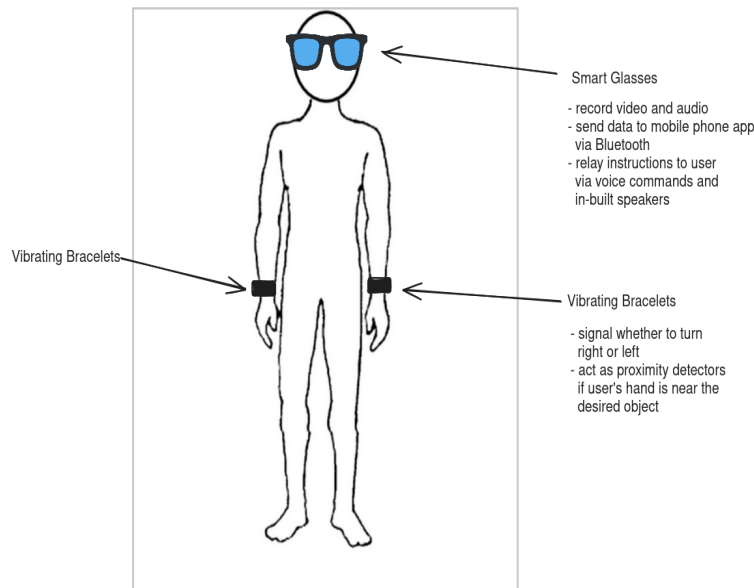
3.1 The Hardware

The hardware consists of smart glasses and a pair of bracelets equipped with vibrator motors. The smart glasses will include Bluetooth technology in order to be able to communicate the mobile app, as well as a micro camera, a microphone and a speaker. The camera will stream the video of the environment to the mobile app. The user will be able to request certain functionality via the microphone, which will also be passed to the mobile app.

Once the mobile app has returned a response the speaker will relay the information to the user. If required the bracelets will vibrate according to the need.

In order to focus on the more vital technologies in the technology stack, Blind-sight has decided to use a third-party smart glasses model for the prototype.

Figure 3.1: Overview of the BlindSight hardware.



3.2 The Mobile App

The mobile app will be used to communicate to the backend via web sockets. It will also host a less resource-intensive AI model to ensure that the product will function even when the server is not reachable. Another functionality of the app is that it will include geolocation services such as Google Maps as to provide navigation assistance and to allow friends, family and emergency services to know the whereabouts of the user in case of any trouble.

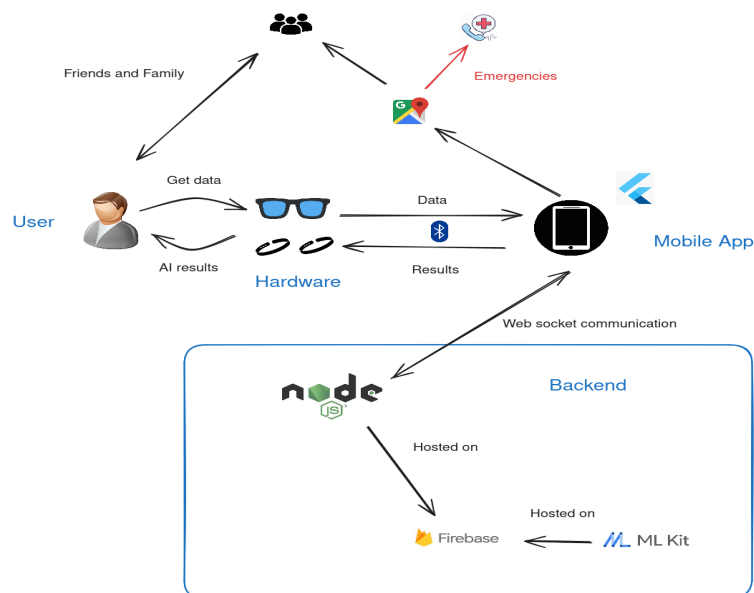
The app will be implemented in the Flutter framework due to the framework having a good native performance and its ability to produce multi-platform applications from a single codebase.

3.3 The Backend

The backend will be responsible for hosting the AI model and the web sockets server (implemented in NodeJS) for the mobile app. BlindSight will be using

Firebase for the backend along with Google's ML Kit.

Figure 3.2: Overview of the BlindSight tech stack.



Chapter 4

User Story

BlindSight will distinguish itself from other competitors in the market by having the widest range of features. From object interaction to navigation, BlindSight will provide visually impaired individuals with the most complete package with which they can achieve their daily tasks efficiently and independently.

4.1 Danger Sense

The main selling point of BlindSight, Danger Sense will alert users of incoming obstacles and / or dangers not only via voice warnings as our other competitors do, but also with haptic feedback from the bracelets. Once an incoming danger is detected by the AI, a decision will be made in which direction the user should turn to as to avoid the approaching threat. Depending on the direction chosen the appropriate bracelet will begin to vibrate. The vibrations will increase the closer the object is to the user.

The haptic feedback will be much quicker than a voice warning as the user will know instinctively and instantly in which direction to turn. Once the user has corrected their trajectory and has escaped the danger, the bracelet will stop vibrating letting the user know he can continue in the current direction he is travelling in.

4.2 Monitoring and Emergency Call

Should a user be unable to avoid the danger and becomes injured, they can call for help with a simple voice command which will alert his circle of friends and family who have downloaded the mobile as well as start a call to the emergency

services.

4.3 Navigation

Building upon the technology of Danger Sense, BlindSight will utilize Google Maps to help visually impaired people navigate to their destinations safely. To select a place to go to, the user must only speak a voice command followed by the name of the destination and the instructions will be passed on to the app which will use the Google Maps API to guide the user to their destination.

4.4 Text Scanning and Translations

Should the user desire to read something, all they have to do is speak a command and whatever is in front of them will be sent to an image processing AI which will extract the text and (if needed) send it to through Google Translate for a translation before returning the result back to the mobile app, which will use text-to-speech software to relay the information back to the user. Additionally, user's will be able to specify which text they want the AI to read out (for example only the drinks section in a menu).

4.5 Object Interaction

Users will be able to find inquire for the AI to describe the environment in front of them. Then, should they want to interact with an object their command will be passed to the AI, which will then guide their hand using voice commands and the vibrations (the vibrations grow stronger the closer the user's hand gets to the object) of the appropriate bracelet to the location of the object.

The combinations of all these features will ensure that BlindSight will be able to provide users with a way to complete tasks independently, all the meanwhile keeping them safe from unexpected dangers.