Research Plan – Blind App Project

Versions

Version	Date	Author(s)	Description	Status
V 0.1	31-10-2023	Ryan Houben	Initial creation	Initial
V 0.2	31-10-2023	Emanuil Karapachov	Added on findings about sub question 1	Done
V 0.3	01-11-2023	Ryan Houben	Added findings on sub question 2.	WIP
V 0.4	01-11-2023	Emanuil Karapachov	Detailed explanation of sub question 1 added	WIP

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Introduction

In this document the research plan is described. All the research questions sub questions and results are written down in this document. All the research is based on the DOT Framework to really validate the results.

With the DOT Framework, the research will be validated by triangulation. One method will be validated by the other method, this way you will get valid research.

Main research question

How can we incorporate the different senses in order to teach born blind teenagers at the age of 10 to 15 about the human body?

Sub-research questions

What kinds of challenges do blind individuals have interacting with sensors?

- Find at least 2 blind individuals for an interview.

What kind of sensors are appropriate to use for learning about the human body?

- Find at least 3 sensors for each sense (excluding vision and taste).

How do blind teens get sexual education in school?

- Find at least 3 methods.
- Try to validate why our idea is better.

DOT Framework methods

Question:	**What kind of challenges do blind individuals have interacting with sensors?**
DOT Methods:	Library: Library research Field: Interview Lab: Hardware testing Showroom: Guideline conformity analysis
Explanation:	Library research: Based on products utilizing sensors it is safe to say that the products often lack standardization in sensor interfaces, making it hard for blind users to learn how to interact with new sensors independently. Field: To validate whether the library research is done correctly, we should interview our target group to gather feedback based on those findings and any prototypes or products relevant to the library research on the topic. Hardware testing: Utilize accessibility evaluation tools (such as screen reader software) to assess the compatibility of sensors with assistive technologies. Identify any operational issues encountered during this evaluation. Showroom: Following guidelines about designs for blind people is bound to reduce the challenges that the incorporated sensors bring onto the table.

Question:	**What kind of sensors are appropriate to use for learning about the human body?**
DOT Methods:	Library: Library research Workshop: Prototype Lab: Hardware testing Showroom: Pitch
Explanation:	Library research: With the library research we have a starting point on the found sensors. We can also find some validation on why the sensors can help blind people, but this is theoretically. Prototyping: After we found a specific sensor, we make a small prototype out of it. Hardware testing: With the hardware testing we can validate the results we found in the library research and prototyping. Pitch: After testing the hardware, we will pitch our prototype to our audience to validate our findings and can base a conclusion on this for a later advice.

Question:	**How do blind teens get sexual education on school?**

DOT Methods:	
Explanation:	

What kind of challenges do blind individuals have interacting with sensors?

Introduction:

Blind individuals face unique challenges when interacting with sensors due to their reliance on non-visual cues and alternative methods of information gathering.

Library Research:

Key challenges identified throughout the library research include limited feedback mechanisms, complex interfaces, lack of standardization, inaccessible visual outputs, inaccurate feedback, dependence on assistive technology, safety concerns, and social barriers.

In order to validate these findings, we set ourselves the following criteria:

Criteria:

- Find at least 2 blind individuals with whom we can validate our library research.

Interview:

Based on our initial talks with Jil and Henriët addressing these challenges might necessitates the integration of alternative feedback models. Throughout those interviews it appeared that traditional touch sensors, especially flat touchscreens, provide no tactile feedback, which can make it difficult for blind individuals to determine their position on the device or to know when they have activated a control.

Additionally, we interviewed Nikol, with whom we spoke about the concrete challenges that might occur when interacting with sensors. She did not have a lot of experience with such technologies. However, she still gave us feedback on some of the key parts of her day-to-day interactions with tech. Initially, when encountering something new on the tech side, Nikol mentioned that there might be a learning curve that makes it challenging to properly understand what is happening but with time she usually gets quite proficient with it. An example that she gave was about the complex gestures that touch screen technologies utilize. Some of those gestures were quite difficult for her to memorize due to them being not intuitive.

As we progress through this project, we should keep in mind this set of feedback and design our product in a way that it is easy to use and understand without having to rely on your vision for indications.

Showroom:

When designing products for visually impaired individuals, the Technology Enhanced Interaction Framework (TEIF) method provides a structured and validated approach. Key guidelines from the TEIF method include:

- **Inclusive Design Process**: Involve visually impaired end-users in identifying barriers and evaluating solutions, ensuring the product is user-centric and tailored to a broad range of needs.
- **Requirement Identification**: Use structured tools like multiple-choice questions from the TEIF method to identify requirements effectively. This aids in developing a clear understanding of the necessary features for accessibility.
- **Evaluation and Validation**: Ensure that any developed solutions are reviewed by both accessibility experts and the target users. The TEIF method has been experimentally validated, showing that developers using it could better evaluate requirements and technology solutions compared to other methods.

By following these guidelines, we can create more accessible products that are not only functional but also respectful of the diverse experiences and needs of visually impaired users.

Hardware Testing:

This is WIP – will be added when we start working with the appropriate technology.

Sources:

Wafa Elmannai, (2017). Assisting the Visually Impaired with RFID-Tags in Indoor Spaces. International Journal of Engineering Research and Applications, 7(3), Part- 2, 6-11. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5375851/

Sánchez J., Elías M. (2007) Guidelines for designing mobility and orientation software for blind children; Proceedings of the IFIP Conference on Human-Computer Interaction[Google Scholar]

Shah C., Bouzit M., Youssef M., Vasquez L. (2006) Evaluation of RUNetra tactile feedback navigation system for the visually impaired; Proceedings of the International Workshop on Virtual Rehabilitation; pp. 72–77. [Google Scholar]

What kind of sensors are appropriate to use for learning about the human body?

Introduction:

To teach born blind teenagers about the human body, we can introduce certain sensors on human like models. They can interact with these sensors to get certain feedback as a response to learn about the human body.

We are working with born blind people, so we must exclude certain sensors (this is mentioned in the criteria).

Criteria:

- Excluding vision and tasting.
- Find at least 3 sensors for each sense.

Library Research:

Below are the senses listed which are valid for this project. Vision is excluded because the target audience is blind. Taste is also excluded because it can get very weird when you are learning about the human body and include taste.

Hearing:

Speaker:

(Eckart, 2019) mentions the following: “Research has shown that people who are born blind or become blind early in life often have a more nuanced sense of hearing, especially when it comes to musical abilities and tracking moving objects in space (imagine crossing a busy road using sound alone).”. For this reason, a speaker sensor is one of the most if not the most important sensor to use. With this sensor we can give the individual a lot of feedback in the way of sound, think about talking, buzzing or even music.

Microphone:

A microphone is of course the opposite of a speaker but is still really helpful. With a microphone, blind induvial can ask questions without using their phone or other devises to type.

Touch:

Smell:

Prototyping:

Speaker:
https://youtube.com/shorts/G8djXnIWNTY

Microphone:

Hardware testing:

Sources:

- Eckart, K. (2019, 22 april). Brains of blind people adapt to sharpen sense of hearing, study shows. UW News. https://www.washington.edu/news/2019/04/22/brains-of-blind-people-adapt-to-sharpen-sense-of-hearing-study-shows/
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How do blind teens get sexual education on school?