

User interview with Nicole

☰ Meeting Tags	User Interviews
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Research Questions

- Is the presented prototype easy to understand of what you can do to control our device?
- Does the terminology make sense?
- Is everything that we provide sufficient enough to record experiments with it?
- Which style should the application follow? (after presenting mood boards and colour schemes)

▼ Interview Script

Interview Script

Introduction

- Doing a user interview, helps us to find out what and how we want to design things early in the creation of a new product
- We ask questions, not directly about you or to test you, but rather to gain insights for our design process
- If you don't know how to answer a question let us know, we're here to help you guide through the process, if you don't want to answer a question that's also fine, just let us know

Warm Up

- Tell us about yourself

- What do you do as your job or hobby?
 - Go into more detail to ask about the context and connection to IDUN
 - Why doing research, what fascinated them?
- What is the greatest pain at your current job/hobby? OR with what the person has mentioned in context and connection to IDUN?
 - Go more into detail and find out the WHY
- What are you currently researching if they're allowed to talk about it?
- Have you heard of brain-machine interfaces – what is a brain-machine interface?
 - Can you describe what a brain-machine interface is and how it works?
 - Have you ever worked with or thought of working with a brain-machine interface?
 - Do you have a research use case in research for a brain-machine interface?
- Have you worked with EEG before?
 - If yes, which systems from which brands?
 - What was the best EEG system you worked with and why?
 - What was the worst EEG system you worked with and why?
- Do you know the benefits of a mobile EEG system?
- What do you think is a benefit of an in-ear EEG system that is fully mobile?

Context

At IDUN, we are building an EEG system that can read your brain's signals in real time. We are not the first to do this, others have been doing it for many decades. The difference between our product and others on the market is the form factor. Our EEG device is the size and shape of a normal in-ear headphone such as Apple AirPods. Compared to e.g. a state of the art system in 2022 our device has similar signal qualities and impedance values in a form-factor which has the potential to be mainstream and the setup speed that is not comparable to any other EEG systems as of today (show some charts).

Our goal is not to develop the headphones themselves (building the brand, marketing, packaging design, etc.), but to integrate our technology (hardware as well as software) into existing headphones. And why? Because we want to be able to incorporate a fully mobile, unobtrusive and therefore mainstream-ready EEG sensor in a form factor that allows hours of measurements during everyday activities. No laboratory environment or special setup is required. Developers and researchers should then be able to interact with the brain data, for example in the form of classified outputs via an API.

- **To give you some examples of what's possible and will soon be possible in the near future:**
 - The users general focus in a range from 1–10
 - The users tiredness in a range from 1–10
 - How long, well and in which stages the user slept
 - Where the user is looking at (top right, bottom left, centre up, centre down etc.)
 - If the user is squeezing their eyes together or not or blinking and how long is blinking
 - If the user is hearing sounds in certain frequencies or what for profiles the user is able to hear
 - If the user is eating something, talking or chewing something hard or soft
 - If the user is hungry, tired, asleep, bored etc.
 - Raw data or filtered data that removes artefacts automatically already in real-time
- More things will be possible soon. Before we continue we want to hear how you feel when you hear what's possible with our device?
- Do you have any concerns about our device and application?
- We will give you two examples of what is possible to build with our device:
 - A music app that recommends music based on your mood: if you're tired it will show you two auto-generated playlists; one that makes you more awake and one that helps you fall asleep. Same with being focus, bored etc. You can replace the music playlist with basically any recommendation engine you could think of. (show example slides)

- Another more complex idea: A user is wearing a AR/VR device and you track where the user is looking at in the 3D world and based on the focal point of the users attention you increase the volume of the source and decrease surrounding sounds (also known as the cocktail party effect). (show example slides)
- What are your thoughts when you heard these two ideas?
 - Ask more questions so that the user elaborates
- Next to using our app for creating applications, it should also enable researchers to setup and record experiments, possibly experiments that need to be recorded outside of the lab. here is where your experience comes into play.
- How do you proceed when you create your own experiment?
 - Here is an example experiment: Resting-state experiment: person looks at a cross and does nothing for one minute, to find out if you can identify some brain health related diseases or just to measure activity in different brain regions under resting conditions. OR oddball paradigm – How would you proceed to create such an experiment?
 - What tools (hardware and software) are you using?
 - Why are you using these tools?
 - What software are you using? Why are you using this software?
 - What are pain points of these tools etc?
- What are you doing after you recorded the data set of one experiment/one participant? Let us walk through it.
 - How are you ensuring the data quality of the recorded data?
 - How are you visualising the data? MATLAB, Excel, some other tool?
 - How are you processing (pre-, post-) the recorded data?
 - What are pain points in that process?
 - Why are you using these tools?
 - What tools are amazing to help you in that regard?
 - Where are you creating your own tool?

- Where did you learn these tools, softwares etc?
- Where are you storing that data?
 - How do you ensure user privacy and data protection for the recorded data?
 - How do you collect the consent for the recorded data from the participants?

Competitors/Examples

- Can you describe the best app for an EEG system that you've used before?
 - Can you describe why this example is amazing and what they're making differently?
- Can you describe the worst app for an EEG system that you've used before?
 - Can you describe why this example is bad and what they're making badly?
- What is the most complex EEG system or lab recording system that you've ever used?
 - Let the user elaborate
- Did you ever create code snippets on your own for experiments in a lab?
 - Let the user elaborate
 - **dig more into them**
 - how did you learn these things? course, bootcamp etc?

Prototype

We have designed a prototype of this web app to help people that want to use our device without the need to code/program. our aim is an easy-to-understand graphical user interface that helps people to understand how the device works, control the device and to record data/experiments. We want you to let it go through. We don't want you to break anything, and keep in mind that this is a prototype that is not 100% finished or thought through. If you have a question or something is unclear, let us know. We encourage you to think out loud about

what you are thinking as you go through the prototype. We have a few exercises for you to conduct and would like to go through them now.

These are the exercises:

- You bought a new device and want to use it for a simple audio stimuli recording, so letting various people ranging of different ages listen to a 40 Hz and a 90 Hz sound to see what the differences in neural responses are in terms of age. For that you need to register a newly bought pair of headphones on the web app's platform. Can you do that for us in the prototype?
- Now that you registered the device you want to quickly test if it works and if brain data goes through, so you want something like a livestream.
- Now that you're looking at the livestream you want to know if the quality is good of the device, so e.g. if the earphone sits correctly in the ear.
- Now in order to record a simple experiment with a possible test subject you want to create a 10 seconds recording and then have a look at the data afterwards. Can you do that for us?
 - Please now access the eye movement data
 - Now you want to visualise the data, how would you do that?
 - Now you want to download the data, how would you do that?
 - What would you usually do after you downloaded such data? What are the tools you're working in?
 - What are pain points or limitations of these tools you work in after downloading such data?
- Now you want to setup a recording template for the hearing threshold experiment that you can reuse with other people. You also want to be able to upload sounds that can be played during the experiments at certain points. How would you do that?
 - What do you think is very important for creating such recording data sets?
 - Mention maybe markers, timestamps, time synchronisation etc.

- Now you recorded 20 experiments with 20 participants. you also always recorded the pulse rate of the recorded people and want to compare them with the recorded brain data.
 - How would you normally proceed in a situation like this?
 - Did you know that you can also upload other data sets such as videos, heart rate etc. to our platform to easily visually compare them? Can you do that for us please.

Style and Moodboard

Thank you so much for helping us understand how your mind works. In order to conclude the design questions, we present you with a few example designs and moodboards from other apps and/or competitors and you need to chose your favourites. Please keep in mind that we encourage you to think out aloud.

Conclusion

Thanks a lot for participating in our user interview session. You were very helpful and provided us with a lot of interesting insights. We will keep the provided information from you private and we will delete the recorded files in the next two weeks. You don't need to do anything anymore. Do you have any questions?

▼ Interview Notes

Psychology, TMU research assistant, MRI , EEG studies. Teacher diploma.

Initial response: doesn't understand exactly how it works, asked about if it's eeg, mark explained how many channels and references

asked about what we can do with it: had a music example in mind, doesn't understand the API and closed feedback loop concept, mark explained the sleep and acoustic attention example

What EEG systems?

Names didn't come to mind

When creating an experiment, just got specs from the system and used it. Didn't do projects at home, worked with 1 and 2 year old babies, used EEG caps that are soaked in salt water, uses 64 electrodes and gel in the lab.

What software?

Uses pre-written scripts, researchers make scripts for Matlab, participants start tasks, EEG system is set up, but she doesn't have to do anything, just press the button to start and stop it.

The tasks a participant does are in Matlab.

Shes really the operator.

Tech Skills

No coding, knows the basics to run the scripts, and learned some stuff but didn't actively learned to code.

No timeline to learn to code.

Has other things on her timeline, it's full even though coding would be super interesting.

During test

Quality checked by looking at the EEG signal, if its too noisy or not, impedance values, under 20 or 10 Ohm is ok.

put on the system, do bio calibration and show the participant what the signal looks like, to show them that they should be as still as possible and not move too much, see that it's important that they sit still

Data is stored on the internal work storage system, data protection is huge topic, it's saved automatically, then gets stored in secure data storage system, participants don't ask what happens to the data, not too concerned

She's not too concerned about data privacy if we stick to our steps to delete the data when directed.

Actual test

Super boring, they just listen to the heart beat, focus on things on the screen, mis-match negativity tests, press a button when a tone or image is shown in a certain way.

Learning tasks, like volatility changes in the environment, having two options to win something with probabilities that change over time

Worst thing working with EEG?

Some people have a skin that doesn't work with EEG, no matter what the skin preparation is

Setup annoyances

Takes a lot of time to prepare everything

Fine though, you talk with the participants

Cleaning out the jell after the test

with long experiments it takes a bit to remove everything and then get it set up again

Usually everything works quite fine

If the data looks strange she talks with the EEG experts to fix it

Restart system

Checking basic settings

No Code or Low Code

Not sure what it means, maybe it's super super simple short code

API? Not sure

What is the cloud? It's a place where you can store data, not local but on an open storage system somewhere

After getting data

She just hands it over to the researchers that do the analysis

A good EEG system

One that doesn't take too much time to setup and not too uncomfortable, doing the things you want them to do

Reliable

MRI

Feels even more helpless if something is wrong

Can't change anything on the scanner

Would be interested in building neuromarker classifiers if code wasn't a barrier

A classifier is some specific marker that gives you hints on certain traits

If a script automatically removed artifacts she would use it

She would try it and see how well it works and if it performed well she would use it more

Check how well it performed

Check for bio-calibrations such as eye movements, motion artifacts

Wireless EEG

See the benefit without cables, more flexible when they are moving around

In-ear EEG

Sees the benefit, would help with issue of making the participant feeling more comfortable, hair not full of jell and water later

For a long time hated in-ear plugs, but she became accustomed to earbuds

Would you do out of lab study?

Remote studies, very good and practical but you don't know what they're doing outside of the lab,

More data points would help to give context to what they are doing during remote studies

A small chance they do something they shouldn't do during the study

what is a bci?

A system that translates brain activity to code or numbers that the computer can give us that we can use and understand

We as in people who use the interface

Is there an interesting EEG experiment?

things related to stress, big issue now adays, meeting people, under constant stress, looking at things that can help with then, while doing sport to help relax, meditation, etc.

If you created such a study with EEG, how would you organize it?

Would have group that does sports, and one that doesn't but the issue is that really enjoy sports and some don't, need something else to control for

or test no-sports vs sports

could ensure people are doing sports with actigraphy sensors

How would you look at the data viz?

Would search for someone who can teach her to do it herself, because if she does a study she want to analyse the data and help her understand it better

How ensure data privacy?

no sure

Do you use the cloud?

yes, ETH polybox, dropbox, not sure if its' all cloud or not

If you had bci earphones would you buy them?

would depend on price, and what they give her, some brain activity without context and actionable insights doesn't mean much

what would be meaningful?

stress, relaxation, understand better in which situations she feels more relaxed and calm, or with sleep

info on how to improve sleep

Doesn't own any wearable sensors, smart watches

likes to go running, thought would be good to keep track , but hen thinks, doesn't want to track and just run and how far, always a bit switgin against tracking like that

If the earphone measure the brain but the data is being sent to google

oh no, Google is the enemy

depends what it's used for

need to understnd exacly what the data is being used for, it's hard to understand how data is being

does it depend where the data is being stored? Feels that it doesn't matter, assumes google is google,

what if it were facebook? no change

Would like to know what processing means, understand what's happening,

what if you get the raw data?

it would be better, but would like a descriptoin of what the processing does

Any apps you like on a daily basis?

running app, how fast and far, tracking each kilometer during running

sports app that has different exercises on it

likes instagram but doesn't post a lot

Apps you don't enjoy but must use?

SBB app, can never find what she wants

Uses Samsung A7 phone

Has no tablet

Used VR a week ago and it was super cool, but it's too expensive

saw a landscape, trees, throwing a paper airplane, surprised how well virtual tools worked and grasping things

SDK?

Nope

Heard of neuroosity, openbci?

Nope

Neurable

Nope

Neurallink

Nope

Devices intrude?

it's a back and forth, we're under constant stress to be perfect if you measure everything, but it's helpful if you see what happens, and you can do something that helps

Could be helpful if a calendar changes her plan if she needs to recover from sleep better, she would go along with it

reaction

people who are creating a portable EEG system that does in the ear for research or daily life for everyday people seems like you're exploring

we seem trust worthy

Ideal for followup testing of UI of no-code experiment design