Presence · Technology for Living in the Moment

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1. Introduction

"It's similar to a game engine. It's a physics engine that you can use to describe and predict how things look in a particular way, feel when you touch them in a particular way, the law of proprioception, auditory perception and so on. So basically the geometry of all these things. And this is probably 80% of what our brain is doing — it's dealing with this real-time simulation."

(Bach, 2021) [1]

This is how computer scientist Joscha Bach defines the human behaviour programs, that allow us to recognise objects of worldly and mental nature. By this definition the notion of real physical objects and artificial virtual objects is misleading, as both could have the same perceptive properties. Bach further states: "Game engines are slowly approximating the fidelity of what we can perceive." Virtual objects are becoming increasingly interactive and are only a couple of magnitudes away from saturating our perception completely.

Technology use is a fundamental part of our lives. Still at its current stage we interact with our devices through our fingers and eyes and this 2004 illustration "How the computer sees us" by O'Sullivan and Igoe [2] is still true to a large extent.
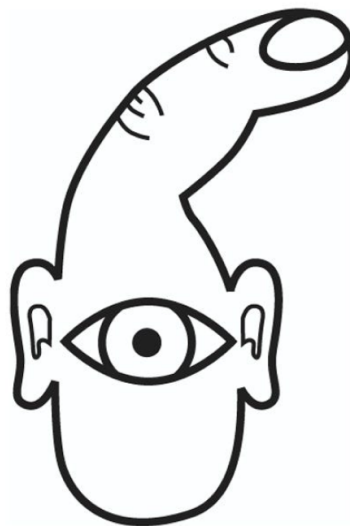
O'Sullivan and Igoe

This adds much friction to our interactions with technology, which surfaces in moments of distraction in both virtual and physical spaces. However neither physical nor virtual states of being should neglect or interrupt our presence in the moment.

Think of the following scenarios.

It is a cozy, rainy Sunday and you are sitting in a coffee shop with your friends. When the brunch comes to your table you have the urge to document this moment. From this second on you are distracted. Not attentive to the on-going conversation anymore *you reach into your pocket to grab your phone, you unlock it, you open your camera application, you frame the picture, you take it.* All those actions took time away from your Sunday and more importantly from the time with your friends. *And you did not even share the photos yet...*

The following Monday you have to finish a report in work. You are sitting on your desk starring into your screen. Your physical body might sit in the office, but your mind is not there, it is in a deep focus state on the document you are creating. You are in the flow. Suddenly a co-worker approaches you from the side. "Hey, could you help me with the printer, please?" ZAPP! You lost your focus. "No problem", *you mumble, "Big problem", you think, you stand up, you walk to the printer, you plug in a USB stick, you adjust the settings, you push the print button.* On arriving back at your desk you question how you could prevent those interruptions as your deadline is getting close. The only solution you find is putting on your noise cancelling head-phones and ignoring everyone for extended periods of time. *This gives you a certain reputation, not optimal...*

In the evening you are coming home. For relaxation you started a new hobby. It is origami. You did some generic shapes at first but now you acquired a level of skill where you want to try to build your own shapes. A rising crane. You are trying to sketch out a folding pattern. For one of the creases you need to apply a Huzita axiom, that defines the way in which paper can be folded. "Oh I am sure it was number 4, but what did it say again?", you think. You need this to move ahead. *You reach into your pocket to grab your phone, you unlock it, you open up a web browser, you type "h · u · z · i · t · a · ' ' · a · x · i · o · m" into Google, you search the results for a good domain, you click it, mhm cookies, you decline them, you don't find what you are looking for, you go back to Google, you click another result, and finally.* "It is axiom 6." *But you don't return to your sketch. A notification from Instagram triggered*

your attention, you start scrolling and scrolling and scrolling, you notice 30 minutes passed by and you are tired now. So you go to bed you did not finish what you planned for, unfortunately...

This thesis should inspire for interactions with technology that eradicate the *emphasised* distractive parts of the above scenarios.

2. Design Opportunity

Research Question

The spatial computing paradigm, to a high-level, acknowledges our perceptive intricacy, our perceptive entirety and the context we inhabit. This unification of physical and virtual spaces could lead towards a world where friction in interaction with technology is minimised to a point where the interaction itself becomes apparent only when it is important to the individual and context.

My initial research question is:

How can unification of the virtual and physical domains through spatial computing lead towards frictionless interaction with meaningful augmentation of our minds and minimal interruption of presence?

Technological Framework

Key-enablers for the proposed spatial interfaces are:

1. Simulation of physics and hyper-physics [3] in real-time to give virtual objects the cues our intricate perception is used to.
2. Superimposition of the field of view and audition with virtual objects.
3. Interpretation of surroundings and behaviours in real-time as input systems.
4. Generation of animated geometries of context in real-time for realistic occlusion.
5. Creation of personalised and contextual high-impact information to answer the questions we have.

These capabilities make mixed reality headsets, like Meta Quest 3 or Apple Vision Pro, a shapeless prototyping platform for all kinds of spatial computing archetypes.

Interface Lens

The following questions offer potential for explorations about interfaces:

- What is friction in interfaces? How can it be minimised?
- Which level of immersion is required for a flow state?
- Which affordances do direct and contextual inputs need?
- How to control assistant capabilities and add applications?
- How are virtual objects perceived from outside perspectives?

Interaction Lens

The following questions offer potential for explorations about interactions:

- What is friction in interactions? How can it be minimised?
- Which situation requires contextual interaction?
- Which situation requires direct interaction?
- Is the interaction based in virtuality or in physicality? Why?
- How to take control over behaviours and experiences facilitated?

These questions are initial directions and will narrow down and change as I explore the topic further.

3. Approach

It is my goal to harmonise my approach between vertical [4] and higher-level thinking. This should take shape in small prototypes that make sense of a common higher-level idea, as opposed to a holistic product-like prototype which would not be a realistic scope for the given time. The three methods below should help me achieve this. They will iteratively repeat for every designed intervention and inform further actions. I want to go through 4 consecutive cycles till the end of the project.
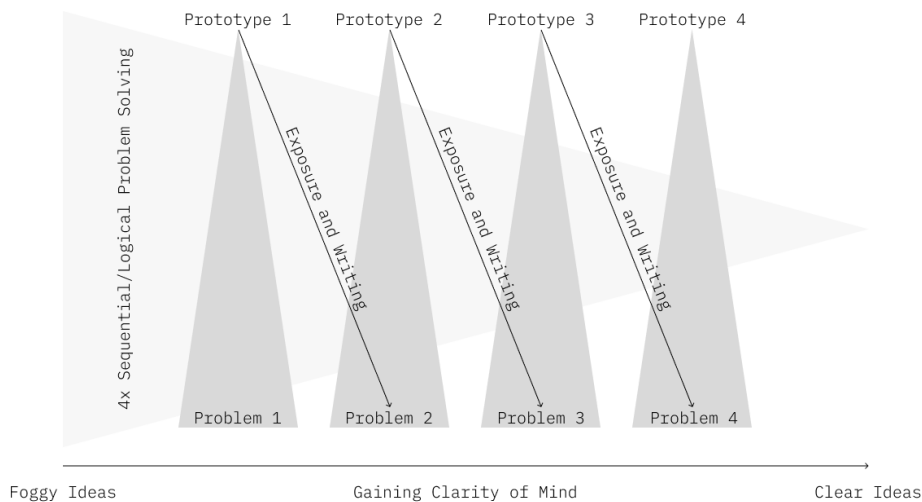
Researching and Sketching

Initial research will be conducted to evaluate possibilities for relevant interventions and the materiality of the underlying technologies. During early stages sketching with technology by Moussette's definition of *a sense-making process with internal radiation pattern* [5], will be used as a tool to dissect ideas and understand possibilities.

Prototyping and Exposing

During later stages of the idea development my resulting insight should be communicated through higher fidelity prototypes that I expose to mentorship for feedback on craft, usage and technical implementation. These prototypes should consider the human-facing factors of the interventions and then go into necessary technical detail for implementation while prioritising aesthetics over technical functionality. Or as Stappers puts it:*"The prototype stands for an engineering goal, an effect to be achieved in the world, rather than a pure knowledge goal, a truth to be known in the mind."*[6]

Reflecting and Writing

After each completed and before every new intervention I want to write an essay about insides from the prototype and its fit into the higher-level idea as well as how it inspires the next prototype. I want to experiment with the style of writing for those reflections.

Scoping Scenarios and "Users"

The indented idea of continuous occupation of the human perception by technology can influence every part of human existence and can express itself in countless shapes. Therefore the project does not have a concrete scenario or user. Applications of the idea of this form of technology need to be explored throughout the process and will be made "tangible" through prototyping.

4. Goals

I want to explore how through interaction design, technology can be integrated deeper into our lives to a point where it becomes non-intrusive to our attention and only faces the fore-ground if needed. I consider this project a success, if the artefacts created during my process give a concrete narrative about the mapped out directions of this brief and have a level of craft that inspires a discourse about the subject of technology for being in the moment.

Crafting Level

- Balance small scope and refined (not holistic) prototyping with higher-level reflection to efficiently communicate an overarching idea.
- Make the individual expressions as relatable, concrete and re-fined as possible. Put them in context of the higher-level idea through understandable writing.

Reflection Level

- Define the starting point and goal of each prototype through research and conversation with colleagues and mentors.
- Create through making and think through writing.
- Do not get attached to creations, expose them early and continuously.

Engineering Level

- Approach the prototyping from an angle of aesthetics and human-facing factors.
- Create engaging refined stories instead of bare-knuckle technology demonstrations that are not relatable.
- Learn more about prototyping with web-based XR (WebXR), ML models (Python) and shader programming (HLSL, GLSL).

6. References

- [1] Fridman, L. (2021, August 22). Joscha Bach: Nature of Reality, Dreams, and Consciousness | Lex Fridman Podcast #212. YouTube.
- [2] Igoe and O'Sullivan. How the computer sees us. 2004.
- [3] Crawford, G. (2019). Developing Embodied Familiarity with Hyperphysical Phenomena. Carnegie Mellon University.
- [4] De Bono, Edward (1970). Lateral Thinking (PDF). Penguin Books. Retrieved 2015-11-01.
- [5] Moussette, C. (2012). Simple Haptics: Sketching Perspectives for the Design of Haptic Interactions. Umeå Institute of Design Research Publications
- [6] Stappers, P.J.(2007). Doing design as a part of doing research.