

# A Case Study on the Future of Humanity: Implanted Digital Assistants

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## Synopsis

The following is a case study on a futuristic, if not inevitable, time when the technology currently available in the early 21st century smartphone is connected directly to humans via a small, implanted communications chip. Initially developed for those suffering from quadriplegia [1] [2], the technology expands to a profitable industry for those desiring high demand, instant access to Artificial Intelligence (AI) regardless of need. This technology allows users to operate technology through thought alone and can communicate with an AI companion throughout their day. Demand for this technology is high, resources are restricted, and setup is time intensive leading to dilemmas on how to prioritize who should have access to it, how the costs should be covered, and what regulations should exist.

## Background

This section will explain the context for the issues that form the basis for the case study, and aid in **Understanding the Problem Space**.

**Human augmentation** is the use of technology to improve or enhance human capabilities with many applications initially researched in the medical field to replace lost limbs or abilities. Simple examples include replacement of a leg for walking, while more advanced technology is employed in helping people run, grab delicate items with robotic hands, or restore sight to the blind. Eyeglasses represent one of the oldest forms of enhancing human abilities and has been around for at least a thousand years while human-computer augmentation was first researched in the 1960s [3].

A **digital assistant** refers to software designed to respond to voice commands to accomplish work with popular examples including Siri from Apple and Alexa from Amazon. Voice recognition technology matured enough to enter markets for home use in the early 1990s and the proliferation of smartphones delivered them to millions of users making them commonly available in the early 2000s.

**AI** has become a buzzword in recent years and public interest and financial markets have exploded making access to AI as simple as accessing a computer with internet access. A detailed history of AI can be found here [4], but an AI mature enough to self-teach was born in the 1950s. For the most recent and most popular examples of AI, one only needs to open a web browser such as Google or Microsoft Edge and ask a question where an AI will scan the internet and generate an answer.

## The Case

Hailey Stevens is a freshman in high school and has relied on others to keep her focused and organized throughout the day and parents to direct her through her homework every night. After a few sessions with a therapist, Hailey is diagnosed with ADHD and her parents are hesitant to begin medication as a first approach and explore a few others [5][6]. Instead, they discover a new technology product called Focus Buddy which promises to keep anyone focused throughout their day by giving users an internal assistant who will constantly remind and guide users to complete priority tasks first. Her parents fit in the upper-middle class and have good health insurance and some “disposable” money that they have saved and can afford to pay for the premium service package offered.

When the Stevens family continued to research the Focus Buddy, they began to see news articles and social media posts discussing potential unequal access to the new technology. Some articles were stating that private, preferential, use was taking priority over other users who were seemingly more needing of the services provided but could not afford the higher premiums putting them on a wait list with others on insurance only lists. Articles covering this topic also note that wait times could be over a year regardless of which list a beneficiary is placed on with privately funded beneficiaries seeing much less waits on average. When asked about the long wait times, the producer of Focus Buddy stated that expertly trained providers, high quality service locations, and materials were limited and slow to grow. Demand for their service grew much faster than they could build, equip, and train in new locations to provide these services and both safety and quality were of utmost importance in expansion initiatives. High demand for the services allowed them to raise prices to slow demand and those immediate payments, or payments in advance, are allowing the upfront capital required for speeding up their growth.

After reading many articles and gathering public opinions from social media, Hailey is now wondering where she fits in this problem. Is she part of the problem? Is she part of the solution? How much does she really need this technology? When she looks at her mess of a day, she *really* thinks she needs this *now*, but when she reads other’s opinions, she has doubts. Her parents believe that they should schedule a first appointment and get on the premium track.

### **The Product and Service**

Focus Buddy is the product line, but users can customize the guide’s name and voice to something they are comfortable with communicating throughout their day. The Focus Buddy Service is a service that streams into a brain implant via a smartphone ensuring a constant connection with any information the Focus Buddy needs from the internet, its service provider’s servers, and its host. The Focus Buddy cannot yet see what the user sees but can interpret brain impulses to determine if the user is focusing and using parts of the brain associated with the prescribed task. Seeing what users see is being researched as a future feature. Currently, it can receive input from the user by interpreting the user’s voice and responds to the user through the user’s eardrum.

Focus Buddy can guide focus and retrieve information for the user. The buddy can speak to the user and ask guiding questions. Here is an example of this interaction where Buddy helps:

**Buddy:** “Our priority is completing math homework right now, and I am getting indications that you are watching something funny and entertaining. I suggest we get back to work.”

**User:** “You are right Buddy. Can you remind me of the formula for velocity?” “Oh, and which question did I have to do next?”

**Buddy:** “Velocity equals time over distance, and you were on question twenty-six.”

**User:** “Oh yeah, this is the last question. What else do I need to get done tonight before I go to bed?”

**Buddy:** “You still have some biology reading to do, but that is it for tonight. Your mom also asked you to load the dishwasher when you were finished with your homework.”

**User:** “That’s right. Thank you.”

## Discussion

The topic of human augmentation has become more heated as the technology gets more advanced and is now being surgically implanted into humans. Who stands to benefit the most through its growth and who stands to be negatively affected (who is going to win or lose) if human augmentation is not employed ethically? Take a moment to reflect on your own ideas and what other people or entities come to mind before answering the first discussion question.

### Discussion Question #1:

A **stakeholder** is someone who will be affected by the problem space regardless of whether they own it, use it, or are affected by second and third order effects. Some stakeholders are everyday people who do not even know that human augmentation impacted their day. Each stakeholder brings requirements for human augmentation to exist and to be used. Who are the stakeholders in this case? How do they win or lose with any outcome or issue presented?

Example stakeholders in AI include academia, government (National Science and Technology Council (NSTC)), intergovernmental (United Nations (UNESCO), World Bank), non-profit organizations (Ethics and Governance of AI Initiative, Black in AI, Queer in AI, Women in AI Ethics, Future of Life Institute), private sector (Google, Meta, IBM, Microsoft, etc.), other end-users and potentially non-users. What other stakeholders from human augmentation and digital assistants can you think of or discover through research?

### Discussion Question #2:

What is your opinion concerning what the Stevens family found concerning equitable access to Focus Buddy? Should all users be put on the same waiting list regardless of their ability to pay a premium or rely solely on insurance coverage? How does your answer affect the primary stakeholders in this case?

## The Story Continues

The Stevens decided to proceed with the initial consultation and discovered that Hailey was at low risk for complications due to her otherwise perfect health and that if they proceed with the premium service, she can be seen in just two months. They get to tour the facility, which is immaculate and covered in high tech features in every corner. Mr. Stevens remarks later that it reminds him of walking on the showroom floor at a high-end car dealership. There is a surgical room with a glass wall where they witness the implant getting inserted and attached to a patient's brain and then get to see monitors around the room light up once it is activated. The tour continues with a doctor explaining what is happening and then turns them over to a tour guide who explains the software side of the technology. The tour ends with the family seeing a room full of technicians at computer stations not so different from any other software company and an explanation that beneath them is a server farm for user data, communication, and AI processing. The tour guide then gives the family a quick feature walkthrough on the companion app on their smartphone.

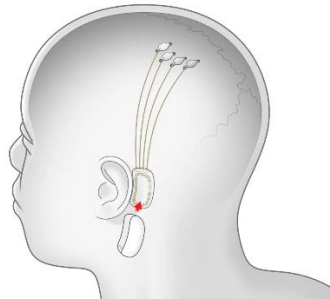


Figure 1-Implant Concept Drawing[7]; Image Credit: Neuralink

After seeing how straightforward the surgery seems to be and only a few weeks of on-site recovery, they schedule the surgery for the next school break. With Hailey's diagnosis she qualifies for some insurance coverage, but her parents pay the extra amount themselves.

### Discussion Question #3:

After the implantation surgery, most of what Focus Buddy does is basically an AI service provider. What concerns do you think users should consider when signing up for a constant monitoring service? Is Hailey's personal data safe? Who gets to access it?

### Discussion Question #4:

What could possibly go wrong? List 2-3 scenarios where this service fails to work as planned. What are the repercussions?

### Discussion Question #5:

What could go right? Out of fairness, list 2-3 scenarios where this service succeeds and enables great things for its users and society as a whole.

## Discussion Question #6:

Does gender/culture/identity have any impact on any of the answers you have provided so far? If the family portrayed was different, would it make a difference? Explain your answer. Where do you see errors in the service developed if there could be a perceived difference?

The surgery completed routinely without complication as expected and Hailey spends her recovery time in the recovery rooms where she works with Focus Buddy trainers to get used to her new AI. There is a calibration sequence that they train with for several days, opening additional features each day. By the time she is released home, she is having conversations with and getting social media updates from “Janet” her Buddy.

Once home, Janet is on duty reminding Hailey of things left behind when Hailey walks through doorways and reminds of domestic tasks Hailey routinely does, but sometimes forgets. For some reason, when Janet does the reminding, it is not annoying like when her parents did the reminding. School quickly returns to the forefront in the following days and Hailey immediately displays a better work ethic and begins to excel in her classes.

For the first few weeks Hailey’s parents are ecstatic with their decision but begin to notice how much less they are talking with Hailey and how much Hailey is always talking to Janet, but they can’t hear half of the conversation. They start to wonder how much they are missing and what is being said to their daughter for so much time of her day. The Focus Buddy app allows Hailey’s parents to see the conversation and how the Focus Buddy interprets it via a text file displayed on screen. Her parents begin to suspect that not all of the conversations are getting picked up completely or that the file they are reading is filtered and is not raw data. Hailey’s mom finds other parents in online communities discussing their observations and growing concerns. One poster shared that they discovered from the company and the fine print of their agreement that what is being hidden is actually proprietary for the operations of how the AI operates and does it differently than any other alternatives. This information is understandable, but not comforting enough to dispel uncertainty.

By the end of the school year, Hailey reaches the top 5% of her class when she used to be a barely passing student and her parents are absolutely tired of Hailey always sounding like she’s on the phone talking to one of her friends. In fact, they can barely tell the difference between a conversation with Janet and any of Hailey’s friends. Hailey’s teachers comment that they expect Hailey to do even better the following year, so her parents justify that the results speak for themselves. However, they now think they need to find a balance where Janet can be turned off or muted for certain times of the day.

## Activity

At this point in the story Hailey is reaping the benefits from human augmentation and excelling in everything she has tried so far, but her parents, who are on the outside, are noticing some negative outcomes. This scenario is not yet real but is not entirely different than what is available today. Based on the current state of this scenario, finish the story.

**Option 1.** Finish the story in a way that expands on what could go wrong in Hailey's story and then expand your focus to other users as body of people.

**Option 2.** Show the point of view of those waiting on service and are impacted by those paying premiums.

**Option 3.** Tell the story of those who oppose the use of this technology by anyone not impacted by physical disadvantages (e.g. quadriplegia, brain injury, etc.).

## Reflection and Discussion Questions

**Inequality** – Unequal access to technology is currently a topic of study [8] and will likely only get worse in scenarios such as this. If this service continues to be popular and the number of people who continue to pay for premium service, the wait times for lower income beneficiaries will continue to grow longer. If unchecked, this future society could develop into another class system of augmented vs. un-augmented humans in our society. Augmented humans could operate at higher efficiency rates and disproportionately attain higher paying jobs and earn coveted places of power in society.

- Based on historical data available today, how can other scenarios of income inequality inform this hypothetical future? How troubling could this future evolve in your own words?

**Transparency** – This human augmentation scenario relies on AI and communication integration with a smartphone. Large amounts of personal data will be streaming at all times and the augmentation provider will most assuredly keep data for further training their AI. Data storage and communication security should be of the highest caliber. It is reasonable that users should be able to see and verify what data is captured and to what purpose.

- What data do you believe would be recorded and stored in this scenario? Where would (likely and/or should) the data be stored? Should it only be housed in the provider's servers? What about third-party data centers? What data would likely be recorded for each augmented person that should be covered by HIPAA? What sort of data security would you expect for your personal data? What provisions should be in writing between a user and the provider?

**Accountability** –Should the service provider fail to maintain data security protocols, manage user data in ways not expressed within contracts, or if their hardware causes harm to the user, there should be some accountability for these actions.

- If the provider is found negligent in the handling of user data or abusing the data to the detriment of the user experience, what repercussions would you expect them to receive?
- Who would you expect to hold (or could hold) the provider accountable? Is there current policy, law, or agency in place now that could address these issues?

**Regulation** – Company policies dictate how large businesses operate and maintain standards as they grow. Government regulation ensures private citizens, regardless of relationship with businesses, are protected or represented when interests cross. Government agencies represent the external stakeholders (non-users) as well as internal stakeholders (users) when at odds with businesses. Regulation also includes oversight of unintended consequences or byproducts of the services provided such as energy consumption, waste management, and human resources. One example from this scenario is that AI server farms consume large amounts of energy as they create a lot of heat and require industrial level air conditioning. In today’s sustainability awareness it is equated with CO2 production and tied to climate change.

- What aspects of this scenario do you see government oversight through regulation as appropriate? Safety regulations? Fees? Taxes? New government bodies? New laws?
- What concerns can you perceive or predict should be regulated by the government?
- What other stakeholders could provide oversight and regulatory “watchdog” services?

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