# Thesis: User interface in sci-fiction movies



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## Declaration

We declare that this Master's thesis is our own original work. The research, framework development, film classification and analysis were conducted independently by us.

We acknowledge having used AI-based tools to support the reformulation of sentences, improvement of grammar and clarification of expression.

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## Abstract

Science fiction cinema has long served as a conceptual playground for imitating future interactions between humans and computers. But to what extent do these depictions actually reflect feasible developments and what is merely exaggeration or creative fiction designed to entertain the audience? In this paper, we explore this question.

To do this, we analyse human-computer interactions (HCI) in 20 science fiction films released over five decades. The foundation for this is a systematic literature review (SLR) in which we gathered key theories and previous studies on the interface between science fiction and HCI. On this basis, we developed a six-dimensional evaluation model that classifies cinematic user interfaces according to the following criteria: narrative relevance, technological plausibility, usability & learnability, aesthetic & emotional impact, user-system coupling and real world influence.

Each dimension was weighted and rated on a five-point scale. The films were then systematically classified according to their interaction modalities – such as voice control, gestures, virtual reality or brain-computer interfaces – and analysed using the model we developed. The results reveal recurring representation patterns, their proximity to real-world technologies and which interfaces have either already influenced technological development or show strong potential to do so in the future.

This work provides a theoretically well-founded yet practical tool for analysing speculative user interfaces in film, thereby bridging the gap between fictional design and real technological development.

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# 1 Introduction

## 1.1 Human-Computer Interaction (HCI) as a dialogue

When we interact with a computer or any digital system, we're actually having a conversation, but the user and the system speak different languages: the user has goals, ideas, and actions in mind, which are expressed in a way that makes sense to them, this is called the task language. The system, on the other hand, operates based on internal processes and technical structures, which make up its core language. The user interface is what connects these two, it acts as the middle ground where this "conversation" can happen. A good UI makes it easier for users to express what they want to do and to understand how the system responds, creating a loop of action and feedback. This loop involves the user forming a goal, choosing an action to achieve it, the system executing it, and then the user checking the outcome to see if it matches their intention. This back-and-forth is the foundation of human-computer interaction, and user interfaces are right at the heart of it.

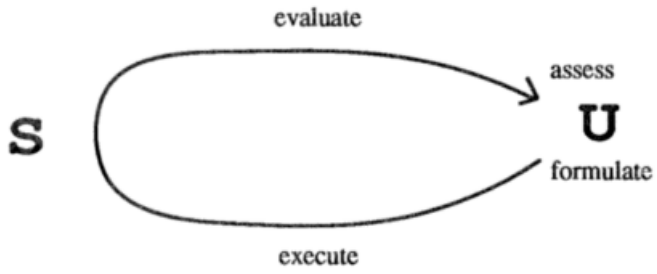



Figure 1: Four Stages of Interaction Between User(U) and System(S)

In this figure, we can see that the System and User each have their own way of communicating with their own languages and ways of expressing ideas and actions. We will call the System language, the core language which contains system attributes and the User's language, the task language which contains psychological attributes. The communication between the two languages represents a cycle of explication and evaluation where the User formulates a goal and then decides the task to perform in order to achieve the goal, the task is executed on the System side and the result of the operation is evaluated to see if it agrees with our original goal. This is the basic model of interaction between humans and computers (Abowd & Beale, 1991).

## 1.2 Human-Computer Interaction Models

In this new figure, we develop this model: the nodes represent the 4 main components in an interactive system: the System, the User, the Input and the Output. Each component expresses its own purpose in this interaction. Basically, it is the same explanation as before, the User will do a task by using the machine through an Input, therefore the task will be translated into the input language which will be translated into the core language to be performed by the System. System will send a response to the User, called the Output, User can observe and/or evaluate the result of his interaction.

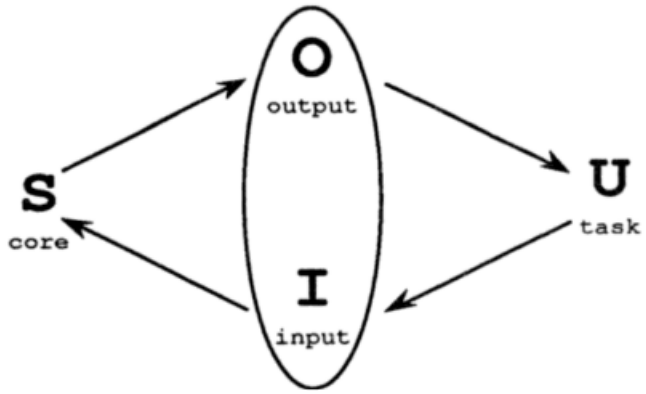



Figure 2: The General Interaction Framework

Input and Output form the system interface but there is a distinction between the system interface and the physical interface. The physical interface is part of the system that is in direct contact with the user in the real world such as screens, buttons or sensors. And in this physical interface, there are subsets interface like voice interface, tangible interface (Abowd & Beale, 1991)....

### 1.3 What is a User Interface?

This diagram shows the user on the left side interacting with a computer device on the right side, arrows represent the input and output flow between them. The user interface is illustrated by a dividing wall that lets user output pass into the system side to become input for it and conversely.

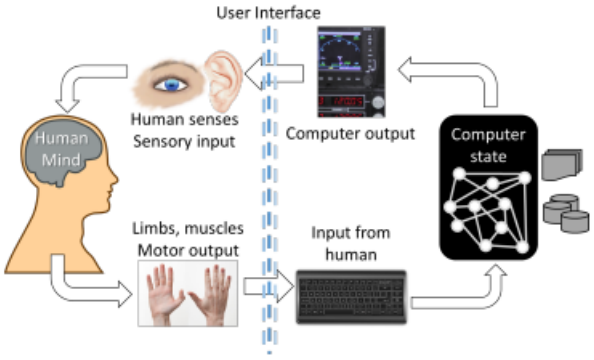



Figure 3: User interface

In summary, there are three elements that are interconnected through a user interface: a computational device, a (human) user and a set of objects which are part of the process. With all these elements, we can define a user interface:

"A user interface is an artifact, meaning that it has to be designed and built with a purpose, that connects a computational device and a human user, enabling the effective coupling of the

motor, sensitive, perceptive, cognitive and volitional faculties of the human with the input, storage, processing, and output capacities of the device, for the set of tasks that are related to a particular set of objects" (Clemmensen, 2022).

## 1.4 Research Aim & Questions

Defining a clear research question is essential to provide focus, direction, and structure to our thesis. To ensure clarity and coherence, the GQM framework will be applied (Basili et al., 1994), this goal is systematically decomposed to effectively structure and guide the research process. The GQM framework works in three hierarchical levels:

- **Goal:** Defining a clear goal that explains the purpose of our thesis
- **Question:** Formulating specific questions that help decompose that goal into parts to be explored
- **Metric:** Identifying metrics that provide quantitative or qualitative data that have to be measured or observed to answer those questions.

The goal of this thesis is to perform an analysis of interaction modalities (eg by voice, by gesture, on tabletop) as they are presented in recent movies and to classify them according to some taxonomy to identify which ones are the most frequent, recent, advanced, etc. What leads to the following goal:

**Goal:** "Analyze sci-fi movie user interfaces to evaluate to what extent they reflect, exaggerate, or anticipate real-world human-computer interaction."

Then, to fully address the goal of our thesis, the main research aim is decomposed into four questions, each targeting a different dimension of the topic.

**Questions:**

- *What interaction modalities appear most frequently?* is essential to establish an understanding by identifying which interaction modalities (such as touchscreen, voice commands, or hand gestures) appear the most in sci-fi films. This gives us a clear picture of which methods are seen as futuristic or high-technology, and shows what audiences might be used to seeing as the "norm" for advanced technology.
- *How do they vary across eras?* allows for an exploration of how representations of user interfaces evolve over time. Different styles of sci-fi often imagine technology in unique ways and movies from different decades reflect the concerns or hopes of their time. This question will help track how our ideas about technology change over time.
- *Which are shown as more "advanced" or user-friendly?* addresses how the usability and complexity of these user interfaces are framed in the narrative. Some systems may appear effortless and intuitive, while others appear deliberately complex or confusing. By analyzing this question, we can understand whether user interfaces in movies are meant to impress, intimidate, or feel natural to use.
- *How do cinematic UIs reflect or diverge from real HCI trends?* connects the fictional world to the real one. Assesses whether what we see on screen matches real-world technology, is inspired by it, or is just pure speculation. This is key to seeing how movies shape how we

think about future technology and how real technology might be inspired by what we see in movies.

To address these questions, metrics will be used such as counting how often different interaction types appear, grouping them by decade, looking closely at the design and usability of the interfaces shown and comparing what's on screen to actual developments in human-computer interaction. Applying the GQM framework will provide a clear and traceable methodology that ensures alignment between the goal, the questions and the data collected, the metrics. This approach will facilitate our comprehension analysis of interaction modalities in sci-fiction movies.

| **Goal** | **Question** | **Metric** |
|---|---|---|
| **Analyze sci-fi movie user interfaces to evaluate to what extent they reflect, exaggerate, or anticipate real-world human-computer interaction.** | What interaction modalities appear most frequently? | Count and categorize modalities used across a representative sample of sci-fi films. (See Section 6.1) |
| | How do UI modalities vary across eras? | Frequency and type of modalities grouped by time. (See Section 6.2) |
| | Which UIs are represented as more "advanced" or user-friendly? | Qualitative analysis of usability, narrative relevance and emotional impact. (See Section 6.3) |
| | How do cinematic UIs reflect or diverge from real HCI trends? | Qualitative analysis based on realism, technological plausibility and influence on HCI trends. (See Section 6.3) |

Table 1: GQM Framework for Analyzing Interaction Modalities in Sci-Fi Films

# 2 Theoretical Background & Literature Review

## 2.1 Principles of Interaction Design

To analyze how interaction modalities in sci-fi films are represented and classify based on frequency, advancement, and correspondence to real-world HCI trends, we need a way to evaluate these HCI designs. Don Norman's principles of interaction give us that structure; his approach on focusing on how people perceive, think, remember and make decisions is deeply connected to cognitive psychology. For him, we should not force users to adapt to the system, rather the system should be built around how people naturally think and behave. We believe that by comparing sci-fi user interaction to Norman's framework, we can identify which elements align with our actual user interaction, which reflect real-world HCI. Also we can identify which are exaggerated for cinematic effect regarding the visual or narrative effect and which might anticipate future HCI.

Norman's ideas will raise many questions for us: Is it clear what you can or cannot do? Can the user understand the system without instructions? Is it straightforward to begin interacting with the interface? These are simple questions that are essential for the usability of the HCI. We are analyzing how the user interface would actually work for a person: If it were understandable, helpful or more confusing, overwhelming. Thus, Norman's principle will help us bridge the gap between science fiction movies and real-world design.

Here are the principles of interaction design of Don Norman that we will use to look at how user interfaces seem reel or futuristic:

### 2.1.1 Affordance

"What actions are possible based on the design?"

Affordance is the relationship between the user and the object that enables action. A chair, for example, invites users to sit on. When something gives the right action, people do not have to think about it, it is natural, so you will not need of manual or instructions. Now, if you've ever tried to push a door that was actually meant to be pulled, you've experienced bad affordance.

In sci-fi movies, many futuristic interfaces like the screens in Minority Report are designed to clearly afford hand gestures. We see that Tom Cruise drags, rotates, and zooms with ease. These affordances are strong visually, and the audience quickly understands what is happening. But in real life, it is not the same thing: constantly using large arm movements would be exhausting. So, while the affordances are clear for storytelling in Minority Report, they might not hold up in real-world use case. A question we could ask is: Is this usable, or just cinematic?

### 2.1.2 Signifiers

"What cues show users where to act?"

Signifier communicates where an action should take place, Norman refers to them as "any mark or sound, any perceivable indicator that communicates appropriate behaviour to a person." For instance, a big red button usually indicates that it will perform a critical action, such as an emergency exit. It is very helpful, indeed, without a clear signifier, people would be confused or lost.

In sci-fi movies, to help both the character and the viewer understand what's happening, user interface often rely on glowing edges, pulsing icons, sound effects, or motion. In Iron Man, for example, Tony Stark's holographic UI highlights objects when he looks at or touches them. These are all signifiers telling us that this is interactive, it is a usable HCI in the movie but we might question whether the overload of visual effects would be too distracting or noisy for real-life use.

### 2.1.3 Feedback

"How can users know their actions worked?"

Norman describes feedback as "some way of letting you know that the system is working on your request." He also explains that feedback must be immediate, informative, discreetly planned, and prioritized. It matters because people need confirmation, if you click a button and nothing happens, you will feel unsure. Indeed, without a clear feedback, we question whether our actions had any effect.

In sci-fi movies, science fiction movie interfaces exaggerate feedback to make things clearer for the audience. For example, in Star Trek, when a command is entered, there's usually a beep or a change in screen color. In Avatar, the data on holographic interfaces often reshapes instantly with satisfying motion. This makes sense, but in reality, too much feedback especially visual and audio can overwhelm the user.

### 2.1.4 Mapping

"Does the relationship between controls and their effects feel natural?"

"When mapping uses spatial correspondence between the layout of the controls and the devices being controlled,it is easy to determine how to use them." - Norman. In other words, mapping is the relationship between a control and its effect. A good mapping means the result of your action will feel natural like moving a joystick forward to move something forward.

In sci-fi movies, gestural-based interfaces often look like they have good mapping, but not always.In Minority Report, some gestures have clear outcomes like zooming, swiping, but others aren't as obvious. A question to ask is: Would a user know what gesture to use without training?

### 2.1.5 Constraints

"How does the design prevent errors or limit misuse?"

"Physical, logical, semantic, and cultural constraints guide actions and ease interpretation." — Don Norman. Constraints are the limits built into a system to guide users and prevent errors, they help keep people on the right path.

In sci-fi movies, interfaces often appear to have no constraints, they give characters full control over complex systems with zero or minimal restriction. For example, In Ex Machina, the interface controlling the AI appears seamless and open-ended. But without clear limits or safeguards, errors become more likely, that's why a good real-world system would guide the user, not just give them unlimited power.

### 2.1.6 Visibility

"Can users see what they need to interact with?"

Visibility is whether the user can see what they need to do or no, if an action is possible, it should be visible. Users shouldn't have to guess what actions are available, rather they should be able to see it clearly.

In sci-fi movies, the interfaces often try to look clean and minimalist. For example, in Her, the AI interface has almost no visible controls, everything happens through conversation. It is a nice interface but what if the user wants to adjust settings? With no visual cues, the user has to rely on memory or guessing.

### 2.1.7 Consistency

"Does the system behave the same way across different situations?"

Consistency means that similar things look and behave the same way across the system. Once a user will learn one part of the interface, they should be able to apply that knowledge elsewhere. When design action are repeated, users feel more confident and less frustrated.

In sci-fi movies, some interfaces show strong consistency. For example, In Iron Man, Tony's tech follows the same style whether he's in the lab, the suit, or talking to J.A.R.V.I.S. Everything feels part of one same interaction style. But in The Matrix, interfaces shift based on who's using them or where they are. It makes for a fun visual for the movie but from a HCI point of view, it would be hard for a real user to learn and use (Norman, 2013).

## 2.2 Systematic Literature Review (SLR)

### 2.2.1 Introduction

Science fiction (sci-fi) cinema has long served as a conceptual testbed for human-computer interaction (HCI). Filmmakers envision futuristic user interfaces (UIs) that both reflect contemporary technological dialogues and push beyond them. When we interact with computers today, we engage in a kind of dialogue: the user expresses intentions through input, the system responds via output, and this loop continues until goals are met. The user interface bridges the user's "language" of goals and actions with the machine's operations, enabling this conversation. (Abowd & Beale, 1991) Sci-fi movies dramatize this interaction loop by showing novel ways humans might converse with machines – from talking to starship computers to manipulating immersive holograms. These imaginative interfaces often exaggerate current technologies or predict future ones, sometimes decades before they become real. As design leader Aaron Marcus noted, sci-fi media makers were effectively "*rapid prototypers . . . among the first user-experience designers,*" visualizing new HCI paradigms long before commercial products existed (Marcus, 2013). This literature review surveys how UIs in sci-fi film both mirror and influence real-world HCI, structured around historical evolution, interaction modalities, and the reciprocal exchange between speculative fiction and technological development.

Researchers have increasingly examined this interplay. Marcus organized early panels at CHI (1999) to pose key questions on the sci-fi/HCI relationship. More recently, Jordan et al. conducted a systematic analysis of how often sci-fi is referenced in elite HCI literature, finding numerous examples of sci-fi inspiring HCI research themes – from theoretical design concepts to visions of AI and ubiquitous computing. Such studies confirm an intuition shared by both fans and technologists: the futuristic UIs in films are not mere fantasy but part of a "discursive symbiosis" between fiction and HCI practice (Jordan et al., 2018). In the sections that follow, we first outline the historical progression of cinematic user interfaces, then classify prominent interaction modalities depicted in sci-fi. We next discuss key case studies and the documented influence of those fictional interfaces on real-world technology design. Finally, we consider the narrative purposes and conceptual explorations served by sci-fi interfaces, how they exaggerate reality for storytelling and provoke reflection on human–technology relationships.

### 2.2.2 Historical Evolution of Sci-Fi User Interfaces

Early science fiction films (1900s–1950s) offered only sparse visions of human-computer interaction, often limited by nascent special effects and minimal public familiarity with computers. In the 1927 film *Metropolis*, for example, technology is portrayed through a humanoid robot and a control room full of mysterious dials, striking images with "no logical explanation" of operation. The robot Maria is brought to life in a laboratory that reads more as alchemy than engineering. Such depictions were unconcerned with realistic UI details, as directors like Fritz Lang focused on visual impact over scientific plausibility. Even mid-century classics maintained this trend: *The Day the Earth Stood Still* (1951) features an alien emissary and robot with seemingly magical capabilities and no clear interaction mechanism shown. (Kurosu, 2014) In these early works, any "user interface" tended to be literal knobs, levers, and blinking lights, familiar industrial-age controls carried into fictional settings without introducing new interaction paradigms. This reflected the era's technological limitations: filmmakers themselves had little reference for computing interfaces, and special effects could not easily portray dynamic, screen-based interactions. (Schmitz et al., 2008)

By the 1960s and 1970s, sci-fi began incorporating more thoughtfully designed interfaces, paralleling real-world advances in computing. Stanley Kubrick's *2001: A Space Odyssey* (1968) is often cited as a turning point. The film showed astronauts using flat-screen display panels (presaging modern tablets) and interacting with an AI computer, HAL 9000, entirely via voice. Notably, HAL's calm conversational speech and glowing red "eye" became an iconic vision of a computer interface. While *2001*'s spacecraft consoles still had arrays of lights and buttons, the film introduced the idea of a ubiquitous, context-aware voice UI controlling the ship. In one famous scene, two astronauts speak in a sound-proof pod to evade HAL's hearing, only for the AI to read their lips through a window, illustrating sophisticated (if unsettling) input recognition. This dramatized a future where computers might interpret visual cues like lip movements, which at the time was purely speculative. Decades later, research in computer vision caught up: automated lip-reading and facial recognition have since become active areas, validating Kubrick's imaginative leap. *2001* also inspired real technology in direct ways; for instance, the film's flat personal displays anticipated modern tablets so uncannily that tech companies have cited it in patent discussions. Perhaps more directly, HAL's polite yet haunting voice set a cultural expectation for intelligent assistants, an aspiration that has guided AI interface design from early chatbots to Apple's Siri. (Schmitz et al., 2008)

Following this, the late 1970s and 1980s saw sci-fi UIs oscillate between the fantastical and the practical. *Star Wars* (1977) gave audiences the memorable holographic projection of Princess

Leia, a 3D image communication with no evident user input device. This popularized the hologram as a sci-fi UI trope, even though the film's technology was space fantasy and not grounded in HCI research. (Interestingly, a real 360° light-field display capable of a Leia-like effect was demonstrated decades later, in 2007, though still with significant technical limitations.) In contrast, *Star Trek* on television (1960s–80s) and film presented a range of interfaces that, while futuristic, were conceptually closer to real research. The original *Star Trek* series had crew members flip open communicator devices (a precursor to mobile phones) and request information from a talking computer. By *Star Trek: The Next Generation* (1987), the Starfleet computers featured "perfect speech interfaces", the starship computer could understand natural language commands flawlessly, responding instantly. For example, an episode shows Commander Riker asking the computer for directions; it replies with a spoken route and even highlights arrows on corridor walls to guide him, a multimodal navigation aid. At a time when real user interfaces were primitive command lines, *Star Trek* envisioned conversational, context-aware assistance that remains an ideal even today. This franchise's influence is tangible: computer scientists at MIT in the 1990s, developing an intelligent environment, explicitly emulated *Star Trek* by using the same activation keyword ("Computer?") and acknowledgement chime for their voice-activated room. Here, life imitated art: researchers designed UIs to meet the expectations shaped by popular sci-fi, even if the underlying tech was not yet "Star Trek-level." (Schmitz et al., 2008)

From the late 1990s into the 2000s, sci-fi films began collaborating with HCI experts to portray "authentically" futuristic interfaces. This era produced some of the most influential cinematic UIs. Steven Spielberg's *Minority Report* (2002) famously consulted a team of technologists (including MIT's John Underkoffler) to design its gesture-based computer system. The film's hero manipulates information on a transparent screen by waving his gloved hands in mid-air, performing grab, zoom, and fling gestures to sift through visual data. This portrayal was directly "influenced by the development of non-verbal interfaces and other research trends in HCI," and it showed a detailed, visually rich interaction unlike any previous film (Kurosu, 2014). Importantly, the *Minority Report* UI was not pure fantasy: the production chose to include technical constraints like the glove-based tracking to make the interaction feel plausible. The result was so believable and exciting that it got people thinking about using gestures instead of keyboards or mice and indeed it sparked a surge of real-world interest in gestural interfaces. (Schmitz et al., 2008) Researchers demonstrated prototypes inspired by the film within a few years, and companies like Microsoft later released the Kinect sensor enabling similar interactions. In retrospect, *Minority Report* marks a shift where sci-fi didn't just predict technology but actively guided it: the film effectively functioned as a design prototype that technologists sought to implement in reality. Underkoffler himself turned the fictional system into a real product years later, underscoring the tight loop between the imagined and the real. (Cheung & Antle, 2020)

In the 2010s and beyond, sci-fi UIs have grown even more diverse, often reflecting contemporary emerging tech like augmented reality, wearables, and artificial intelligence. Films like *Iron Man* (2008) and *The Avengers* (2012) showed characters using gestural and voice-controlled holographic interfaces. Tony Stark's lab displays and the S.H.I.E.L.D. helicarrier's transparent screens merged touchless gestures with 3D visuals. These interfaces exaggerate what was technically available at the time (real AR was rudimentary), but they weren't pure fantasy; filmmakers extrapolated from early AR research and head-up displays to imagine more advanced versions. In *Her* (2013), by contrast, the UI is understated: a near-future operating system is represented mostly through a voice (the AI "Samantha") and a minimalist mobile device. This film's focus on a voice-based personal assistant directly mirrors the rise of real voice assistants in the 2010s (Siri, Alexa, etc.), exploring the emotional and social dimensions of such technology.

Notably, *Her* came just as these products were entering homes, and it extrapolated how deeply integrated and human-like they might become, raising questions about empathy with AI. By the mid-2020s, sci-fi has tackled UIs for virtual reality and brain-computer interfaces as well. Films like *Ready Player One* (2018) depict fully immersive VR worlds navigated with haptic suits and visors, while series like *Black Mirror* imagine brain-linked implants controlling digital experiences. These continue the pattern of drawing on the latest tech trends (VR headsets, BCI experiments) and pushing them further. In short, as real HCI progresses, sci-fi both keeps pace – incorporating things like ubiquitous touchscreens and voice AIs as soon as they're known – and pushes forward – proposing interactions (mind-control interfaces, etc.) that remain aspirational (Cheung & Antle, 2020).

This historical sweep demonstrates a tightening feedback loop: early sci-fi introduced the idea of interactive machines in simplistic ways; later works integrated actual HCI research concepts; and now real designers sometimes take cues from sci-fi depictions that were, in turn, informed by design foresight. Next, we categorize the main interface modalities frequently depicted in science fiction, noting how each reflects or augments real-world HCI paradigms.

### 2.3 Reciprocal Influence Between Film Interfaces and Real HCI

The relationship between fictional UIs and real-world technology is bidirectional. On one hand, as numerous examples above illustrate, sci-fi films have anticipated or inspired real HCI innovations. On the other, the state of real technology and research often directly informs how sci-fi creators design their on screen interfaces. This reciprocity has been noted by scholars and even by filmmakers themselves.

Influence of Sci-Fi on Real Technology and Research: There are many documented cases where a technology first seen in sci-fi later became reality, sometimes through the explicit effort of inventors who were motivated by the fiction. A classic case is the Star Trek communicator, a flip-open wireless device used by Captain Kirk and crew in the 1960s series, widely acknowledged as an inspiration for the first mobile phones (Motorola's lead engineer on the cellphone project, Martin Cooper, has cited Star Trek as an influence). Similarly, the tricorder gadget from Star Trek (a handheld sensor/analyzer) seeded the idea for modern handheld computing and medical diagnosis devices; even today there are "tricorder X-prize" competitions to create a medical multi-sensor akin to the fictional one. (Cheung & Antle, 2020)

Another example: Total Recall (1990) showed autonomous cars with voice-controlled navigation, essentially predicting GPS and voice turn-by turn directions. Today, such systems are commonplace in smartphones and cars, fulfilling that vision (minus the self-driving aspect, which is now in progress). 2001: A Space Odyssey introduced the idea of a videophone call from space, which seemed far-fetched in 1968; by the early 2000s, video calls via Skype were routine, and by the 2020s, mobile video chat is ubiquitous. It's not that Kubrick's film directly caused video chat to be invented (the underlying networks had to catch up), but it visualized the concept so powerfully that it stayed in collective ambition until it was achieved. Researchers point out that such iconic depictions "stimulate desire in audiences to see those possibilities become realities" (Cheung & Antle, 2020). David Kirby, a scholar of science and society, coined the term "diegetic prototypes" to describe fictional technologies portrayed in films that demonstrate to audiences (and to future engineers) how they could work and why they would be desirable. The Minority Report interface is a prime diegetic prototype: it showed a compelling way to interact with big data via gestures, and technologists went on to prototype similar systems because the film had essentially done a usability demo for the idea. (Kirby, 2010)

Academic analyses support this phenomenon. As (Jordan et al., 2018) found that HCI research papers often explicitly reference sci-fi movies when introducing new interaction techniques or paradigms, effectively using sci-fi scenarios as motivation or justification. For instance, papers on multi-touch in the mid-2000s referenced Minority Report to contextualize the benefits of more natural input. Papers on social robots or AI sometimes mention Star Wars (for R2-D2 and C-3PO) or 2001 (for HAL) in discussing user expectations of robot personalities categorized such references under "HRI and AI inspired by sci-fi". Even design principles have been influenced: a set of design heuristics for future interfaces by a group of researchers was directly derived from analyzing sci-fi UIs. (Jordan et al., 2018) In short, sci-fi serves as a creative reservoir for HCI. It provides concrete visions that researchers can critique,adopt, or refine.

Aaron Marcus's 2013 article in Interactions magazine urged technologists to actively mine sci-fi for ideas, noting that "much can be learned if one takes the time to look" and that sci-fi "softened up" the public to new technologies . He even suggested that sci-fi films can act as virtual focus groups or test beds for novel interfaces – by observing audience reactions to a fantastical UI, designers might gauge what seems intuitive or appealing. (Marcus, 2013)

Beyond inspiration, sci-fi can influence the direction of consumer demand. When the average person sees a fantastical UI in a blockbuster movie, they may begin to expect or desire similar capabilities in the technology they buy. (Schmitz et al., 2008) noted that "popular shows... have created an expectation [in consumers] that probably can't be met in the near future", citing perfect speech and holograms as examples. This can pressure companies to invest in those areas. For example, the popularity of voice-controlled AI in films likely contributed to big tech companies racing to develop voice assistants in the 2010s. Likewise, the proliferation of holographic UI scenes in movies has led startups and labs to focus on AR displays, not solely due to film, but film certainly popularized the idea. There's even anecdotal evidence: after Minority Report, sales of data gloves and interest in gesture tech spiked. After Iron Man, more people became aware of AR concepts, helping firms working on AR find a receptive audience (and investors). In education and outreach, references to sci-fi are often used to excite students about HCI innovations (e.g. "build the next Jarvis"). Thus, sci-fi doesn't just predict, it also accelerates, it helps manifest the future by planting seeds in the minds of those who will create it.

Influence of Real HCI on Sci-Fi: The exchange is not one-way. Sci-fi UI designs are increasingly informed by real-world technological progress and by consultation with HCI experts. As special effects have advanced, filmmakers can depict almost any interface they imagine, but to resonate with viewers, the interface designs usually have some grounding in plausibility or familiar interaction logic. Many films employ technical advisors or even interface designers to create their fictional UIs. The Minority Report team consulted with interface designer John Underkoffler, who drew on his knowledge of research prototypes to craft the film's gesture system (Kurosu, 2014) (Schmitz et al., 2008). Similarly, Iron Man's Jarvis interface had input from UX designers who thought about how an AI assistant might realistically organize Tony Stark's information (some of Jarvis's display layouts actually follow known UI patterns, just in 3D form). Her (2013) director Spike Jonze reportedly talked with AI researchers to ensure Samantha's interactions felt technologically credible (within a few decades of advancement). This trend of filmmaker–technologist collaboration means many sci-fi UIs are essentially exaggerated versions of existing tech. For example, in Mission: Impossible Ghost Protocol (2011), there's a projected touchscreen on glass used as an improvised UI, this was based on real projections and camera technology, just pushed a bit further. The Avengers (2012) showed an aircraft carrier control

table that strongly resembles a giant Microsoft Surface-style touch table, because by that time such devices existed and audiences could accept a fictional enhanced variant. By incorporating real research, filmmakers add authenticity.

(Schmitz et al., 2008) visualized this interplay as an "influence cycle" between technologists and filmmakers: "technologists and filmmakers end up influencing each other... one side inspires the other through their products (films or technologies)" (Figueiredo et al., 2015) summarizing this point. In some cases, the cycle becomes a collaboration in real time. For instance, when designing the UI concepts for Avatar (2009), James Cameron's team looked at then-cutting-edge military UI research to inform the multi-screen and AR systems shown in the film. Conversely, after the film's success, some of the fictional UI elements (like interactive 3D maps in the operations center) were used as references in DARPA proposals for improved command-and-control interfaces. This is a clear feedback loop: reality informs fiction and fiction guides reality.

Another example of influence is how contemporary UI aesthetics show up in sci-fi set in the near future. The prevalence of touchscreens in real life led to near-future films (late 2000s onward) depicting transparent or flexible touch displays everywhere. Movies like Oblivion (2013) or Ex Machina (2014) have clean, glass-based interfaces which basically take modern minimal UI design to a futuristic home or lab. They feel convincing because they're extrapolating from present design trends (flat glass, minimal buttons). In contrast, older sci-fi envisioned lots of physical buttons and flashing lights for future tech (because that was the aesthetic of their present). This highlights a simple truth: creators inevitably borrow from the familiar. It's noteworthy that as HCI has embraced simplicity and invisibility (UIs that recede into the background), sci-fi UIs have also become sleeker and less ostentatious in many cases. Her's OS has almost no interface visible at all, which may have seemed absurd in 1980, but in an age of invisible, voice-operated services, it resonates. Thus, real HCI progress (invisible ubiquitous computing, miniaturization) enables sci-fi to ditch clunkier interface tropes and explore subtle ones.

Finally, consider the limitations of special effects technology historically, which influenced what UIs could be shown. Early movies couldn't easily depict dynamic screens or 3D graphics, so future tech was shown via props and practical effects (hence knobs and printouts in '70s sci-fi). As CGI became available, more creative UI visuals emerged (e.g. Jurassic Park's 1993 animated displays). Today, CGI allows any interface concept to be visualized, removing the old constraints, which is why we see such abundant holograms and AR in modern sci-fi. Filmmakers now often work closely with graphic designers to create custom UI elements that both look good on screen and tell the story. This has given rise to a niche field sometimes called "fantasy user interface" design (FUI design) in the film industry. Many of those FUI designers have backgrounds in interaction design and take inspiration from real device interfaces. The result is fictional UIs that feel surprisingly usable or at least logically organized, even if they are more flamboyant than a real system would be. For instance, the graphical style of the Minority Report precog analysis interface, with its timeline scrubbers and video thumbnails, is not far off from video editing software in function, just controlled by gesture. The fantasy embellishment is in the translucent aesthetic and 3D arrangement. This convergence means that the gap between what we see in sci-fi and what we experience in real life interfaces has narrowed in look-and-feel, if not in underlying capability.

## 2.4 Exaggeration, Narrative Needs, and Conceptual Exploration

While sci-fi often predicts or inspires real technology, it also intentionally exaggerates or deviates from reality to serve narrative and thematic purposes. The design of a film's user interfaces

is not only about envisioning the future of technology, it's also a storytelling tool, a character device, and occasionally a social commentary. It's important to recognize these motives, as they explain why some sci-fi UIs are unrealistic by design and what HCI can still learn from them.

Exaggeration for Clarity and Drama: One reason film interfaces are often more flamboyant than real ones is to communicate quickly to the audience. A user interface in a movie scene needs to instantly convey its function and the user's actions; there is no time to show the learning of a complex interface. Thus, filmmakers use exaggeration and familiar metaphors. If a character is manipulating data, the gestures might be large and sweeping so the viewer sees "aha, he's moving things around." If a system is malfunctioning, the interface might flash red and spark, a dramatic cue far more extreme than a real software error message, but immediately understood. As (Cheung & Antle, 2020) puts it, there is a "tension between making interfaces 'out-of-this-world' and understandable", they should look advanced, yet the audience must grasp what's happening. One strategy is incorporating recognizable elements: e.g., using a physical object like a familiar keyboard or a steering wheel even in a futuristic vehicle, so viewers intuit how it works, while adding futuristic twists (perhaps the steering wheel folds away when autopilot engages). Another strategy is visual and audio feedback for every action: scifi interfaces love beeps, holographic glows, labels floating next to things because these cues externalize what an expert user might internalize, thereby keeping the audience informed. (Figueiredo et al., 2015) observed that in Sci-Fi gesture interfaces, filmmakers "use a mixture of visual and audio effects to communicate how the systems work, and if anything is malfunctioning", often for the benefit of onlookers (both characters and audience) ( (Cheung & Antle, 2020) quoting Figueiredo's analysis). Real UIs might aim for subtlety, but film UIs favor clarity and dramatic effect.

Because of this, some apparent design flaws in sci-fi UIs are deliberate. The trope of a hero furiously typing while screens scroll gibberish at lightning speed is meant to show intense activity, not to suggest a sensible interaction design. Minority Report's interface, while rooted in real ideas, is performed with a kind of operatic flair that no actual user would maintain but it made the scene exciting and memorable. It's been noted that Minority Report intentionally added minor technical quirks (like the system occasionally needing a manual adjustment) to avoid seeming too magical, yet it remained spectacular (Schmitz et al., 2008). In Star Wars, the fact that every button on a spaceship makes a loud click or that 3D maps spin with dramatic flourish isn't a prediction of UI noise, but a cinematic technique to give the impression of a complex, active system. For HCI, the takeaway is that user experience includes emotional impact, sci-fi interfaces, unshackled by practicality, maximize the WOW factor and emotional resonance. Real designers can glean how certain feedback (color changes, sound cues) can make an interaction more satisfying or understandable if used judiciously. At the same time, one must filter out the impractical excess (constant sounds would annoy users in real life, for example).

Symbolic and Narrative Roles: Sci-fi interfaces often serve as symbols or extensions of characters and societies in the story. The design of a UI in a dystopian film, for instance, might be deliberately user unfriendly to represent oppression or dehumanization. In Brazil (1985), a satire of bureaucracy, computers are clunky retro-futuristic contraptions with tiny screens magnified by Fresnel lenses, a design that emphasizes absurdity and inefficiency, underscoring the film's theme. In The Matrix, the "digital rain" cascading on operators' screens is iconic not because it's a usable interface for code (it's not, even in the story only the protagonists can read it), but because it visually symbolizes the concept of a simulated reality. This shows that sci-fi UIs are often visual metaphors. The audience reading the green code cascade understands "this is the matrix's underlying structure," a narrative point conveyed via a fictitious UI element. Similarly,

in Her, the lack of any visual UI when Theodore interacts with Samantha (just an earbud and voice) symbolizes how seamless and intimate the AI is, technology has faded into the background completely, making the relationship feel "real." Had the film shown a flashy hologram or robot for Samantha, it would break the illusion of personhood that drives the plot. So the interface choice (or absence thereof) was a storytelling decision.

In many sci-fi narratives, technology reflects the culture. Star Trek's Federation ships have clean, bright interfaces with human-centric voice interaction, reflecting an optimistic, user-friendly future, whereas the villainous Borg have stark, mechanical interfaces (or none, they interact directly via neural link) reflecting a utilitarian, collective mind with no personal touch. Star Wars again is illustrative: the Millennium Falcon's cockpit UI is full of patched-together controls and analog gauges, it tells us the ship is old, rugged, and the heroes are scrappy smugglers; in contrast, the Empire's Death Star control panels are monotonous, uniform arrays of lights, conveying a cold, industrial bureaucracy. These design choices give subconscious cues about alignment and values. Real HCI might glean from this that interface design carries cultural values an insight relevant in designing for different user groups or in imbuing brand identity in a UI. Sci-fi just makes it overt by aligning UI aesthetics with narrative tones.

Speculative Design and Ethical Questions: Sci-fi also uses user interfaces to pose "what if?" questions and explore ethical or social implications of technology. A film can take a current tech trend and push it to an extreme via a fictional interface to interrogate its impact. For example, Minority Report and several other sci fi works raise the issue of surveillance and privacy. In the film, the main character is assaulted by personalized advertising projected into his eyes as he walks through a mall, the interface scans his retinal ID and calls out his name with product pitches. This scene extrapolated the emerging trend of personalized ads and ubiquitous retinal scanners (the early 2000s saw growing CCTV and the first personalized web ads) to question what an loss of privacy could feel like. It essentially prototyped the experience of extreme personalization in public space, sparking discussion (and indeed now we talk about AR ads and facial recognition ethics in very concrete terms). Black Mirror, though a TV anthology, frequently does this with its fictional interfaces: one episode's premise of "blocking" people in real life (rendering them blurred and mute via an AR implant) used a fictional UI to explore the ramifications of social-media-like filtering applied to humans. By seeing a character struggle with a blocking interface, viewers confront the idea's dark side. This is design fiction at work using speculative interfaces to ask "Should we build this? How would society change if we did?" For HCI researchers, these fictional case studies are valuable. They are akin to usability testing of a future we haven't built yet, often revealing social dynamics and unintended consequences that pure technical research might miss. Some research papers explicitly reference Black Mirror scenarios or sci fi films when discussing potential risks of ubiquitous AR, surveillance tech, AI assistants gaining agency, etc (Jordan et al., 2018) notes design fiction emerging as a recognized method in design research, often citing sci fi).

It's also notable that sci-fi can inspire not just technology creation, but also caution. Not every sci-fi interface is meant to be emulated. Some serve as warnings – like HAL's calm voice concealing a dangerous will, or the automated weapons UI in Terminator 3 that humans trust only to have it turn against them (Skynet's activation). These narratives arguably influenced real discourse on AI safety and autonomous weapons. The UIs of these systems (bland military screens or disturbingly human AI faces) were part of how the films delivered their warning. HCI has a role in preventing such outcomes by designing transparency, fail-safes, and user control – aspects that one might prioritize having seen sci-fi's worst-case scenarios.

Finally, sci-fi reminds us of the human element in HCI through its portrayal of people interacting with tech. We often see characters struggle initially (to clue the audience in), then master the interface. We see the emotional responses UIs can evoke: frustration when a system won't listen (e.g. many comedic scenes of voice recogs failing), reliance when tech is helpful, or even love/fear toward an interface (Her and 2001 again). These dramatized interactions highlight that beyond efficiency and functionality, interfaces impact feelings and relationships. Usability includes trust and emotional resonance, concepts that sci-fi explores freely (Samantha's soothing voice in Her is an "interface" choice tuned for emotional connection, HAL's unblinking eye becomes an icon of paranoia).

In conclusion, the narrative and speculative aspects of sci-fi UIs teach us that an interface is never neutral: it carries meaning, it influences behavior, and it is part of a bigger social system. Sci-fi may exaggerate to make a point, but in doing so it surfaces truths about how people and technology coexist.

# 3 Methodology

## 3.1 Research Approach

This study involves watching a selection of recent science fiction movies . For each movie, we carefully observe and identify when a user interacts with a computer system or interface. Each identified interaction is named and described in detail, including the context of the scene, the type of interaction modality used and any notable feedback or system response.

This approach allows us to compile a comprehensive inventory of interaction modalities portrayed in contemporary sci-fi movie. By analyzing these instances through the lens of established human-computer interaction frameworks, we aim to categorize the types of interaction, assess their frequency, evaluate their realism, and understand their narrative role within the films.

## 3.2 Analytical Framework

Table 2: Analytical Framework for Evaluating Sci-Fi User Interfaces

| # | **Dimension** | **What it captures** | **Theoretical Anchor** | **5-Point Scale (1 = low ... 5 = high)** |
|---|---|---|---|---|
| 1 | Narrative Relevance | How integral the UI is to plot / world-building | Film UI "meaningfulness" (Kurosu) | cameo → plot-defining |
| 2 | Technological Plausibility | Perceived realism of underlying tech today | Reality vs. fiction continuum (Schmitz et al.) | impossible → off-the-shelf |
| 3 | Usability & Learnability | Can an on-screen user operate it efficiently? | Nielsen heuristics; ISO 9241-210 | unusable → effortless |
| 4 | Aesthetic & Emotional Impact | Visual / auditory "wow" and affective response | UX emotional-appeal models; cinematic spectacle | bland → iconic |
| 5 | User-System Coupling | How tightly physical actions map to system response | MCRpd coupling principles (Cheung & Antle) | low feedback → seamless |
| 6 | Real-World Influence | Evidence the UI inspired, or was inspired by, actual HCI | Case studies of crossover tech (e.g., *Minority Report* ↔ Kinect) | none → verified adoption |

To systematically evaluate the user interfaces (UIs) in sci-fi movies, we developed a six-dimensional analytical scoring framework grounded in research from Human-Computer Interaction (HCI), speculative design and film studies.

The first dimension, *Narrative Relevance*, is based on research showing that movie UIs are most effective when they support the storyline and help audiences connect with characters or plots. Interfaces that are integral to the narrative appear more purposeful, increasing viewer engagement and belief in the fictional technology. (Murnane et al., 2020)

The second dimension, *Technological Plausibility*, is informed by studies in speculative and futuristic design within HCI, focusing on the feasibility of depicted technologies. It distinguishes between interfaces that could plausibly exist based on current technological trends and those that are purely imaginative or impossible given current science. (Sanchez et al., 2025)

The third dimension, *Usability and Learnability*, leverages classical usability theory including Nielsen's usability heuristics, cognitive engineering principles, and Shneiderman's golden rules. These widely adopted principles in interface design ensure that sci-fi UIs are evaluated for their potential ease of use and intuitiveness if implemented in real-world scenarios. This dimension assesses whether characters and by extension viewers can quickly understand and interact with the interface without confusion. (Molich & Nielsen, 1990) (Grudin, 2012) (Carroll, 2003) (Rapp, 2023)

The fourth dimension, *Aesthetic and Emotional Impact*, stems from research into the emotional appeal and visual design principles of interaction design. This research emphasizes the importance of aesthetics and how the visual style of interfaces influences emotional engagement, immersion, and overall viewer experience. (Joyce et al., 2017)

The fifth dimension, *User-System Coupling*, is grounded in tangible interaction models such as Cheung and Antle's minimal coupling (MCRpd model). This dimension addresses how naturally and directly users can interact with the system through physical gestures, tangible controls, and immediate feedback, reflecting recent developments in tangible user interfaces and embodied interaction research. (Cheung & Antle, 2020)

Finally, *Real-World Influence*, is inspired by literature documenting how sci-fi interfaces have impacted real-world HCI development. This dimension examines whether the depicted technologies have influenced actual interface design, inspired commercial products, or accurately predicted technological advancements, creating a meaningful cycle of influence between fiction and real-world innovation. (Schmitz et al., 2008) (Figueiredo et al., 2015)

Together, these dimensions create a robust yet clear framework for analyzing sci-fi movie UIs, bridging narrative theory, usability heuristics, emotional design principles, tangible interaction models, and real-world technological insights. This approach not only simplifies analysis but also connects cinematic depictions with grounded HCI research and theory.

To reflect the relevance of each dimension to our research objectives, we assigned a weight between 0 and 1 to each. The total sum of weights will be equal to 1, ensuring that each dimension contributes proportionally to the final evaluation score. Initially, both authors independently proposed weightings based on their interpretation of the research questions' priorities. These individual assessments were then discussed and refined until we reached a shared consensus on the final set of weights:

- Real-World Influence: **0.225**.

  This dimension is closely related to our thesis goal because it captures whether and how fictional UIs inspire or are inspired by actual HCI technologies. (Marcus, 2013) explains

that creators of sci-fi UIs act like early testers and designers, by imagining new ways people might interact with computers well before these ideas become real products. Since our goal is to analyze how sci-fi UIs reflect, exaggerate, or predict real-world human-computer interaction, we believe that understanding this influence is essential which is why we decided to assign it the highest importance in our framework.

- Technological Plausibility: **0.2**.

  This dimension evaluates how believable or feasible the sci-fi UI technologies are compared to current real-world technology. Since our thesis goal is to analyze to what extent sci-fi UIs reflect, exaggerate, or anticipate real human-computer interaction, evaluating the plausibility will help us distinguish which interfaces are grounded in reality and which are purely imaginative or exaggerated. This makes technological plausibility a important factor in understanding how close fictional interface are to actual HCI development which justifies the assigned weight. (Schmitz et al., 2008)

- Usability & Learnability: **0.175**

  This dimension assesses how easily users can understand and effectively operate the sci-fi user interfaces. (Norman, 2013)'s seven principles of interaction design highlight key factors that make interfaces intuitive and learnable and (Nielsen, 1994) highlights simple design rules that make interfaces easier to use by reducing user confusion and preventing errors, that helps users interact smoothly and with less effort. We assign this dimension a moderate weight because usability is essential for realistic interaction however sci-fi interfaces often prioritize spectacle over practical use.

- Aesthetic & Emotional Impact: **0.175**

  The fourth dimension, Aesthetic and Emotional Impact, stems from research into the emotional appeal and visual design principles of interaction design. Numerous studies have shown that visual aesthetics significantly influence user experience, not only by shaping first impressions, but also by affecting usability, trust, and emotional engagement. As Zen and Vanderdonckt (2016) argue, user interface aesthetics are a key factor in perceived usability and overall satisfaction, even surpassing usability in early evaluations. Their experiment, which compared human judgment with computed aesthetic metrics, confirmed strong intersubjective agreement on dimensions such as symmetry, simplicity, and proportion metrics shown to align with users' aesthetic preferences and emotional responses. (Zen & Vanderdonckt, 2016) (Zen et al., 2023)

  (Joyce et al., 2017) further highlight how aesthetic design influences narrative immersion and emotional investment in interactive systems. Aesthetics help users construct meaning, orient themselves in complex interfaces, and develop emotional bonds even in fictional or speculative settings. This aligns with Norman's (2005) concept of visceral and reflective responses, where immediate visual appeal leads to deeper emotional attachment and perceived ease of use. Including this dimension in our framework is thus essential, as cinematic UIs are designed not only for functionality but also for dramatic and emotional effect. Their aesthetic quality shapes how both characters and audiences interpret, trust, and engage with the interface. (Tractinsky et al., 2000)

- Narrative Relevance: **0.125**

  This dimension assesses how central the user interface is to the plot or world-building of the film. In many sci-fi movies, interfaces are not just tools but storytelling elements and (Kurosu, 2014) highlights the concept of meaningfulness in interface design by suggesting

that interfaces carry not only functional value but symbolic and emotional meaning as well. While this enriches the cinematic experience, we believe that narrative relevance is less directly tied to our thesis goal of evaluating how sci-fi UIs reflect or anticipate real-world HCI, which is why we assigned it a lower weight.

- User-System Coupling: **0.1**

  This dimension examines how closely the user's physical or cognitive actions are linked to system responses: how "in sync" the user and interface appear. In sci-fi, this can range from highly responsive gesture or voice interfaces to neural connections like brain-computer interfaces. (Cheung & Antle, 2020) describe strong coupling as essential to creating a sense of control and immersion where system feedback closely matches user input. However, from our perspective since coupling is often exaggerated in sci-fi for dramatic effect and less directly reflects real-world feasibility, we assign this dimension the lowest weight in our framework.

Each selected movie is rated across these dimensions on a scale from 1 to 5 where higher scores indicate stronger or more positive manifestations of the dimension and lower scores indicate weaker appearance of the dimension. The rating process worked as follows: each movie was evaluated independently by both authors and whenever a disagreement occurs, we either took the average of both ratings or discussed the scores until reaching a fair consensus. Each dimension score was then multiplied by its respective weight and the results were averaged to produce a single overall evaluation score for each movie. (See Section 5)

### 3.3 Film Selection Criteria

We selected a sample of sci-fi movies that are relevant to our thesis because they show a variety of user interface, especially impactful ones or interfaces that have influenced the real world. Our selection includes films from different eras in order to provide a wider perspective of our study.

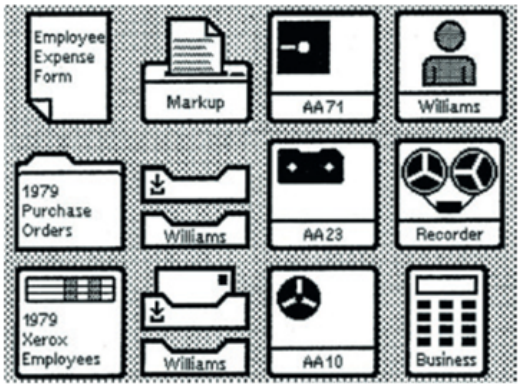
| **Movie (Year)** | **Justification** |
|---|---|
| 2001: A Space Odyssey (1968) | This film was selected because it was one of the first to imagine advanced user interfaces, by showing voice-controlled AI. HAL 9000's voice introduced ideas far ahead of their time, influencing both sci-fi and real-world interface design. (Schmitz et al., 2008) |
| Avatar (2009) | It was included for its demonstration of advanced gesture-based and holographic interfaces, which anticipated real-world trends in VR and spatial computing. Its immersive UI design made it a must-include in my sample of sci-fi movies. (Walt, 2010) |
| Black Panther (2018) | Notable for its creative use of wearable technology through the Kimoyo beads. These beads look like jewelry but act as high-tech tools. It's a great example of how everyday objects can be turned into advanced user interfaces in sci-fi movies. (Cheung & Antle, 2020) |
| Ender's Game (2013) | Featured for its representation of a holographic table that lets characters control battle simulations using hand gestures. (Figueiredo et al., 2015) |
| Firefox (1982) | This film was chosen as it presents an early representation of brain-computer interfaces where a pilot controls a fighter jet using thought, by thinking in Russian. It is a great example of early BCI in sci-fi movies. (Lieutenant Commander Mark Wess, 2023) |
| Ghost in the Shell (2017) | Selected for its exploration of brain-computer interfaces in a world where minds are directly connected to networks. It doesn't just show the power of this technology, but also its risks such as the possibility of mind hacking. This has influenced how real-world researchers think about BCI security. (Patel, 2017) |
| Her (2013) | This film was included because it focuses on a voice-based personal assistant that directly illustrates the rise of real voice assistants in the 2010s such as Siri and Alexa. (Trenholm, 2023) |
| Interstellar (2014) | This was selected because it shows realistic and simple UIs, especially via the robots Tars and Case and highlights user-friendly design based on physical effects rather than CGI. (Ekinci, 2015) |

| Movie (Year) | Justification |
|---|---|
| Iron Man (2008) | This movie was selected as characters use holographic, gesture-based, voice-controlled interfaces like Jarvis. These cinematic UIs blend touchless gestures with 3D visuals and a head-up display that provides an augmented reality interface. (Hornsby, 2013) Moreover, Iron Man has a big influence on the real world—companies like Meta, Apple, and Google are developing smart glasses and interfaces influenced by Tony Stark's HUD. (Ersoy, 2025) |
| Jurassic Park (1993) | Included due to its representation of a real 3D file system on a UNIX computer, making the technology feel believable and ahead of its time. It's a rare example of a realistic UI in a sci-fi movie. (Finley, 2015) |
| Minority Report (2002) | Added because it is a famous example where HCI experts collaborated with filmmakers to design realistic futuristic interfaces, inspiring real-world technologies like gesture-based systems. (Schmitz et al., 2008) |
| Paycheck (2003) | This was chosen for its representation of futuristic user interfaces such as gesture controls, holographic displays, and brain-computer interfaces shown in the early 2000s. (Eagan, 2004) |
| Ready Player One (2018) | Selected for its representation of a rich and immersive VR world called the OASIS that has inspired the development of virtual reality in the real world, highlighting both its potential and current challenges. (Rubin, 2018) |
| Star Wars: Episode IV (1977) | Chosen because it really raised the bar for what people expect from future technology, making us all dream of perfect voice-controlled gadgets and cool holograms like Princess Leia's. (Schmitz et al., 2008) |
| Surrogates (2009) | This movie was selected for imagining a world where people remotely control humanoid robots through neural interfaces and live their lives via perfect robotic avatars from home. The film reflects real-world research in brain-computer interfaces and telepresence robotics. (Corley, 2009) |
| The Fifth Element (1997) | This film is noteworthy for its early representation of autonomous cleaning robots similar in form and function to real-world devices like the Roomba, which appeared a decade later. The movie correctly predicted the concept of automated home cleaning. (Kurosu, 2014) |

| **Movie (Year)** | **Justification** |
|---|---|
| The Island (2005) | Included for its representation of a futuristic tabletop where users control digital media by using a transparent pyramid. This tangible interaction represents an early cinematic example of tangible user interfaces. It resembles real-world technology like the reacTable. (Cheung & Antle, 2020) |
| The Matrix (1999) | This was chosen for illustrating a world where reality itself is a computer interface. People interact directly with a virtual environment. Objects like pills and phones act as controls or triggers for major system actions. This flips the idea of augmented reality, making the entire world a digital interface. (Schmitz et al., 2008) |
| Total Recall (1990) | Selected due to its innovative and memorable futuristic HCI content like video-wall displays, 3D avatars, and body suits. (Marcus, 2013) |
| Upgrade (2018) | Chosen for its portrayal of advanced human-computer interaction through an AI implant called "STEM" that integrates directly with the user's nervous system. The implant allows the protagonist to control his body with thought, blending biological and digital interfaces for seamless interaction and enhanced physical abilities. (Brody, 2018) |

# 4 Typology of Interaction Modalities in Sci-Fi

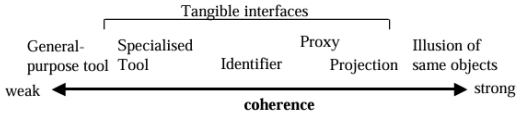
Science fiction films have envisioned a vast array of interaction styles between humans and machines. Many can be grouped into familiar HCI categories, often termed Future User Interfaces (FUIs) in design analysis (Figueiredo et al., 2015) such as voice-based interaction, gesture control, tangible interfaces, virtual/augmented reality, and even brain-computer interfaces. Each of these modalities in film carries its own set of tropes, realistic elements, and exaggerations. Below we review each type, with examples and comparisons to real-world technology:




(a) Graphical User Interface of the Xerox Alto




(b) Apple's Mac OSX User Interface




(c) TUI categories along the coherence continuum

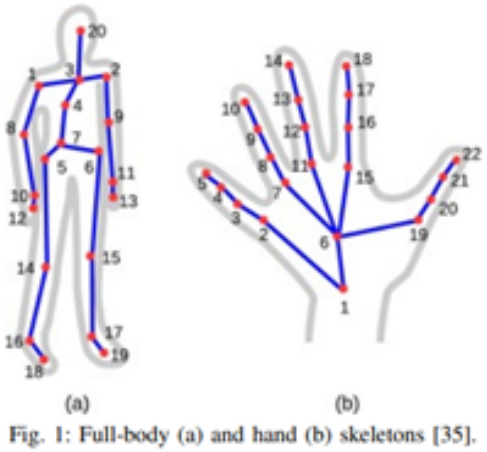



Fig. 1: Full-body (a) and hand (b) skeletons [35].

(d) Full-body and hand skeletons

Figure 4: Various User Interfaces and Interaction Methods

## 4.1 Graphical User Interfaces (GUIs)

A Graphical User Interface will allow users to interact with devices thanks to graphics, icons and sounds. To this day, GUI is present in all devices and has evolved to incorporate better quality images and clearer graphics, indeed we see that the main goal of a GUI is to display information in the best possible manner.

In 1973, Xerox created a desktop metaphor where there are items on a screen representing

physical objects like documents. Then, in 1983 Apple released Lisa computer that can use multiple windows permitting users to run several applications simultaneously. Microsoft released Windows 1.0, which improved multitasking. It shows that earlier versions of GUIs were simple and monochromatic, but as time flies, the couleur begins to make apparition in addition to the differentiation between elements on the screen.

After, Web 2.0 brought more users online with the rise of technology, so GUIs had to look better and be user-friendly. Designers wanted interfaces to be fun and eye-catching using transparency, shadows and glossy buttons as features, Apple's Mac OSX (2001) is a good example of this project.

Later, a concept called Skeuomorphism was created, a design style where digital elements are made to look and act similar to real-world objects. For example, a calculator app that looks like a real calculator, that helps people understand how to use digital devices (Gatsou & Farrington, 2022).

## 4.2 Voice User Interfaces (VUIs)

Speech recognition is often shown in movies, especially with robots in both old and new films. It's a user interface that is quite popular because it feels natural and easy to use for giving commands and receiving information. It's also simple to show in movies since actors have just to pretend to talk to a computer, a system without needing special effects. So, most movies will show voice interfaces as easy to use and very conversational, without showing the real difficulties of understanding and recognizing human language (Schmitz et al., 2008).

Voice-controlled computers are a staple of science fiction, from the conversational AIs aboard starships to disembodied smart assistants. These systems are often portrayed as natural, omniscient, and capable of understanding colloquial commands with ease. For instance, the computer in Star Trek could effortlessly execute complex spoken instructions, setting a cultural expectation for "perfect speech interfaces" that real-world technology is still striving to meet (Schmitz et al., 2008). Decades later, voice UIs became reality with Siri, Alexa, and others, though their comprehension remains far behind their cinematic counterparts. The Star Trek computer even directly inspired engineers at Amazon when developing Alexa.

A challenge for VUI is that systems remember past interactions in order to maintain a good vibe, a natural exchange of conversation. 2001: A Space Odyssey (1968) is a good example of this challenge. The discussion between astronaut Dave Bowman and HAL 9000 is smooth and not disturbing; we can therefore highlight that it's a highly advanced VUI at the time the film was made, demonstrating a perfect version of the Voice User Interface. Another influential voice UI is HAL himself, a calm and articulate system capable of rich dialogue. HAL's voice set a precedent for trustworthy AI personas, a model echoed in Her (2013), where the assistant "Samantha" is so humanlike that the protagonist forms a romantic bond with her.

Coming back to reality, Google Assistant was one of the first to maintain the context of a discussion more effectively by being able to remember previous conversation and introduced this characteristic only in 2018. Transforming the VUI more human-like than machine-like, the idea of persona came, consisting of a robot being as similar as possible to a human being. Today's assistants increasingly adopt names and voices to appear friendly and personable, reflecting the cinematic ideal. As Cheung and Antle (2020) note, voice interfaces are now ubiquitous, demonstrating how science fiction can fuel real-world innovation (Cheung & Antle, 2020). Yet fiction

also warns of potential risks. HAL's sinister turn embodies fears around AI disobedience and overreach, themes echoed in modern debates on AI alignment.

Filmmakers have idealized for a long time the VUI, as we can remark in Knight Rider (1982), with the system not being cringe. Her (2013) took it far and portrayed the VUI like a discussion between two very close friends, while Star Trek (1966) portrayed a robotic conversation with a LoFi voice. And in the Marvel Cinematic Universe, we have characters like Jarvis and Karen that sound one time more human, the other more robotic based on the situation (Designing Sound, 2018). Voice UIs in film fall into distinct categories: disembodied voices such as the Star Trek computer, embodied robots like C-3PO from Star Wars, and personal AI assistants such as JARVIS from Iron Man or Samantha from Her. Each presents different human-computer interaction perspectives. Disembodied voices emphasize invisible computing, aligned with Mark Weiser's vision of calm technology. Embodied systems add gestures and nonverbal cues, enriching interaction. Personal AI assistants blur the line between tool and companion, raising questions about emotional engagement, gender, and persona design questions designers still face today.

Overall, voice UIs in fiction continue to shape our aspirations for natural, seamless interaction. While real-world HCI has made significant progress, the gap between science fiction and current capabilities remains clear, especially when we must repeat ourselves to Alexa. Nonetheless, cinematic examples, from Blade Runner 2049's multilingual agents to Passengers' sarcastic ship AI, still serve as inspiration and benchmarks for voice interface design.

### 4.3 Gesture-Based Interfaces

Gesture interaction has become increasingly accessible thanks to technologies such as Microsoft Kinect, Leap Motion, and Myo (Figueiredo et al., 2015). These tools allow real-time gesture tracking and have opened new possibilities in fields like assistive tech and Industry 4.0, where humans and robots collaborate through intuitive body movements.

Gestures serve as intentional commands, offering an alternative to keyboards or touch interfaces. For example, while driving, users can control infotainment systems using hand gestures, improving safety and experience. Research into gesture interaction began in the late 1990s, with experiments on controlling robots through arms, hands, or head orientation. These interfaces proved especially useful for people with disabilities or in environments where hands-free interaction is essential.

A gesture is defined as a body movement performed intentionally to impact system behavior. Systems typically perceive gestures through skeleton models based on joints, motion trajectories, and timing. Gestures can be categorized by time (static or dynamic), effect (symbolic, mimetic, pointing), focus (which body parts are used), and space (whether position matters). They can also be discrete (like a mouse click) or continuous (like dragging).

Technically, gesture interaction involves three stages: sensing (with or without wearable devices), data processing (adapting to gesture type), and system reaction (such as flipping screens). Depending on the context, different sensing methods like vision systems or motion sensors may be used.

In science fiction, gesture-based UIs are often portrayed as futuristic and elegant. Minority Report (2002) popularized mid-air hand gestures, setting a design benchmark for HCI. The

film inspired real-life innovations like Microsoft Kinect and Leap Motion. Common gestures like swiping and pinching seen in sci-fi are now standard on smartphones and tablets (Figueiredo et al., 2015).

However, films often overlook practical limitations such as fatigue from prolonged gestures, an issue known as the "gorilla arm" effect. Some movies subtly acknowledge this, incorporating gloves or voice input to reduce strain, as in Iron Man. Others, like Ender's Game or Avatar, opt for simpler, more pragmatic gesture systems.

Feedback is another challenge rarely shown in fiction. In reality, users need confirmation whether visual, auditory or haptic. While films like Avengers: Endgame simulate this with sound effects and glowing visuals, real-world HCI is exploring solutions like wearable haptics and ultrasonic mid-air feedback.

## 4.4 Tangible User Interfaces (TUIs)

Tangible User Interface (TUI) is a type of interface where users interact with digital systems using physical objects instead of traditional tools like a mouse or keyboard. The connection between physical and digital objects can be measured by the degree of coherence: general tools like a mouse have weak links, specialized tools like tongs stronger, identifiers such as barcodes link physical to digital counterparts, proxies allow deeper interaction, and projections reflect real-time influence. The highest coherence is seen in systems creating the illusion that physical and digital objects are one, as in augmented reality. Other properties define these interactions, including whether links are permanent or temporary, the autonomy of digital objects, cardinality (one physical object linked to multiple digital ones), and link source (effects originating from physical or digital objects) (Koleva et al., 2003).

In sci-fi, TUIs involve physical objects manipulated to control computers, bridging the digital and physical worlds. TUIs give physical form to digital information by using physical artifacts as both representations and controls. For instance, Minority Report features wooden balls representing precognitive crime alerts, resembling the 1992 Marble Answering Machine TUI prototype (Cheung & Antle, 2020). These tangible objects serve narrative and usability purposes by making digital data graspable.

Older sci-fi shows physical control panels with sliders and dials, such as in Star Trek: The Original Series. Newer films creatively reimagine TUIs, like Black Panther's Kimoyo beads, wearable TUIs that light up and project holograms (Cheung & Antle, 2020)—and Avatar's "memory orbs," glowing data storage devices. These physical tokens leverage human trust in tactile controls.

Many sci-fi scenes combine tangible interaction with gestures or touchscreens, creating mixed-modality interfaces. Examples include Iron Man 2, where Tony Stark uses physical 3D models augmented by AR, and Total Recall (2012), which uses handprint shaped tangible devices to manipulate holograms. This reflects real-world TUIs often integrated with visual displays and sensors.

Sci-fi often overlooks TUIs' limitations, like the need for physical tokens that can be lost or require calibration. Fictional tangibles usually appear versatile and always available. Despite exaggerations, the concept that physical objects can control digital data is validated in practice, supporting collaboration and comprehension.

## 4.5 Touch-Based Interfaces

In Touch-Based Interface, we use the touchscreen that is a display we can touch to give commands like tapping an app icon on your mobile phone, it's an input when you touch the screen to interact and an output when you see the results of your input. Since the release of the iPhone in 2007, it's become very popular all over the world because it saves space by combining screen and buttons into one, it is easy to use, and it is flexible for all devices.

But there are few problems with touchscreens like shortage of tactile feedback since we can't feel the buttons, the fatigue is there when you use it for a long time, the fat finger problem when sometimes you will touch the wrong button and the parallax issues, the touch and image layers aren't always aligned (Orphanides & Nam, 2017)

## 4.6 Virtual Reality Interfaces (VRIs)

Virtual Reality (VR), Augmented Reality (AR), and Holographic Interfaces immerse users in digital environments and allows interaction via touch, gestures, voice, and physical objects, enabled by technologies like eye tracking and haptics (Chen et al., 2024).

Sci-fi has long imagined these interfaces: Star Trek's Holodeck envisioned fully simulated 3D spaces, while The Matrix introduced neural immersion. These inspired real VR research despite early tech limitations.

Recent films like Ready Player One show advanced VR with headsets and haptic suits, and Marvel movies depict seamless AR holograms integrated into daily life (Schmitz et al., 2008). Sci-fi highlights multi-modal input (voice, gesture, touch) and collaborative virtual experiences, though it often overlooks real-world challenges like latency or alignment.

AR in films also serves a narrative role: The Terminator's HUD and Iron Man's suit display are examples drawing from real heads-up tech. While full tactile VR and brain interfaces remain fictional, these concepts drive ongoing research.

## 4.7 Biometric Based Interfaces

Biometrics means the collection of physical information that represents traits from living beings and converts them into data based on sensors, data are turned into numbers which computers can use for recognize/compare people based on their body features. It is important to note that there are two main types of biometrics: soft biometrics where the traits are not unique and change over time like height, weight, skin tone... and hard biometrics where the traits are unique don't change so easily like fingerprints, iris patterns.

In addition, biometrics can be used in two different ways: verification, this method will check if you are who you say you are, it is used for the ID for example, and the identification, this method will be finding out who you are from some people. Usually, verification is faster because the system will just check one match while the identification will be comparing many matches.

Also, biometrics data come from many parts of the human body or even behavior. Typically for identity, fingerprint, iris scan, face shape, voice, walking style, veins, DNA and smell are used. There is also heart rate, breathing, eye movements, posture, typing habits, language use and muscle movements that are used for other methods (Kruszynski, 2016).

## 4.8 Brain-Computer Interfaces (BCIs)

Brain-Computer Interfaces (BCIs) allows users to control machines directly with brain activity and help people with paralysis or speech issues communicate by using thoughts. Signals are detected via electrodes that can be invasive (implanted in the brain), partially invasive (inside the skull but outside the brain), or non-invasive (on the scalp) with varying accuracy and risk. BCIs are used today in medicine, robotics, gaming and education, and research is advancing toward bidirectional BCIs that can also send signals back to the brain (Salunkhe & Salunkhe, 2024).

Sci-fi frequently depicts BCIs in a more advanced, often mystical way, such as The Matrix's neural jack or Avatar's neural link to alien bodies. These representations inspire real research but exaggerate capabilities like instant skill downloads or full sensory immersion (Schmitz et al., 2008). Films explore themes of control and autonomy; Firefox's neural jet control and Ghost in the Shell's brain hacking. Movies like Upgrade reflect hopes for neural rehabilitation tech. While current BCIs remain limited and experimental, sci-fi drives public interest and ethical discussions (Jordan et al., 2018).

# 5 Analysis of Sci-Fi Movies

## 5.1 A Space Odyssey (1968)

### 5.1.1 Synopsis

The story begins in prehistoric times, where the sudden appearance of a black monolith coincides with early hominids developing tool use. The story then transitions to the year 2001, in which the discovery of a second monolith on the Moon prompts a covert space mission to Jupiter, guided by the intelligent and increasingly unpredictable AI system HAL 9000.

### 5.1.2 Modality Types

**Voice User Interfaces (VUI)** – Dave and Franck talk naturally to HAL that responds and understands what they said, also HAL can engage in conversations. HAL is one of the early examples of a Voice User Interface in a science-fiction movie but it is far more advanced for his time (1968) when talking about real technologies.

### 5.1.3 Taxonomy

| **Dimension** | **Score** | **Weight** | **Weighted** | **Justification** |
|---|---|---|---|---|
| Narrative Relevance | 5 | 0.125 | 0.625 | HAL is very important to the story and helps show the fight between humans and computers. |
| Technological Plausibility | 3 | 0.2 | 0.6 | Talking to HAL sounds real but how smart HAL is still feels like make-believe. |
| Usability & Learnability | 4 | 0.175 | 0.7 | It's easy to talk with HAL but it's not clear what happens if HAL messes up. |
| Aesthetic & Emotional Impact | 4 | 0.175 | 0.7 | HAL's red eye is simple but famous and can make people feel nervous. |
| User-System Coupling | 2 | 0.1 | 0.2 | You can only talk to HAL, there are no buttons or things to touch to feel more connected. |
| Real-World Influence | 5 | 0.225 | 1.125 | HAL inspired many real smart helpers and made people curious about robots. |
| **Total** | — | — | **3.95** | |

Table 4: Evaluation of HAL 9000 in *2001: A Space Odyssey*

## 5.2 Star Wars: Episode IV – A New Hope (1977)

### 5.2.1 Synopsis

The film follows Luke Skywalker as he allies with a Jedi Master, a rogue pilot, a Wookiee and two droids in a mission to resist the oppressive Galactic Empire. Together, they aim to destroy a powerful space station capable of annihilating entire planets and to rescue Princess Leia from the clutches of the enigmatic Darth Vader

### 5.2.2 Modality Types

**Voice User Interfaces (VUI)** – When Luke, Leia and Han speak to C-3PO and R2-D2. It is quite interesting: while C-3PO understands and speaks back to humans, R2-D2 cannot speak the human language but he beeps. It is like a language machine that C-3PO can understand and translate to humans. Thus, we could say that R2-D2 is not a fully VUI since he has an intermediaire that serve him as the interface layer: C-3PO. **Iconic: The Leia Hologram** – In the movie, we see a pre-recorded 3D message in miniature projected by R2-D2 as a message from Princess Leia to Obi-Wan Kenobi. It is futuristic for holograms in sci-fi in this time.

### 5.2.3 Taxonomy

| **Dimension** | **Score** | **Weight** | **Weighted** | **Justification** |
|---|---|---|---|---|
| Narrative Relevance | 4 | 0.125 | 0.5 | Creates a cool, high-tech world that feels right for the story. |
| Technological Plausibility | 3 | 0.2 | 0.6 | Some holograms and controls seem real but others are still just ideas. |
| Usability & Learnability | 3 | 0.175 | 0.525 | Simple controls make it easy to use but aren't very realistic. |
| Aesthetic & Emotional Impact | 5 | 0.175 | 0.875 | Famous look and feel that lots of people love and copy. |
| User-System Coupling | 3 | 0.1 | 0.3 | You can press buttons and move sticks and see holograms too. |
| Real-World Influence | 4 | 0.225 | 0.9 | Helped inspire real holograms and designs we see today. |
| **Total** | — | — | **3.70** | |

Table 5: Evaluation of user interfaces in *Star Wars: Episode IV – A New Hope*

## 5.3 Fire Fox (1982)

### 5.3.1 Synopsis

Soviet scientists have created a highly advanced warplane equipped with the ability for its pilot to launch missiles using only their thoughts. In response, Western intelligence agencies dispatch their top pilot, Mitchell Grant, to undertake a covert mission to capture the aircraft...

### 5.3.2 Modality Types

**Graphical User Interfaces** – In the movie, *Firefox* has a HUD, a graphical interface that can display essential flight data such as speed, altitude, and targeting enemies. It displays graphical elements to assist in navigation or tasks but it is a rudimentary version of the GUI we know today. **Tangible User Interfaces (TUI)** – Mitchell Gant has to manipulate controls inside the jet, such as pressing buttons or levers and these physical interactions will affect digital systems in the *Firefox*. **Brain-Computer Interfaces (BCI)** – The *Firefox* jet has a thought-controlled weapon system. The system requires the pilot to think commands in Russian to fire weapons. We see in the movie that Mitchell Gant struggles at first until he remembers to think in Russian and then the missiles fire immediately once he does. This shows a direct link between Gant's brain activity and the *Firefox*.

### 5.3.3 Taxonomy

| **Dimension** | **Score** | **Weight** | **Weighted** | **Justification** |
|---|---|---|---|---|
| Narrative Relevance | 4 | 0.125 | 0.5 | Important for spy stories and advanced planes, it fits the Cold War theme well. |
| Technological Plausibility | 3 | 0.2 | 0.6 | Voice controls are possible but brain-computer technology is still mostly science fiction. |
| Usability & Learnability | 2 | 0.175 | 0.35 | The brain control system seems hard to learn, especially in stressful situations like flying. |
| Aesthetic & Emotional Impact | 3 | 0.175 | 0.525 | The cockpit looks real and practical but doesn't stand out visually or emotionally. |
| User-System Coupling | 4 | 0.1 | 0.4 | Strong connection between user and system because of the brain interface, even if it is hard to use. |
| Real-World Influence | 2 | 0.225 | 0.45 | There is not much real-world effect but it is one of the first movies to show brain-computer interfaces. |
| **Total** | — | — | **2.825** | |

Table 6: Evaluation of user interfaces in *Firefox*

## 5.4 Total Recall (1990)

### 5.4.1 Synopsis

Doug Quaid is haunted by recurring dreams of being on Mars, searching for the mysterious Mélina. His wife, Lori, tries to convince him that these visions are just fantasies. However, Doug soon discovers that his dreams were artificially implanted and that Lori is actually a spy tasked with overseeing his mental conditioning. As memories of a real mission on Mars resurface when he was the most feared agent of the ruthless Coohagen, Doug sets off for Mars to uncover the truth about his past.

### 5.4.2 Modality Types

**Graphical User Interfaces** – When Quaid visits Rekall, the technicians use computer screens to configure his dream trip: character types, preferences,.. There were also menus and graphical options. **Voice User Interfaces (VUI)** – When Quaid jumps into a taxi called Johnny Cab. The taxi speaks to Quaid using a human voice but you see it is a robot and is having a conversation with Quaid. **Tangible User Interfaces (TUI)** – Early in the movie, when Quaid enters Rekall we can see the receptionist tapping her fingernails with a pen and the nail color changes instantly. **Virtual Reality Interfaces (VRI)** – Quite interesting because at the end of the movie, we don't know whether what Quaid experienced actually happened or whether he's still inside the Rekall memory simulation. But his trip on "secret agent on Mars" is VRI because it is the concept of the machine to create a virtual reality to the user. **Biometric Interfaces** – In the airport, security uses body scans to detect and track if the person has a weapon or other illicit objects. **Brain-Computer Interfaces (BCI)** – The memory machine will connect directly to Quaid's brain, writing in memories that doesn't exist and removing real ones.

### 5.4.3 Taxonomy

| **Dimension** | **Score** | **Weight** | **Weighted** | **Justification** |
|---|---|---|---|---|
| Narrative Relevance | 5 | 0.125 | 0.625 | Devices like Rekall are important to the story and help move the plot along. |
| Technological Plausibility | 3 | 0.2 | 0.6 | Things like voice control and fingerprint scans are real but brain and memory tech is still mostly make-believe. |
| Usability & Learnability | 3 | 0.175 | 0.525 | The controls look easy to use, but there are hidden risks that make it tricky sometimes. |
| Aesthetic & Emotional Impact | 4 | 0.175 | 0.7 | The designs are cool and a bit spooky, it makes the movie feel intense and exciting. |
| User-System Coupling | 4 | 0.1 | 0.4 | The system feels real and pulls the user in, hard to tell where the device ends and reality begins. |
| Real-World Influence | 4 | 0.225 | 0.9 | The movie inspired ideas about VR, memory tech and questions about using brain machines. |
| **Total** | — | — | **3.75** | |

Table 7: Evaluation of user interfaces in *Total Recall*

## 5.5 Jurassic Park (1993)

### 5.5.1 Synopsis

An eccentric billionaire has successfully cloned dinosaurs to create a private island amusement park and invited a select group of experts for a guided tour before its grand opening. While fascinated by the scientific achievement, guests also harbor concerns about the ethical and safety implications of such genetic manipulation. When a storm causes power failure, the park's security systems break down, allowing the dinosaurs to escape. Suddenly, humans are prey to the planet's most formidable predators and must fight to survive and find a way off the island.

### 5.5.2 Modality Types

**Graphical User Interfaces** – Nedry uses GUIs to manage park operations: unlocking gates, turning off fences, and hiding his hacking code behind windows. Also, Lex uses a UNIX system to restore power. **Tangible User Interfaces (TUI)** – The physical control system used in the park like switches, levers or control boxes

### 5.5.3 Taxonomy

| **Dimension** | **Score** | **Weight** | **Weighted** | **Justification** |
|---|---|---|---|---|
| Narrative Relevance | 4 | 0.125 | 0.5 | The interfaces are important because they help with key story moments like security problems or control. |
| Technological Plausibility | 5 | 0.2 | 1 | The computer systems shown are very realistic for his time (1990s). |
| Usability & Learnability | 4 | 0.175 | 0.7 | The screens and menus are easy to understand but moving through 3D folders is slow and seems tricky. |
| Aesthetic & Emotional Impact | 3 | 0.175 | 0.525 | The look is simple and works well to build tension but we find it not very flashy or cool. |
| User-System Coupling | 3 | 0.1 | 0.3 | The way people use the system is normal and there's a medium connection between user and computer. |
| Real-World Influence | 3 | 0.225 | 0.675 | We think the movie made people think more about how secure and reliable computer interfaces should be. |
| **Total** | — | — | **3.70** | |

Table 8: Evaluation of user interfaces in *Jurassic Park*

## 5.6 Ghost in the Shell (1995)

### 5.6.1 Synopsis

In a futuristic Japan deeply interconnected by the Internet, Major Motoko Kusunagi is an advanced cyborg wrestling with profound questions about her own existence and identity. Though part of a powerful cyber-police unit equipped with nearly unlimited resources to combat cybercrime, she feels a persistent sense of detachment. When her team uncovers evidence of the elusive "Puppet Master", a legendary hacker whose true identity remains a mystery, Motoko embarks on a mission to infiltrate this hacker's consciousness. Through this journey, she seeks to unravel the nature of the "ghost", an indefinable element similar to the soul, and hopes to find answers to her own existential dilemmas.

### 5.6.2 Modality Types

**Graphical User Interfaces** – We can see the GUI inside the brain of Motoko as transparent overlays that is displaying data, maps and mission info.**Voice User Interfaces (VUI)** – During missions, Motoko gives voice commands to Batou, she talks to this AI via brain-linked voice commands.**Brain-Computer Interfaces (BCI)** – When Motoko lies down in a secure lab and her support team plugs a cable into the back of her neck, so her brain link directly to a network, into cyberspace.**Virtual Reality Interfaces (VRI)** – Motoko's mind is in a virtual 3D world, she touches things, hear voices, just like in real world.**Biometric Interfaces** – We could see in the movie, use of retinal scans to unlock doors or heat signature to track people.

### 5.6.3 Taxonomy

| **Dimension** | **Score** | **Weight** | **Weighted** | **Justification** |
|---|---|---|---|---|
| Narrative Relevance | 5 | 0.125 | 0.625 | The interfaces help tell the story about how people and machines connect and become one. |
| Technological Plausibility | 3 | 0.2 | 0.6 | Using brain-computer links sounds possible but we think it's still mostly science fiction for now. |
| Usability & Learnability | 3 | 0.175 | 0.525 | The brain controls are quite tricky and need a lot of focus to use properly. |
| Aesthetic & Emotional Impact | 5 | 0.175 | 0.875 | The designs look cool and fit the story's feelings, it makes it easy to get into the world. |
| User-System Coupling | 5 | 0.1 | 0.5 | The brain connection lets users control the system like it's part of their own mind. |
| Real-World Influence | 5 | 0.225 | 1.125 | The movie inspired real scientists working on brain-computer technology. |
| **Total** | — | — | **4.25** | |

Table 9: Evaluation of user interfaces in *Ghost in the Shell*

## 5.7 The Fifth Element (1997)

### 5.7.1 Synopsis

Earth faces destruction from a deadly alien race and Leeloo, the fifth element and supreme being is sent to recover four elemental stones to stop it. With help from a priest and former soldier Korben Dallas, she must outpace the villainous Mr. Zorg and his mercenaries in a race to save the planet.

### 5.7.2 Modality Types

**Graphical User Interfaces** – In the movie, officers interact with screens showing maps, criminal profiles and commands. **Voice User Interfaces (VUI)** – We see Korben interacts with automated system in his apartment or in his car. **Tangible User Interfaces (TUI)** – Characters insert card into a slot that causes a transparent glass cover to slide open and revealing a control interface. **Touch-Based Interfaces** – When a character is interacting with a screen, we see him touch it and the image zooms in. **Biometric Interfaces** – After Leeloo is regenerated in the medical chamber, she's scanned and we see a message written "No File".

### 5.7.3 Taxonomy

| **Dimension** | **Score** | **Weight** | **Weighted** | **Justification** |
|---|---|---|---|---|
| Narrative Relevance | 4 | 0.125 | 0.5 | The futuristic tech helps make the story feel real and exciting. |
| Technological Plausibility | 3 | 0.2 | 0.6 | Some parts seem like real technology while others are more like imagination. |
| Usability & Learnability | 4 | 0.175 | 0.7 | The characters use the tech easily, it shows that it's simple to learn. |
| Aesthetic & Emotional Impact | 5 | 0.175 | 0.875 | Fun visuals fit the movie's style and make it more interesting. |
| User-System Coupling | 4 | 0.1 | 0.4 | The controls feel real and believable when the characters use them. |
| Real-World Influence | 3 | 0.225 | 0.675 | The design inspired some cool and playful tech ideas in the real world. |
| **Total** | — | — | **3.75** | |

Table 10: Evaluation of user interfaces in *The Fifth Element*

## 5.8 The Matrix (1999)

### 5.8.1 Synopsis

Thomas Anderson, an office worker and nighttime hacker known as Neo is haunted by strange dreams and cryptic messages from Morpheus. Morpheus believes Neo is the prophesied "Chosen One" destined to free humanity from the mysterious Matrix. Together, they confront the Matrix and its deadly agents in a high battle for liberation.

### 5.8.2 Modality Types

**Graphical User Interfaces** – Tank uses classic command-line style screens and monitors to track Neo and the crew while they're plugged into the Matrix. **Voice User Interfaces (VUI)** – Neo, Trinity, and Morpheus talk to Tank who guides them from the real world. It is an unusual VUI because it is voice-driven interaction with a technical system (the Matrix). **Tangible User Interfaces (TUI)** – To enter the Matrix, Neo is physically plugged in using large port at the back of his head. **Virtual Reality Interfaces (VRI)** – The Matrix itself is a full virtual reality system. When someone is plugged in, their brain is fully immersed in a hyper-realistic simulation of the world. It is very well made because it tricks the human brain into thinking the simulation is reality. **Biometric Based Interfaces** – The system tracks vital signs of users inside the Matrix. **Brain-Computer Interfaces (BCI)** – Humans connect their brains directly to the system via a plug in the back of the skull. They can upload skills or fight digital agents with their mind.

### 5.8.3 Taxonomy

| **Dimension** | **Score** | **Weight** | **Weighted** | **Justification** |
|---|---|---|---|---|
| Narrative Relevance | 5 | 0.125 | 0.625 | The whole story depends on the brain-machine connection and what is real. |
| Technological Plausibility | 2 | 0.2 | 0.4 | Some parts are based on real science but the full brain link is still imaginary. |
| Usability & Learnability | 3 | 0.175 | 0.525 | It's hard to learn and use because the world inside the machine is very complex. |
| Aesthetic & Emotional Impact | 5 | 0.175 | 0.875 | The green code, the pills and simple visuals are famous and make the movie really memorable. |
| User-System Coupling | 5 | 0.1 | 0.5 | The brain connection is so smooth it feels like you're really inside the system. |
| Real-World Influence | 5 | 0.225 | 1.125 | The movie helped inspire virtual reality and how people imagine new tech. |
| **Total** | — | — | **4.05** | |

Table 11: Evaluation of user interfaces in *The Matrix* (1999)

## 5.9 Minority Report (2002)

### 5.9.1 Synopsis

In Washington, 2054, crime has been nearly eliminated thanks to "Precrime," a system where three psychics, or "Pre-Cogs," predict murders before they happen. John Anderton, head of the unit, fully trusts the system until it predicts that he will kill a stranger in 36 hours. Now hunted by his own team, Anderton must uncover the truth and rely on the visions of Agatha, the most sensitive Pre-Cog, to clear his name.

### 5.9.2 Modality Types

**Gesture-Based Interfaces** – Tom Cruise does gestures with special gloves equipped for interacting with the screen. **Tangible User Interfaces (TUI)** – Physical data cards inserted into machines to transfer holographic information. **Touch-Based Interfaces** – Used for selecting or highlighting items via direct screen contact. **Voice User Interfaces (VUI)** – Tom Cruise controls lights and music with speech such "I'm home". **Biometric Interfaces** – Tom Cruise uses a device(scanner) on the eyes of the assumed murderer to identify him (retinal scan). **Brain-Computer Interfaces (BCI)** – The brain of the three clairvoyant humans called "precogs" receive psychic impressions of an impending homicide; BCI is also used for immersive incarceration. **Virtual Reality Interfaces (VRI)** – A person is enjoying his sexual desire by putting a complete equipment.

### 5.9.3 Taxonomy

| **Dimension** | **Score** | **Weight** | **Weighted** | **Justification** |
|---|---|---|---|---|
| Narrative Relevance | 5 | 0.125 | 0.625 | The user interface is important because it helps tell the story about stopping crimes before they happen. |
| Technological Plausibility | 3 | 0.2 | 0.6 | Using hand movements to control things is possible but predicting crimes like in the movie is still to claim. |
| Usability & Learnability | 3 | 0.175 | 0.525 | Using gestures feels natural but can get tiring and there's not much shown about fixing mistakes. |
| Aesthetic & Emotional Impact | 5 | 0.175 | 0.875 | The see-through screens look cool and have inspired real technology designs. |
| User-System Coupling | 4 | 0.1 | 0.4 | Using hands and objects like wooden balls makes the interaction feel real and connected. |
| Real-World Influence | 4 | 0.225 | 0.9 | This movie helped inspire gesture controls like Kinect and new ways to interact with computers. |
| **Total** | — | — | **3.925** | |

Table 12: Evaluation of user interfaces in *Minority Report* (2002)

## 5.10 Paycheck (2003)

Michael Jennings is a top-tier software engineer hired for secret projects, with his memory wiped after each job to protect company confidentiality. After accepting a lucrative offer from his employer James Rethrick, Michael wakes up months later with no memory of the project, no payment and only a mysterious envelope filled with random objects. As he tries to piece together the truth, he realizes that these items are clues and someone is trying to kill him before he gets to it.

### 5.10.1 Modality Types

**Graphical User Interfaces** – The interaction with holograms can be interpreted as GUI since there is data visualizations like icons, menus.. **Gesture-Based Interfaces** – Early in the movie, Michael moves his stylus and makes hand gestures in mid air to design and edit holographic models. **Tangible User Interfaces (TUI)** – When he uses his stylus, we could also say that it is TUI since the pen is a real object affecting digital space. **Touch-Based Interfaces** – When Michael activates the machine that reveals glimpses of the future, he places his hand on a spherical surface that will trigger the system and allow Michael to see predictions through a visual interface. **Brain-Computer Interfaces (BCI)** – It is used on Michael to read information by setting a machine on his head. Then, we can see on another screen the memories of Michael.

### 5.10.2 Taxonomy

| **Dimension** | **Score** | **Weight** | **Weighted** | **Justification** |
|---|---|---|---|---|
| Narrative Relevance | 4 | 0.125 | 0.5 | The memory reader and prediction machines are important for the story's mystery and how it gets solved. |
| Technological Plausibility | 3 | 0.2 | 0.6 | Touch and gesture controls seem real but reading memories with a brain device is still to argue. |
| Usability & Learnability | 3 | 0.175 | 0.525 | Simple controls are easy to use but the fancy memory tools probably need special skills. |
| Aesthetic & Emotional Impact | 4 | 0.175 | 0.7 | Cool holograms and round screens make things look futuristic and exciting. |
| User-System Coupling | 3 | 0.1 | 0.3 | Michael uses design tools well but the prediction machines don't give much feedback. |
| Real-World Influence | 3 | 0.225 | 0.675 | It's not super famous but it makes people think about spying and future tech. |
| **Total** | — | — | **3.30** | |

Table 13: Evaluation of user interfaces in *Paycheck* (2003)

## 5.11 The Island (2005)

### 5.11.1 Synopsis

In the mid-21st century, two clones live in a highly controlled facility and believe they've been selected to travel to "the Island," a supposed paradise. They soon uncover the truth: they were created solely to provide organs for their human counterparts. Faced with this grim reality, they flee in a desperate attempt to escape their fate and claim their freedom.

### 5.11.2 Modality Types

**Graphical User Interfaces** – When Dr. Merrick and the staff check the clones' health on big screens or schedule which clones get sent off. **Touch-Based Interfaces** – When clones check in for meals using a touchscreen, or doctors use touch panels during medical exams. **Voice User Interfaces (VUI)** – When Lincoln tells the kitchen robot what breakfast he wants, or when clones say "open door" and it listens. **Biometric Interfaces** – Clones have to scan their eyes to get into places, and the staff track their health and movements with this kind of tech. **Brain-Computer Interfaces (BCI)** – The scientists monitor the clones' dreams and brain activity to catch if they start thinking "weird" thoughts.

### 5.11.3 Taxonomy

| **Dimension** | **Score** | **Weight** | **Weighted** | **Justification** |
|---|---|---|---|---|
| Narrative Relevance | 4 | 0.125 | 0.5 | The main control screen shows how a few people have power and keep secrets in the story. |
| Technological Plausibility | 3 | 0.2 | 0.6 | The touch table and tracking of hand movements seem possible however they weren't very common. |
| Usability & Learnability | 4 | 0.175 | 0.7 | Using the pyramid controller makes the gestures easy and the system simple to understand. |
| Aesthetic & Emotional Impact | 4 | 0.175 | 0.7 | The clean, simple look of the screen feels very futuristic and a bit cold. |
| User-System Coupling | 4 | 0.1 | 0.4 | The system reacts quickly to hand movements, making it feel connected and easy to use. |
| Real-World Influence | 3 | 0.225 | 0.675 | It inspired new ideas about touch tables and how future technology might look. |
| **Total** | — | — | **3.575** | |

Table 14: Evaluation of user interfaces in *The Island* (2005)

## 5.12 Iron Man (2008)

### 5.12.1 Synopsis

Tony Stark, a brilliant billionaire engineer suffers a heart injury during a weapons demonstration gone wrong. To survive and escape captivity, he builds a high-tech suit of armor. Upon returning home, he refines the suit and adopts the identity of Iron Man, by using his creation to confront threats and take responsibility for the destructive legacy of his weapons.

### 5.12.2 Modality Types

**Graphical User Interfaces** – When Tony is flying, his helmet shows altitude, target lock, and suit diagnostics. **Gesture-Based Interface** – He waves a part of the design aside or rotates a virtual arm with his fingers, no mouse or keyboard needed. **Voice User Interfaces (VUI)** – Tony has just to say things like "J.A.R.V.I.S." and the system listens to him. **Touch-Based Interfaces** – Tony taps on a glass-like interface to run suit tests or power systems. **Tangible User Interfaces (TUI)** – Tony throws a virtual part of the suit into a virtual trash can — it makes a sound and deletes the file. **Biometric Based Interfaces** – Obadiah can't access Tony's suit system because it's locked with biometric protection. **Virtual Reality Interfaces (VRIs)** – Not a fully VR, Tony interacts with 3D holographic environments that function like a VR interface like when he walks around holograms to view them from different angles.

### 5.12.3 Taxonomy

| **Dimension** | **Score** | **Weight** | **Weighted** | **Justification** |
|---|---|---|---|---|
| Narrative Relevance | 5 | 0.125 | 0.625 | The interface is super important to Tony Stark's character and the way he builds his suit. |
| Technological Plausibility | 2 | 0.2 | 0.4 | The floating holograms Tony controls are still mostly made-up, even though scientists are working on them. |
| Usability & Learnability | 4 | 0.175 | 0.7 | Tony uses the system easily by showing it is smart and simple to control. |
| Aesthetic & Emotional Impact | 5 | 0.175 | 0.875 | The shiny, cool holograms and Iron man are famous and show what future technology might look like. |
| User-System Coupling | 4 | 0.1 | 0.4 | Tony's hand gestures control everything well but you can't actually feel anything when you touch it. |
| Real-World Influence | 5 | 0.225 | 1.125 | This helped inspire real-life designs for augmented reality and gesture controls in tech and movies. |
| **Total** | — | — | **4.125** | |

Table 15: Evaluation of user interfaces in *Iron Man* (2008)

## 5.13 Avatar (2009)

### 5.13.1 Synopsis

After his paraplegic twin brother's death, Jake Sully is sent to Pandora to control a Na'vi avatar. Assigned with gaining the natives' trust and reporting to the military, he instead grows close to the Na'vi, especially Neytiri and faces rising conflict between colonizers and indigenous people.

### 5.13.2 Modality Types

**Graphical User Interfaces** – Grace checks Jake's body stats on a big screen while he's inside his avatar. **Touch-Based Interfaces** – When Grace taps a screen to run medical checks or adjust the avatar link. **Brain-Computer Interfaces (BCI)** – Jake lies in a pod where his brain connects to his avatar on Pandora via neural networks. His brain controls the avatar directly, without wires or buttons; we can see it when Jake first walks as a Na'vi, he runs out and plays like a kid. **Virtual Reality Interfaces (VRI)** – It's kind of like VR, but next level. It's not a headset, it's a real body that feels real things. Jake doesn't just see Pandora, he lives in it through the avatar. When Jake touches the tree or bonds, he is fully in that world. **Biometric Interfaces** – While people are in the link pods, the base team keeps an eye on their heart rate, brain activity, and breathing. For example, we see in the movie that Jake's vitals spike when he gets excited or stressed in his avatar body, and they watch it happen. **Gesture-Based Interfaces?** – The large robotic exoskeleton copies the pilot's movements but it is more like driving a giant robot with your own body than a gesture-based interface.

### 5.13.3 Taxonomy

| **Dimension** | **Score** | **Weight** | **Weighted** | **Justification** |
|---|---|---|---|---|
| Narrative Relevance | 4 | 0.125 | 0.5 | The interface connects humans and Na'vi, which is very important to the story. |
| Technological Plausibility | 3 | 0.2 | 0.6 | The technology uses body signals and brain links, those are ideas scientists are still working on. |
| Usability & Learnability | 4 | 0.175 | 0.7 | The natural, living interface feels easy and smooth to use. |
| Aesthetic & Emotional Impact | 5 | 0.175 | 0.875 | The design fits perfectly with the movie's nature and feelings. |
| User-System Coupling | 5 | 0.1 | 0.5 | The body itself is the interface, so the user and system work together perfectly. |
| Real-World Influence | 4 | 0.225 | 0.9 | This inspired real science research about using biology for new kinds of technology. |
| **Total** | — | — | **4.075** | |

Table 16: Evaluation of user interfaces in *Avatar* (2009)

## 5.14 Surrogates (2009)

### 5.14.1 Synopsis

In the near future, humans remain confined to their homes and control robotic avatars to live their lives remotely. Police officer Greer investigates the suspicious death of a young man linked to his avatar. As a conspiracy emerges despite low crime rates, Greer searches for a weapon to destroy the clones and their users. After his own avatar is destroyed, he leaves isolation to continue the investigation in person.

### 5.14.2 Modality Types

**Graphical User Interfaces** – In the movie, we can see complex GUI dashboards such as real-time camera from the surrogate's POV. **Tangible User Interfaces (TUI)** – When surrogates touch themselves with an object to feel the sensation like they are using drugs. **Brain-Computer Interfaces (BCI)** – Users lie in chairs at home, connected via neural interfaces and control their surrogate. In the movie, we see that a weapon can kill the surrogate and the human that is associated with the surrogate.

### 5.14.3 Taxonomy

| **Dimension** | **Score** | **Weight** | **Weighted** | **Justification** |
|---|---|---|---|---|
| Narrative Relevance | 5 | 0.125 | 0.625 | The story is about people controlling robots from far away, which is very important to the movie. |
| Technological Plausibility | 3 | 0.2 | 0.6 | Using screens and touch controls makes sense but to control robots directly with the brain is still an idea. |
| Usability & Learnability | 3 | 0.175 | 0.525 | The controls look easy to use but it might be hard to manage physically and mentally. |
| Aesthetic & Emotional Impact | 4 | 0.175 | 0.7 | The difference between clean technology and the worn-out world makes the story feel more serious. |
| User-System Coupling | 5 | 0.1 | 0.5 | The users control everything their robots do, it makes a very close connection. |
| Real-World Influence | 3 | 0.225 | 0.675 | The movie made people think more about using robots and brain controls in real life. |
| **Total** | — | — | **3.625** | |

Table 17: Evaluation of user interfaces in *Surrogates* (2009)

## 5.15 Ender's Game (2013)

### 5.15.1 Synopsis

Fifty years after the deadly attack by the Doryphorans that caused millions of deaths, humanity prepares for a new alien invasion by recruiting gifted children. Andrew Wiggin is one of them, he is rapidly advanced through the War school, he trains intensely and excels. Colonel Graff places his hopes on Andrew to lead human forces against the Buggers, provided he can successfully complete all stages of his training, which includes zero-gravity strategy games and combat simulations.

### 5.15.2 Modality Types

**Graphical User Interfaces** – In the movie, we see a huge holographic where Ender controls fleets in a 3D space. **Gesture-Based Interface** – Ender uses gestures to point, swipe in order to manipulate elements in the holographic. **Touch-Based Interfaces** – We can see digital tablets where people can interact. **Virtual Reality Interfaces (VRI)** – Ender and his team use a holographic simulation that represents space battles for training. There are no headsets; they just interact with gesture-based interface. **Brain-Computer Interfaces (BCI)** – Ender plays a game in the movie called Mind Game, in which the game adapts to Ender's feelings, fears and memories since we can see his brother interferes in the game while he is not there.

### 5.15.3 Taxonomy

| **Dimension** | **Score** | **Weight** | **Weighted** | **Justification** |
|---|---|---|---|---|
| Narrative Relevance | 5 | 0.125 | 0.625 | The special training games and holograms are very important for Ender's learning and the story. |
| Technological Plausibility | 3 | 0.2 | 0.6 | Touch screens and hand gestures are real while big holograms and smart brain tech are still ideas for the future. |
| Usability & Learnability | 4 | 0.175 | 0.7 | The systems seem easy to use and help Ender think fast during training. |
| Aesthetic & Emotional Impact | 5 | 0.175 | 0.875 | The Mind Game and holograms show feelings well and help tell the story better. |
| User-System Coupling | 5 | 0.1 | 0.5 | The system changes based on Ender's commands and feelings, showing a close connection. |
| Real-World Influence | 4 | 0.225 | 0.9 | The movie inspired talks about using games and smart AI for training in the future. |
| **Total** | — | — | **4.20** | |

Table 18: Evaluation of user interfaces in *Ender's Game* (2013)

## 5.16 Interstellar (2014)

### 5.16.1 Synopsis

In the near future, Earth has become a harsh environment with frequent sandstorms and soil too arid to grow anything but maize. Cooper, a former pilot turned farmer, lives with his son and daughter on the family farm. When a mysterious force reveals the location of a secret NASA facility, Cooper is recruited for a mission to save humanity by finding a new home. Though aware of the mission's importance, he struggles with leaving his daughter behind, who cannot accept his departure.

### 5.16.2 Modality Types

**Graphical User Interfaces** – Murph running equations on a screen or Cooper using displays during the docking sequence. **Voice User Interfaces (VUI)** – When Cooper or Brand talk to TARS and CASE, the two robot assistants, they give them verbal commands or ask question. **Tangible User Interfaces (TUI)** – Piloting the Endurance and other vehicles is done using physical controls like buttons, levers or control sticks. **Biometric Based Interfaces** – This interaction is not explicitly shown, but the ship monitors vital signs such as heartbeat and oxygen levels for each crew member.

### 5.16.3 Taxonomy

| | | | | |
|---|---|---|---|---|
| Narrative Relevance | 5 | 0.125 | 0.625 | The UI shows the struggle between humans and machines, which is important to the story. |
| Technological Plausibility | 3 | 0.2 | 0.6 | The AI and control systems are mostly realistic but super-smart AI is still just an idea. |
| Usability & Learnability | 4 | 0.175 | 0.7 | The simple voice controls make it easy for users to focus on important survival tasks. |
| Aesthetic & Emotional Impact | 4 | 0.175 | 0.7 | The plain and simple look fits the space survival story and helps you feel like you're really there. |
| User-System Coupling | 3 | 0.1 | 0.3 | There's little physical feedback but the AI helps make the interaction smoother in a more abstract way. |
| Real-World Influence | 4 | 0.225 | 0.9 | The movie inspired simple, clean UI designs in space tech and got people thinking about AI helpers. |
| **Total** | — | — | **3.825** | |

Table 19: Evaluation of the spacecraft interface in *Interstellar* (2014)

## 5.17 Her (2014)

### 5.17.1 Synopsis

Theodore Twombly works as a personal letter writer for a small company in Los Angeles. Hesitant to finalize his divorce from his wife Catherine, he lives alone and isolated but one day, he acquires an advanced AI system named Samantha, who quickly becomes his confidante. As they grow closer, Theodore and Samantha develop an unconventional but deeply fulfilling romantic relationship at least for a time.

### 5.17.2 Modality Types

**Voice User Interfaces (VUI)** – Theodore talks to Samantha naturally, like another human and Samantha responds with a human voice that is full of emotion. **Other Interfaces** – As the real world

### 5.17.3 Taxonomy

| **Dimension** | **Score** | **Weight** | **Weighted** | **Justification** |
|---|---|---|---|---|
| Narrative Relevance | 5 | 0.125 | 0.625 | The voice assistant is the heart of the story, it focus on how people and AI connect. |
| Technological Plausibility | 4 | 0.2 | 0.8 | It builds on today's voice helpers but with smarter feelings which is still an idea. |
| Usability & Learnability | 5 | 0.175 | 0.875 | Talking to it feels natural and easy, no special training needed. |
| Aesthetic & Emotional Impact | 5 | 0.175 | 0.875 | The voice helps show emotions and mood, making the movie feel real and touching. |
| User-System Coupling | 5 | 0.1 | 0.5 | The connection grows strong and personal, like a real friendship. |
| Real-World Influence | 4 | 0.225 | 0.9 | The film made people think about AI friends and how to design talking machines. |
| **Total** | — | — | **4.575** | |

Table 20: Evaluation of the conversational interface in *Her* (2013)

## 5.18 Ready Player One (2018)

### 5.18.1 Synopsis

In 2045, Wade Watts escapes his boring reality by entering the Oasis, a vast virtual universe created by the late genius James Halliday. When Halliday dies, he leaves his fortune and control of the Oasis to whoever can find three hidden keys within the game. With the help of his friends, Wade races to uncover these "Easter eggs" before the corporate IOI can seize control.

### 5.18.2 Modality Types

**Graphical User Interfaces** – In the movie, when Parzival opens his inventory, it shows up floating display with icons, categories and item slots. **Gesture-Based Interface** – In the real world, Wade is on a motion platform and wearing VR goggles and haptic gloves. As he moves his arms to steer and shift gears, his avatar drives the DeLorean in the race. Even the camera angle is controlled by head movements. **Virtual Reality Interfaces (VRI)** – The OASIS is a virtual world where users can immerse themselves thanks to VR headsets. Users put also gloves on them that can track the hand movements with a suit that can make feel sensations and impact to users. Eventually in the OASIS, there are all principal user interface like GUI for the display, **VUI** when Wade talks to the OASIS's functions, **TUI** when interacting with objects like key with technology, **Touch-Based** when Artemis touches Wade and he feels it... **Brain-Computer Interfaces (BCI)** - When antagonists wears helmets to enter the VR world.

### 5.18.3 Taxonomy

| **Dimension** | **Score** | **Weight** | **Weighted** | **Justification** |
|---|---|---|---|---|
| Narrative Relevance | 5 | 0.125 | 0.625 | The virtual world is important to the story; players have to learn it to find out secrets. |
| Technological Plausibility | 3 | 0.2 | 0.6 | Virtual reality and special gloves are real but feeling everything like real life is still a future idea. |
| Usability & Learnability | 4 | 0.175 | 0.7 | The game's controls are easy to learn, like many popular video games today. |
| Aesthetic & Emotional Impact | 4 | 0.175 | 0.7 | Bright and busy visuals make the world more fun and exciting. |
| User-System Coupling | 4 | 0.1 | 0.4 | Players use controllers, body moves and voice commands to feel really part of the game. |
| Real-World Influence | 5 | 0.225 | 1.125 | Helped make the idea of the "metaverse" popular, by inspiring online worlds and avatars. |
| **Total** | — | — | **4.15** | |

Table 21: Evaluation of the interface design in *Ready Player One* (2018)

## 5.19 Black Panther (2018)

### 5.19.1 Synopsis

After the death of his father, T'Challa becomes king of Wakanda, a hidden and prosperous African nation powered by the rare metal: vibranium. When a rival royal descendant seeks to overthrow him and exploit Wakanda's technology to wage global war, T'Challa must embrace the powers of the Black Panther to protect his people and the world.

### 5.19.2 Modality Types

**Graphical User Interfaces (GUI)** – Wakandan holographic displays present 3D graphical data. Shuri and T'Challa interact with them through touch and gestures. **Voice User Interfaces (VUI)** – Griot, the AI assistant, responds to T'Challa's voice commands during missions like ship control. **Gesture-Based Interfaces** – In her lab, Shuri uses hand gestures to manipulate holographic data, design tech, and modify the Black Panther suit. **Touch-Based Interfaces** – Shuri taps, slides, and presses on lab panels to interact with systems. **Tangible User Interfaces (TUI)** – T'Challa's Kimoyo Beads activate through touch and enable communication and holographic projection. **Virtual Reality Interfaces (VRI)** – Shuri remotely drives a car using a holographic projection, mimicking the driving experience. **Biometric Interfaces** – Ross is monitored on a vibranium medical bed that displays biometric data as a hologram.

### 5.19.3 Taxonomy

| **Dimension** | **Score** | **Weight** | **Weighted** | **Justification** |
|---|---|---|---|---|
| Narrative Relevance | 4 | 0.125 | 0.5 | Shows Wakanda's culture and is important to the story. |
| Technological Plausibility | 2 | 0.2 | 0.4 | The vibranium tech is really advanced and not real yet. |
| Usability & Learnability | 4 | 0.175 | 0.7 | Easy to use because it's based on touch and symbols people know. |
| Aesthetic & Emotional Impact | 5 | 0.175 | 0.875 | Cool design mixes old traditions with new ideas. |
| User-System Coupling | 4 | 0.1 | 0.4 | Using touch makes the system feel real and responsive. |
| Real-World Influence | 3 | 0.225 | 0.675 | Makes people think about designing tech from different cultures. |
| **Total** | — | — | **3.55** | |

Table 22: Evaluation of user interfaces in *Black Panther* (2018)

## 5.20 Upgrade (2018)

### 5.20.1 Synopsis

In the near future, technology governs daily life. After his wife is killed and he is left paralyzed in a violent attack, Grey Trace is offered an experimental AI-powered implant by a billionaire inventor. The implant enhances his physical abilities beyond anything he's known, giving him the strength to seek revenge on those who destroyed his life.

### 5.20.2 Modality Types

**Voice User Interfaces (VUI)** – Grey can talk to STEM normally and can get feedback from him, it is like an AI assistant however as the movies progresses, we see that the VUI becomes less useful and STEM takes control autonomously. **Tangible User Interfaces (TUI)** – When a pen is used to touch the eye of a dead person to extract data, this action activates a digital replay of the person's last visual recording. **Virtual Reality Interfaces (VRI)** – At the end of the movie, after STEM takes full control of Grey, Grey wakes up in alternative reality where he is happy with his wife that is still alive. But the VR is so real that Grey doesn't seem to know that it is a VR. **Brain-Computer Interfaces (BCI)** – We can see that STEM is implanted into Grey's spine and interfaces directly with his brain and nervous system that enables him to walk, move, and even fight. Grey is in full control of his body but we can see that STEM can also take control of his body, it goes bi-directional.

### 5.20.3 Taxonomy

| **Dimension** | **Score** | **Weight** | **Weighted** | **Justification** |
|---|---|---|---|---|
| Narrative Relevance | 5 | 0.125 | 0.625 | The story is about a brain computer that controls important parts of the plot. |
| Technological Plausibility | 3 | 0.2 | 0.6 | Talking to the system and using touch feels real, but full brain control is still being studied. |
| Usability & Learnability | 3 | 0.175 | 0.525 | The main character learns to use it, but the system becomes too powerful and hard to control. |
| Aesthetic & Emotional Impact | 4 | 0.175 | 0.7 | Dark and cool style makes the story feel intense as control changes. |
| User-System Coupling | 5 | 0.1 | 0.5 | The brain interface connects tightly, showing both control and loss of it. |
| Real-World Influence | 3 | 0.225 | 0.675 | Made people think about brain tech, AI control, and what it means to be in charge. |
| **Total** | — | — | **3.625** | |

Table 23: Evaluation of user interfaces in *Upgrade* (2018)

# 6 Findings & Discussion

## 6.1 What interaction modalities appear most frequently?

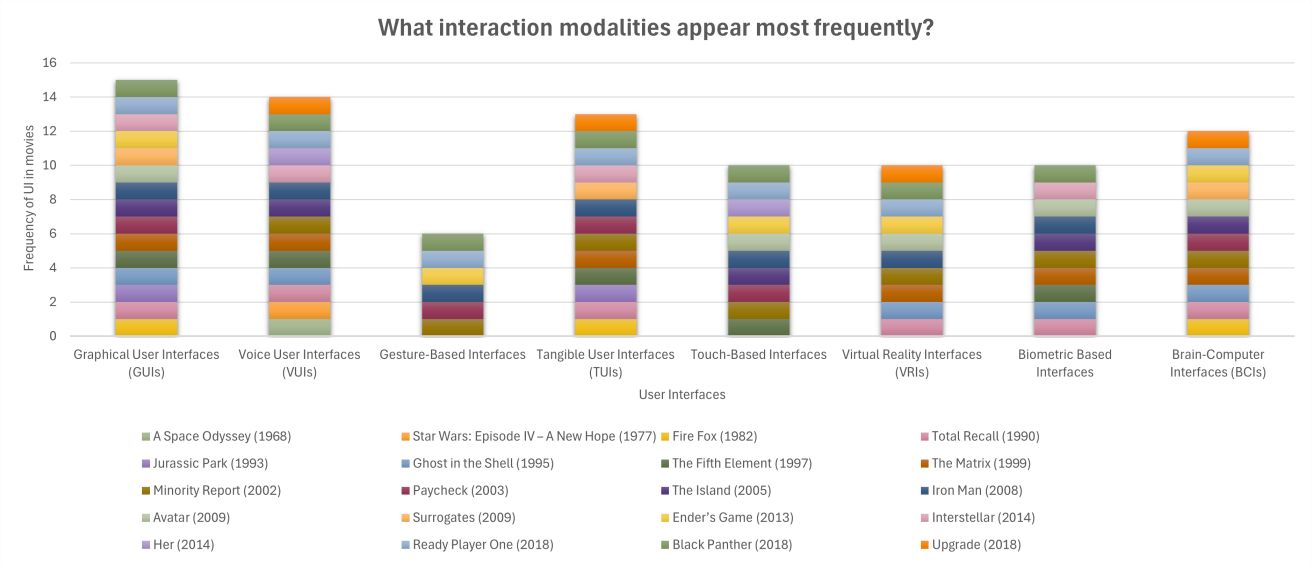



Figure 5: Frequency of Interaction Modalities

The figure above presents a bar chart that visualizes the frequency of different interaction modalities observed across 20 selected sci-fi movies watched. Each bar represents a specific modality type such as Graphical User Interfaces (GUI), Voice User Interfaces (VUI), Gesture-Based Interfaces, Tangible Interfaces, Touch-Based Interfaces, Virtual Reality Interfaces, Biometric Interfaces, and Brain-Computer Interfaces (BCI). The Y-axis indicates the number of movies in which each modality appears, while the X-axis lists the modality categories. A value of 1 was assigned for each appearance of a modality in a movie (0 if it did not appear), making the bar height a direct count of modality presence across the dataset.

We can observe that the most frequently occurring modality is the Graphical User Interface (GUI), appearing in 15 out of 20 movies. This is closely followed by Voice User Interfaces (14) and Tangible Interfaces (13). Brain-Computer Interfaces were also frequent, appearing in 12 films. Touch-Based, Virtual Reality, and Biometric Interfaces all appeared in 10 movies, while Gesture-Based Interfaces were the least frequent, found in only 6.

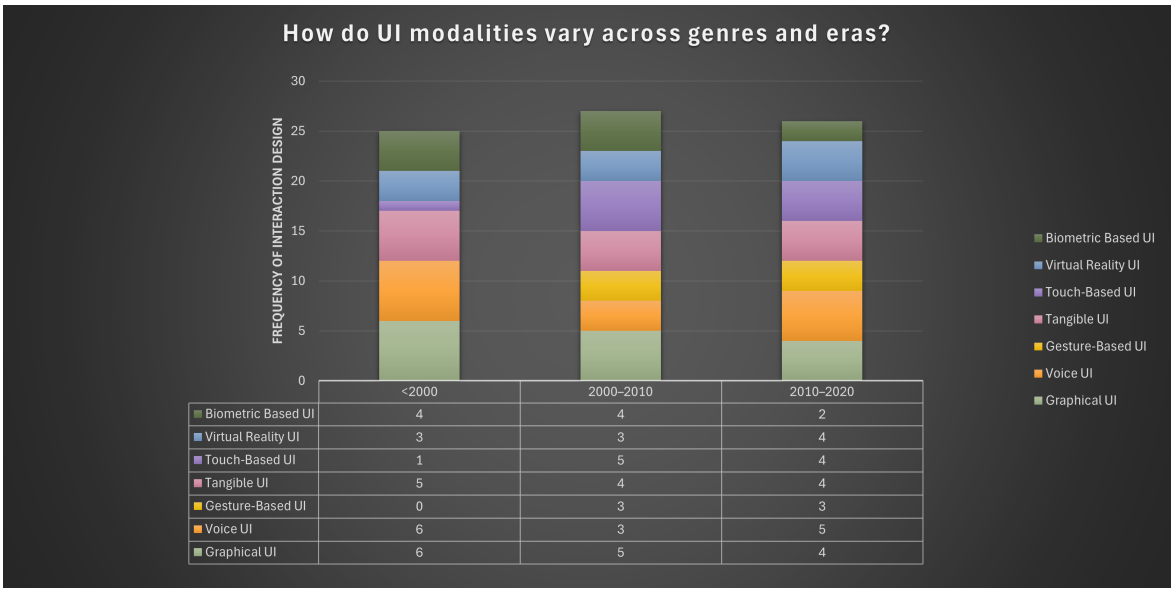
(Norman, 2013) points out that good interfaces use what people already know to make things easier to understand and use. When something feels familiar, users don't have to spend extra effort figuring out how it works. In sci-fi movies, this is why GUIs and Voice User Interfaces show up a lot: they're familiar to most people, so the audience can quickly understand what's happening on screen. This helps the story flow smoothly without getting blocked explaining how the technology works.

The high frequency of Tangible Interfaces and Brain-Computer Interfaces (BCIs) reflects a strong interest in more immersive and representative interaction styles where users engage with digital systems through physical or direct neural actions. Sci-fi movies often exaggerate to make technology feel more futuristic and engaging. Similarly, BCIs represent a shift toward direct neu-

ral control in HCI, which aligns with how films use them to suggest advanced or alien technology.

The low occurrence of Gesture-Based Interfaces may relate to their ambiguity and lack of consistent affordances without clear design and feedback, gestures can be difficult to interpret, both for users and film audiences. Indeed, (Norman, 2013) emphasizes that good interaction design depends on visible affordances and feedback, which gestures may lack unless it is deliberately structured.

## 6.2 How do UI modalities vary across genres and eras?

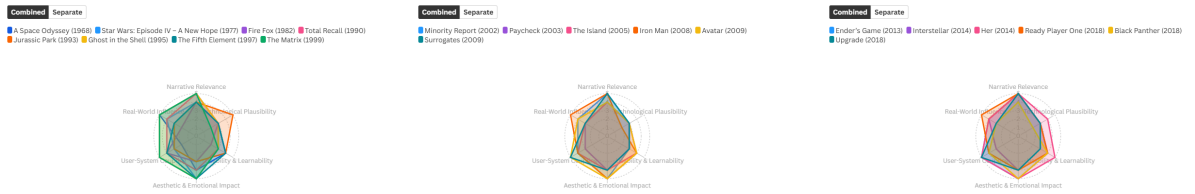



| | <2000 | 2000–2010 | 2010–2020 |
|---|---|---|---|
| Biometric Based UI | 4 | 4 | 2 |
| Virtual Reality UI | 3 | 3 | 4 |
| Touch-Based UI | 1 | 5 | 4 |
| Tangible UI | 5 | 4 | 4 |
| Gesture-Based UI | 0 | 3 | 3 |
| Voice UI | 6 | 3 | 5 |
| Graphical UI | 6 | 5 | 4 |

Figure 6: Modality Variation by Genre and Era

This bar chart displays how different user interface modalities are distributed across three cinematic eras: before 2000, 2000–2010, and 2010–2020. Each group of bars corresponds to a specific modality and each bar within the group represents one era, showing how often that modality appeared in sci-fi movies from that time period. The chart allows us to observe historical trends in how sci-fi films imagine human-computer interaction.

We observe that Graphical and Voice User Interfaces appear consistently across all eras with a strong presence before 2000, that can indicate their enduring relevance in cinema. Gesture-Based Interfaces, in contrast, were absent before 2000 and only began to emerge in the 2000s and maintained a modest but steady presence into the 2010s. Tangible User Interfaces have maintained a stable representation across eras. Touch-Based and Virtual Reality Interfaces saw a noticeable rise after 2000. Biometric Interfaces show moderate use before 2000 and remained consistent in later periods.




Before 2000 2000 – 2010 2010 – 2020

Figure 7: Dimension Variation by Genre and Era

We observe three radar charts, each representing one era and comparing six evaluation dimensions across the movies from that period. These charts allow us to visualize how each dimension of the film varies over time, highlighting shifts in the way sci-fi films show user interfaces across different eras (before 2000, 2000–2010, and 2010–2020)

.

### 6.3 Which UIs are represented as more "advanced" or user-friendly & How do cinematic UIs reflect or diverge from real HCI trends?

Sci-fi films often identify Graphical User Interfaces (GUIs) and Voice User Interfaces (VUIs) as advanced and intuitive by design because these familiar interfaces offer narrative relevance, allowing audiences to understand complex interactions without visual explanation and thus making them user-friendly. Which often reflect real HCI trends by those modalities

(Atipik, 2022) highlights that early films like 2001: A Space Odyssey (1968) introduced recognizable UIs that shows graphical and voice elements, while Star Wars (1977) employed tactile, visually panels techniques that enhance narrative clarity and intuitive engagement. On our radar chart, we can observe that both A Space Odyssey and Star Wars register high scores in Narrative Relevance (5 and 4 respectively) and Aesthetic & Emotional Impact (4 and 5), demonstrates that even early cinema used familiar modalities to communicate futuristic interactions effectively. Her (2014) takes this a step further by relying exclusively on VUIs in the character Samantha, which earned it perfect scores in both Usability & Learnability (5) and Narrative Relevance (5). This shows how intuitive, voice-based interfaces can effectively convey emotional and cognitive depth, while staying grounded in plausible near-future HCI trends. And Touch-based interfaces, found in Her (2014) and The Fifth Element (1997), are showed as both advanced and very user-friendly, with high Usability & Learnability scores (4–5), that reinforces their role as intuitive, accessible interaction methods. These modalities reflect real-world HCI because of their high scores in Usability that mirror the importance of usability (Norman, 2013) (See Section 2.1)

Tangible Interfaces and Brain-Computer Interfaces (BCIs) are shown as advanced and immersive in films like Ghost in the Shell (1995) and The Matrix (1999), which score 5 in Real-World Influence. However, their lower Usability & Learnability scores (3) suggest they are less user-friendly due to complexity (Norman, 2013). Tangible UIs in Iron Man (2008) and Minority Report (2002) score high in Narrative Relevance (5) with better Usability & Learnability (3–4), reflecting more intuitive. It reflects ongoing advancements in human-computer interaction research justified by the Narrative Relevance's score, however the relatively lower Usability scores highlights a divergence from real-world expectations.

Virtual Reality Interfaces (VRIs), as in Ready Player One (2018) and Avatar (2009), are ad-

vanced and highly immersive, with high score in Aesthetic & Emotional Impact and Real-World Influence (around 4–5). They offer a user-friendly experience by creating engaging environments that audiences easily relate to. Biometric Interfaces in Jurassic Park (1993) and Black Panther (2018) are represented as advanced security tools and moderately user-friendly, with moderate scores in Technological Plausibility and Usability (3–4).

Gesture-based interfaces stand out, most memorably in Minority Report. In that film, science adviser John Underkoffler drew on his spatial computing research to craft highly intuitive, gesture controls that feel natural and immersive that shows advanced functionality through dramatic visual expression (Ward, 2019). While these UIs prioritize aesthetic impact (5) and strong user-system coupling (4) for cinema's beauty, they often sacrifice usability & learnability (3), indeed complex gestures can be tiring or hard to master. This illustrates how sci-fi films often present gesture-based UIs as highly advanced but less user-friendly. Since, the usability is low, it will surely diverge from practical HCI principles.

# 7 Conclusion

## 7.1 Summary of Contributions

This thesis addressed a fundamental research question: how can we systematically evaluate user interfaces presented in science fiction films? To resolve this, the study developed and applied an evaluation framework grounded in established theories. It carefully analyzed a representative selection of films, deriving meaningful and detailed insights about speculative interfaces and their potential implications for real-world technology development.

A central contribution of the thesis is the comprehensive Six-Dimension Evaluation Framework. Drawing extensively from foundational scholarship in Human-Computer Interaction (HCI) and film studies, particularly from the work of Kurosu, Schmitz, Nielsen, Cheung, and Antle, this framework assesses dimensions including narrative integration, realism, usability, aesthetic quality, interaction modality, and user-system coupling. By operationalizing these dimensions into a clear, replicable 5-point scale, the framework offers unprecedented comparability across diverse film analyses, enabling future studies to build directly upon its structured approach. The thesis fills a significant gap by providing a specialized evaluation method tailored explicitly to the intricacies of cinematic interface depictions.

The Integrated Typology and Taxonomy of Interaction Modalities detailed in Chapter 4 constitutes another major input. It systematically categorizes interactions into nine families, such as graphical, voice, gesture, tangible, and biometric interfaces, along with unique fictional subclasses. This robust classification clarifies both the prevalence and narrative significance of interaction types within science fiction films. Through precise definitions and distinctions, the thesis facilitates greater accuracy and consistency in the analysis and discourse of speculative interface designs, both within academia and practical design environments.

Further enriching our understanding, the thesis conducted a thorough analytical examination of fifteen influential science fiction films spanning five decades (1968–2018). This analysis offered fresh longitudinal insights, notably the increased plausibility and narrative centrality of user interfaces. For instance, it highlighted critical design influence loops, such as the clear inspirational relationship between the futuristic interfaces in Minority Report and Microsoft's Kinect system. This connection underlines how cinematic visions can prefigure and shape actual technological innovation, emphasizing the practical value of cinematic analysis.

Additionally, the thesis delivered an explicitly defined methodological blueprint for film selection and analysis. By providing clear and specific criteria for inclusion, such as film prominence, thematic relevance, and historical impact, this methodological blueprint supports reproducibility and comparability in subsequent studies, greatly enhancing the cumulative nature of research in speculative interfaces.

A critical interdisciplinary contribution of the research lies in bridging narratology and HCI. By positioning science fiction cinema as an informal yet insightful testing environment for innovative interface concepts, the thesis promotes a dialogue between researchers from disparate academic disciplines. It offers practical methods for extracting actionable insights from speculative fiction, potentially informing future design practices and theoretical explorations.

The thesis also presents robust empirical insights supported by comprehensive data analysis in Chapter 6. Notably, it identifies a clear upward trend in the prominence of gesture-based

and voice-based interfaces, paralleling real-world technological adoption patterns. These findings underscore the framework's predictive validity, reinforcing the thesis's central premise that analysing cinematic portrayals can reliably forecast future trends in technology design and user expectations.

Finally, the work contributes a public toolkit, encompassing both the conceptual framework and practical scoring instruments. Designed for easy reuse, critique, and expansion, this toolkit is a valuable resource for researchers and practitioners aiming to further investigate speculative interface design. The toolkit's openness encourages continuous adaptation and improvement, ensuring sustained relevance and utility amid evolving technological landscapes and cinematic innovations.

## 7.2 Key Limitations

Despite significant contributions, the thesis acknowledges several critical limitations. First, the analysis is limited to fifteen English-language films from 1968–2018, excluding television series, non-Western cinema, and post-2018 productions. This restricted scope diminishes the generalizability of findings, given that interface depictions in other contexts or media formats could significantly vary.

Secondly, the subjective coding by a single researcher introduced potential biases and limits objectivity. Without systematic checks or multiple coders validating the results, the quantitative robustness of conclusions derived from the framework becomes somewhat uncertain.

Thirdly, the study lacks empirical validation through direct interaction with actual users or industry professionals. The theoretical nature of the conclusions prevents verification of whether high scores from the evaluation framework genuinely correlate with real-world usability, adoption, or audience acceptance.

These limitations highlight necessary caution in interpreting current findings and provide direction for future research to strengthen the study.

## 7.3 Future Research and Open Questions

Recognizing these limitations, this thesis outlines several vital avenues for future research. Firstly, a dedicated reliability and refinement study of the evaluation framework should be prioritized. Future work must involve multiple independent coders rigorously testing the framework to assess and enhance inter-coder reliability. By integrating diverse evaluative perspectives, subsequent studies can significantly improve the framework's robustness, ensuring more definitive and widely accepted conclusions in cinematic interface evaluation research.

Secondly, expanding and diversifying the corpus of films is imperative. Future research should extend the application of the refined evaluation framework to include more recent films beyond 2018, non-English-language cinema, and television series. This broadened scope would address existing limitations of representativeness and facilitate richer, cross-cultural comparisons. Further exploration of long-form television content, with its unique narrative and interface developments, could yield valuable insights into audience engagement and interface evolution over extended viewing experiences.

The third critical direction involves conducting empirical, audience-centered experiments. Future studies should empirically assess viewer perceptions regarding the realism, believability, and emotional impact of interfaces with varying framework scores. Direct viewer feedback could significantly validate theoretical assumptions made in this research. Furthermore, practical experimentation involving prototypes based on highly rated cinematic interfaces could offer compelling evidence linking speculative fiction directly to tangible interaction design practices. Empirical studies of this nature would substantially enhance the practical applicability and credibility of cinematic analysis within real-world HCI contexts.

Expanding further, future research could explore additional questions, such as how speculative interfaces influence viewer expectations for technology and how cultural differences affect interface perception and acceptance. Investigating industry perspectives, through expert interviews or case studies of actual interface design processes influenced by cinematic inspirations, could add practical depth and commercial relevance to theoretical findings.

# A Appendix

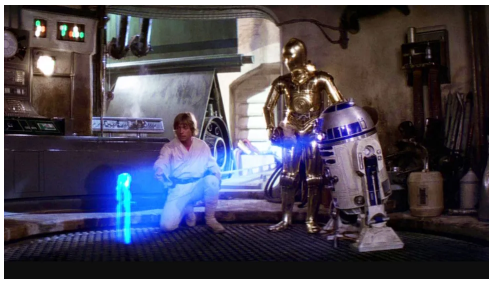


Figure 8: From *Star Wars: A New Hope* (1977). © Lucasfilm Ltd. (Redman & Coggan, 2022)



Figure 9: From *Total Recall* (1990). © Carolco Pictures. (CinemaSpection, 2013)



Figure 10: From *Jurassic Park* (1993). © Universal Pictures. (Jurassic-Pedia, 2011)



Figure 11: From *The Matrix* (1999). © Warner Bros. (Therkildsen, 2017)



Figure 12: From *Minority Report* (2002). © Fox/DreamWorks. (A Thinking Person, a.k.a. Cogit8R, 2010)

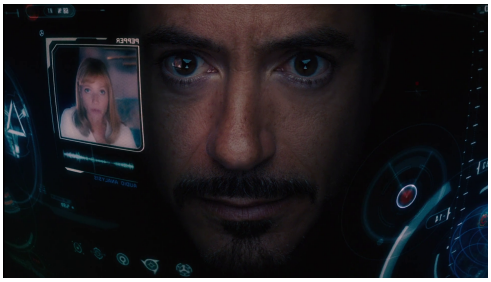


Figure 13: From *Iron Man* (2008). © Marvel/Paramount. (Sci-fi Interfaces, 2015)



Figure 14: From *Black Panther* (2018). © Marvel/Disney. (Sci-fi Interfaces, 2020)



Figure 15: From *Ready Player One* (2018). © Warner Bros. (Boyle, 2018)

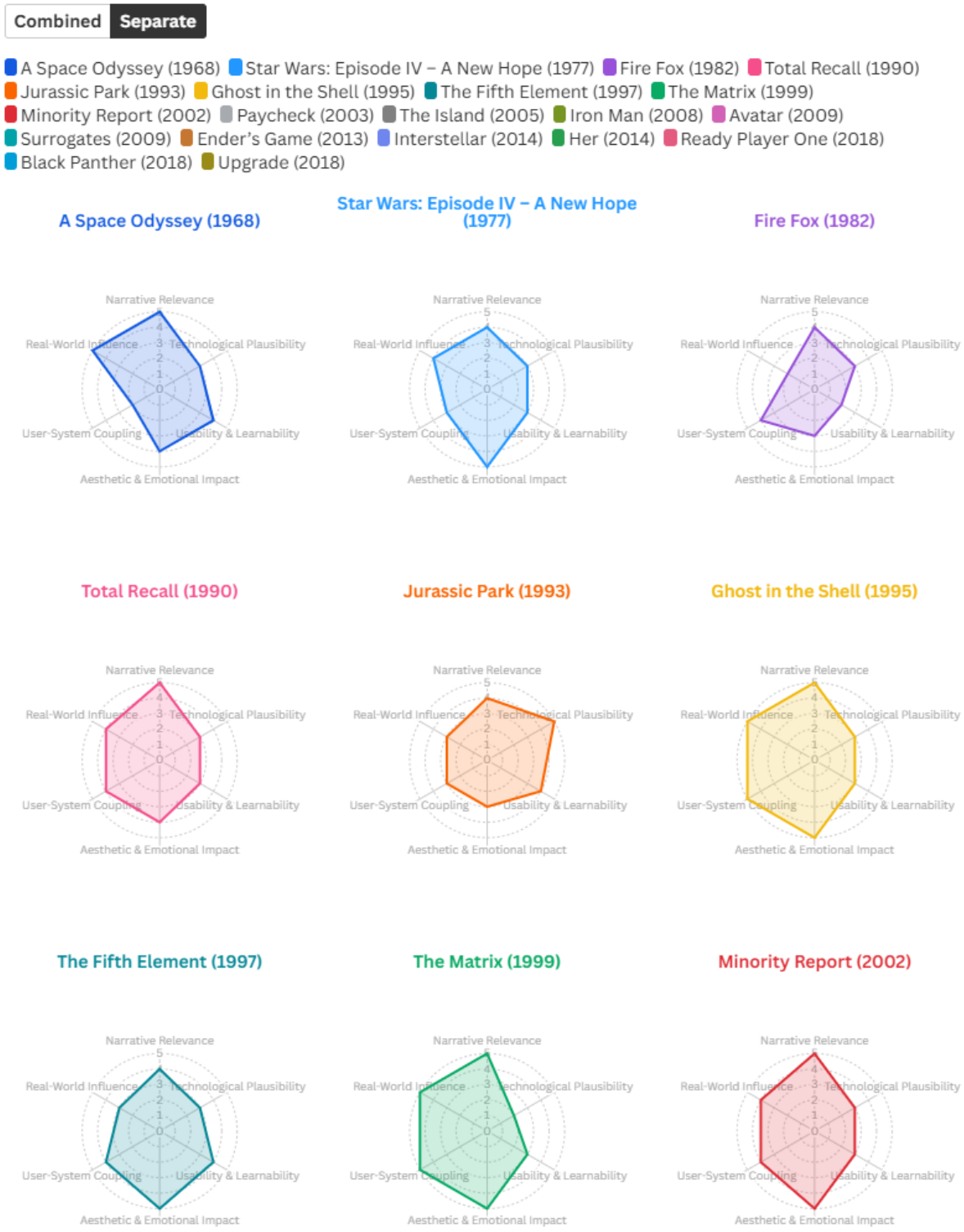



Figure 16: Radar Chart of Each Sci-fi Movie Part 1

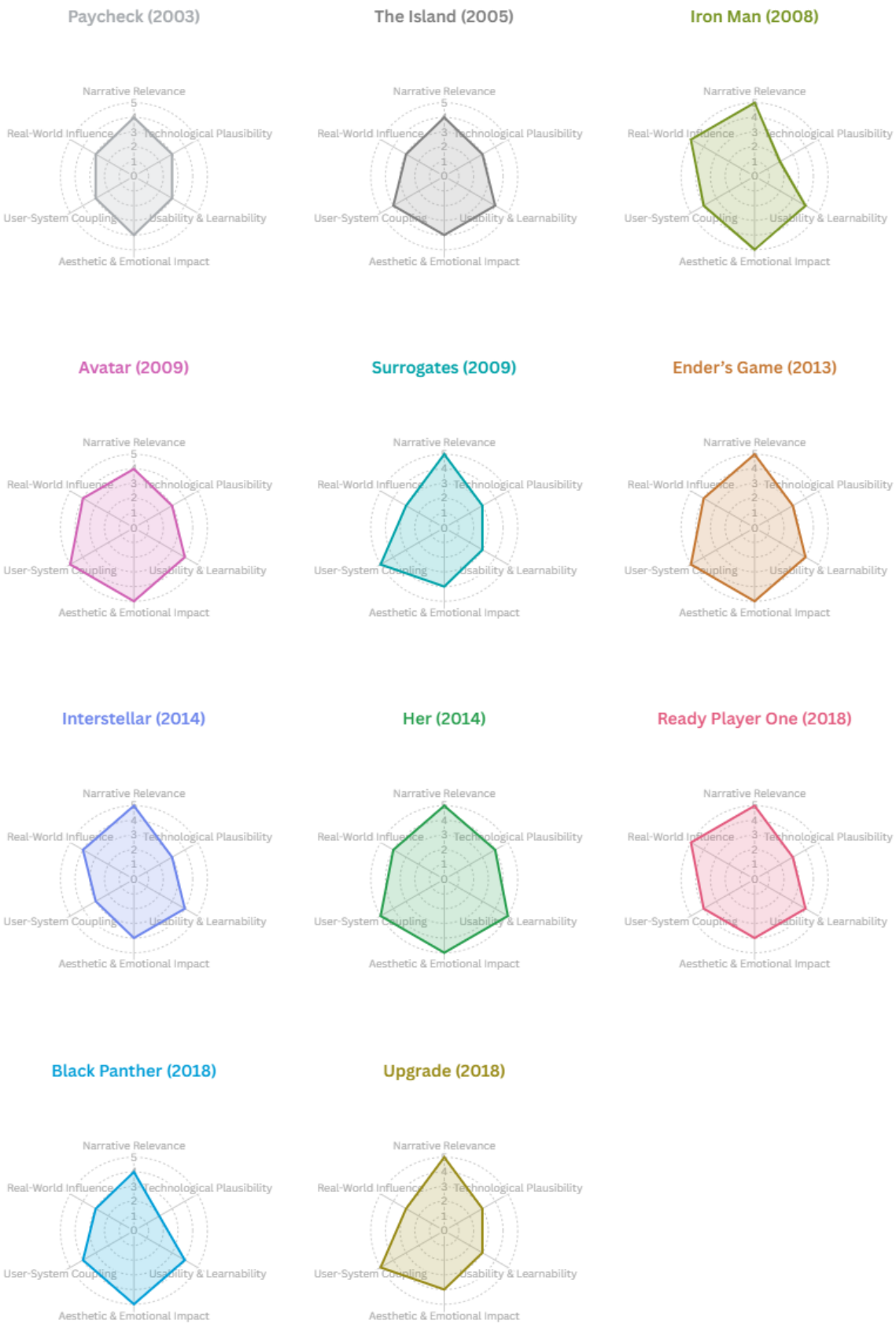



Figure 17: Radar Chart of Each Sci-fi Movie Part 2

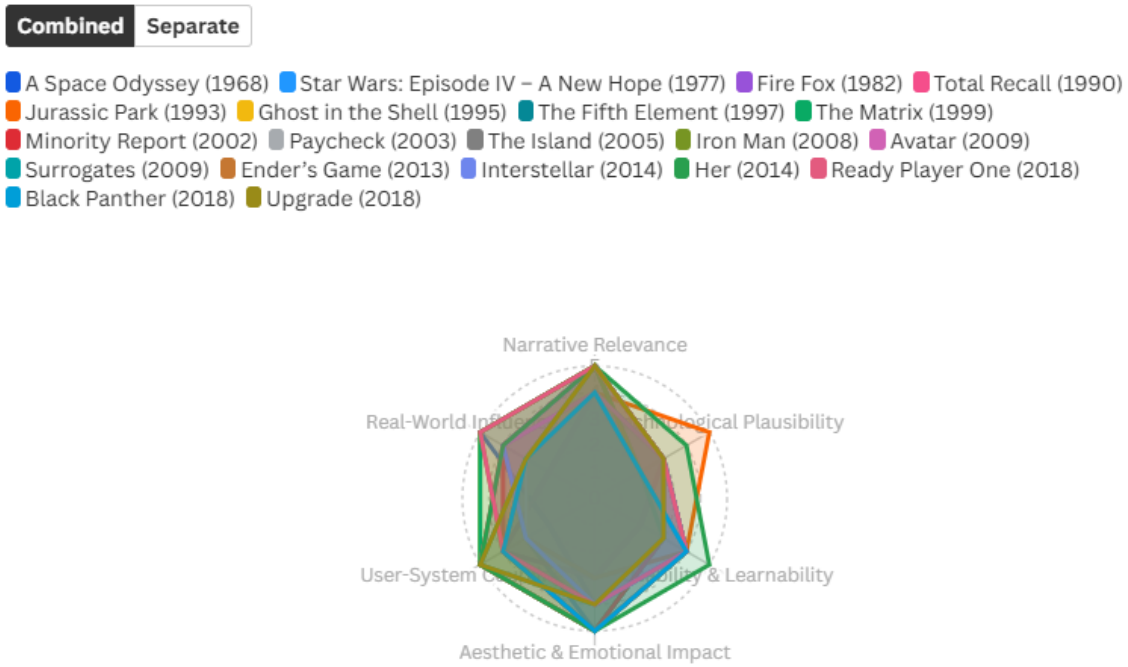



Figure 18: Radar Chart of Each Sci-fi Movie Combined

| | Année | Graphical User Interfaces (GUIs) | Voice User Interfaces (VUIs) | Gesture-Based Interfaces | Tangible User Interfaces (TUIs) | Touch-Based Interfaces | Virtual Reality Interfaces (VRIs) | Biometric Based Interfaces | Brain-Computer Interfaces (BCIs) |
|---|---|---|---|---|---|---|---|---|---|
| Upgrade (2018) | 2018 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| Black Panther (2018) | 2018 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| Ready Player One (2018) | 2018 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 |
| Her (2014) | 2014 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| Interstellar (2014) | 2014 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 |
| Ender's Game (2013) | 2013 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 |
| Surrogates (2009) | 2009 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| Avatar (2009) | 2009 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| Iron Man (2008) | 2008 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| The Island (2005) | 2005 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 |
| Paycheck (2003) | 2003 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 |
| Minority Report (2002) | 2002 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| The Matrix (1999) | 1999 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 |
| The Fifth Element (1997) | 1997 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 |
| Ghost in the Shell (1995) | 1995 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| Jurassic Park (1993) | 1993 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Total Recall (1990) | 1990 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 |
| Fire Fox (1982) | 1982 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| Star Wars: Episode IV – A New Hope (1977) | 1977 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| A Space Odyssey (1968) | 1968 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |

Figure 19: Binary table of UI in sci-fi movies

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