Decolonizing Computer Science: The Immersive Elevator Experience

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Abstract

The immersive elevator experience is a speculative design for a system which informs people about the issue of decolonization in computer science. The specific area of decolonization that we have chosen to focus on is the issue of how people in first-world countries use and dispose of technology, and how this links to the exploitation of people in third-world countries. We underwent an iterative design process and created an interactive experience that is installed inside an elevator. The aim is to educate users about how the way they use technology is harming people in poorer regions. Through using the iterative design process and receiving feedback from lecturers and our peers, we continuously made changes to design an installation that was engaging and informative. We also discovered how to make our project as user-friendly as possible. This helped us to ensure that users would pay attention to the important issues that we are raising and gives us confidence that they will come out of the experience willing to make a change.

CCS Concepts

• **Human-centered computing → Human computer interaction (HCI)**; • **Applied computing → Arts and humanities**.

Keywords

speculative design, decolonization, colonisation, interactive art, design fiction

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1 Introduction

Colonisation – "a more or less subtle or indirect imposition of certain worldviews, prescription of certain solutions and methods, and/or legitimisation of certain forms of accepted knowledge" [7] – has permeated the design and influence of technology. In this paper, we describe the speculative design of an immersive elevator system that engages visitors at the University of the Arts Holborn campus building in reflecting on the colonial influences embedded in technology. The Immersive Elevator Experience aims to provoke critical thinking on how technology design, usage, and disposal contribute to systemic inequalities, urging users to consider more sustainable and equitable alternatives. The elevator, a part of daily life, will transform into an interactive experience that challenges users to consider the history and decolonisation of modern computing.

As users travel between floors, the system presents dynamic audiovisual content that maps out the global trade routes of electronic waste (e-waste), emphasizing how discarded technology from wealthier nations is often shipped to Global South countries for disposal or recycling under hazardous conditions [5]. Through immersive projections users will see how outdated electronics, often designed with planned obsolescence, contribute to technocolonialism [9] — where developing countries bear the environmental and health burdens of global technology consumption. The experience will show users key sites such as e-waste dumps, where informal workers dismantle toxic materials with little regulation. This matters because e-waste is a manifestation of digital colonialism, where Western-designed technology creates long-term environmental harm in marginalized regions.

1.1 Inspiration

The design is influenced by speculative and critical design methods, as outlined in Dunne & Raby's speculative design principles [3]. These methodologies emphasize designing for reflection [1] rather than solutionism, prompting users to question dominant narratives and consider alternative technological futures. We are also inspired by immersive technology companies like Immersive Interactive Ltd. [8] which highlight the power of multi-sensory engagement in learning environments, reinforcing the project's focus on interactive storytelling and deep engagement.

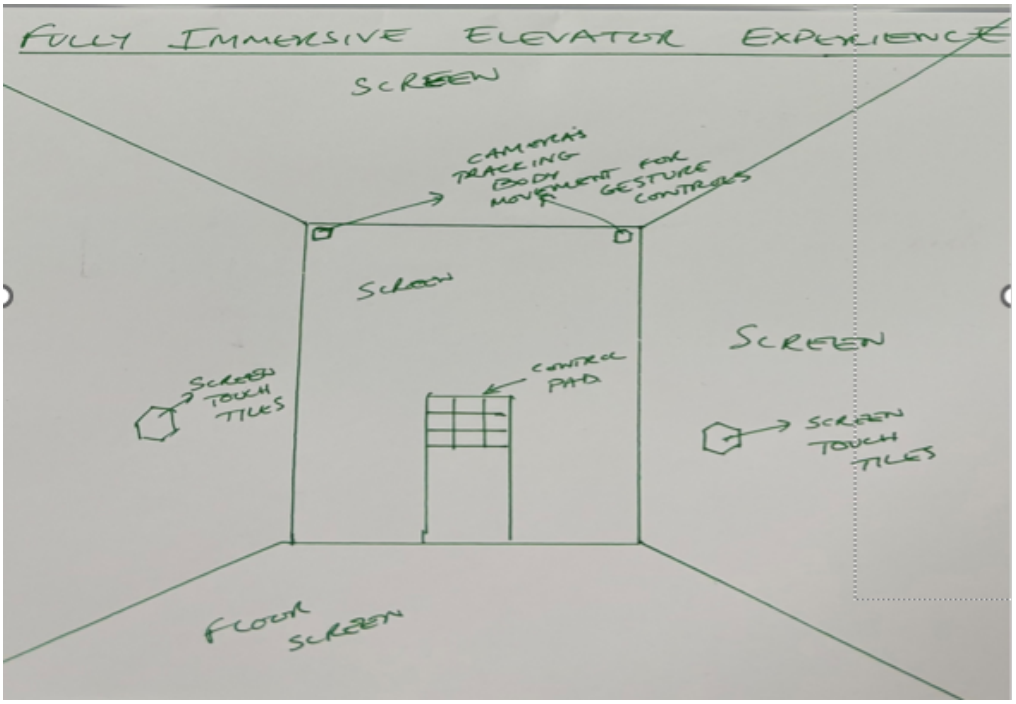

Figure 1: Initial sketch of inside elevator design.

1.2 Why the Elevator?

The choice of an elevator as the medium for this experience is intentional. Elevators create a captive audience, ensuring focused engagement with the material during a brief but immersive journey. This setting allows for an intimate and controlled learning environment, where participants can engage with content without external distractions. Additionally, the transient nature of an elevator ride reinforces the idea of journey and transition, symbolizing the shift in perspectives that the installation aims to achieve. To this end, our design targets three design goals:

- **Engagement:** The elevator system is inherently interactive, responding to user input via touchscreen panels, motion sensors, and auditory feedback.
- **Everyday Foresight:** Since elevators are in use multiple times daily, this design encourages reflection into habitual activities, ensuring ongoing engagement rather than a one-time learning moment. **The key to our design is to encourage moments of reflection where people will apply foresight in their everyday activities, as opposed to just reflecting on them and not taking any action.**
- **Inclusivity:** The system is designed to be accessible to diverse users, featuring multiple language options and screen readers. The content will also include non-Western perspectives on computing to decentralize dominant narratives.

Below, we describe the iterative design process we followed to create our speculative design (Section 2 through 5). The process consisted of weekly design crits [10] where we gathered feedback from both our lectures and colleagues.

2 Iteration 1: Initial Ideas

We started our speculative design by gathering design inspirations. First, The Carbon Wall [4] highlighted the connection between climate issues and historical exploitation, encouraging action through interactive features. We felt that the wall engages users by linking climate issues to historical exploitation, allowing users to input daily choices, which are then compared to historical and global data to illustrate patterns of inequity. With visualized future pathways and personalized foresight suggestions, the system also seems to encourage reflection on how personal decisions impact global climate and social inequalities. The collaborative features also enable shared exploration, fostering awareness and action, as well as reflection through collaborative discussion [1]. Second, we were inspired by Perpetual Plastic [6] which uses an interactive touchscreen to transform plastic waste into an engaging learning experience about recycling. Immersive.co.uk [8] also demonstrated to us the power of immersive, sensory-rich virtual environments for deep user engagement.

From this, we created an initial sketch for our elevator design, shown in Figure 1. We imagined an elevator with different touch points of interaction, as well as camera tacking body movement, which could display our experience across the walls and floors of touch screens on the walls of the elevator. The use of the elevator could offer a captive audience and integrate in everyday life (sparking everyday reflection [11]) in an engaging, multi-sensory educational experience.

3 Iteration 2: Usability

After the first iteration, we were given feedback regarding usability issues, particularly about the complexity of interactions, cognitive load, and user engagement. Feedback from our lecturers and peers suggested that there was a risk of information overload due to the high volume of content presented, which likely could not be absorbed during a brief elevator ride. Additionally, the use of various input methods (touchscreen, motion sensors, and spatial audio) was seen as daunting by some users, particularly those who were using it for the first time. In response to concerns about information overload, we simplified the interface to concentrate on a single primary interaction per user experience. We hadn't focused in on our choice to historical trade routes yet, so decided to visualise e-waste disposal sites instead of juggling multiple topics simultaneously. We also considered the motion-based interactions which might be used. We decided that user should be able swipe or tap to navigate through content, removing the necessity for intricate gestures that could've been essential to using body motion tracking. We focus on the touch points visualised in our sketch, as opposed to more complex interactions.

4 Iteration 3: Inclusive Design

In this iteration, we focused in on accessibility features, especially for individuals with disabilities such as d/Deafness, visual impairments, and non-native English speakers. For example, we decided to integrate high-contrast visuals and larger fonts to enhance readability. We also suggested that spatial audio should be added to the design such that there were clear narrations designed for users with visual impairments.

It was important to us that the Immersive Elevator Experience would also offer support for multiple languages apart from English, especially those used by communities affected by digital colonialism, including Spanish, Hindi, and Swahili. Users have the option to choose their preferred language at the start of the experience. The content now emphasizes voices from the Global South, showcasing case studies from scholars in Africa, South Asia, and Latin America within the technology sector. Perhaps in doing so, the storytelling dominated by Western perspectives could be illuminated.

A Figma[1] mockup was created to help explain these features, shown in Figure 2. This displays improved navigation gestures, allowing for more intuitive user interactions and high-contrast interface with larger fonts for improved readability.

5 Iteration 4: User Feedback on Prototype

We conducted a paper-based questionnaire to evaluate user experiences with a prototype elevator experience. We used a projector to mimic the elevator visuals in the corner of the classroom and invited our classmates to enter the area we cornered off. We also added audio cues at this stage to guide users and add to the immersive aspects of the experience. Users completed the User Engagement Scale [13], which focuses on five key areas: Focused Attention, Usability, Aesthetic Quality, Reward, and Engagement. Whilst only a preliminary investigation, the results gave as some areas in which to reflect on our design and make improvements. The results are

[1]https://www.figma.com/

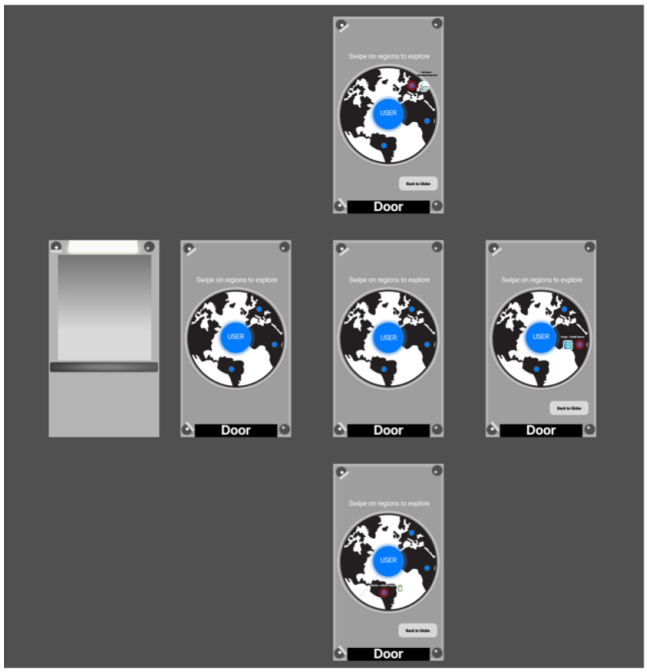

Figure 2: High-contrast interface for our elevator with larger fonts for improved readability.

shown in Figure 3, and collection was covered by the university ethics board.

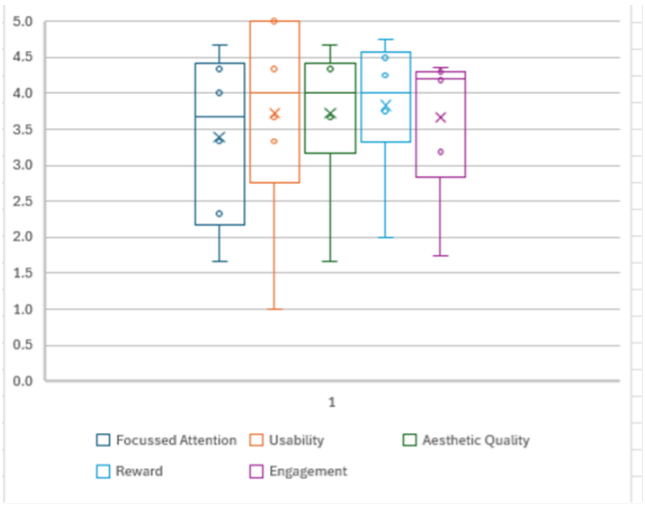

Figure 3: Box Plot displaying user data on five key areas.

Focused Attention has a relatively narrow interquartile range (IQR). The median score of 3.5 is supported by scores as low as 2.0 and almost as high as 5.0. Most data points cluster in the middle, indicating a moderation of agreement by users, with many participants being engaged, though several struggled to keep attention. An outlier close to 2.0 reflects that a few users strongly struggled

to stay focused, perhaps because a captive audience design made it more of a passive experience rather than an actively immersive one . Usability has the widest range, from 1.0 to 5.0, with an outlier at 1.0. That means at least one user found the system difficult to use; most likely, the reason for this was the inaccessibility of some features or unclear design of some elements. The broad variability reflects differing experiences, possibly due to the manual interaction required with the projected screen on a DIY elevator. While some users found this intuitive, others struggled. Indeed, during testing, we noticed some problems with a button that might account for this.

Aesthetic Quality has a much lower IQR, with a median close to 3.0, scores in the range between 2.5 and 4.5. Without extreme outliers on both ends, there seems to be general agreement on the visual appeal of the prototype.

Reward and Engagement have wider IQRs, a median around 3.0, and several low outliers. This could suggest that the users had different experiences, which were probably due to individual preferences, expectations, and past experiences. Some found the system engaging and rewarding, while others did not. Studies into reward structures in engagement, such as [2], have concluded that differences in reward systems have significant implications for user engagement. The variability in responses suggests mixed opinions on how rewarding or engaging the system felt.

Further user testing will help in showing areas where refinement should be done.

6 Final Design

Our final design is an interactive 3D projection to be installed inside an elevator. The elevator walls will become a learning experience with this installation, wherein the users can interact with a digitally projected 3D globe using hand gesture interactions. The design intends to decolonize computer science and investigate how, from the point of view of the Global South, raw materials fuel technological development for the most part for the benefit of the Global North.

The user interaction works as follows. First, guests enter an elevator displaying a big projection of a 3D globe on the interior elevator walls. Next, using hand movements users can i) rotate and explore the globe; ii) click on specific countries (e.g. Congo and Bolivia) to expose detailed information; iii) view textual information for that area of the globe e.g. on extracting coltan (a key mineral in all electronic devices from Congo) or lithium (needed for batteries from Boliva). We focused on these materials and countries based on previous feedback that the design needed to focus in more on particular areas of decolonising computer science.

Our elevator prototype of the world map, through gesture control, turned an elevator into an interactive reflective space. We place the experience within the familiar environment of an elevator to naturally nurture 'passive engagement' [13] with it in ways that require no deliberate effort. This meets inclusive, human-centred design principles, where experiences in the digital world should easily integrate into natural environments, promoting curiosity and contemplation [12].

7 Discussion

Overall, our design offers an immersive experience that calls users to reflect critically on the hidden costs of technological progress. Hence, it raises awareness of global power imbalances in resource extraction. By placing this interactive learning moment in an everyday space like an elevator, our design guarantees that even the shortest journeys are opportunities for reflection and education.

Our design started with the concept to use screens that were installed on the walls of the elevator that the user would interact with through a touch screen interface. We changed the design to use projectors as our method of display, which the user could interact with hand gestures. As we continued to develop our design, we decided to implement audio cues to better immerse the user within our experience. We also included a 3d globe that shows the trade routes of materials such as cobalt and lithium and provides information on how certain countries are being exploited for their materials.

During the development of our project, we found several tools to be quite helpful in assisting with improving upon our ideas. One tool that helped was Figma. By using this platform, we were able to visualise what our ideas would look like in a real-world scenario, which helped us to decide what needed to be changed or removed, and what could potentially be improved upon.

Another tool that we found to be helpful in developing our product was the in-person questionnaire. This was carried out after users had the chance to test a prototype of our project and asked the users how they felt whilst being inside our elevator, and whether they thought that it was informative and engaging to use. The feedback that we received from this questionnaire was very helpful as it showed us what users liked about our product and what they did not. An idea that we found quite difficult to abandon was the use of audio cues in our experience. The initial idea when introducing them was to have loud sound effects like explosions that would mimic the experience that people in third-world countries have when mining in unsafe conditions for metals such as cobalt and lithium. We as a group felt that the sound effects were necessary to immerse users within our experience, so as a compromise we replaced the explosions with quieter ambient mining and cave noises, which would be less intruding on the user.

The feedback that we received during our design process helped us to continually improve on our project to make it a better experience for users. Our initial design goal was to create an experience that would be hard to ignore or forget and could potentially change people's minds on how they use technology, and we believe that that our design is informative and engaging enough to do so.

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