Post-Poster – a Graphic Medium Rewired by Interaction

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Abstract

This research repositions the urban poster as a responsive interface, challenging its historical role as a static visual artifact in public space. Traditionally a vehicle for political, commercial, or cultural messages delivered to passive audiences, the poster has become increasingly inadequate in environments shaped by sensors, screens, and data flows. Drawing on media ecology, second-order cybernetics, and the aesthetics of interaction, this thesis explores how posters can evolve into adaptive media systems that respond to human presence and environmental dynamics[1]. Using a research-through-practice approach, it involves prototyping interactive posters with tools such as p5.js, PoseNet, and environmental sensors, and testing them in urban contexts.

The inquiry began with the author's design for Haus der Elektronischen Künste (HEK)'s Regionale 2025 poster. Coming from a city with few printed posters, seeing the work fade in sunlight, soak in rain, and engage passersby raised urgent questions—especially as digital screens increasingly replace physical posters. Something essential felt missing in looping visuals.

This led to a series of experiments, including a co-operation with Director Benny Truong and Treibstoff Theatertage Basel. A prototype for Model Minority (2025, theater play) was installed on streets across Basel and at ROXY Theater, enabling live observations of interaction with bodies, gestures, proximity, and ambient shifts.

This research is rooted in graphic design and expands its scope by engaging methods and conceptual frameworks from adjacent fields such as interactive design and media art. Rather than departing from graphic design, it uses its lens to reinterpret and integrate interactivity and explore how the physical time-based qualities of analogue posters can be translated through digital methodologies.

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[1] See Matthew Fuller, *Media Ecologies: Materialist Energies in Art and Technoculture* (Cambridge, MA: MIT Press, 2005); Shannon Mattern, *Code and Clay, Data and Dirt: Five Thousand Years of Urban Media* (Minneapolis: University of Minnesota Press, 2017); Heinz von Foerster, "Ethics and Second-Order Cybernetics," in *Understanding Systems*, ed. Albert Müller and Karl H. Müller (New York: Springer, 2003); and Katja Kwastek, *Aesthetics of Interaction in Digital Art* (Cambridge, MA: MIT Press, 2013).

Ultimately, the study argues for reframing the poster not as a fixed image but as a living system—an interface that listens, adapts, and shapes urban public experience. The findings contribute to emerging discourse in post-digital design, critical interface studies, and civic media by redefining the poster as a material-discursive node where technology, design, and everyday life intersect.

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INTRODUCTION

The poster is not just a graphic form, but a public surface. Soaked up in the rain, faded under the strong summer sun, torn and layered by the wind. No two posters look the same after spending time in the real world. They carry the time and weather, coincidence, and interaction with the public. This silent transformation has always been fascinating to me.

At the same time, we live in a world where everything is interactive. Or even, the interactivity is so deeply embedded in our daily lives that we hardly notice it. From unlocking phones with gestures or just by a mere presence, to voice commands and eye tracking, we interact endlessly, often without even realizing it. This shift is sometimes referred to as 'Post-digital'[2] or 'Post-interaction'[3], showing the environment where interactivity is not a novelty but an invisible default.

While interaction is central and ubiquitous in digital environments, its role within poster design is still taking shape. This research explores how posters can meaningfully engage with interactivity while staying rooted in graphic and typographic form.

Historically, posters have been evolving not only in forms but also in functionality, as a tool to catch people's attention in a matter of seconds. This design principle, often referred to as the "Three-seconds-rule", presumes that passers-by only take a maximum of 3 seconds to glance at the posters, and within that short time, the message needs to be delivered or at least felt. According to this, posters have been absorbing new technologies to amplify the visual impact. Photographic reproduction allowed realistic imagery. Chromolithography in the 19th century enabled bold color combinations and the marriage of text and image on a mass scale. Offset printing in the early 20th century allowed for sharper lines, gradients, and high-resolution imagery. Later, phototypesetting and vector design software introduced precision and control,

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[2] Alessandro Ludovico, *Post-Digital Print: The Mutation of Publishing Since 1894* (Eindhoven: Onomatopee, 2012).
[3] Usman Haque, "Post-Interaction Design," *Architectural Design* 79, no. 1 (2009): 110–115.

supporting the rise of minimalist, grid-based modernism that characterized the International Typographic Style.

The boundaries between graphic design, art, and coding have been dissolving for decades[4]. And each technological transition has been forming poster as a medium that is 'easier to notice', 'more impressive', and 'more eye-catching'. Studios like Feixen(Switzerland) and Dumbar(Netherlands) have been leading the genre of 'moving poster' while expanding the poster from a static image to motion. Yet even these kinetic designs remain largely screen-bound and predetermined looping animations. Why has poster not been considered as an interactive platform even now, when there is an access to ubiquitous computing, sensors, creative coding, and artificial intelligence? Why hasn't this historically public, attention-seeking format embraced the potential to sense, adapt, or participate?

Behind these questions, a deeper cultural anxiety lies. The discussion about 'Death of the poster in the digital age' has been ongoing for a long time, along with the prediction that printed materials will be replaced with new technology[5]. Since the end of the 19th century, when the electronic network first emerged, the prospect that printed media, considered as a 'static' medium, will go extinct by 'advanced' mediums has been repeated. But the printed media has never died out. It has rather evolved and adapted to a new form in digital environments.

Now we live in an era of hybridisation, where the boundary of paper and digital medium is being blurred[6]. Just as the analogy "Paper is flesh, screen is metal", two medias reveal the transformative hybrid characteristics within a complementary and competitive relation. In this context, reconceptualizing the poster not as 'a complete imagery' but 'a living system' or 'material-discursive node' is not only an experimental design attempt, but also a critical proposal about the way that the poster can exist in transforming the geography of media.

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[4] Alessandro Ludovico, *Post-Digital Print: The Mutation of Publishing Since 1894* (Eindhoven: Onomatopee, 2012), esp. 82–83.
[5] Victor Hugo, *The Hunchback of Notre-Dame* (Paris: Gosselin, 1831). In chapter V, Hugo famously predicts that "this will kill that" ("Ceci tuera cela"), referring to the printed book displacing architecture as the primary vehicle of cultural expression
[6] Ludovico, *Post-Digital Print*, esp. 82–83.

For example, ‘Media Ecology’ from Matthew Fuller understands media as an endlessly changing and hyper-connected ‘dynamic systems’, rather than a static object[7]. He argues that all media have the possibility of “more is always to come” and opens up a way that posters can also be seen as an open medium interacting with environments and onlookers.

Along with this, ‘Media Archaeology’ from Shannon Mattern approaches the medium from the perspective of hardware and materiality, while revealing poster that contributes to the city’s visual communication as a part of a material ontology involving technical, social, and aesthetic levels[8]. She demonstrates the history of urban media as a “cyclical, entangled, a messy mix of discourses and dirt, imaginaries and I-- beams, sketches and sensors,” revealing that the poster, too, should not be understood as a singular vehicle of message transmission, but rather as part of a complex and continually reconfigured media ecology[9]. The perspective considering poster as a living media system that intersects our social recognition and sensual experience, rather than a simple visual communication tool, allows us to reflect on the current technological transformation critically and constructively.

And this perspective played the key role in my thesis project. While ubiquitous computing, sensors, creative coding, and kinetic design each have their place in the digital arts, bringing them together within poster design felt both underexplored and urgent. It was this gap and its potential that motivated me to prototype what I call the “Post-Poster”: a hybrid between print logic and machine logic, but no longer bound to ink, paper, or screen pixels. This new poster unfolds itself as a responsive interface, participating in the sensual, environmental, and behavioural stream of daily life.

This thesis distinguishes itself from commercial interactive advertising campaigns by focusing on the aesthetic, civic, and design research implications of posters that sense and respond. Rather than approaching interactivity through a marketing or branding lens, I want to emphasize the graphic construction of meaning by exploring how typographic

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[7] Matthew Fuller, *Media Ecologies: Materialist Energies in Art and Technoculture* (Cambridge, MA: MIT Press, 2005), 15.
[8] Shannon Mattern, *Code and Clay, Data and Dirt: Five Thousand Years of Urban Media* (Minneapolis: University of Minnesota Press, 2017), 22–24.
[9] Mattern, *Code and Clay, Data and Dirt*, 20.

order, visual composition, and spatial behavior can evolve when informed by sensors and environmental inputs. The image is not treated as a vehicle for conversion, but as a designed experience, shaped by the graphic designer's intentions, authorship, and sensibility.

In an era saturated with experimental and attractive posters, the format risks becoming fragmentary, consumable gestures more and more—easily admired, quickly forgotten. This thesis proposes Post-Poster as a response to this limitation. It's not only a new medium for sensory interaction, but also an attempt to re-question how posters can form recognition, attention, and public space as a format.

This thesis is based on Niklas Luhmann's theory of art as a social system, treating the poster as 'a medium of communication that captures perception and invites ongoing observation' more than 'a medium as a vessel of information'. Luhmann declares, "Seeing is overlooking. Communication captivates perception and thereby directs awareness." Just as art produces meanings through continuous observation, posters can also function as an aesthetic interface that contains both informativity and emotionality[10]. They are not mere surfaces but situated communicative agents, absorbing input from the public while contributing visually and experientially to the texture of urban environments.

In this sense, interaction is not a gimmick or add-on, but a method for graphic design to expand its communicative function. Post-Poster encourages the passers-by to overcome their historical role as a 'receiver' and to be a 'participator', embracing their gestures, voices, and existence as parts of the visual and sensory urban landscape.

[10] Niklas Luhmann, *Art as a Social System*, trans. Eva M. Knodt (Stanford, CA: Stanford University Press, 2000), 23.

This paper theoretically establishes and practically expands the concept of Post-Poster through four chapters. Chapter 2 examines posters from the perspectives of reproducibility, publicness, ideology and resistance, and digital transformation, reinterpreting them not as mere visual media but as sensitive indicators of media change. Chapter 3 conceptualises posters as interactive systems that detect and respond in real time, rather than one-directional images, based on media ecology, second-order cybernetics, and interaction aesthetics. Chapter 4 describes the process of experimentation and prototype implementation in urban spaces based on research-design methodology, while also exploring technical and ethical considerations. Finally, Chapter 5 proposes the potential and scalability of posters functioning as a system through interactive experiments using sensors, APIs, and machine learning, as well as application cases of the *Moby Dick* and *Model Minority* posters.

Definitions

The term ‘interaction’ discussed in this paper does not simply refer to technical responses. Interaction has changed over time in various theoretical and historical contexts, and its definition is also complex. In 1901, the Dictionary of Philosophy and Psychology defined interaction as ‘a relationship in which relatively independent systems influence each other,’ and since then, this concept has been interpreted in various fields, including sociology, cybernetics, human-computer interaction (HCI), and art[11]. In particular, Katja Kwastek views the activities of the recipient as constituting the form and existence of the work in interactive art[12], while Christoph Neuberger distinguishes between ‘interaction’ and ‘interactivity’ to differentiate between actual processes and potential possibilities[13]. In the realm of art, interaction operates not merely as a result of user input but as a structure that co-creates aesthetic experience[14][15]. Through this multi-layered definition, this paper aims to approach interaction not as a mere technical response but as an act of design and a way of forming relationships.

[11] Dictionary of Philosophy and Psychology, vol. 2, ed. James Mark Baldwin, 1901
[12] Katja Kwastek, *Aesthetics of Interaction in Digital Art*, MIT Press, 2013.
[13] Christoph Neuberger, “Interactivity in Digital Communication,” in *The International Encyclopedia of Communication*, Wiley-Blackwell, 2008.
[14] Lev Manovich, *The Language of New Media*, MIT Press, 2001;
[15] Matthew Fuller, *Media Ecologies: Materialist Energies in Art and Technoculture*, MIT Press, 2005.

1. Literature Review: The Poster Across Media Systems

I seek to rethink the poster as a media form that has reconfigured its function and logic in an ever-changing communications landscape.[16][17] From mechanical reproduction to ideological messaging, from civic decoration to instrument of resistance-the poster has always moved with the media systems, technological infrastructures, and social tensions of its time. In other words, the poster is more than a static visual object. It is a sensitive indicator of media change, a kind of media barometer that has been constantly reconfigured in the middle ground between urban space and social sense[18].

1.1 Reproducibility and publicness

Posters are not the product of a specific era; their origins can be traced back to ancient cave paintings and Roman street panels, as well as to the human desire for visual expression to convey specific messages in specific places. However, with the advent of mass printing and urbanization after the Industrial Revolution in the 19th century, posters were transformed into a medium predicated on reproduction and diffusion. This period marked a radical shift in both reading practices and urban perception. Whereas reading had traditionally been a private and leisurely activity, Victorian posters and handbills introduced a distracted, fragmented mode of reading, shaped by speed, movement, and crowd behavior. As posters multiplied, they became more than announcements—they began to define the tempo of modern life, reflecting and reinforcing the rhythms of consumption, spectacle, and mobility[19]. Often referred to as the "poor man's art gallery," posters attracted attention on the streets and visually reimagined the urban experience itself. In this period, posters were not just a medium for communicating content, but an aesthetic component of public space and a signifier of collective rhythm.

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[16] Sérgio M. Rebelo et al., "Evolutionary Experiments in the Development of Typographical Posters," in *xCoAx 2018: Proceedings of the Sixth Conference on Computation, Communication, Aesthetics & X* (Madrid, 2018), 66.
[17] Andrew Blauvelt, "The Persistence of Posters," in *Graphic Design: Now in Production*, ed. Ellen Lupton and Andrew Blauvelt (Minneapolis: Walker Art Center, 2011), 92–111.
[18] Elizabeth E. Guffey, *Posters: A Global History* (London: Reaktion Books, 2015), 38.
[19] Ibid., paraphrased from p. 38.

1.2 Messages, ideology, and resistance

In the 20th century, posters became more than a means of communication. In times of war, they became a key channel for transmitting state messages to citizens, and in Eastern Europe during the Cold War, they were used as a medium for regime propaganda. At the same time, in Western societies, posters functioned as capitalist propaganda, promoting advertising and consumerism. Since the 1960s, however, posters have been reborn as a medium of resistance and autonomy. Attempts to subvert established norms, such as the "anti-poster" movement, emerged, and scribbles, graffiti, and handmade artworks occupied urban niches. The poster is no longer a centralized, one-way communication, but a tool of a subculture that is created on the periphery and disrupts the center.[20]

Fig. 1 The 'Lennon Bridge' , Tai Wo Hau, 2020

[20] Thalmann, Rolf, ed. *So nicht!: Umstrittene Plakate in der Schweiz 1883–2009*. With contributions by Krystyna Kuczynski, Benjamin Herzog, and others. Zürich: Echtzeit Verlag, 2009.

Fig. 2 'Peeling Poster', from Image Cities, Los Angeles, 2022 © Anastasia Samoylova

Fig. 3 'Decollage', photo-montage, 220 x 360 cm, poster in public space, Berlin-Mitte, 1997
© Caroline Hake and VG Bild- Kunst

1.3 Digital Transformation and the Reshaping of the Poster

The rise of digital technology has once again radically reshaped the form and meaning of the poster. No longer a static visual on paper, posters are now living objects that move on screens, are coded, and spread across networks. On social media and digital platforms, the poster is no longer a finished product, but a medium 'in motion' - a constantly reconfigured visual node that is remixed, glitched, and reused in the hands of the user.[21] This reflects a broader post-digital condition, where the line between authorship and audience, original and derivative, is increasingly blurred. Ratiu and Iacob (2013) argue that the shift of activist poster practices from print to digital platforms not only extends their distribution but transforms the medium's function while blurring the boundaries between authorship, activism, and participation[22]. The poster becomes less a finished object and more a circulating node within a networked media system. Works such as Studio Feixen and DEMO Festival experimentally embody this transition and show that the poster can now be understood as a medium that can 'act'.

Studio Feixen exemplifies how digital experimentation has expanded the public's perception of posters. Through their animated and screen-based poster work, they have trained audiences to imagine movement consciously or unconsciously even in static visuals. As visual literacy has changed, today's audiences have come to expect movement and responsiveness in images, and as a result, even static posters often read as if they have a sense of movement or layered logic. Their Oto Nové Swiss project[23] explores how typographic systems can respond to digital gestures, presence, rhythm, and more, expanding the possibilities for interactivity while maintaining a strong graphic identity.

Studio Dumbar's DEMO Festival[24] is a project that started in Amsterdam and recently expanded globally, reclaiming digital advertising infrastructure and transforming it into a stage for graphic experimentation. For 24 hours, commercial billboards in different screens of each city showcase non-commercial, movement-based design work

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[21] Laszlo Bencze, "The Socio-Political Poster in the Digital Age," *Journal of Media Research* 8, no. 3(23) (2015): 11.
[22] Mara Rațiu and Bogdan Iacob, "'Digitalization' of Art Activism: Case Study of the Cluj-Based Collective MindBomb," *Ekphrasis* 2 (2013): 198–199.
[23] Studio Feixen, "Oto Nové Swiss," accessed August 4, 2025, https://www.studiofeixen.ch/work/oto-nove-swiss.
[24] Studio Dumbar, "DEMO Festival," accessed August 4, 2025, https://studiodumbar.com/work/demo.

from around the world. The act repositions the digital poster as a tool of cultural intervention, emphasizing form, rhythm, and temporality over message delivery. It is an attempt to reassert the civic and poetic role of graphic design in a space dominated by marketing.

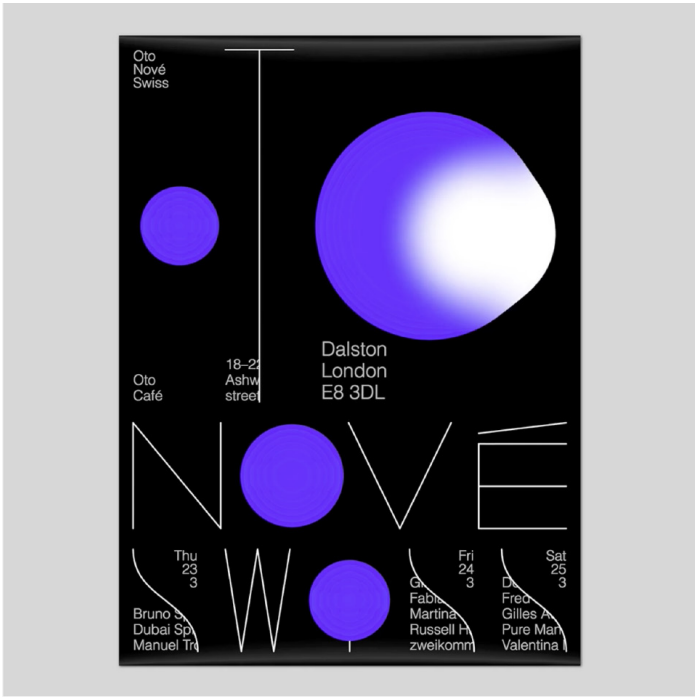

Fig. 4 'Oto Nové Swiss', Studio Feixen, London, 2017

Fig. 5 'Demo Festival', Studio Dumbar, Amsterdam, 2020

On the other hand, there are also examples like Blowing in the Wind[25] (Ogilvy, 2015), including a motion-sensitive advertisement, and a billboard at a red-light intersection in Paris[26] (Serviceplan, 2017) that utilizes sensors and sound to interact with pedestrians in real time, suggesting new possibilities for the convergence of machine vision and image interaction.

Fig. 6 'Blowing in the wind', Ogilvy, Stockholm, 2015

Fig. 7 'The Virtual Crash Billboard', Serviceplan, Paris, 2017

As of these examples, many digital, especially interactive, posters are still campaign-driven, event-based, or limited to corporate purposes. This thesis departs from these models and takes a different perspective. Instead of consuming interactivity as a

[25] Ogilvy, "Blowing in the wind," accessed August 4, 2025, https://www.oneclub.org/awards/theoneshow/-award/22886/blowing-in-the-wind/
[26] Serviceplan, "The Virtual Crash Billboard", accessed August 4, 2025, https://lbbonline.com/news/serviceplans-virtual-crash-billboard-gives-jaywalking-pedestrians-a-shock?

mere attention-getter or spectacle, it understands it as a method of graphic composition and an organizing principle of temporal experience. In other words, this thesis attempts to reposition the poster as a system that 'responds' to change, as a sensory interface between the urban environments and human beings.

1.4 The poster as a redefined public medium

Across all of these historical phases - from mass printings to political messages, from modern clarity to expressive experimentation - the poster has always been a mediator between public messages and the urban environment. It covers and organizes the surface of the city, while simultaneously organizing the movement of citizens and invoking memory. It has always reflected the media systems of its time, such as the mechanical reproduction of lithography and offset printing, the ideological reproduction of propaganda, the systematic logic of modernist design, and the personalized fragmentation of postmodernism. What hasn't changed is the poster's "situatedness". It has always been located within the material, spatial, and social conditions of the city. Like Gehl Architects advocate through Jan Gehl's public realm principles, the city can no longer be seen as a passive backdrop. It functions as a co-producer of public life. As print media is replaced by screens, sensors, and data flows, the poster must evolve again. Responsive posters-a visual system that senses gestures, changes with the environment, and responds to users and situations-can therefore be a device that bridges the boundaries between urbanity and visual communication. Katja Kwastek's Aesthetics of Interaction(2013) explores how the aesthetic experience of a work of art is shaped by the activeness of the receiver[27]. This supports the core of my thesis that posters should not simply be objects to "look at," but should provide a participatory experience where their form and meaning are reconfigured in real time by "reacting" to the onlooker's movements, gestures, proximity, and changes in their surroundings. Kvastek also explains that in interactive art, exploring how a system works through "black box"[28] situations is an important component of the aesthetic experience. From this perspective,

[27] Katja Kwastek, *Aesthetics of Interaction in Digital Art* (Cambridge, MA: MIT Press, 2013), 163.
[28] Ibid., 49. Kwastek describes the interactive system as a "black box," emphasizing the user's role in uncovering the logic through interaction.

posters can now be understood not just as a medium for conveying information, but as an interface that archives social traces, reclaims space, and connects sensation and data.

Fig. 8 'Wi-Fi: Looking for networks', Leonardo Angelucci, Longlake Festival, 2021

2. Theoretical Framework: Toward the Responsive Poster

Historically, posters have often been viewed as a one-way broadcast medium, delivering a fixed message to a passive audience. This is still common in commercial posters to this day, and they still make up a large part of public visual culture, maintaining a static communication that flows from top to bottom. But as we saw in the previous chapter, this perspective overlooks the way posters actually come alive in public space-an informal, participatory lifecycle. Through activist practice, street interventions, and remix culture, posters have long operated in an informal feedback loop: torn down, graffitied, reinterpreted, layered, and placed in new contexts.

Building on this latent responsiveness, this thesis reconceptualizes the poster as an interactive system rather than a mere communicative surface. It is an attempt to understand interactivity as a structural principle of graphic design, rather than a mere visual device or eye-catching effect. This thesis reframes the poster as a responsive system, capable of interacting with its environment. Instead of assuming a static image and passive observer, the responsive poster senses, interprets, and transforms in real time. Inputs such as proximity, voice, gesture, or wind become part of the graphic composition, transforming typography, layout, color, image or motion.

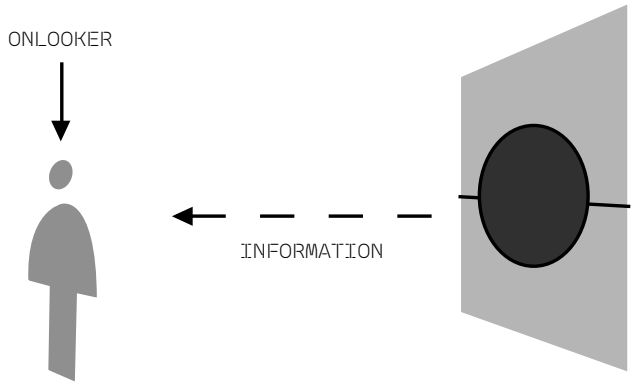

Fig. 9a Traditional one-way communication of posters in public spaces

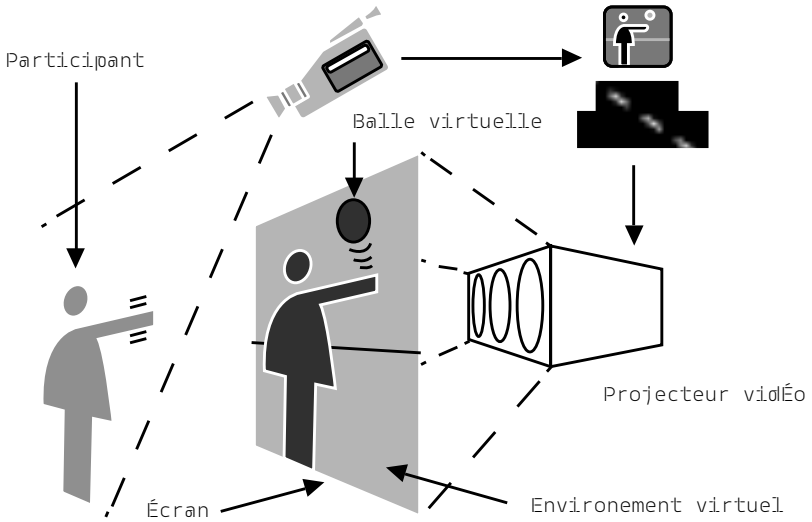

Fig. 9b 'Sketch for videoplace', Myron Krueger, 1972-1990s

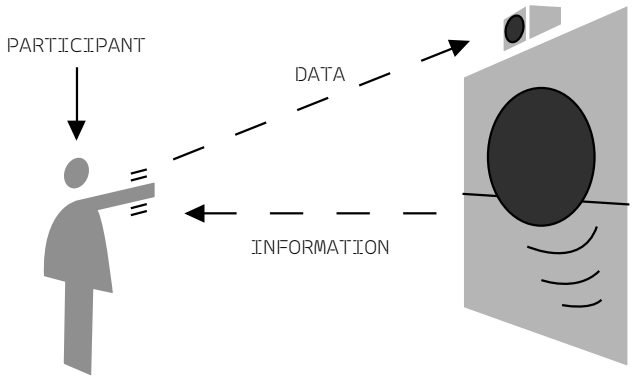

Fig. 9c Two-way communication using live data in public spaces

This shift aligns with media theorist Shannon Mattern's description of cities as sites of "urban interfaces," where screens, sensors, and bodies co-produce experience[29]. It echoes broader trends in design and computation, where interactivity is ambient and built into the environment. The poster, reimagined through this lens, becomes a graphic surface that listens, not just speaks. Typography itself becomes dynamic. Letters stretch, scatter, or disassemble in response to presence. Spacing adjusts with density. Composition unfolds over time, shaped by the environment. Through tools like PoseNet, p5.js, and environmental sensors, this thesis experiments with graphic systems that behave by treating interaction not as ornamentation, but as a principle of design.

[29] Mattern, *Deep Mapping the Media*, 2015, xix.

Second-order cybernetics supports this model[30]. In this view, communication is never neutral. It is shaped by feedback, mutual perception, and context. Similarly, Rafael Lozano-Hemmer's notion of "relational architecture" suggests that meaning is co-authored through system responsiveness[31]. While originally articulated in media art and installation, these concepts are here repurposed to rethink poster design as a cybernetic communication surface.

While early examples of interactive environments emerged from media art, this thesis focuses on how similar principles have been translated into the poster format, bringing bodily engagement and system feedback into the domain of graphic design. Myron Krueger's "responsive environments(1977)"[32] and Golan Levin's voice- and gesture-driven systems[33] show how interaction itself can become content. This thesis extends such thinking into the graphic domain: how can a poster sense bodies and/or environmental surroundings and respond accordingly?

Where previous projects (e.g., Feixen, Dumbar) have explored responsive visuals or graphic posters forming the surface of the city, this thesis emphasizes graphic authorship and typographic structure within live-data-driven systems. The poster becomes a dynamic interface, responding to the body and surroundings through motion, sound, and proximity through using feedback not only to trigger movements but also to reorganize graphic structure in real time.

This framework positions the responsive poster as a cybernetic surface: one where interaction is not supplemental but fundamental. In doing so, it aligns graphic design with systems thinking, temporality, and embodied perception—proposing a new typology of public visual communication.

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[30] Heinz von Foerster, *Ethics and Second-Order Cybernetics*, in *Understanding Systems: Conversations on Epistemology and Ethics*, ed. Albert Müller and Karl H. Müller (New York: Springer, 2003), 288–289.
[31] Rafael Lozano-Hemmer, "Relational Architecture," accessed August 4, 2025, https://www.lozano-hemmer.com/body_movies.php
[32] Myron W. Krueger, "Responsive Environments," in *Proceedings of the National Computer Conference* (New York: AFIPS Press, 1977), 1:37.[5]
[33] Golan Levin and Zachary Lieberman, *Messa di Voce* (installation and performance, 2003), as described in "Messa di Voce by Levin and Lieberman," *CROSSLAB//COLLAB*, May 23, 2014.[6]

3. Methodology: Research-through-Design in Urban Space

This chapter outlines the methodological framework employed in this research, grounded in the principles of research-through-design (RtD). RtD is particularly suited to practice-based inquiries that seek to generate knowledge through iterative making and reflective experimentation[34]. Within this context, the poster is treated not as a static artifact but as an experimental interface for testing propositions about interaction, visual composition, and urban experience.

3.1 Preliminary Installation Test Toward Public Deployment in Basel

The research was conceptually and technically developed for implementation in the urban landscape of Basel, Switzerland, with a focus on testing interaction in public space. While the final public street deployment and live applications, such as those planned for the Treibstoff Theatertage and the ROXY Theater, are scheduled to take place shortly after this thesis submission, the design process has been grounded in real-world considerations.

A series of early-stage prototypes were tested in semi-public environments, including hallways and critique spaces within the school. Two forms of feedback played a central role during this phase. First, one prototype session involved the participation of the Model Minority director, allowing for focused reflection from a cultural stakeholder directly involved in the production. Second, controlled testing sessions were conducted with participants outside the design field, offering valuable insights into how non-expert audiences perceive and interact with the prototype. Together, these istallation experiments informed refinements to both the system's design logic and the communication strategy for its upcoming public release.

Moby Dick; Das solo spiel served as the first functional prototype, demonstrating how interactivity could engage contextual narratives in poster form. These

[34] Christopher Frayling, "Research in Art and Design," *Royal College of Art Research Papers* 1, no. 1 (1993): 1–5; John Zimmerman, Jodi Forlizzi, and Shelley Evenson, "Research Through Design as a Method for Interaction Design Research in HCI," in *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (New York: ACM Press, 2007), 493–502.

preparatory interventions, while not situated in open public space, provided valuable observational material for refining the system's graphic logic, sensor behavior, and spatial orientation. Later iterations, including the Model Minority poster, allowed the research to explore how interactivity intersects with questions of identity, visibility, and audience expectation. These stages showed how the same system might perform differently across geographic, demographic, and cultural conditions.

3.2 Research Tools and Technical Systems

The technical foundation of the research combined software and hardware systems designed to enable environmental and bodily responsiveness. The modularity of this system allowed for prototyping across multiple conditions and sites, enabling comparative design iterations and site-specific tuning.

- PoseNet was employed for gesture tracking and proximity detection.
- p5.js was used to generate dynamic visual compositions and handle real-time sensor input.
- Arduino-compatible sensors were incorporated for detecting distance, sound levels, light, and motion etc.

3.3 Data Collection and Documentation

The research deployed a triangulated documentation strategy combining:

- Visual recordings (photo and video) to capture interaction patterns.
- Autoethnographic field notes, where the researcher documented design decisions, contextual variables, and observed behaviors.
- Post-interaction reflection, including both researcher annotation and informal feedback gathered from passersby and cultural workers.

These documentation methods enabled the researcher to move beyond assumptions about user behavior and instead examine how specific configurations of poster design, placement, and interactivity shaped engagement.

3.4 Ethical Considerations

Given the public and sensor-driven nature of the research, ethical questions arose around surveillance, visibility, and consent. No personal data were recorded, and all camera-based systems used anonymous body tracking rather than biometric recognition. However, ambient data collection still raises concerns in public space, particularly when individuals are unaware of being sensed. This thesis reflects critically on these tensions, acknowledging that authorship in responsive systems is always partial and distributed. Issues of power, access, and agency are not neutralized by technological openness.

3.5 Conclusion

The methodology presented here positions design not only as a means of visual communication but as a method of inquiry. While full deployment in the urban streets of Basel is imminent, preliminary tests have already provided vital feedback on the interactive system's performance and reception. Through these early interventions and ongoing reflective cycles, the responsive poster has emerged as a critical interface for rethinking visual engagement, including typography, shape, and layout, as well as authorship and interactivity in public space.. The forthcoming street tests are expected to extend these insights, contributing to the broader evolution of interaction-driven design practices.

4. Experimental Prototypes — From Medium to System

In this study, ‘system’ does not simply refer to technical infrastructure. Rather, it refers to the way in which poster designs are constructed, namely, a design structure in which visual elements are rearranged according to input and can transform themselves according to external conditions. This concept goes beyond cybernetic communication models, functioning as a way for designers to present only design rules and response structures without controlling all outcomes. This systemic approach shifts the focus of poster design from outcome-centric to ‘process-oriented’ and from closed messages to ‘condition-based’ media. This chapter explores how the system was structured in each experiment, what input values elicited specific visual responses, and how the designer's role evolved within this system.

4.1 Interaction Experiment Using Live Data Elements(API, PoseNet, Sensors)

Before building real-life interactive posters, this research began with a series of small-scale experiments using built-in laptop sensors such as the microphone and webcam. These early attempts focused on adding interactivity to static poster compositions, drawing conceptual inspiration from the vibrant, dynamic visuality found in the posters of Armin Hofmann and Wolfgang Weingart (see Figs 10, 11, 12). These canonical Swiss posters, while static in form, seem to suggest movement and rhythm—qualities that inspired a desire to explore actual movement through interaction.

Fig. 10 'Plakate aus der Sammlung des Gewerbe museums Basel', Armin Hofmann, 1961(left) and sound to shape interactive frame of author's reinterpretation(right)

Fig. 11 'Typographie kann unter umstÄnden kunst sein', Wolfgang Weingart, 1973(left) and brightness to density interactive frame of author's reinterpretation(right)

Fig. 12 'Giselle', Armin Hofmann, 1959(left) and frame of author's reinterpretation motion tracking to 3-dimensional typography turns(middle) and time to color interaction(right)

Building on this sensibility, the research moved to the integration of physical sensors. Before embedding these directly into poster systems, initial experiments visualized simple geometric shapes or typography in p5.js as a way of translating sensor data into clear, graphical behavior. The process involved learning how to connect structures that are different from each other and to interpret data from sensors using Arduino IDE and visualizing outputs in p5.js. This required extensive online research and experimentation, as information on the intersection of physical computing and graphic visualization was often fragmented and scattered.

4.2 0PEN:SENSE

Recognizing this gap, I began to document and consolidate these experiments into an open-source website: 0PEN:SENSE(Fig. 13). The platform was created not only to support the thesis work but also to make sensor-visualization tools accessible to other designers and researchers interested in physical-digital interaction. It became a structured

archive for project experiments, embedded sketches, interaction recordings and code samples—each one intended to support an emerging graphic design methodology grounded in sensor-based interaction.

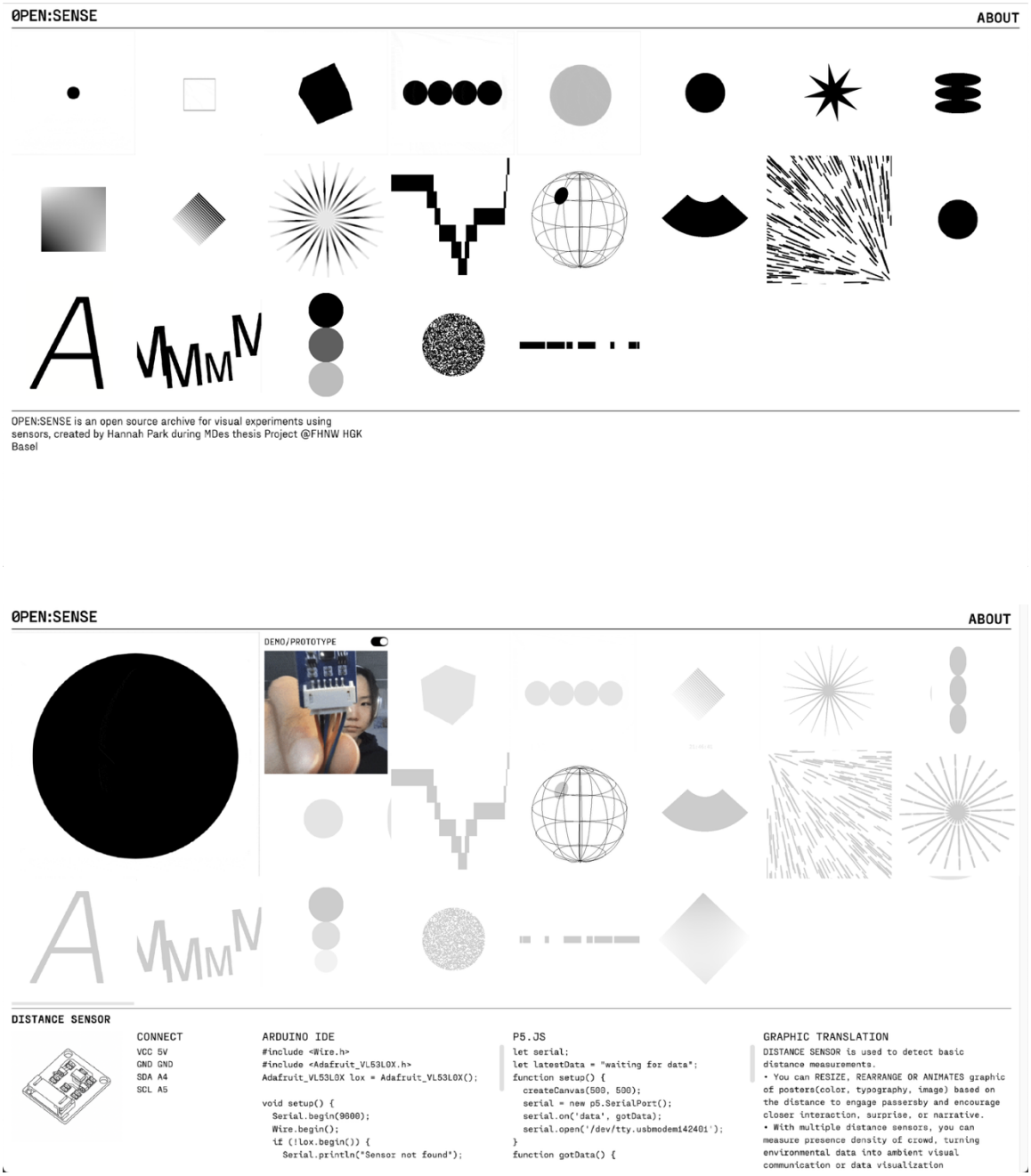


Fig. 13 0PEN:SENSE website screenshot,
0PEN:SENSE website screenshot, published 2025, Grace H. Park
http://0pen-sense.xyz/

Table 1 provides a comparative framework for understanding the range of sensors explored throughout the development of the interactive poster system (see Appendix). Rather than reproducing materials(e.g. source code or specific interaction prototypes) that are more appropriately presented in digital form and are accessible through the 0PEN:SENSE website, this chart focuses on the technical distinctions, operational principles, and spatial installation requirements of each sensor. It emphasizes the diverse modalities through which environmental and bodily data can be captured and translated into graphic responses. The intention is not to present an exhaustive account of implementation, but rather to foreground the interpretive and aesthetic potentials of each sensor within a design context. On the website, the full Arduino and p5.js example code is provided alongside interactive prototypes and detailed documentation of each sensor experiment. This supplementary material enables readers to engage with the work both conceptually and practically, supporting an open and reproducible research process.

4.3 API

In addition to sensor-based input, another compelling source of live data explored in this research is the use of public API(Application Programming Interface)s. Through a series of graphic experiments, I integrated data from various APIs including OpenWeatherMap (weather conditions), Unsplash (contextual imagery), transit data APIs (real-time vehicle movement), noise pollution APIs, geolocation-to-city services, and even Gemini AI API services. These data streams enabled dynamic visual responses such as typographic shifts based on wind speed (Fig. 14), background changes triggered by geolocation-related imagery and Gemini AI using the geolocation data to write poetry(Fig. 15). This exploration highlights the potential of API-driven interaction in poster design. These experiments underscore how APIs can expand the informational and experiential layers of a poster, making it responsive to broader temporal and environmental systems beyond its immediate physical context. However, such integrations often require a stable internet connection and, in many cases, rely on closed or rate-limited platforms, which may limit their viability for continuous use in public space. While not always suitable for street-level deployment, the aesthetic and conceptual

affordances of APIs present a valuable direction for extending the vocabulary of interactive graphic design.

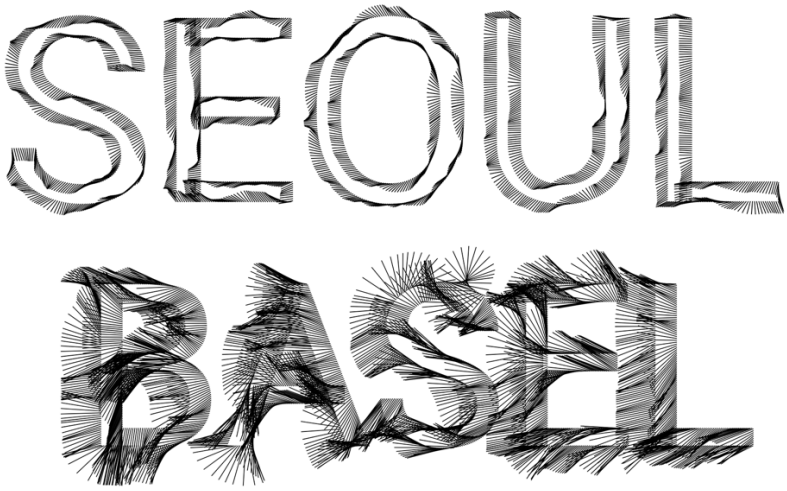


Fig. 14 Rhein and Han river's different typographic features due to different live wind speed data API

Fig. 15 Unsplash image of Basel with short poem generated by Gemini with the keyword "Basel"

Using this archive as a toolkit by myself also, I started looking for real life scenario that I can use to apply my sensor-graphic translation suggestions/ideas in appropriate contexts(reasoning) and with related contents.

4.4 The poster experiment for ‘Moby Dick; Das solo spiel’

Moby Dick; Das solo spiel is a regular annual production at the Basel Theater and was the first full-scale experimentation of the sensor-based graphics system proposed in this thesis in a cultural context. Inspired by the stage direction and dynamic movements of the actors, I decided to design a poster that would visually interpret the play.

As a first step, I needed to flesh out the concept of the poster and set a direction. In the process of focusing on technical experiments, coding, and connecting sensors, I temporarily forgot about my original starting point: poster design. I reminded myself that I am a designer, and I shouldn’t let technology drive my design. So, I started by sketching out different concepts using vector design tools, designing how the visual elements would react and change based on different sensor inputs (distance, voice, weather, etc.), and then creating interaction flow diagrams like the one below(Fig. 17).

Fig. 16 Moby Dick Poster sketch

For example, I gave shape to the response when the viewer is 5-10 meters away from the poster to the rearrangement of the typography when they get closer by using distance sensor. Depending on the geolocation of the poster, the poster receives the live wind speed data from openWeather API and this impacts on how fast and how much the typography and graphic shape will be shaking. Lastly, when a passerby speaks out the

name of the play(which is also the name of the whale they look for in the play), the live sound detection hears it and triggers a whale spout animation. Each interaction will look different even with the same input, depending on what status other interactions have.

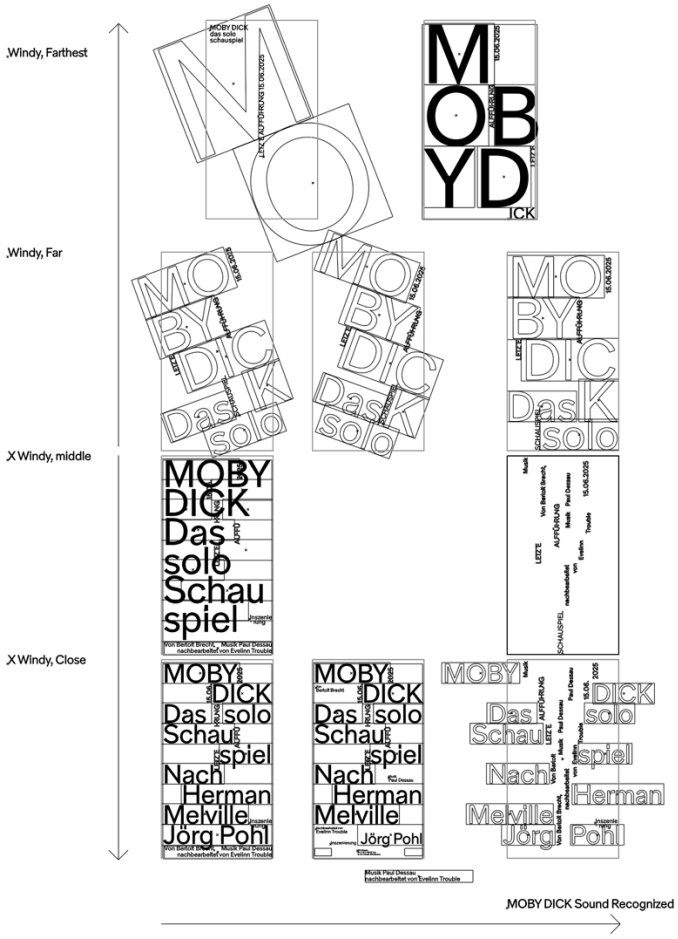


Fig. 17 Interaction Parameters Diagram

The second step was to implement it, coding with p5.js to integrate distance sensors, voice recognition, weather APIs, and more. However, there were some technical limitations to our initial experiments. The range of the distance sensors used was very narrow, limiting the scope of interaction testing, and the coding environment offered less freedom of typographic expression than professional typesetting tools, making it difficult to faithfully implement the design details of the initial sketches. As a result, the hierarchy of information and organizational principles was not fully reflected in the poster.

This process also raised important questions. The way in which the design was thoroughly planned in advance and the interactions were organized accordingly is the

kind of control that traditional graphic designers (including myself) are used to. Prioritizing real-time environmental responses over animating with motion graphics tools first and then adding interactivity was a choice that reflected the thesis's view that the poster should be a "living visual system." However, this approach led to "unintentional frames." The view from certain distances, times of day, or when interactions overlap could be different from the initial sketch, which led to an important conceptual question: "Who is in control of a message that is constantly changing through interaction?", " How much control does the designer retain or lose within such a system?"

The exploration of this question was a critical point in the experiment and a key turning point in this thesis. In conclusion, the designer's role shifts from being a "creator" of the outcome to a "moderator" who designs the system so that different environmental conditions and user engagement can influence the outcome. If the designer tries to control every visual outcome, it inhibits true interaction. The user becomes a mere animation trigger, and the poster reverts to a one-way playback structure.

Fig. 18 Autoethnographic prototype archive with screen installation

Another important question that arose during the course of this experiment was that of surveillance. Questions such as "If the poster is listening to people's conversations, is it legal?", "Wouldn't people feel uncomfortable with this?", "How could this technology be misused?" led to reflections on publicness, ethics, and the social responsibility of technology. As the interactive poster becomes a sensory organ that 'hears,' 'senses,' and 'reacts,' the question of how far this technology should be extended and within what boundaries it should operate is an essential one. In particular, the

operation of these systems in the open spaces of urban environments raises a variety of ethical issues, as user awareness, consent, and potential invasions of privacy.

This research acknowledges that the advancement of technology does not necessarily mean interactivity and participation, but also the possibility that it can become a means of surveillance and control. Therefore, designers need to go beyond being visual designers and design and take responsibility for the way technology works and its social impact. This experiment does not shy away from these questions, but rather uses its discomfort to explore a new triangle between technology, design, and ethics.

The experiments demonstrated that sensor-based posters can be more than just a visual response, but an interface that changes and reconfigures meaning in real-time based on the environment and user interaction. This is closely linked to the aim of this research, which is to redefine the poster from a fixed medium of message delivery to a fluid, participatory communication system. Interactivity should now be an organizing principle of design, not an external factor that changes the outcome. The insights gained from this experiment provide concrete suggestions for the future role of posters in urban environments - the possibility of moving beyond information delivery to become a medium for connecting senses and data.

4.5 Final poster application prototype and installation for ‘Model Minority’

The opportunity to participate in the poster project for *Model Minority* began when I had the chance to present my previous interactive poster experiment, *Moby Dick; Das solo spiel*, to director Benjamin Truong. This experiment was a project that centered on sensors and interaction as key elements of graphic expression, and at the time, the director was also conceptualizing stage devices that transform to the movements of actors, which attracted his interest. Sharing an interest in interactivity in both performance and design, this collaboration unfolded naturally and meaningfully.

4.5.1 Theater play ‘Model Minority’

Model Minority is a play that explores the living conditions and sociocultural tensions experienced by second-generation Vietnamese Germans. The stage is set in an Asian market, where the structures of import, export, display, and inventory symbolically evoke themes of memory, identity, and collective consciousness. The play unfolds through scenes where three characters explore, reflect on, and sometimes feel a sense of distance from one another. They find themselves entangled in unfamiliar yet intertwined relationships, prompting questions about memory, identity, and collective consciousness. The performance is conducted in German and Vietnamese, with Vietnamese and English subtitles provided to emphasize cultural complexity.[35]

The director wanted to reveal the reality that even Asians who have lived in Europe for a long time are still perceived as foreigners, not only on stage but also through the poster. He hoped that the poster would become a medium that visually expands the core message of the play beyond a simple promotional tool. In other words, he proposed the poster as a medium that visually evokes the racial prejudice and gaze that are casually revealed in everyday life.

[35] *Model Minority* performance brochure, directed by Benjamin Truong, Treibstoff Theatertage 2025 (Basel: ROXY Theater, 2025), PDF, accessed August 4, 2025.

Fig. 19 Mockup image of Model Minority Poster on a street of Basel

4.5.2 Layers of the *Model Minority* poster

The final poster was designed as a multi-layered interactive system that responds to the distance, movement, and environment surrounding the audience.

The **first layer** focuses on **eye interaction**, referencing the gaze that Asians often encounter in public spaces—a gaze cast upon them solely based on their appearance or skin color. The two Os in the poster's main title, *MODEL MINORITY*, are designed in the shape of eyes that follow the movement of passers-by. This interaction is enabled by **two distance sensors** positioned on the top two corners of the poster. By triangulating the viewer's location in front of the screen, the system can calculate the approximate position and animate the eye graphics accordingly. This mechanism goes beyond merely attracting attention; it provokes discomfort or reflection by externalizing the sensation of being watched.

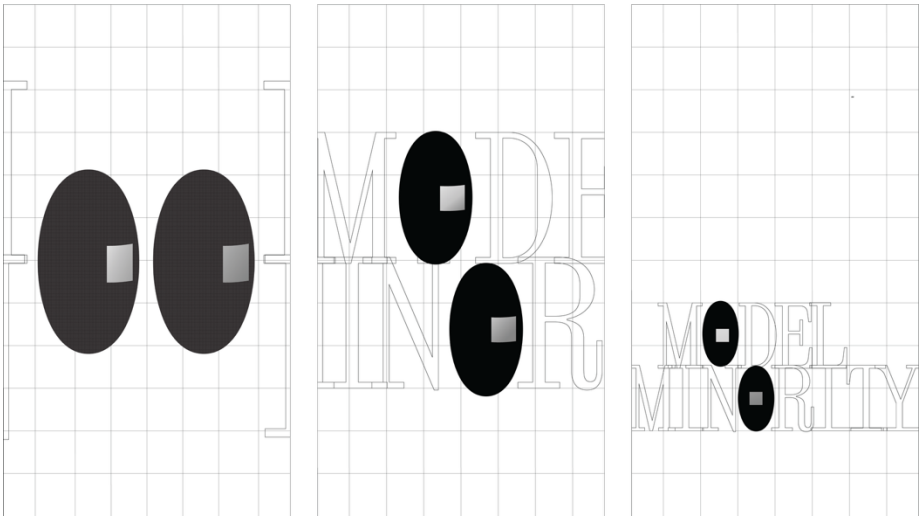
The **second layer** involves the **typographic structure** of the title. As viewers approach the poster, the title's letterforms shrink, and the spacing tightens, gradually revealing embedded information. This proximity-based response is also driven by

distance sensor data, allowing the typography to adapt dynamically depending on how close the viewer stands. The interaction reveals that the two Os—initially perceived as decorative or snowflake-like—are integral parts of the title. The system thus uses visual hierarchy and motion to transition from ambiguity to clarity, reinforcing the play's central theme of "the visible and the invisible."

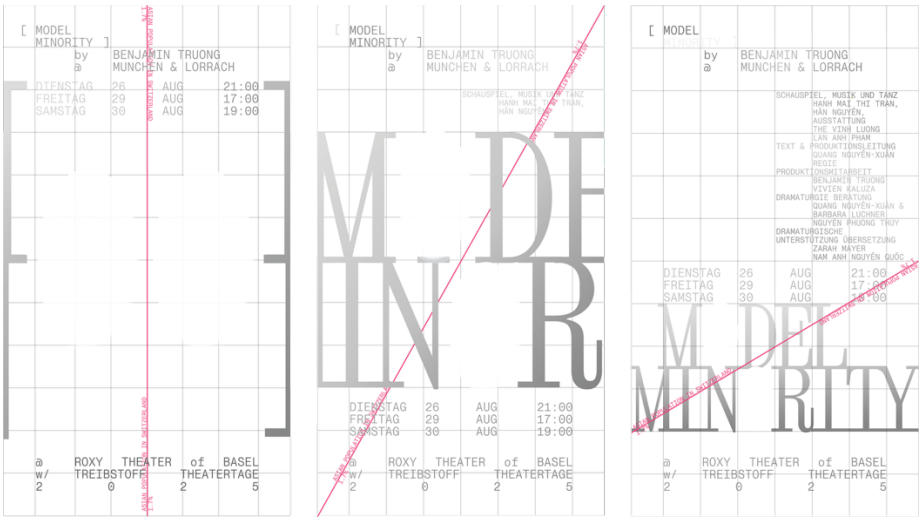
The **third layer** is a **data-based visualization** of racial demographics. The background texture is generated based on global ethnic ratio statistics, with graphic elements such as dots and lines color-coded by population distribution. In Switzerland, for example, where East Asians comprise less than 2% of the population, most of the background is rendered in skin-toned hues, while the 2% is expressed in fluorescent colors, making it visually prominent. The dominant color selection is determined by a **color sensor** which calculates the most vibrant contrast color in relation to the surrounding environment. Additionally, the background responds to ambient light and context-specific color data gathered from the poster's four-corner light sensors. These sensors measure the accumulated intensity and warmth of the environment and use that information to create a metallic, silver-printed-like texture on the typographic layers, dynamically adjusting the contrast and material illusion depending on time of day and light exposure.

The **final layer** incorporates **generative graphics** that evolve over time. Each time a person passes by the poster, **a motion sensor (PIR)** detects the movement and triggers the addition of a predefined visual sketch onto the background. These elements accumulate progressively with each encounter, creating a layered visual history of interaction. This accumulation is not merely a decorative or technical feature but serves as a visual metaphor for memory, repetition, and residue, thematically echoing the intergenerational complexity explored in the play.

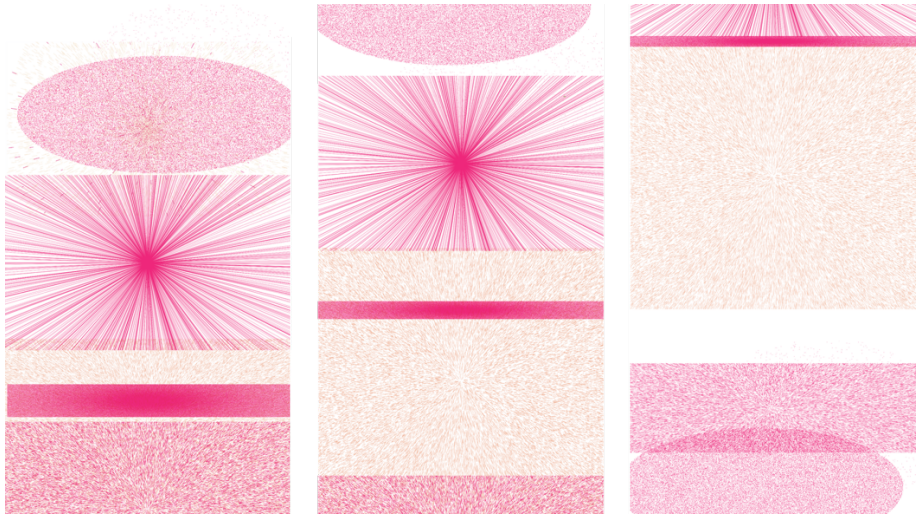
This poster functions as an experimental interface that generates meaning through interaction with the audience, transcending the role of a simple visual medium. Combining sensor-based responsiveness, data visualization, changes based on environmental context, and generative elements, this poster attempts to provide another layer of response and visual commentary on the questions raised by the play—how are we being seen, and from whose perspective?



First Layer: Eye Interaction



Second Layer: Typographic Structure Reveal



Background: Generative Texture with Environment Reactive Color and Density

4.5.3 *Model Minority* Poster Prototype: Implementation Feedback and Technical Reflections

Based on experiments and conceptual foundations in early semi-public spaces, the *Model Minority* poster prototype became an important turning point in examining how this research could function in actual cultural and performance contexts. Following the submission of this paper, the system is scheduled for outdoor installation in Basel streets and during the Treibstoff Theatertage theater festival(26–30 August 2025), and the prototype has served as a key testing and feedback tool in preparing for such public installations.

Fig. 20 HGK Campus pilot installtion

Several notable technical and design insights emerged at this stage. One of the most significant issues was the limitations of the distance sensors previously used. Despite experimenting with various low-cost distance sensors such as TOF10120, VL53L0X, and VL53L1X, all of them struggled to provide stable distance measurements at distances of more than 1 meter. Considering that distance-based interaction is a core system structure, this posed a significant constraint in simulating distance installation environments that require greater distance sensitivity. To address this issue, this study purchased additional long-range sensors with better performance, which will be used in

future outdoor tests. However, the *Model Minority* poster prototype adopted a webcam-based distance estimation and presence detection method as an alternative.

This alternative method led to an important realization: the physical location of the data collection device has a significant impact on the accuracy of the interaction. Whether using sensors or cameras, the angle and position of the device relative to the poster, the height at which it is installed, and the extent to which it can be obscured by passersby all directly affect the system's performance. Such environmental factors will be key considerations in refining device placement strategies for future outdoor installations.

Another important feedback point relates to system responsiveness in multi-user situations. In public or semi-public spaces, it is common for multiple people to enter the detection range simultaneously, and the system must decide which person's data to use as the basis for its response. The current prototype lacks priority-setting logic for such situations, resulting in unstable responses as it detects the presence of multiple users. In subsequent versions, we plan to modify the system to fix the response to the first detected person and respond only to that person until they leave the detection range. This approach will help maintain consistency in graphical responses and stabilize the narrative flow of the user experience. While this may be a technical solution, it also reveals limitations in that a single user-centric response structure alone is insufficient to fully realise the potential of posters as public media, especially when considering the simultaneous interactions with multiple users that are inherent to urban environments. Therefore, future research should explore how to accommodate and visualise multi-agent systems or collective interaction beyond simple priority setting. This demonstrates the possibility of Post-Poster expanding beyond an interface that responds to the movements of individual users to become a public visual system that responds to simultaneous and intertwined social behaviours. In other words, the poster is no longer a response device for a single person but can become a medium that sensually reveals the collective existence of urban users and the relationships between them.

In addition to these technical refinements, the prototype revealed valuable insights into audience behavior and perception. The poster’s visual structure—including the layered difficulty of recognition and the subtle “noticing threshold” of the interactive gaze—effectively influenced how people discovered and engaged with the system.

Several onlookers initially did not notice that the poster was reacting to them. However, once they realized that the eyes followed their movement or that the visuals responded to their gestures, many reacted with surprise or delight. Anecdotal observations noted participants stopping mid-stride, laughing, pointing at the poster, or calling over friends. Some attempted to "test" the interaction further by jumping, crouching, running quickly past the poster, or reaching out to "touch" the screen, suggesting that the graphic response successfully elicited exploratory and playful behaviors. This aligns with the original design intent to embed interaction at a perceptual threshold—subtle enough to invite discovery, yet rewarding enough to provoke deeper engagement.

Ultimately, the *Model Minority* prototype not only tested the system's feasibility within a specific cultural and performative context but also provided an opportunity to more precisely diagnose technical feasibility, installation environment, and social interaction variables. This experimental process reaffirms the methodological stance of this study. Interaction design is not simply a matter of visual decisions or technical implementation, but a process of continuous coordination and consultation between space, technology, and people. The feedback collected through this prototype, both technical and experiential, will serve as a concrete foundation for future outdoor installations and ultimately support the evolution of the poster system as a critical interface that contributes to rethinking typography, interaction, and copyright concepts in public spaces.

4.5.4 Potential and Future Application Plans

The feedback obtained through the *Model Minority* poster prototype played an important role in concretising future development possibilities in both technical and conceptual aspects. In particular, the four main components—street-based interaction, gaze response system, data visualisation-based background composition, and generative graphics—each present new aesthetic possibilities for interactive typography posters and call for a rethinking of visual communication methods in public spaces.

Going forward, this system will undergo more rigorous testing of its potential and limitations through actual street-based trials. During a regional Asian community event scheduled for 8–9 August 2025, initial outdoor testing will be conducted with citizens of

diverse ages and backgrounds, providing an opportunity to evaluate both the practicality and cultural interpretability of the responsive system. Furthermore, ahead of the official premiere of the play ‘Model Minority’ on 26 August, posters will be experimentally installed in at least three locations in Basel. Each installation will focus on how the responsive system functions within various urban elements, such as physical context, audience flow, light, and color.

These experiments are expected to provide empirical data on how interaction-based poster design mediates cultural narratives, going beyond simple application. Furthermore, as intended by this research, it will open up the possibility of typography and visual language in public spaces interacting with viewers in real time, serving as a decisive step in exploring how design can function as a ‘responsive entity’ in an urban context. User feedback and visual traces accumulated through future testing and exhibitions will serve as foundational data for the next phase of this system, including more sophisticated technological integration, sustainable hardware configuration, and the development of new content-based graphic strategies.

Conclusion

This paper redefines posters as no longer one-directional visual communication media, but rather as responsive entities, which is, “living media systems”[36]. Post-Poster constructs a visual language that changes in real time based on sensors, algorithms, environmental data, and human gestures and voices. It was an attempt to redefine the relationship between design, technology, and ethics, rather than a simple technical application. This system-based approach transforms posters from ‘finished images’ to ‘process-oriented interfaces,’ suggesting the possibility of redesigning the relationship between urban environments, humans, and machines.

The final application case, the *Model Minority* poster, functioned as a result for a single event while also serving as practical evidence that Post-Poster could be continuously expanded as a system. The eye movements responding to the street and body language, the typography structure revealing information, the background composition based on environmental data, and the generative graphics accumulating over time each operated as layers of multi-layered interaction. This composition constituted a sensory experience that encouraged the audience's “participation” and “discovery,” rather than simply a visual and auditory effect.

The core insights raised by Post-Poster converge into three questions:
Authority, Agency, and Temporality.

a. Authority: In a situation where messages are constantly changing,
   who holds the power?

This study demonstrates that the role of the designer has shifted from that of a “creator” of the final product to that of a “moderator” who designs and coordinates the conditions of interaction[37]. Copyright in responsive systems is always partial and distributed, and designers are positioned as entities that design the direction and possibilities of interaction rather than controlling the overall outcome. This implies a

[36] Lev Manovich, *The Language of New Media* (Cambridge, MA: MIT Press, 2001), 43–45.
[37] Heinz von Foerster, “Ethics and Second-Order Cybernetics,” in *Understanding Systems*, ed. Albert Müller and Karl H. Müller (New York: Springer, 2003), 288–289.

decentralisation of power in design, requiring designers to take on a broader range of ethical and coordination responsibilities.

b. Agency: Who initiates the exchange, the system or the passerby?

Post-Poster transforms the audience from passive recipients to active participants. Gestures, voices, and even presence become part of the poster, which no longer exists as a speaking surface but as a listening graphic surface. This creates a new co-production structure where senses and data, humans and technology collaborate, and the poster functions as a "responsive mediator" between the city and its people.

c. Temporality: How does the poster change and evolve?

Post-Poster is not a single image but a visual system that evolves in real time in response to the flow of the environment and the movements of people[38]. In particular, the generative graphics of the *Model Minority* poster accumulate background elements in response to the audience's movements, visually changing over time. This accumulation is not merely a technical effect but functions as a device to visualize the themes of memory, repetition, and residue, simultaneously expanding the poster's temporality and sensibility.

These three concepts are the core of the aesthetic, technical, and social significance proposed in this paper as an extension of existing poster theory. At the same time, these proposals also present the following critical questions and possibilities for future research.

First, the concept of distributed copyright requires deeper discussion at the doctoral level in terms of aesthetics, law, and ethics. When a designer's 'intention' is transformed into "unintentional frames" through audience intervention, who is responsible for the results? Furthermore, can the subjectivity of participants go beyond simply triggering the meaning of the poster and lead to the reconstruction of the message? If the response does not exceed the scope set by the designer, the role of the participants may still be limited.

[38] Golan Levin and Zachary Lieberman, *Messa di Voce*, 2003, accessed August 4, 2025, https://www.flong.com/archive/projects/messa/index.html; Matthew Fuller, *Media Ecologies: Materialist Energies in Art and Technoculture* (Cambridge, MA: MIT Press, 2005), 2.

Temporality can also be expanded to reflect the more complex temporality of the city—destruction, recombination, and recontextualization. For example, if the accumulation of generative graphics is connected to the physical erosion (tearing, overlapping) experienced by actual posters in the city, the temporality of the poster can evolve from simple accumulation to the poetics of fragmentation and reconstruction.

Finally, the interaction "perception difficulty" shown in the *Model Minori*ty poster can be understood as a notable new "design parameter" in visual design[39]. Each interaction layer is composed of different cognitive difficulties, guiding the audience to experience not only immediate responses but also the rhythm of gradual exploration and the narrative of discovery. This demonstrates that interaction design does not simply aim to be 'easy to see,' but can also take the temporality of the senses and layers of interpretation as design objects.

At the same time, this difficulty design forms a tension with the core principle of existing poster design, the 'three-seconds rule,' which requires public visual objects to convey messages in a short amount of time. However, the very act of adjusting this 'cognitive difficulty' or 'clarity of interaction' can become designer's language of expression, functioning as a core formative element of design decisions.

Therefore, the act of determining how much and how to 'make users aware' is not merely an act of consideration for users but an act of adjustment that reflects the aesthetic intentions and philosophy of graphic designers. This method of adjusting difficulty functions as a design parameter, and future research needs to further refine how this parameter is linked to visual language, information structure, and publicness.

All of these discussions converge toward a common conclusion.

That is, Post-Poster is not a completed form but an evolving system still in the process of being constructed. It is not a final product but a design methodology, a poster serving as an interface connecting the sensory layers of the city with data. How to design this system, where to place it, and with whom to establish connections are the next chapters that designers and researchers must collectively explore in the future.

[39] Katja Kwastek, *Aesthetics of Interaction in Digital Art* (Cambridge, MA: MIT Press, 2013), 49, 163.

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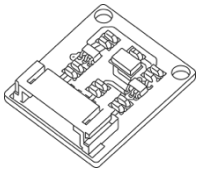
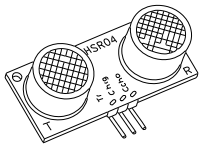
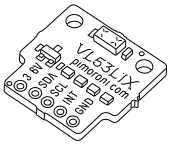
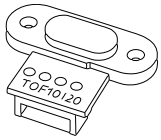
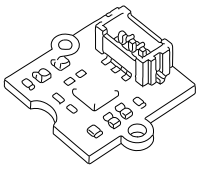
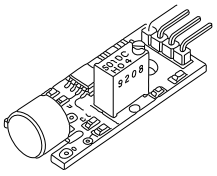
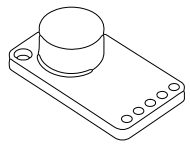
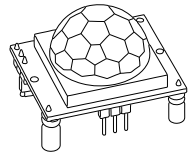
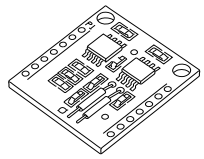
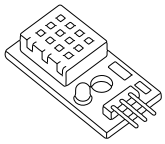
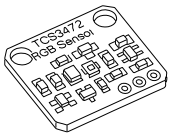
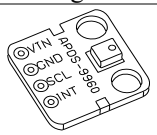
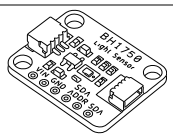
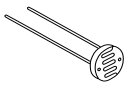
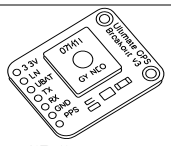
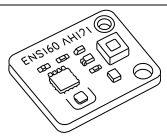
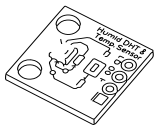
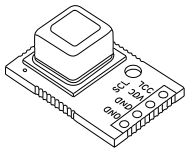
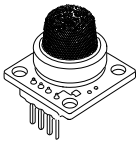
Appendix.

Comparative Overview of Sensors Used in the Interactive Poster System

Table 1. 0PEN:SENSE Archived Sensor Data

Sensor Image / Type	Sensor Model	Installation	Data Input	Data Output	Graphic Translation
 Distance sensor	VL53L0X	VCC_5V GND_GND SDA_A4 SCL_A5	I²C	mm distance	Resize, rearrange, animate color, typography, image. With multiple distance sensors, measure density of crowd, or position.
 Ultra sonic sensor	HC-SR04	VCC_5V GND_GND TRIG_D2 ECHO_D3	Digital pulse	duration in microseconds	Animate based on proximity, trigger changes in layout or type as someone approaches
 Distance sensor	VL53L1X	VCC_5V GND_GND SDA_A4 SCL_A5	I²C	mm distance	Better range and accuracy. Good for large installations
 TOF Distance sensor	TOF10120 DM3822	VCC_5V GND_GND SDA_A4, SCL_A5	I²C	mm distance (longer range)	Control opacity or blur based on distance; good for fuzzy/ organic effects
 Accelerator	ADXL345	VCC_3.3V GND_GND SDA_A4, SCL_A5	I²C/SPI	3-axis acceleration	React to tilt or movement of the poster; move graphics as if the surface is shaking
 Sound sensor	KY-038	VCC_5V GND_GND A0_A0(analog) D0_D4(option)	Analog/ Digital	Amplitude	React to noise levels; volume affects type size, speed, ripple or glitching

 Microphone sensor	MAX9814	VCC_3.3/5V GND_GND OUT_A0	Analog	Audio amplitude	Create responsive waveforms, distort images or letters based on ambient sounds
 PIR motion sensor	HC-SR501	VCC_5V GND_GND OUT_D2	Digital	HIGH/LOW (motion)	Trigger animations, transitions, or message reveal when motion is detected
 Clock sensor	DS3231	VCC_3.3/5V GND_GND SDA_A4 SCL_A5	I²C	Time (RTC)	Time-based animation or type changes throughout the day (e.g. time of day affects color)
 Temperature sensor	DHT22 / DS18B20	VCC_3.3/5V GND_GND DATA_D2 (10kΩ resistor)	Digital	°C / °F (Temp)	Temperature changes affect warm/cool color palette, melt/stretch visual effects
 RGB Light sensor	TCS-34725	VCC_3.3V GND_GND SDA_A4 SCL_A5	I²C	RGB light data	Background or type color shifts based on ambient light; simulate adaptation
 RGB Proximity sensor	APDS-9960	VCC_3.3V GND_GND SDA_A4 SCL_A5	I²C	RGB + proximity + gesture	Use gestures for navigation; proximity alters layout/intensity of visuals
 Light sensor	BH1750	VCC_3.3/5V GND_GND SDA_A4 SCL_A5	I²C	lux (light level)	Switch between light/dark themes; adjust contrast or glow dynamically
 Photo sensor	LDR	One leg to 5V, other leg to A0 with 10kΩ to GND	Analog	Light level (voltage)	Graphic brightness, gradient, texture recreation or layering
 GPS sensor	GY-NEO 6MV2	VCC_5V GND_GND TX_D4 RX_D3	Serial (UART)	Latitude, Longitude	Location-based content changes; different graphics shown in different geographies
 Air quality sensor	ENS160+ AHT21	VCC_3.3/5V GND_GND SDA_A4 SCL_A5	I²C	VOC, CO_2 levels, AQI	Smoggy data causes blur, pixelation, or haze overlays in visual system

 Humidity sensor	SHT20	VCC_3.3/5V GND_GND DATA_D2 (pull-up resistor)	Digital	% Relative Humidity	Influence texture dry: crisp, wet: smeared/misty. Evoke atmosphere in visuals
 CO_2 sensor	SCD41	VCC_3.3/5V GND_GND SDA_A4 SCL_A5	I^2C	CO_2 ppm concentration	Higher CO_2 makes letters suffocate or shrink. Emphasize presence and air density
 Gas sensor	MQ-135	VCC_5V GND_GND A0_A0	Analog	Gas concentration	Different gases distort graphics differently — evoke environ-mental tension