Look Around You! Situating Extended Reality within the Urban Fabric

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Abstract

The future of Extended Reality (XR) technologies is revolutionising our interactions with digital content, transforming how we perceive reality, and enhancing our problem-solving capabilities. However, many XR applications remain technology-driven, often disregarding the broader context of their use and failing to address fundamental human needs. In this paper, we present a teaching-led design project that asks postgraduate design students to explore the future of XR through low-fidelity, screen-free prototypes with a focus on observed human needs derived from six specific locations in central London, UK. By looking at the city and built environment as lenses for exploring everyday scenarios, the project encourages design provocations rooted in real-world challenges. Through this exploration, we aim to inspire new perspectives on the future states of XR, advocating for human-centred, inclusive, and accessible solutions. By bridging the gap between technological innovation and lived experience, this project outlines a pathway toward XR technologies that prioritise societal benefit and address real human needs.

Introduction

As an emerging technology, Extended Reality (XR) is enticing, often envisioned through the lens of science fiction and popular culture as a seamless integration of virtual elements into our physical world. While XR encompasses a spectrum of different immersion levels, spanning from subtle intervention to a fully rendered virtual environment, the current framing of XR frequently prioritises technical advancements, such as reducing friction in accessing content or enhancing convenience. However, these goals often fail to address fundamental human needs, offering tools without clear societal benefits or meaningful applications. In media, XR is frequently depicted as a broadscale technological advancement, rendered with glowing boxes anchored to the physical world, and placing a significant emphasis on a third-person view of a scene. This narrow focus risks overlooking the broader potential of XR to enrich the human experience and foster more inclusive, accessible, and relevant interactions.

There are numerous examples of "successful" technologies that have failed to prioritise human needs, ultimately proving unsustainable. For instance, a fruit juice startup valued at millions collapsed within 16 months of seed funding [1], or AI-imbued desktop toy robots floundered without a clear purpose or roadmap beyond simply reaching the market [2]. These failures stress the risks of developing technologies without a well-defined audience or a meaningful problem to solve, resulting in products that struggle to address tangible opportunities or deliver real-world value.

To move beyond a purely technology-driven perspective, this project explores the city and built environment as rich lenses for understanding real-world scenarios that can inspire innovative thinking in XR design. By engaging directly with urban spaces, this research emphasises how human-centred applications of XR can prioritise societal benefit, addressing fundamental needs and fostering meaningful interactions in everyday life [3]. This approach reframes XR not merely as a tool for convenience but as a medium for enhancing connections, accessibility, and inclusivity.

A key feature of this exploration is its engagement with designers who have no prior expertise in XR. By introducing fresh perspectives unburdened by existing technical constraints, the research fosters innovative thinking unshaped by conventional paradigms. These designers were encouraged to consider human behavioural patterns within everyday scenarios, identifying opportunities for augmented environments to offer genuine benefit. To further shift the focus from technical capabilities to human-centred design provocations, low-fidelity, screen-free prototypes were employed. These prototypes served as speculative tools to explore XR possibilities in a way that encouraged inclusivity and accessibility while maintaining relevance to the realities of daily life.

Figure 1. *Lead image from the design brief*

The project leveraged the built environment as a canvas for ideation, framing design outcomes around six carefully selected urban sites (Figure 1). This use of real-world settings emphasised the role of XR in addressing everyday challenges, particularly through solutions conducive to repeated, sustained use—an area often neglected in current XR applications, which favour one-off demonstrations. By grounding design provocations in field observations and culminating in low-fi prototypes and on-site presentations, this research highlights the transformative potential of XR when it is guided by human-centred values and informed by the rhythms of everyday life.

Situating Extended Reality within the Urban Fabric

We chose the built environment as the setting for this project due to its porous, changing nature and the multitude of different ways its inhabitants move through, engage with and shape it. In considering urban life in a dense city (and prior to the prevalence of ubiquitous, on-person computing), Raban [4] describes the "signals, styles, systems of rapid, highly-conventionalised

communication [that] are the lifeblood of the big city.", evoking a world charged with layers of history and experience, rich for observation. The built environment, defined by its perpetual state of flux, presents a stark contrast to the controlled settings of engineering or design studios where XR applications are often conceived and developed [5]. It is a space shaped by both the individual and the public. As Calvino [6] notes, "You take delight not in a city's seven or seventy wonders but in the answer it gives you to a question of yours."

The notion of enhancing the physical world around us with cognition-enhancing information historically predates contemporary representations of Augmented Reality (AR), often depicted on the screen of a sensor-packed mobile device. Early drawing apparatus, such as the *camera lucida*, patented by William Hyde Wollaston in 1803, can be seen as an early form of AR, enabling users to augment their drawing skills. Similarly, the Blackburn Buccaneer aircraft, introduced in 1961, featured a central Heads-Up Display (HUD) in the cockpit, providing a projected overlay of critical instrumentation [7]. Even optical glasses can be considered one of the earliest examples of XR Head-Mounted Displays (HMDs), enhancing the user's ability to interact more effectively with their surroundings.

Extended Reality has the potential to offer a wide range of perceptual lenses through which we can engage with the world. From familiar everyday spaces to unfamiliar environments, we can envision scenarios where the virtuality continuum [8] is adjusted according to the desired levels of 'virtuality'. This could range from lightweight augmentations of the world to larger interactive interventions, to the blending of physical and digital objects all the way to full immersion. These different modalities, whether auditory, visual, or haptic, delivered either discreetly or directly, constitute legitimate strategies for developing applications that enable us to extract essential information from our environment meaningfully and contextually.

London as a case study

We selected six sites within the City of London as foundational contexts for exploring potential XR use cases. The emphasis on designing for site-specific contexts, away from the desk, served a dual purpose: first, to encourage a departure from the studio environment, facilitating the observation of human behaviour and the consideration of the site itself; and second, to avoid the pitfalls of generic 'converged vision' design responses that might propose technologies applicable anywhere [9].

The six sites (Figure 2) were chosen for their distinctive and contrasting characteristics, representing spaces frequented by a range of audiences engaging in diverse activities, either individually or in groups. They embody the elements Lynch [10] describes as constituting the imagability of a place, influenced by physical and perceptible objects that shape how people interact with their surroundings. These elements of paths, edges, districts, nodes, and landmarks are all significant when considering how XR can interface with space to meet human needs and expectations.

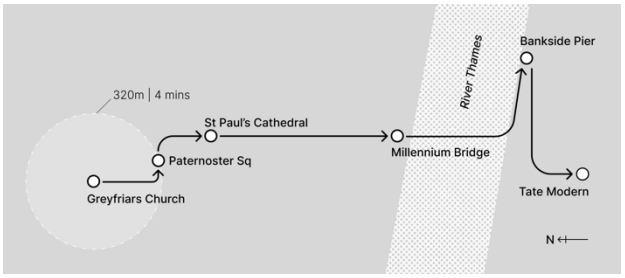

Figure 2. *Diagram showing the six locations selected within the City of London and route walked.*

The sites (Figure 3) were purposefully located within walking distance of one another, with the aim of imagining users moving between spaces and altering their intentions as they transition from one site to another. It's likely that the same individual might encounter the different contexts of two sites, such as sites 2 and 3, thus shifting how they would interact with a future XR platform. We were also deliberate in choosing sites that are spaces, not merely places. As Solnit [11] observes, "walking, witnessing, are as much part of the design and purpose [of cities] as being inside."

The six selected sites included:

1. *Christ Church Greyfriars*: A bomb-damaged Wren church now serving as a public garden, offering a striking contrast between ruins and greenery amidst the urban bustle.
2. *Paternoster Square:* A space blending modern developments with a distinctive architectural vernacular, home to both historical remnants, such as the relocated Temple Bar gate, and contemporary urban activities like market stalls and events.
3. *St Paul's Cathedral:* An iconic landmark at the heart of London's medieval landscape, drawing visitors for its religious, architectural, and historical significance.
4. *Millennium Bridge:* A steel suspension bridge linking St Paul's with the Tate Modern. The bridge transforms throughout the day, shifting from a busy thoroughfare to a quiet viewing platform [12].
5. *Bankside Pier:* Serving as a departure point connecting the city via the Thames, this site offers a contrasting dynamic to the Tate Modern, a former industrial space now repurposed as a cultural hub.
6. *Tate Modern:* A former industrial power station now repurposed as a world-renowned cultural institution, offering a rich historical and contemporary cultural context.

Figure 2. *Diagram showing the six locations selected within the City of London and route walked.*

Methodology

This study adopts a design research methodology that emphasises the integration of Extended Reality (XR) technologies within real-world contexts. The approach encourages a shift in perspective by situating XR development in the dynamic and multifaceted settings of the urban environment, specifically within central London.

Over five weeks, thirty postgraduate students from the MA Information Experience Design (IED) programme at the Royal College of Art (RCA) in London were invited to investigate future XR scenarios through site-specific observations. The research process was structured into two phases: the first encouraged divergent thinking and exploration, followed by convergence on a single, site-specific design proposition. The core prompt for the project was: *Investigate and demonstrate how Extended Reality (such as VR or AR) might affect the way we experience our immediate urban environments.*

The project involved conducting site-specific observations across the six sites in central London to enable participants to engage directly with the urban environment, experiencing the spaces in real time. Field observations were gathered to capture a rich range of data, grounded in the lived experiences of those who use these spaces. These observations were carefully documented and organised on *Miro boards*, which served as 'sources of truth' for all participants (Figure 4). This collaborative platform allowed students to asynchronously share and reflect on observations and sketches made by their peers, promoting a collective understanding of the spaces being studied. The use of *Miro* ensured that data collection remained centralised and accessible, fostering a collaborative research environment.

In line with the goal of prioritising human-centred design, we deliberately avoided the emphasis on cutting-edge technical capabilities [13] [14], opting instead to work with low-fidelity prototypes. This decision encouraged creativity by allowing participants to explore XR possibilities without being constrained by the limitations of advanced technology. Rather than focusing on the technicalities of implementation, the prototypes encouraged students to think freely about how XR could be applied to address real-world needs. Narrative and storytelling were integral components of this process, with students developing stories based on their observations and translating them into potential XR applications. These narratives helped contextualise the proposed technologies within specific urban environments, ensuring that the design responses were both relevant and meaningful.

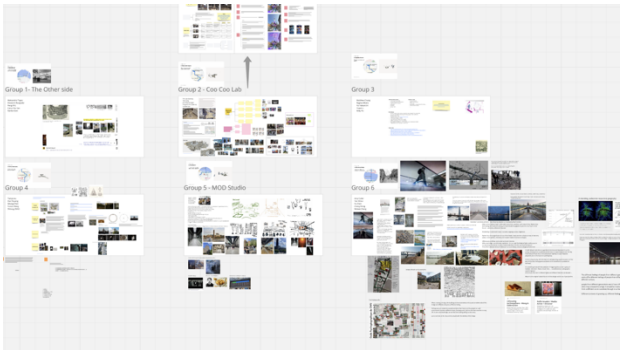

Figure 4. *Miro Board overview showing student's broad themes, iterated on in full sight of all teams*

The final phase involved in situ demonstrations of the prototypes, where students presented their ideas in the very environments they had studied. This allowed them to test their design responses in the actual spaces for which they were conceived, embedding their concepts directly within the fabric of urban life. This real-world testing phase not only provided valuable feedback on the feasibility of the designs but also helped ensure that the proposed XR applications remained sensitive to the needs and experiences of users within their immediate surroundings.

Workshops and Group Allocation

To further guide the design process, students participated in workshops that introduced a variety of ideation techniques, including affinity mapping, value canvases, and voting. These activities were designed to support the students in generating and refining their ideas, while also encouraging collaboration and a constructive level of competition. Students were organised into six groups, each randomly allocated a location to serve as the foundation of their XR proposals. This division not only encouraged teamwork but also ensured that each group engaged deeply with the unique characteristics of their assigned site.

The cohort's diverse academic and professional backgrounds brought a breadth of perspectives to the project. While most students had a general understanding of everyday technology and interactive systems, they were not XR specialists. This was an advantage, as it prevented reliance on conventional AR use cases, such as wayfinding, and encouraged exploration of novel applications. The absence of advanced coding expertise also minimised dependence on pre-existing XR templates, promoting originality in the design responses.

Prototyping

As an aid to thinking of XR for delivering an application, each student was given a sheet of acetate and an OHP marker, encouraging them to start sketching views over the environment (Figure 5). During the early stages of ideation, the emphasis was on allowing broad and generative thinking, disregarding the traditional 'feasible, viable, desirable' design framework.

Special attention was drawn towards examples of low-fidelity prototyping where the concept and its supporting narrative carried greater weight than polished interaction patterns; this was to avoid burning design cycles focused on the technical functionality of a prototype, rather than the core idea. In order to stop students from designing predetermined solutions and instead instigate them to think through making, they were introduced to a variety of methodologies, including storyboarding, paper prototyping, narrative video, ad hoc UXR and combining mixed format types. These methods highlight the role of the sacrificial prototype within design ideation.

Students were encouraged to lean into their collective skill sets within the group and to purposefully refrain from resorting to freely available mobile AR authoring tools, such as Meta's Spark Studio [15]. The underlying rationale was to instigate design responses not limited by the constraints of mobile device form factors and interactions, and to circumvent the time-consuming process that comes with learning a new piece of software.

Figure 5. *Acetate sheet showing sketches produced by students during the early ideation process*

Look Around You!

The *Look Around You* project invited students to critically engage with urban spaces by integrating augmented reality (AR) tools and techniques. Framed as an experiential design exploration, the project sought to blend historical, cultural, and ecological insights with cutting-edge XR (extended reality) technologies to reimagine how physical environments are perceived and experienced. Over the first week, students were briefed, organised into groups, and assigned distinct urban sites. The process began with site visits, where students collected instinctive observations, returning multiple times to document changes. Their initial engagements demonstrated the iterative and exploratory nature of the design process, enhanced by technology.

Students were quick to utilise familiar tools in order to capture observations and playback. Multiple groups utilised consumer LIDAR scanning applications to build models of their locations for later discussion. QR tags played a role in directing the rest of the group towards supporting content when it came to presenting back. Mobile apps were used to take field recordings that were then composed and arranged into audio content as backdrops to narrate concepts. These examples all pointed to the plasticity of a group of designers looking to a range of tools that helped facilitate design outcomes that went beyond preconceptions of AR.

Convergent: razors, propositions and presenting back

After thinking broadly, students shifted their focus from broad exploration to refining their ideas, aiming to distil their diverse concepts into a single, compelling "hero" proposal. This process was guided by collaborative discussions and strategic decision-making tools. Key criteria included the strength of an observed human need, the potential to offer novel ways of experiencing the built environment, the perceived uniqueness and contextual relevance of an idea to its assigned site, and the suitability of XR as a medium, specifically, whether it enhanced or improved upon existing approaches.

The culmination of the project mirrored its field-oriented beginnings, as the final presentations took place at each group's designated site. This method not only rooted the proposals in their spatial context but also allowed the students to showcase how their concepts interacted with the environment, emphasising the real-world applicability and transformative potential of their designs.

Design Responses

Revealing Invisible Histories | Greyfriars Church

The Greyfriars Church ruins presented an opportunity to explore how AR can bring historical narratives to life in ways that are tactile and emotionally engaging. Students began by examining the history of the site, focusing on its architectural changes and the remnants of its former grandeur. They observed how passers-by often overlooked the ruins, unaware of the significance of the site.

To address this, the group designed a system that combined a digital display interface with a haptic wristband (Figure 6). This interactive system allowed users to trace the outlines of the church's lost structures through a heatmap overlay [16]. The haptic wristband provided physical feedback, enabling users to feel the boundaries of spaces that no longer exist. This approach bridged the gap between the visible and invisible, transforming the ruins into a living archive of memory. The design drew on the concept of a "digital genius loci," an AR-enhanced spirit of place that overlays historical narratives onto physical spaces [17]. The students' solution eschewed traditional visual-heavy AR markers, opting instead for a subtle, multisensory interaction that invited deeper reflection on the site's past.

Figure 6. *A) Team 1's display interface is designed to allow users to visualise the outlines of Greyfriars Church's lost structures through a Sobel operator. B) Haptic wristband designed to provide physical feedback to users of the Greyfriars Church ruins.*

Playful Urban Engagements | Paternoster Square

Paternoster Square provided a contrasting context: a site characterised by its modern commercial energy and social use. The central column, a ventilation shaft disguised as a neo-classical pillar, became the focal point of the group's investigation. Their observational research revealed the space's primary function as a gathering point for workers during lunch breaks or moments of respite.

The group's response (Figure 7) was a playful reimagining of the column as a competitive gaming station. They developed a concept combining elements of *Dance Dance Revolution* and *Beat Saber* [18], where participants could engage in rhythm-based challenges. To encourage interaction, the system incorporated whimsical features such as rewarding points for the participation of pigeons, a nod to the ubiquitous presence of birds in the area. The proposal redefined urban interactions, fostering a sense of community and engagement while challenging traditional notions of AR interfaces. By prioritising agnostic interaction methods that could operate independently of specific devices, the group proposed a more democratised and inclusive AR experience.

Figure 7. *A) Detail of storyboard view highlighting key steps in the user steps around a gamified architectural overlay. B) Pre-visual render showing a shared environmental game UI.*

Avian XR Spectacles | St Paul's Cathedral

St Paul's Cathedral, with its iconic dome and rich historical and ecological significance, became the backdrop for an exploration of non-human interactions within urban spaces. Through archival research, the group uncovered a fascinating anecdote from 1834 detailing a peregrine falcon captured from the dome and later displayed at a local pub [19]. This discovery inspired the group to investigate the avian ecologies that continue to define the area today.

Their proposal involved XR-generated projections of avian flocks, designed to mimic the natural patterns of birds at sunrise and sunset (Figure 8). Using Boids algorithms [20], they simulated flocking behaviour based on rules of separation, cohesion, and alignment. The projections created an artificial yet dynamic spectacle that highlighted the interplay between natural phenomena and human-built environments. This design reframed the act of observing urban ecologies as a participatory experience, blending the real and the virtual to draw attention to often-overlooked aspects of the site.

Figure 8. *A) Snapshot of students' onsite presentation pointing out target demographics, pain points, and proposed outcome. B) Visualisation of flocking 'boid' style animation clustered around the landmark of St Paul.*

Generative Soundscapes | Millennium Bridge

The Millennium Bridge offered a unique opportunity to explore sound as a medium for urban augmentation. Through site visits, the group observed that the bridge primarily served as a transitional space rather than a destination, with most visitors crossing it en route to other landmarks.

To enhance the experience of movement across the bridge, the group proposed a generative soundscape powered by real-time environmental data. The system incorporated inputs such as tidal rhythms, foot traffic, and atmospheric conditions, as well as custom patches contributed by artists. By transforming the bridge into an interactive audio sequencer, the proposal invited users to engage with the site in a novel way. This concept aligns with Mattern's [21] notion of "grafting," where existing urban structures are layered with digital technologies to better cater to human needs. The design positioned the bridge as both a functional crossing and an artistic experience, reshaping perceptions of urban infrastructure (Figure 9).

Figure 9. *A) Students' onsite presentation featuring a collection of visuals of the Millennium Bridge as part of the ideation process. B) Annotated study of historical gathering points of Georgian-era taverns, situated around the vicinity of the present-day Millenium Bridge.*

Literary Overlays | Bankside Pier

Bankside Pier's proximity to the Globe Theatre and its rich literary heritage provided fertile ground for the group's exploration. Their research uncovered the area's deep connection to performance and storytelling, spanning centuries. Rather than focusing on the pier's contemporary role as a transport hub, the group chose to highlight its historical layers.

Their XR intervention (Figure 10) involved projecting generative text onto the surface of the Thames, inspired by Lao's Mirror of Visualised Thoughts [22]. Passages of text were generated using large language models (LLMs) and were contextually informed by visual and proximity data from passers-by. To enhance accessibility, the group proposed the use of monocular telescopes placed across the river from the Globe Theatre. These devices allowed users to view the projections without the need for app downloads, addressing barriers to participation common in AR applications. The design blended literary heritage with cutting-edge technology, creating a democratic and immersive cultural experience.

Figure 10. *A) Augmented Reality demo showing generative lyrics and poetry, SLAM-tracked against the river Thames. B) AI-generated visual proposing a method of deploying fixed telescopes to encourage participation and engagement of passersby.*

Spatial Archiving | Tate Modern

The Tate Modern's Turbine Hall, known for its monumental temporary installations, became the focus of a group exploring digital preservation. The students recognised the challenge of maintaining the ephemeral nature of these installations while enabling future audiences to experience them.

Their proposal involved creating XR-based re-creations of past installations using technologies such as Neural Radiance Fields (NeRFs) and Gaussian splats [23] (Figure 11). These tools allowed for immersive, site-specific re-experiencing of artworks long after their physical dismantling. The concept subverted traditional applications of digital twins [24], using art as the origin rather than industrial prototypes. This approach raised critical questions about the relationship between location and art, particularly in cases where installations were intended to be site-specific. The group's design echoed themes from Gibson's Spook [25], where the real world coordinates of an artwork become as significant as the artwork itself.

Figure 11. *A) Early exploratory sketches looking at massing and ephemerality of gallery visitors and temporary artworks. B) Screenshot from prototype proposing the viewing of geo-fenced, site-specific artworks delivered through Augmented Reality.*

Emergent Themes

The design responses that emerged from the project can be categorised into three key themes: location, living content, and experience-based (Figure 12). Each of these themes reveals insights into the potential and limitations of XR technologies when applied to public spaces and reflects how XR can be integrated into real-world environments to enhance and reimagine the way we interact with these sites.

Projects were deemed successful based on their ability to address a specific user behaviour or need intrinsically tied to the allocated site. Successful projects demonstrated a thoughtful engagement with the site's context and constraints, moving beyond conventional AR/MR approaches that merely anchor fantastical objects to a ground plan or fixed environmental feature.

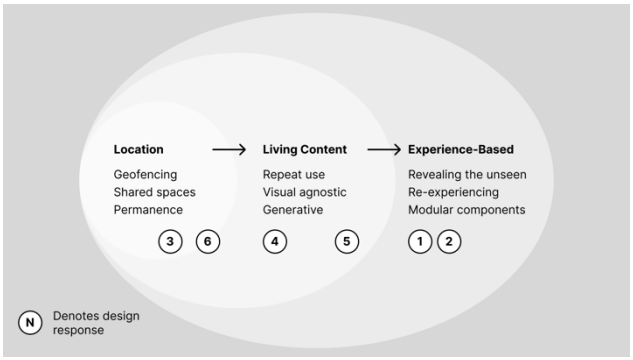

Figure 12. *Framework highlighting grouped dependencies of key themes that emerged from design proposals.*

Location

Geofenced. The contextual relevance of XR content is inextricably linked to location. Geofencing, referring to using physical boundaries to trigger specific digital content, emerges as a crucial aspect of ensuring that XR interventions are directly tied to the place and moment in which they are experienced. All of the design responses in this project were specifically tailored to work for a specific location a requirement inherent in the project's brief. However, students also demonstrated an awareness of the need for XR designers to accommodate ingress and egress from sites. As visitors approach or leave a location, the XR experience must remain fluid and adaptable, enhancing the sense of place without disrupting natural flows or interactions.

Shared spaces. Stavros [26] reflects on "Common spaces, shaped through the act of commoning", a quality explored by three of the responses. The projection-mapped gaming in Paternoster Square, the generative soundscape of the Millenium Bridge MIDI, and the AI-generated poetry on the Thames all tapped into the idea of XR content being collectively experienced by multiple audiences at once. These sites, by their nature, are public and shared, and the XR experiences designed for them were intentionally inclusive, with the potential for diverse, simultaneous engagement. This move away from the traditional mindset of XR as a singular, isolated experience encourages a shift towards multi-user, synchronous interactions, which are crucial for the future of public-facing XR applications.

Permanence. A distinctive response, particularly in the case of the Tate Modern, challenges the perception of XR as fleeting ephemeral content. The idea proposed was to create persistent, world-locked layers of XR that could interrogate and re-examine moments in time, turning them into enduring digital elements that could be accessed and revisited. The concept of permanence within XR is an important consideration for integrating digital layers with the physical world, suggesting that XR has the potential to be as lasting and as site-specific as any real-world intervention in the built environment. When XR can preserve and reanimate historical or cultural moments, it starts to build a more lasting connection with the space it inhabits.

Living content

Repeat use. Traditional mobile AR experiences, which often centre on individual, egocentric interactions, such as filters or one-off apps, tend to lack the substance required to encourage repeat engagement. As McLuhan [27] notes, people are fascinated by extensions of themselves, but without ongoing utility, XR

applications may remain fleeting experiences. The project's proposals suggested a need for deeper, more immersive interactions that could encourage return visits. Examples included a "radio-like" layer to observe historical events, the body-as-input controller for projection-mapped gaming, and a bridge that allowed users to upload MIDI patches. These proposals all aimed at creating repeatable, engaging experiences that could evolve over time, thus offering sustained value and appeal.

Visual agnostic. The conventional view of XR often centres on floating, 3D digital geometry overlaid onto the physical world. Yet half of the groups in this project prioritised audio as a core component of their design responses, recognising the untapped potential of sound in creating XR experiences. One group, for instance, proposed generative soundscapes to accompany a journey across the Millennium Bridge, allowing the urban space to come alive audibly as people passed through. This emphasises a crucial point: XR does not have to be purely visual. With the evolution of spatial audio technologies, XR experiences that are audio-first could become more prevalent, offering an accessible and immersive alternative to visual displays, especially as visual display technologies continue to advance.

Generative, personalised, and community-driven content. A key theme emerging from the project is the idea that XR content and experiences should not be static or pre-programmed but instead shaped by the users and communities interacting with it. With advances in generative content technologies, such as AI-driven image, video, and text generation, XR experiences can be dynamic and personalised. The content could evolve based on the interactions of its users, whether in the form of user-generated art, community-driven narratives, or adaptive AI assistants. This democratisation of content creation suggests a future where XR experiences are not dictated by a central authority but instead arise organically from the participants themselves.

Experience-Based

Revealing the unseen. XR is often envisioned as a medium through which the "unseen" can be made visible, digital content pinned to the world, accessible at will, to reveal hidden histories or unnoticed layers of a space. This phasing of visibility could help guide decision-making or enhance navigation through the built environment [28]. Many of the proposals in this project explored how XR could uncover hidden aspects of sites—whether historical events, invisible systems, or other unseen elements. By making these layers of information visible through XR, the users' understanding of a place is deepened, enabling them to engage more meaningfully with their surroundings.

Reliving and reexperiencing. Several of the student proposals focused on the idea of reliving and re-experiencing moments that had occurred at a specific site. Whether revisiting a historical event, such as the peregrine falcon roosting at St Paul's, or experiencing a past art exhibition, these scenarios allowed users to engage with a space through multiple temporal layers. This reflects a growing interest in using XR as a tool for historical and cultural preservation, allowing users not just to witness the past, but to live it again, experiencing a place as it once was.

Modular components. All six of the projects directly referenced their assigned site, grounding the designs in the unique qualities of the space. However, they were also adaptable enough to function in different contexts. For instance, the game-like mechanics for building projections could work just as well in a temporary setting, such as a festival, as in an established urban space. Similarly, the concept of archiving an art exhibition through XR could serve as a way to revisit and relive public events in an asynchronous manner, facilitating the creation of a "city that may even talk to its citizens" [29]. These responses highlight the flexibility of XR, suggesting that it has the potential to transcend its immediate location, offering scalable and adaptable experiences that can grow and evolve across different contexts.

Conclusion

The *Look Around You* project demonstrated the transformative potential of XR technologies in reimagining urban and historical spaces. By integrating multisensory, participatory, and contextually informed approaches, the student-designed interventions demonstrated how XR can transcend traditional interactions and foster new ways of seeing and engaging with the city. Through the lens of historical, ecological, and cultural narratives, these designs showcased how experiential design can provoke creative and critical perspectives while pushing the boundaries of technological applications.

Central to the project was the effort to uncover a diverse range of design provocations that reflected potential futures for XR in urban environments. From revealing hidden layers within the cityscape to enabling re-experiencing of temporal events, fostering community engagement, and experimenting with projection-mapped gaming and generative, location-driven content, the outcomes underscored the breadth of possibilities for XR to enrich human interaction with place. Crucially, these ideas arose from field observations, decoupling the design process from preconceived notions of XR as merely mobile-based or geometry-focused. Instead, the students demonstrated how XR could be deeply contextual and responsive to the specificities of place and human activity.

The design artefacts surfaced recurring themes such as geolocation, synchronicity, privacy, crowd contribution, customisation, repeat use, and permanence versus ephemerality. These themes suggest enduring concerns that will likely shape the evolution of XR technologies. Importantly, despite the participants' limited experience in XR, their outcomes aligned with established fields in XR research and practice, hinting that the development of future use cases could build naturally on existing human engagements with the world rather than requiring radical, ungrounded shifts.

However, the project also highlighted the inherent challenges of depicting XR experiences through static representations. XR's richness lies in its interactivity, immersion, and responsiveness—qualities that demand to be experienced rather than described. To advance the designs further, more immersive prototyping methods, such as bodystorming [30] [31], audio-visual storytelling, or dynamic, scenario-driven presentations, should be explored. Additionally, expanding the focus to consider scale—examining interactions beyond the individual and within larger urban networks—would offer valuable insights into the systemic implications of XR in public spaces.

Ultimately, the project affirmed that the built environment is a fertile ground for everyday XR applications that meet real human needs. By engaging with users in situ, XR can avoid the pitfalls of novelty or generic implementation, instead offering innovative ways to experience, understand, and intervene in the world. The project's findings point to a promising trajectory for XR development—one rooted in the natural progression of human

interaction with technology and place, rather than speculative leaps disconnected from lived realities.

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