

Mixed reality and pervasive game design, a playful tool in native habitat restoration

Using site-specific interactive play through augmented experience to connect community to place and facilitate a reconnection to the smaller native ecosystems present in our natural world.

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Abstract:

Augmented reality (AR) and pervasive game design can be a tool for presenting play-driven information. The novelty of combining this approach with a public facing interactive experience could help to raise awareness within the community on threatened native biodiversity due to habitat loss. This is important because although native biodiversity is threatened by expanding urban environments, a conscious attempt to provide native habitats can help to prevent irreversible loss of flora and fauna [2]. A potential vehicle to share this information are installations that utilise mixed reality, which are becoming more frequently adopted into education strategies and have proven to be a strong tool in grabbing student attention [3]. Elsewhere, publicly displayed and location-based artworks promote a sense of community, reaching a broader audience than their gallery-housed counterparts [9]. Pervasive game design and urban play takes advantage of this to restructure the use of public space, facilitating community interaction and offering a template for site-specific installations [7].

A gap in the findings was found in the intersection of pervasive game design and urban play for the use of environmental education via interactive augmented experience. This experiment was designed to combine these already well-documented approaches into a practical solution for a current problem within the community. Practice-based research is the primary methodology being used and presents as a case study centred around the projects '*Frightened Frog*' and '*Shark the Bird*' [12], which are site-specific story-driven augmented experiences created for the moving parklet of Playable City Melbourne ("the Public Parklet").

The research is in its infancy and ongoing. However, its initial testing appears to demonstrate that public engagement and curiosity on the topic of native habitat restoration were notably higher after being exposed through play. Participants asked follow up questions based on the narrative driven experience, wondering how they and the community could help prevent the loss of native biodiversity. Combining the novelty of a mixed reality experience with public location-based play should prove to be an effective tool in engaging a broad range of players in a local environmental issue.

Concepts:

Pervasive game design, urban play, public art, augmented reality, native biodiversity, site-specific installation

1 Introduction:

Biodiversity, the variety of plant and wildlife in a particular habitat [10] is under constant threat from expanding urbanisation. Traditional means of conveying information about the topic struggle to encourage action within the local community. However, a mixed reality (XR) approach, which involves the use of real and virtual combined environments [11], has been shown to provide an element of novelty that promotes exploration and deeper understanding [3], while pervasive game design and urban play can be used to critically rethink and restructure how urban space can be used within a community [7].

Without individual action, native biodiversity could become unrecoverable. Interactive art installed in public locations can be used to convey this message. It has the capacity to dissolve barriers and reach viewers that would otherwise not seek it out. In the field of ecology, it has been proven that a community-based approach to providing local native habitats can drastically improve the population density of threatened flora and fauna [2]. XR has demonstrated that it is a powerful tool in encouraging exploration and developing a deeper understanding of topics through a novel experience and shift in perspective [3]. When this is combined with the approach of pervasive game design and its ability to connect community to place, an experience that exposes the user to this problem can be curated through play.

This study aims to show that a creative approach that utilises mixed reality as a tool for location-based play can produce an informative experience that encourages individual action within the local community. I hypothesise that the community is more likely to be meaningfully engaged with the information on the loss of native biodiversity when it is introduced through means of urban play and pervasive game design. The novelty of a public facing and site-specific augmented experience will help to facilitate discussions on this issue and provide a foundation for community and individual action.

The contribution to the field will be in the form of the project ‘Frightened Frog’ where I will produce a site-specific public interactive experience that consciously blends the theories of pervasive game design and urban play with the tool of XR to facilitate conversations on the role of the individual and community in preventing the loss of native biodiversity. This document discusses the development and progress of the work ‘Frightened Frog’ and the research conducted in the fields of both XR interactive education and pervasive game design. It illustrates how these tools could be leveraged to help prevent the decline of native biodiversity within the local community. The work has been laid out as practice-based research into the current state of these fields and the practical application of them in a public facing parklet. The project's development process will be outlined in this document and via video essay upon completion.

2 Background

2.1 Pervasive Games and Urban Play:

Urban play can be used to reimagine public spaces, restructuring their priorities from efficient and productive to values more closely connected to community, place and people [8]. Pervasive game design is game play that is not contained within one device but rather extends out into the real world [7] and works hand in hand with urban play in rethinking these priorities for public space and how they can be used for the benefit of the community by reframing the connection with public art in a creative way [8]. When these approaches are targeted towards site-specific installations, the cultural, historical and environmental influences are intertwined in a grounding experience connecting the player to community and place.

2.2 Educating through mixed reality:

Utilising mixed reality in teaching has been shown to give a sense of novelty that encourages exploration, collaboration, problem solving and a deeper understanding of ideas [12]. The flexibility in the deployment of AR content has allowed it to shine in a climate where online teaching has become a forced normality [11]. In an era where a mobile device is more common than a wristwatch, augmented experiences are more accessible than ever. This allows these experiences to be taken from the confines of a classroom and brought into the community, explored through place and play.

2.3 Native Biodiversity:

Biodiversity, the density of flora and fauna in a habitat, is under significant threat from expanding urbanisation [1]. The consequence of sprawling suburbia often means a lack of space for wildlife, however a conscious choice to provide native habitat can help to prevent an irreversible loss of native biodiversity [2]. This is so that both on a community and individual level, there is a path of action whereby creating pockets of native habitat throughout the community can create a connection of refuges for threatened species, known as a wildlife corridor [13].

2.4 Related works:

Key works within the field have already built a foundation for this inquiry, such as the biodiversity initiatives that can be found within forward thinking council areas including the local Boroondara biodiversity workshop [20]. Utilising a very tactile approach, the initiative teaches the community about the importance of native habitat, why it is threatened and what the individual can do to help. Virtual Macquarie Island (VMI), on other hand, takes a different approach which enables permanent preservation, and educates through digital replica. It leverages the permanence of digital space and the virtual side of mixed reality to work towards creating a 'digital twin' of Macquarie Island [19]. In this way our threatened native habitats can live indefinitely and be shared across the world in an immersive virtual experience. A practice that takes a site-specific approach to augmented exploration, '64 Ways of Being' uses the streets of Melbourne to connect people to place [16]. Dr Troy Innocent, a researcher of urban play, crafted this public art experience to connect people to a different way of being through visual and auditory exploration. This curated experience is driven by 'conversations with the city'. Another key work within the field, Keith Armstrong's exhibition 'Many Horizons' [21] also serves as inspiration on augmenting space to encourage conversation and provoke thought towards sustainable futures. The work manifests the interconnection of everyone and everything as an 'ecological mesh'. By augmenting light and space, Keith attempts to draw attention to this entanglement.

3 Framework:

The major framework used to facilitate the ongoing development of this practice-based research is the three horizons approach to innovation and cultural change, whereby common practice, disruptive innovation and an emerging future are plotted over time as a tool for conceptualising transformation and how to actualise it [14]. Within this framework, tools such as AR and pervasive game design can be seen as disruptive technologies with the potential to help move societal trends.

4 Methodology:

The predominant methodology used to guide this inquiry was a practice-based research approach [5]. The focus of this research is centred around the project 'Frightened Frog', an interactive AR experience developed for the Public Parklet.

The completion of this project requires the conscious blending of existing fields as a creative solution. Public Art, Interactive installations, AR, pervasive games design and urban play have all been leveraged to create a project that engages informs and promotes change.

It is this combined approach that will enable the project to present as a novel experience. Building upon tried and tested methodological approaches and collaboration with fellow practitioners to create both an exemplar and technical framework for future interactive installations within the Public Parklet.

5 The project:

Ongoing research is being conducted through the Urban Play lab at RMIT University and the Public Parklet, whereby I help to facilitate engagement from the public with various urban play installations including but not limited to 'Yomeci band', 'Communitas' and 'Skit'. This hands-on experience with the adoption of public and temporary interactive installations has played a valuable part within the development and planning stages of the project.

The initial phase of this project consisted of scouting the area for the latest instalment of this playable parklet and the place it is surrounded by. Documentation was taken in the forms of photo, video and 3D scan as a tool to help conceptualise and develop the site-specific installation. From this point, the installation and its interactions could be planned out and developed through ongoing playtesting.



Figure 1: 3D photostandard public parklet
Figure 2: Public parklet layout reference

Frightened Frog:

Frightened Frog is a site-specific public AR experience that takes the player on a journey through a striped reed frog's ordeal to find shelter in a suburban street. Without shelter, the frog is vulnerable and quickly finds itself in danger being stalked by a neighbourhood cat. The player must scare off the hungry predator before crafting a native refuge for our young frog. In the process of creating this urban habitat the player learns about the importance of providing native flora and the animals that rely on it. Invasive species are also drawn to attention and the damaging effect they can create within our waterways. Once this oasis has been completed the player can watch and explore as its inhabitant's flourish.



Figure 3: Adobe Aero function testing
Figure 4: Animation and interaction blocking out

In the process of developing and playtesting with fellow practitioners, the decision was made to combine the Frightened Frog installation with a similar site-specific AR experience, 'Shark the Bird'. By choosing to collaborate we hope to develop a more engaging and interactive experience that requires physical input and exploration from the player enhanced through responsive feedback from the Public Parklet itself by way of hidden speakers and lights. By means of creating a digital twin of the Public Parklet and a template within Unity, the Project has grown to also serve as a foundation and structural framework for further interactive installations based within the Public Parklet.

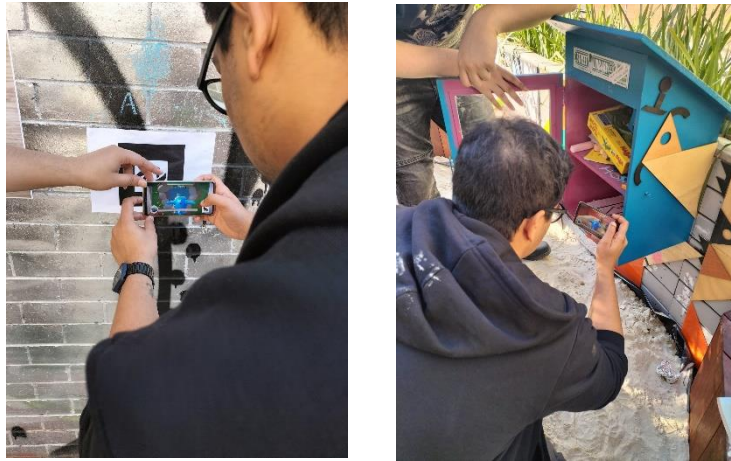


Figure 5,6: Public playtesting experimental interactive mechanics

Moving forward, the revised narrative on biodiversity will centre around three extinct animals from the Melbourne area. The Australian painted snipe, the brush-tailed phascogale and the Yarra pygmy perch. Geometric markers, the physical object used for calibrating the digital AR experience to real world space, will be used as a playful mechanism where the player must find, move and combine these markers to progress the story, building a native habitat in the process so that these creatures can once again live in the community.

The initial public alpha testing of the installation will be held during Melbourne Knowledge Week on 10 May 2022 and will continue its development to be launched through the Public Parklet within the Melbourne CBD.

6 Discussion and conclusion:

The project is being developed based on an inquiry into how site-specific interactive play through augmented experience can connect community to place and facilitate a reconnection to the smaller native ecosystems present in our natural world. The project is ongoing and will continue to develop in accordance with its theoretical framework and conceptual methodology. However, perhaps more importantly, its direction and iterative progression will continue to be shaped by its adoption and feedback from public play testing.

Research into the practical application of these fields in service of the inquiry is ongoing through both the development of the project and involvement in the Public Parklet. Documentation on the findings and a detailed development process will be showcased via video essay shortly after its public launch. It is my hope that the framework created within this research and its playful approach to augmented storytelling can continue to develop and adapt to share more stories of value in service of the community.

The framework created in the development of this project aims to contribute to the fields of pervasive game design, site-specific design, AR development and urban play creators. It strives towards a practice that holds establishing connections between community, place, environment and culture as its core ideal.

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