

Case Study

Augmented Reality
for Wayfinding &
Placemaking

By



AUGMENTED REALITY EXPERTS



Wayfinding &
Placemaking

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Scope of the Case Study

This case study introduces readers to augmented reality (AR) and its use in wayfinding and placemaking. Here wayfinding refers to “information systems that guide people through a physical environment and enhance their understanding and experience of the space” [1]. Meanwhile, placemaking is understood as “a collaborative process by which we can shape our public realm in order to maximize shared value. More than just promoting better urban design, Placemaking facilitates creative patterns of use, paying particular attention to the physical, cultural, and social identities that define a place and support its ongoing evolution” [2].

After detailing key benefits, research findings and industry examples regarding the use of AR for wayfinding and placemaking, the document provides a series of points to consider in designing your own AR app and information about how our team at Augmented Reality Experts can help you realise your AR objectives.

Introducing Augmented Reality

What is Augmented Reality?

With the advancement of technology and changing demands of an increasingly digitally native a population [3], augmented reality (AR) continues to enter more and more facets of our lives. One of the earliest widespread examples of this was in sports coverage where additional information such as touchdown lines or 3-point markers have been superimposed over the live playing area – augmenting the viewer’s

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experience. Similarly, gamers often engage in different forms of AR, one being when they look through a screen or lens containing supplementary information about health, targeting systems, location, weapons etc. that responds to their surrounds. AR is defined by this bringing together of the real and the virtual to enhance our knowledge and understanding and help us do things better and more efficiently [4].

“With augmented reality we harness the affordances of technology to provide users with an enhanced experience by adding a layer of digital information to our experience of the world around us. This experience can be delivered in many ways using different technologies across different locations for various purposes and industries”

Alec, Augmented Reality Experts

AR can be conceptualised as forming part of a continuum that ranges from virtual reality (completely synthetic) through to telepresence (completely real)[5], which is the end AR falls closer to [6, 7]. Unlike virtual reality which takes the user to a new world, AR does not seek to replace reality, but rather use it as a background [8]. AR is not limited to certain tools or technologies, and has been understood as a technique comprising three key characteristics; that it combines real and virtual, is interactive in real time and registers in 3D (although 2D options are possible) [9]. Regardless of how one defines AR, when we use it we are no longer a “detached observer”, but rather enter the digital environment and interact with it [4].

Why use Augmented Reality?

It is the blending of the real and digital that grants AR such widespread potential, yet has simultaneously posed technological challenges. For AR to function well objects need to be tracked in space and time so that the virtual and real visually align and coincide in real time. While these serious resourcing needs may have previously held the industry back, digital natives are now demanding more innovative and interactive opportunities. Coupled with the widespread adoption of smartphones and other personal devices, these drivers have spurred interest from developers and companies in recent times [10]. As a result, AR is becoming more widely known and better understood, especially since the successful release of PokemonGo in July 2016 which bough AR into the lives of millions across the globe [11].

Beyond its interactivity, ability to provide additional information and immersive nature, AR is able to assist with learning and memory processes. The key principle being that we tend to “remember things better when they are spatially associated with locations in 3D spaces rather than as abstract ideas” [4]. This process of remembering things by relating them to spatial locations can be used effectively to recall information by walking back through certain places or ‘loki’ [12]. These characteristics of AR make possible countless applications across industries ranging education and training, property, gaming, retail, personal use and the public sector.



Augmented Reality for Wayfinding and Placemaking

Applicability of Augmented Reality in Wayfinding and Placemaking

Wayfinding and placemaking have received growing attention in recent years as technology has advanced and revolutionised the way we can navigate and interpret spaces. In an increasingly urban and developed world wayfinding and placemaking have great potential to reach people and influence their everyday lives. The success of Pokémon Go highlights this desire to engage, and be engaged within the urban environment [13]. AR wayfinding and placemaking can be used to provide a new spin on walking tours, scavenger hunts, historical facts, special geo-based promotions, local businesses and organisational communications, analytics and green technology [14].

Wayfinding encompasses knowing where you are and your destination, finding the best routes there and back as well as helping you identify your destination on arrival (Carpman & Grant 1993) [15]. This can be particularly helpful in complex built environments such as transit hubs, shopping malls, healthcare facilities, educational campuses, community spaces, tourist destinations and other cultural sites where people can become easily lost if they are unfamiliar with the environment. While traditional aids such as maps, signs and asking for directions can help, the use of AR assisted wayfinding can greatly improve and speedup this process. This comes from AR's unique ability to superimpose digital information over what the user is actually seeing and experiencing in real

time to help them find their way [15]. Having Line of Sight (LOS) also makes this whole process a lot more intuitive and gives the user access to supplementary information about their destination on the go [14].

AR enhanced placemaking also offers great utility to users wishing to maximise the physical, cultural and social identities of a space or location [2]. By drawing on the affordances of AR, placemaking is able to engage users, both local residents and visitors, in new and interactive ways. Be it through sharing information about a site's history or culture, facilitating the reimagining of spaces or enabling new and creative art installations, placemaking has a plethora of applications that are enhanced through the use of AR techniques and technologies.

What the Research Says

The use of AR in wayfinding and placemaking is increasing, however, relevant research and evidence remains very limited. The majority of information relating to these uses of AR comes in the form of community activity case studies or corporate press releases regarding their adoption of such technologies. However, the limited research suggests:

- Augmented Reality (AR) has great potential to supplement current wayfinding aids and AR-based wayfinding systems can significantly reduce the time and cognitive workload of human wayfinding [15]
- Visitors to sites with AR placemaking tools become more aware of their surroundings and gain a stronger connection to the place's culture and history [16]



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- On-demand displays should be used for AR to minimize divided attention and improve performance. Hands-free operation could also be a useful activation strategy. [17]
- Augmented display contents should be either integral to the scene or be minimized to avoid divided attention issues for the user. The real world will usually prevail to a participant confronted with an augmented and real image. Therefore, integral augmented scene contents should be indistinguishable from the actual scene [17].

Different uses of Augmented Reality for Wayfinding and Placemaking

The uses of AR when it comes to wayfinding and placemaking are abundant and only just starting to be leveraged. The ability to AR to capture and analyse data about user behaviour and interaction opens up additional possibilities. Some uses gaining in popularity are discussed below although, this list only touches the surface on what is possible

In-store or location navigation

Use AR technologies to help users navigate spaces and stores to find items they are searching for. Mobile AR in-store navigation apps can enhance the shopping experience by enabling customers to search for products, save them to lists and then find them in-store using their smartphones [18]. The technology uses motion tracking, depth perception and area learning to direct shoppers around stores by overlaying directional prompts onto the real life in-store view. Companies and organisations which control large spaces such as shopping malls and

transit hubs are also using AR to help people find specific stores and the best ways to arrive at them. For example, Gatwick airport recently installed 2,000 indoor navigation beacons to facilitate wayfinding by providing the necessary infrastructure for third parties such as airlines and airport stores to build AR assisted wayfinding tools into their own apps [19]. Such apps also free up service representatives to spend more time on other tasks.

Landmark overlays and positioning

In increasingly urban environments wayfinding for pedestrians has become a major challenge with key landmarks often being occluded by ceilings, obstructions, tunnels and high-rise buildings [20]. To help overcome this obstacle, AR-based applications have been developed that overlay 3D images of prominent landmarks onto a smartphone's live camera feed. This augmentation enables the user to see invisible landmarks, which can help them orientate themselves and find their own way more intuitively [20]. This has potential for use in cities and other developed locations.

Point to point wayfinding

We are all very familiar these days with GPS navigation in our cars and on our smartphones which helps us negotiate our way across cities, countries or even continents. However, this technology is advancing especially in relation to the use of smartphones and wearable AR devices such as smart glasses or motorcycle helmets which can now have heads up displays built into the visor [14]. Such tools already provide users with the best routes based on a range of factors such as traffic conditions, presence of tolls, total distance or time as well as total emissions.



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However, using AR we are now able to design apps specifically for drivers, cyclists, pedestrians and even search and rescue teams that provide real time information overlaid onto what they see to help them find their way. This method can reduce distractions and the need to take their eyes off the road or path in front of them. For example, AR apps designed for cyclists can provide information about the location of bike paths, blind spots, hazards and ambient pollution levels to help decision making and remove the need to stop and reassess their progress [21].

Walking tours and remembering

Walking tours, be they with a personal guide or audio guide, have always been a great way to get to know the history and culture of new places. With AR we are now able to take this to a new level. We are able to explore places at our own pace using location-based triggers and 3D animations and overlays to better understand and visualise how things were. AR can also provide additional audio-visual materials to create an interactive and engaging tour experience that people can enjoy using their smartphone. Many community, arts and civic groups are using digital and mobile media to share local history and heritage, making it more accessible to local people in both rural and urban settings [22].

“[people] have forgotten how buildings and places contribute to the history and character of our neighborhoods, towns, states, and nations”

Urban planner Kyle Ezell [16]

Visualisation and reimagining (community engagement)



Through its ability to reimagine how spaces look and can be used, AR can be used to facilitate community feedback and engagement by combining digital and physical media [13]. This form of digital placemaking provides opportunities to facilitate interactive discussion within a localised context [13]. This has a range of potential ranging from redevelopment projects, public works and new housing constructions etc.

Art Installations

AR can expand the functionality of art installations. Simply download the relevant app for your smartphone and then engage with art interactively. For example, the popular app Snapchat has gone from just augmenting the photos taken by users to creating what they call ‘world lenses’ which augment what users of the app see as they look through their cameras [23]. Using geo-locking information to position users, the app places artist Jeff Koons’ iconic giant balloon animal installations in popular locations worldwide that can only be seen by those using the app [24].

Future of Augmented Reality in Wayfinding and Placemaking

Despite growing interest in the affordances of AR in wayfinding and placemaking, it is still yet to be fully exploited. As the technology and hardware develop further, especially regarding wearables such as smart glasses, their use will become more common and the scope for AR in regard to such applications will increase dramatically. Such AR tools have relevance across different fields including community engagement, retail, history and education, search and rescue and public transport to name a

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few. As people becoming more and more reliant on technology for their navigation and search needs, the importance of wayfinding will only expand. Placemaking on the other hand enables us to better utilise, understand and reimagine the spaces and places we come into contact with, a tool that has significant appeal in an increasingly urban environment.

How ARE Can Work with You

The use of AR in wayfinding and placemaking in Australia is an exciting and developing opportunity for all types of organisations to capitalise on as they mix the boundaries between mobile, online and the real world. At ARE we are a team of specialised individuals that combine skills across business, architecture and engineering, software development, animation and 3D rendering to create innovative applications that integrate AR. We are passionate about AR and work closely with our clients to find new and creative ways to leverage the affordances of AR to meet their objectives. We are based in Melbourne with representation in Sydney and Adelaide and look forward to realising your AR ideas with you.

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AR App Design Considerations

Project Title:

Key Objectives

- Improve public consultation & engagement
- Improve efficiency of in-store navigation
- Improve efficiency of point-to-point navigation across diverse locations
- Collect data about public & consumer movements
- Improve consumer awareness of store locations
- Share local histories, culture & stories
- Overlay visualisations of reconstructions & restorations
- Modify spaces through art or advertising installations
- Reimagine the way people engage with your art / installations
- Other (specify)

Relevant AR Affordances and Characteristics

- Provide audio-visual overlays on public spaces
- Provide interactive & informative location-based experiences
- Geotagging, GPS tracking & wayfinding
- Provide 3D virtual visualisations
- Provide interactive checklists
- Provide access to on-demand navigation clues
- Other functions (specify)

Data Collection

Which, if any, key data metrics would you like to capture?

Context of App Use*

Intended location/s of use (campus, in-store, community, plaza, home etc.) and activities being performed (sightseeing, shopping, commuting, learning etc.)

*Note: Context of use will have implications on hardware choices and safety considerations

Safety and Security Considerations

What potential security risks need to be considered?

- Access to personnel/client information
- Access to company data & intellectual property
- Access to location information & layout (e.g. airports)
- Other (specify)

What potential safety risks need to be considered?

- User distraction (traffic, urban furniture)
- Hardware obstruction / interference
- Potential hazards posed by public installations
- Provision of inaccurate information (navigation etc.)
- Other safety & security risks (specify)

Hardware

- | | |
|--------------------------------------|-----------------|
| <input type="checkbox"/> Smartphones | Laptops |
| Tablets | Desktops |
| Smart glasses | Other (specify) |
| HoloLens | |



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Software Considerations

Licensing	Integration with existing platforms
Updatability & modifiability	Intended audience (public, internal)
Ability to work offline	Individual or group use
Data exporting formats	Intended duration of availability

Which platforms do you want it supported on?

- Android
- iOS
- Other (Specify)

Relevant Policies

Does your organisation, government, council or regulatory body have relevant policies to consider?

Readiness

- Do stakeholders understand how the app is used and its potential influence on user behaviour?
- Are the intended users familiar with AR technologies?
- Is there community approval and acceptance for the project?
- How will this project potentially influence the organisation or community?
- Is there sufficient and appropriate tech support?

Content, Design and Messages

- Design priorities - ease of use, practicality, enjoyment, look, feel
- Key topics, histories, stories and/or processes to be included
- Information layering
- Legibility, flexibility, interactivity
- Visual clues - images, graphics and video
- Key phrases and messages
- Relevant teaching and training approaches and pedagogies
- Examples of themes or storylines from similar applications
- Colour schemes, fonts, branding
- Specific characters, products, animals or objects
- Information delivery (visually, aurally or both)

Notes



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