

Shore

Spreading Awareness using Location
Based AR

Communication Design Project III

By

Vedang Pathre

Under the guidance of

Prof. Jayesh Pillai



IDC School of Design
अभिकल्प विद्यालय

Approval sheet

This project report entitled “Shore : Spreading Awareness using Location Based AR” by Vedang Pathre, 216450004 is approved for partial fulfillment of the requirements for Masters of Design Degree in Communication Design.

Project Guide:

Chair Person:

Internal Examiner:

External Examiner:

Declaration

I declare that this written submission represents my ideas in my own words and where others' opinions or words have been included, I have adequately cited and referenced the sources.

I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated any idea/data/ fact/source in my submission.

I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been appropriately cited or from whom proper permission has not been taken when needed.

Name: Vedang Pathre

Roll No: 216450004

Date: 22/05/2023

Acknowledgment

I want to express my heartfelt gratitude and appreciation to everyone who has helped me along the way to finishing this Project.

First and foremost, I want to extend my heartfelt gratitude to my guide, Prof. Jayesh Pillai, for their tremendous advice, knowledge, and constant support. Their informed feedback and constructive criticism helped to shape the direction and quality of this project I am eternally grateful for their guidance and constant support.

I'd also like to thank my friends and family for their unwavering faith in me and for being a constant source of motivation. Throughout this entire endeavor their encouragement, understanding, and patience have been vital in keeping me focused and encouraged.

I would like to recognize the different organizations scholars, and authors whose work and insights have expanded my understanding of the subject. Their research papers, books, and reports served as the basis for this project and a guiding light in my exploration of the subject.

Last but not least, I want to thank everyone who helped, advised, or supported me in any way during the course of this endeavor. Their contributions, large or small, have made a significant difference. I am really grateful to everyone who contributed to the completion of this project. Your encouragement, support, and advice have been helpful.

Thank you.

Abstract

Amidst the vast expanse of our Oceans, where mysterious depths await exploration, there exists a realm of wonder hidden within our reach—the enigmatic shores. These coastal realms, brimming with life, offer a gateway to the extraordinary. Yet, in the urban tapestry of Mumbai, we often overlook their allure, blind to the treasures they hold.

Such is the grandeur of our coastal ecosystems that goes unrecognized, and this effort seeks to put light on this exquisite domain. Shore is a location-based AR app that aims to increase awareness of coastal biodiversity while also luring individuals to see these lifeforms for themselves. The app presents users with a thrilling journey of exploration, with narratives and assistance, by fusing the digital and physical worlds. This initiative not only showcases AR's potential as a digital activism tool, but it also emphasizes the need for increased awareness and action to conserve our fragile marine ecosystems.

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Introduction

Marine biodiversity remains largely unexplored by the general public due to the difficulties of interacting with this underwater world. A majority of our experiences with marine life are limited to consuming seafood or visiting pet stores. Although informative content, such as documentaries and programs hosted on popular nature channels like discovery, Nat Geo, Animal Planet etc. They showcase the beauty of this world in all its glory, with the creatures surviving in pristine blue waters, away from any form of civilization.

If you were to visit any shore of Mumbai, you would see a vast expanse of murky brown water from the garbage-strewn beach, you would have walked to see the gentle nodding of the waves. As a child, I have frolicked on these beaches, going around trying to collect empty shells amongst the garbage washed ashore. Any thought of the beautiful delicate creatures surviving here would be a distant thought for anyone.

The recent controversy surrounding the construction of the Coastal Road and its impact on the Koli community has unmasked the existence of these creatures and their ecosystems on our shores. The importance of preserving the natural ecosystem of the Mumbai coastline has never been discussed by the media until now. The relocation of corals from the Haji



Ali shore due to the construction work shed light on the existence of corals in Mumbai's waters. Corals are not only integral to the ecosystem but also serve as breeding grounds for a number of species, including many of the fish commonly caught by local fishermen.

How does such an impressive ecosystem go largely unnoticed by the masses?

There are more than 500 species observed in and around the Mumbai coastline!



Intertidal zones

Intertidal zones are areas that are exposed to the air at low tides and submerged underwater during high tides. It is the transitional zone between land and sea; the constant fluctuations make them an ever-changing environment. Despite the harsh conditions in these zones, many animals and plant species have adapted to survive here, like, marine algae, crabs, molluscs, sea stars, etc. These areas are important for both ecological and economic reasons, as they support local fisheries, tourism and other recreational activities.

In urban areas like Mumbai, the intertidal zones tend to be under greater threat from human activity. Rampant pollution and dumping are easily noticed.

Corals in Mumbai

Corals are an essential part of marine ecosystems; they are home to a variety of species and a nursery to many more. Deep sea fish often come to the coast to lay eggs, and the young ones play out the early stages of their lives in these areas, far away from predators.

despite their significance, the coral population has been highly overlooked and, in turn constantly declining. Pollution, coastal development, and overfishing have caused massive degradation of these habitats.

The resilience of the creature is quite admirable. Some corals that you can only imagine thrive in pristine waters have been sighted along our coast, like the gorgonian sea fan coral.



Coastal Road Project

The Coastal Road Project is an 8-lane, 29.2 Km long road being built across the western coast of Mumbai. It connects the marine drive and kandivali, and aims to reduce traffic congestion and improve connectivity between south and North Mumbai. Although it seems like a huge leap in development, the project has had some severe negative impacts on the city's marine biodiversity, coastal ecosystems and livelihoods of the Koli fishing community. For these, it has faced opposition from environmentalists, activists and local communities, along with other legal challenges, and for these, the construction has been halted multiple times. Despite these protests and impacts the project is given the green signal by the government, and the construction work remains ongoing.

The blatant destruction of these ecosystems by this road construction seems to be the perfect event for us to start (even though a little late) to realize the treasures hidden under Water.



Augmented Reality

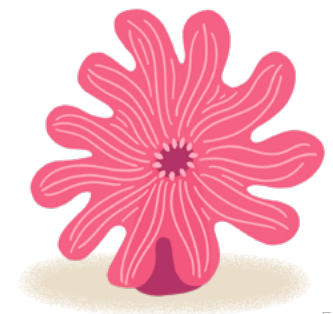
As a tool for creating immersive experiences, augmented reality (AR) has gained significant popularity in recent times. By overlaying digital content onto the real world, AR provides users with an interactive and dynamic experience.

In 2016, an AR experience called Pokémon Go caused a sensation worldwide. It lets users capture virtual creatures in actual places by using smartphones. The IKEA Place app enables shoppers to see how furniture would look in their homes virtually before buying it. Meanwhile, Snapchat filters, with their fun masks and effects, remain a hit among users.

Recent studies have shown that AR technology can have a significant impact on user engagement, knowledge retention, and emotional response. An AR-enhanced/activated museum exhibit was found to evoke a greater emotional response than a traditional exhibit, leading to a more memorable experience.

AR as a Tool for Storytelling

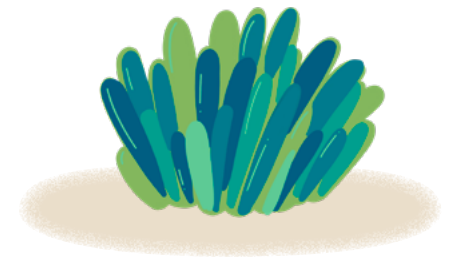
AR's ability to blend digital content with our reality provides us with a massive opportunity to create unique dynamic, and interactive narratives. A unique perspective and insights can be given to the audience when leveraged correctly.



Objectives

Given the significance of this ecosystem and the lack of awareness amongst the general public, there is a need to create initiatives that promote engagement and awareness. The project hopes to create and increase awareness about corals and the ecosystems around them. It also aims to aid people in experiencing various animals in person.

It is also an experiment to use a location to add to the narrative experience. and explore the impact it would generate versus reading a blog about it sitting at home.



The Idea

One potential solution is the use of augmented reality (AR) technology to create immersive experiences that bring marine life and its importance to the forefront of public consciousness. The design and development of a location-based AR app focused on coral conservation in Mumbai is one such initiative.

By leveraging AR technology, the app can provide an interactive experience to users, highlighting the importance of coral conservation and its impact on the local ecosystem and community.

Location based AR

One potential solution is the use of augmented reality (AR) technology to create immersive experiences that bring marine life and its importance to the forefront of public consciousness. The design and development of a location-based AR app focused on coral conservation in Mumbai is one such initiative.

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Communication Design Project III

Shorewalk Guide

The remaining ecosystems and organisms can be seen in tide pools that are formed during low tides. The problem being that these creatures tend to be quite small often no larger than 5cms and have a great sense of hiding for their survival, a shore-walk is the best way to see these, where you wander into this intertidal zone, during low tides. You can see various creatures living out their lives. Guided shore walks are a great way to experience these places, they ensure your safety as well as the safety of the animals which is of utmost importance, also the experience of these guides helps you increase the chances of viewing these beautiful creatures. But where do I find a guide? in Mumbai, an organization called Marine Life of Mumbai hosts these guided walks regularly.

i understand that only so many can afford a guided tour or match times and get a slot in them. So a digital shore walk guide to be able to self initiate a exploratory endeavor at your own convenience to lower the gap and increase interaction and awareness. The digital guide might not assure sighting but it, helps you walk through the basic rules necessary for your safety as well as the creatures, and a few do and donts. The guide helps you identify the creatures that you have spotted along your exploration and if not, it gives you the option to view them in AR true to size as well as a zoomed in view to admire their details.

Secondary Research

The research for this Project included a thorough examination of relevant publications, organizations and existing AR applications. They provide vital information and have impacted the decisions being taken during the development process.

Organizations

Coastal Conservation Foundation (CCF)

The Coastal Conservation Foundation (CCF) is a non-profit organization committed to conserving and protecting the coastal and marine environments. Their goal is to increase awareness and understanding the importance of these ecosystems and, the diverse range of species that inhabit them. They use a multi-faceted approach that includes research, outreach, education and citizen science.

their initiatives include, Coastwise- a festival that aims at shedding light on these lesser known ecosystems., MLOM- their flagship program that is dedicated to raising awareness

Marine life of Mumbai

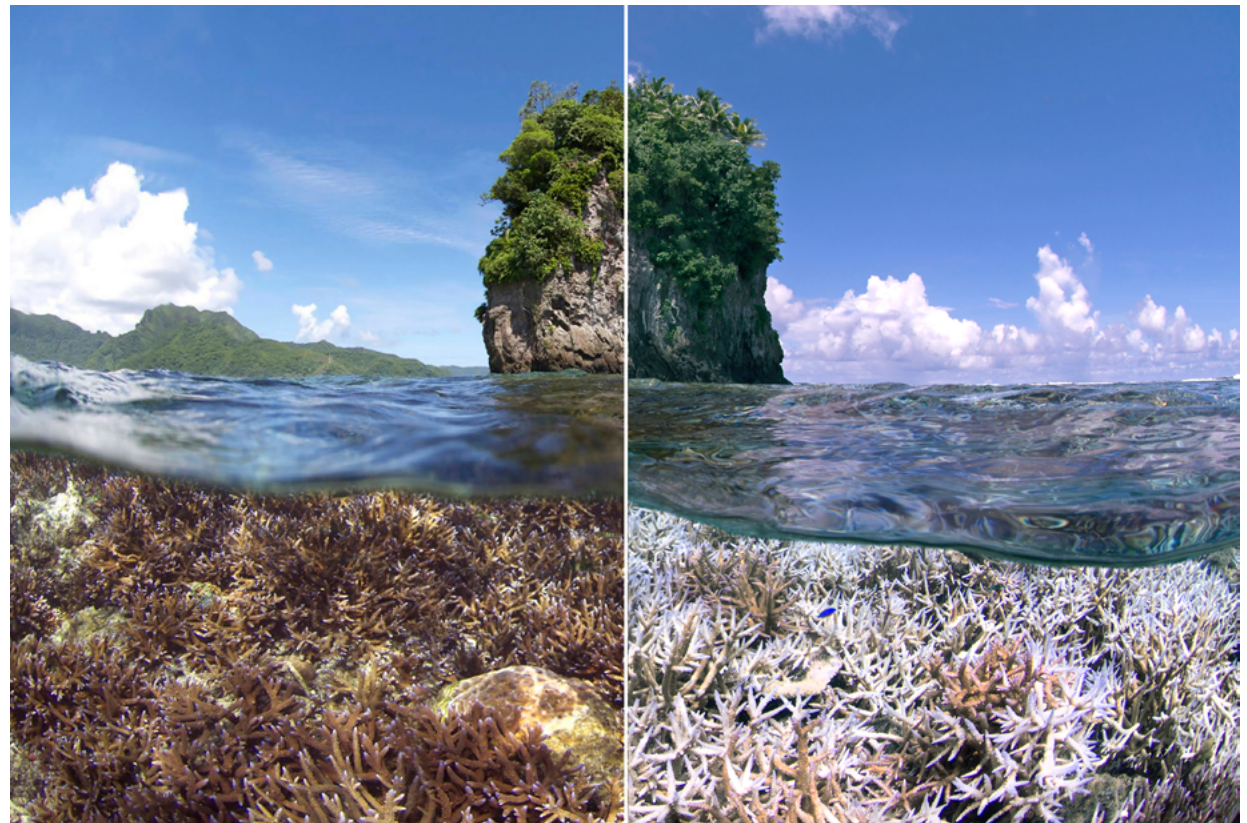
Marine Life of Mumbai (MLOM) is the flagship program of the Coastal Conservation Foundation (CCF), a marine research and conservation organization. MLOM is dedicated to raise awareness about the fascinating array of marine life that can be found along the coast of Mumbai and to encourage the public to rediscover these natural treasures hidden in plain sight. The program along with outreach activities also embraces citizen science, actively involving individuals in collecting and analyzing data to contribute to conservation efforts. By highlighting the significance of Mumbai's marine biodiversity, MLOM strives to inspire public engagement and foster conservation in these invaluable environments.



The Ocean Agency

The ocean Agency is unique non profit that creates demand and support for ocean science and conservation, by identifying major issues and then developing creative ideas,communications and collaborations needed to help solve them.

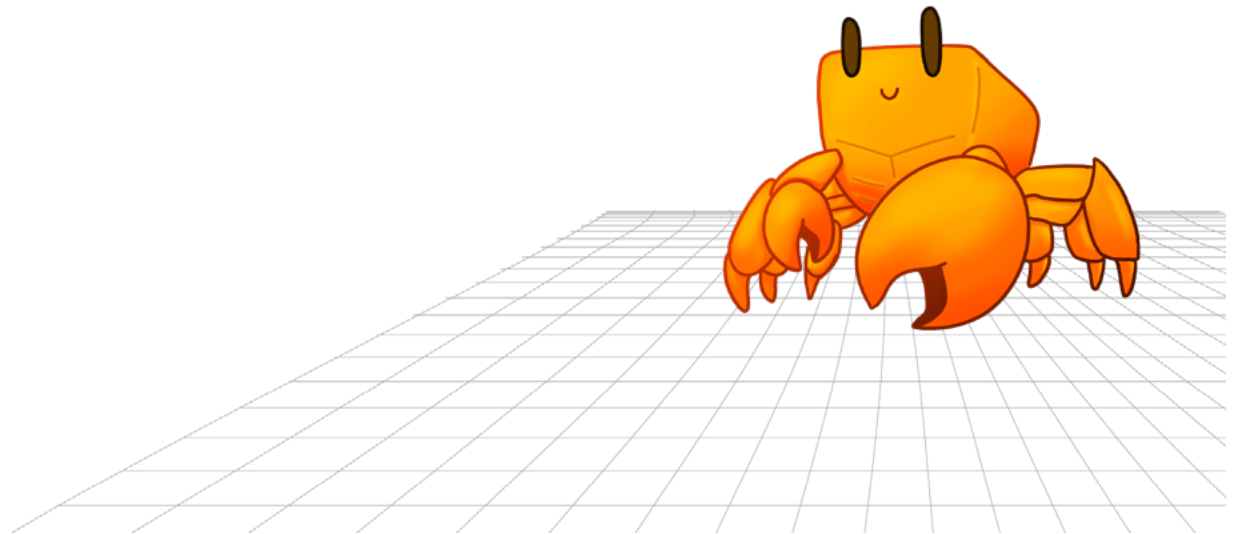
They have harnessed the power of street view and google earth tho develop several virtual museums and exhibitions.



Existing AR Experiences

AR experiences are of many different kinds the Pokemon go and face filters like those on Instagram and snapchat have been quite popular and widely used.

AR experiences in a similar space which use use location based AR is used to engage audience in a specific place or to use it in a shared AR world. AR also gained popularity as a means for activist to democratize their voices, as these solutions provide a low cost yet high impact way to achieve their activist goals. AR ability to tell stories in a more immersive way helps people to empathize more with the subject matter



AR Occupy wall street

was a movement created after protesters were not allowed to protest around the New York stock exchange, they took the protest digital and augmented the entire financial district. People were rallied to send their photos and videos while protesting which were then added to the augmented reality protest

the experience contained multiple AR pieces created by various artists which could be either found Online or by scanning codes printed on bags adorned by other protesters.



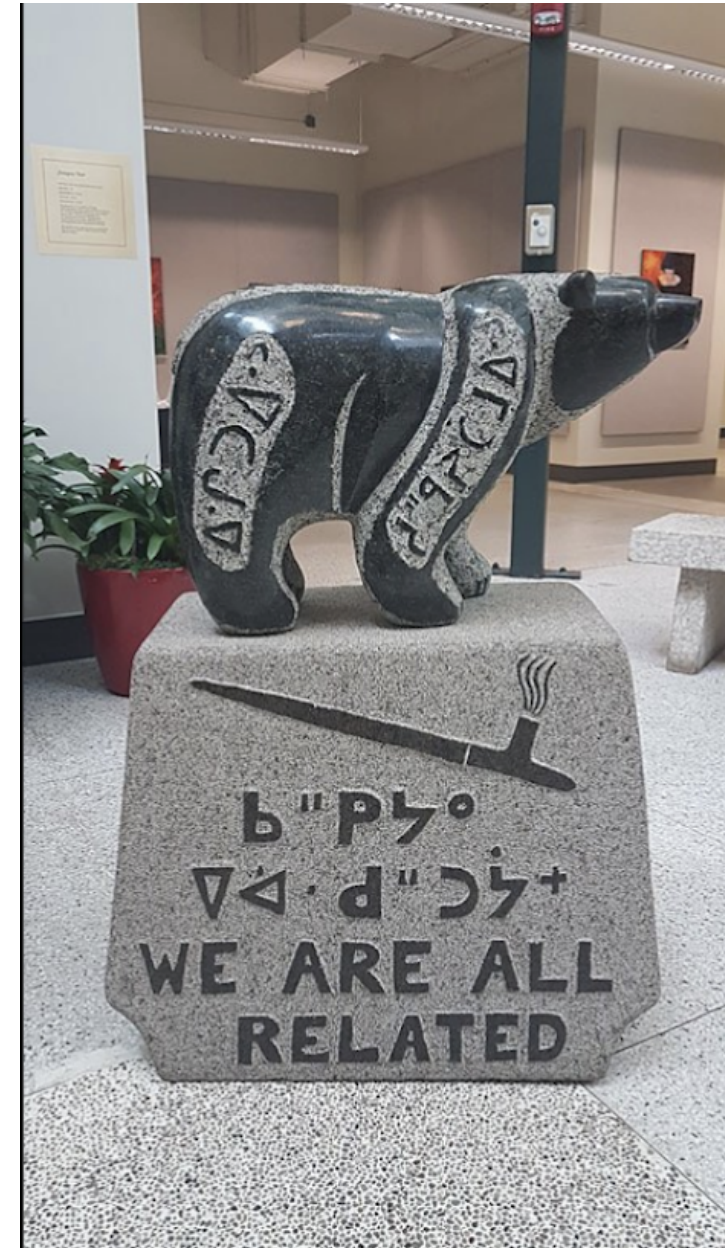
a few of them were location based, specific to a certain building/monument. while others would use marker detection to overlay information.

- Location used to add value, and deliver specific information
- Locations used in an impactful way to show narratives

Sweetgrass AR

Is an AR experience that aims to share stories of the indigenous people versus the narrative the colonist rendered. these stories are accessible across 4 'Treaty-6' marker sculptures placed in and around the University of Alberta Campus, each location once scanned overlays 4 stories, 2 being common across all the sites and 2 unique stories for each site.

- Marker based (more than location based)(markers placed at specific locations)
- Narratives not specific to location, yet important to the culture



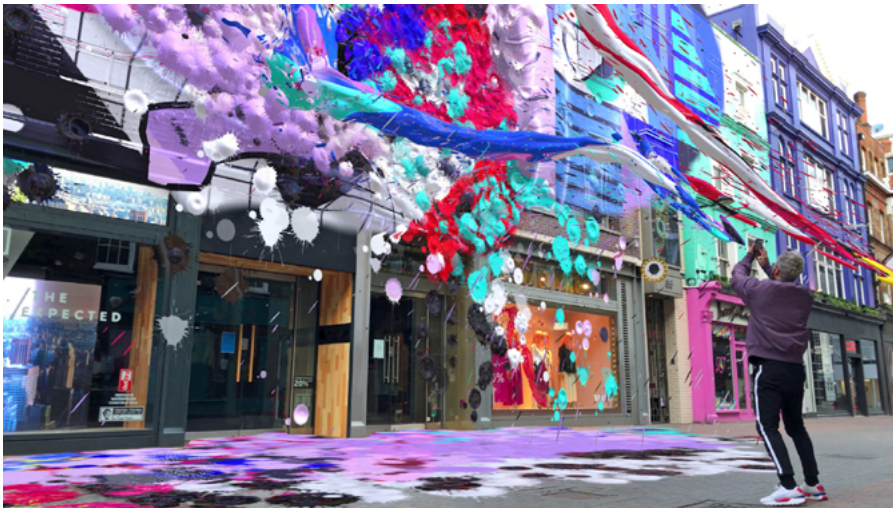


Pokemon Go

it is a app that combines gaming with the real world, the game uses location tracking and world mapping to create a augmented reality where play-er can catch and train pokemon in real locations,

The game also lets the user switch off AR, but the location based aspect cannot be ignored, one has to roam in the real world to play the game, the AR aspect add a layer to the experience, blurring the lines between fiction and reality.

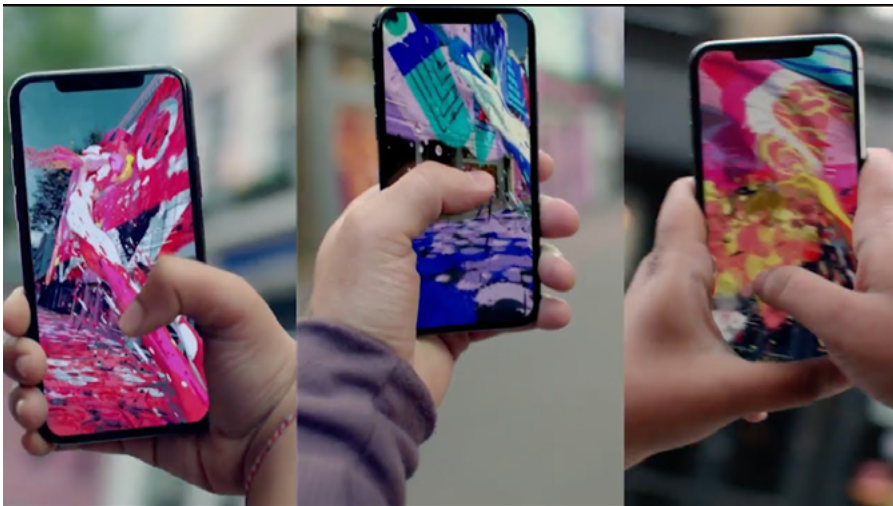
- Location aspect is necessary for movement but does not necessarily add to the experience of it.
- AR used to view pokemon if they existed in that environment.
- Environment not monitored



Snap: City painter

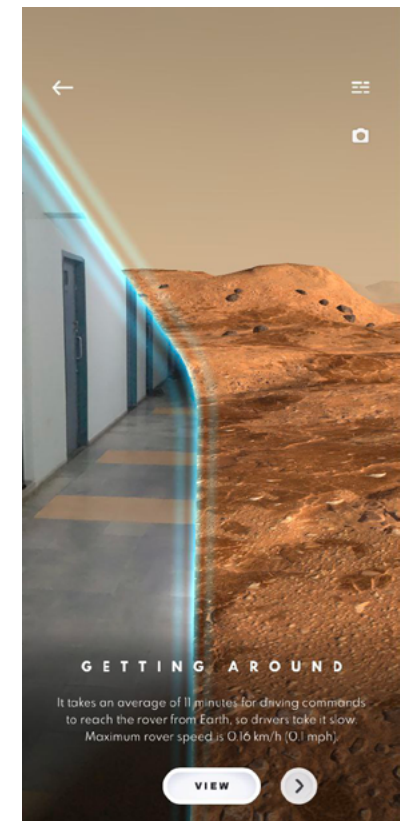
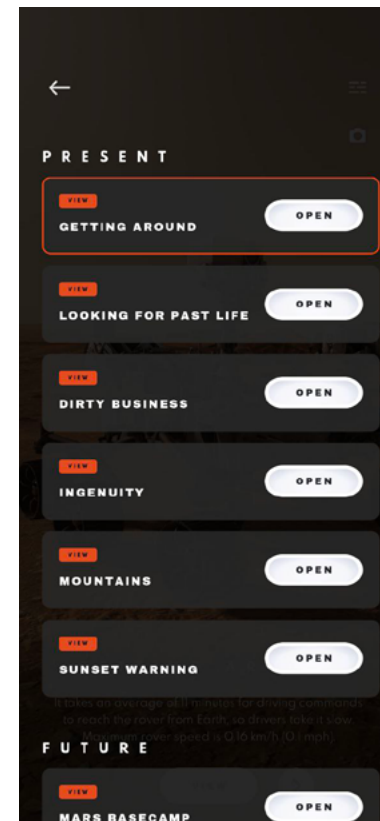
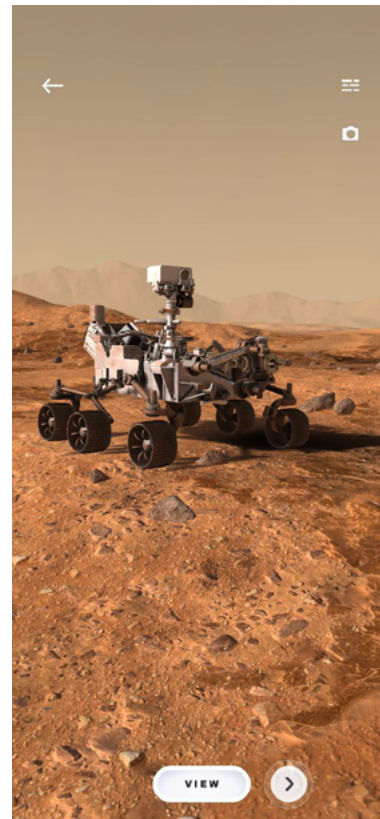
It was the first major example of local lenses, snaps ambition to create a share virtual world mapping across major landmarks. by using various sources of data, 360 degree images and community snaps, it is able to build a representation of the physical world

People are then able to add their own content across this virtual world which is updated in real time, and can be viewed by others instantly



- Location used to identify environment, and make a collaborative space.

Mission to Mars



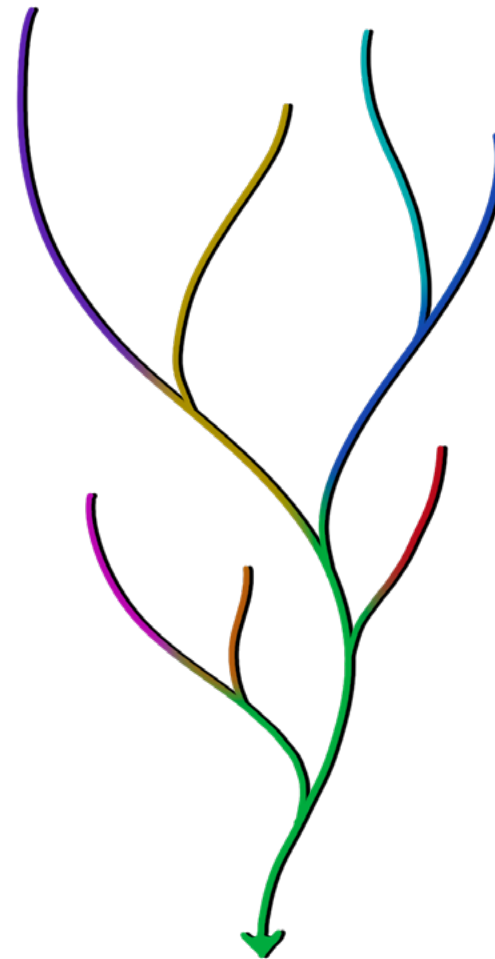
This experience revolves around the various space missions to Mars, and has various educational features, along with highly interactive AR experiences where one can control a Mars rover, view its landing, move around and see the rover in 1:1 scale and then increase or decrease the size according to its preference.

Inferences

The Publications and organizations shed light on the fragile habitat of corals and the significant effect they have on marine life. The works emphasized the importance of raising awareness and conserving these natural resources. The findings of these examinations provide the groundwork for understanding the importance of highlighting marine animals and the delicate balance of ecosystems in the Mumbai coastal region.

Examining existing AR applications gave useful information about the use of location-based experiences and their value in generating interest. These applications illustrate how augmented reality might immerse its users in their surroundings while offering learning materials at the same time. The successful integration of location-based aspects in these applications served as an example for including similar features in the project.

The primary-findings of the research are twofold: Firstly, there is an urgent need to raise awareness about marine biodiversity in urban environments like Mumbai. Second, Immersive experiences and location based services are capable of successfully conveying messages.



Location

The choice of location for the experience plays a important role in binding everything together and the overall impact of the app. The selected locations serve as a canvas for the experiences to be played out on.

The following points were taken into consideration while scouting locations.

- **Contextual relevance:** location should align with theme purpose and narrative. Direct connection to the Subject matter enhances the authenticity and engagement of the user experience.
- **Physical Features-** There should be ample clear space without hurdles for the user to experience the augmented content, without hurting themselves or others, it should also be a public space with ease of access.
- **User Engagement Potential:** Locations with high foot traffic have the potential to captivate and engage more users, while creating opportunities for social interactions, community engagements and share experiences.





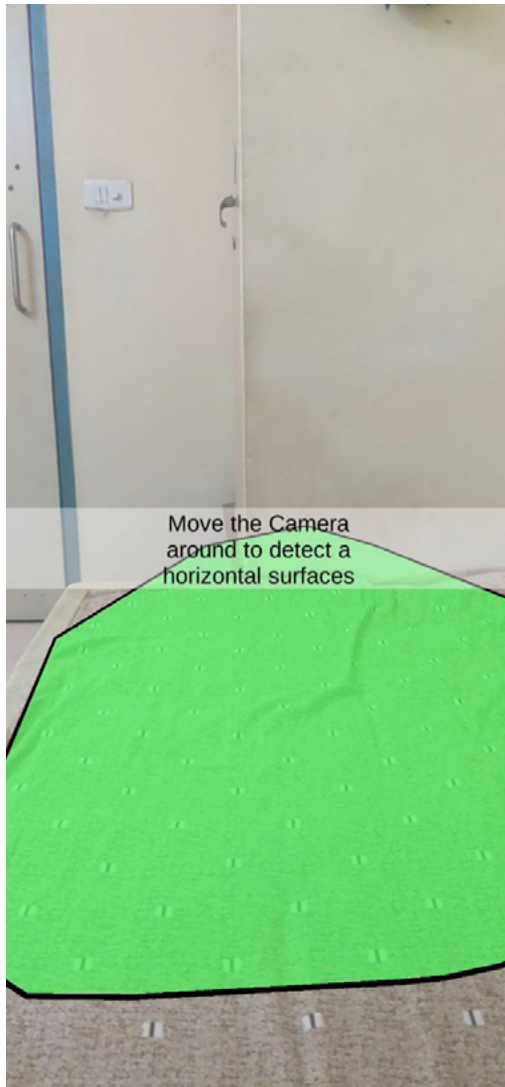
Process

Despite my lack of experience in AR development, developing a location-based AR software for coral conservation in Mumbai was a personal challenge for me. My motivation was to gather knowledge in another sector and to push myself to learn a new talent. However, the development process was not without difficulties. I encountered Multiple challenges throughout the prototyping stage. Despite numerous attempts, I was unable to develop a functional prototype. However, I was able to produce enough to show a proof of concept for my location-based AR approach.

Unity with AR core was my go to platform for development, due to its extensive documentation and the number of resources available for beginner to get a grasp of the various functions. They also have numerous tutorials both official and user created for building various apps and functions.

Other platforms and SDK's were considered but were inaccessible due to lack of documentation for complete beginners, their reliance on expensive services and their technical difficulty.





Development in Unity

Unity with AR core was my go to pipeline for development, due to its extensive documentation and the number of resources available for beginner to get a grasp of the various functions. they also have numerous tutorials both official and user created for building various apps and functions.

AR Core extensions has a dedicated geospatial API for location based AR experience although the resources for it were meant for individuals with higher technical proficiency.

I started with understanding the basics of a marker-less AR experience, going through the stages adding one small function at a time.

setting up a scene > Plane detection > error messages > Placing Object on plane> object instantiating along with modifications.

Up next was integrating the geospatial API , to constraint the ability to spawn an object only in a specific area.

Story

The main objective of the project is to make people aware of the existence of corals and the impact we have on them. the narrative has to raise empathy for the actions and make us rethink the decisions we take by directly showing their consequences.

The 3 ideas for the final experience were shortlisted

A

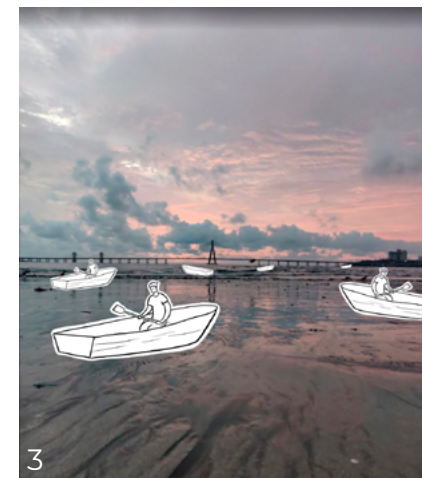
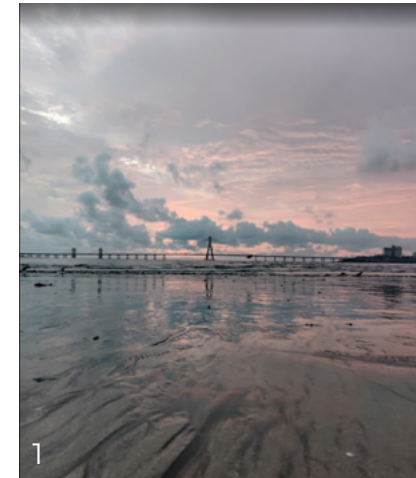
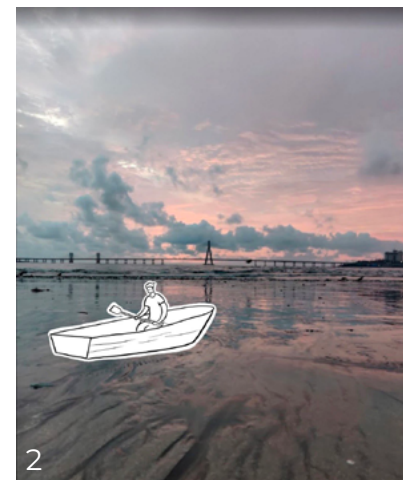
You go to the beach and the app tells you to scan an area on the sand and place the object to start the experience

You place a dilapidated boat, with a sad koli sitting beside it

The koli starts talking

He tells you how a few years back there used to be more fishermen along with him

He tell you to look around to see the boats that used to exist (you turn around and see the boats that used to populate the shore in the past(slides to go to the past



B

Go to location, find a plane , place object

Object is a portal

You enter to go into an underwater realm, it is a lively coral reef

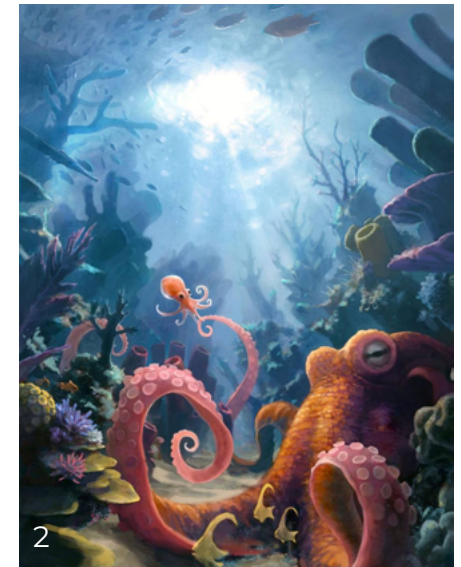
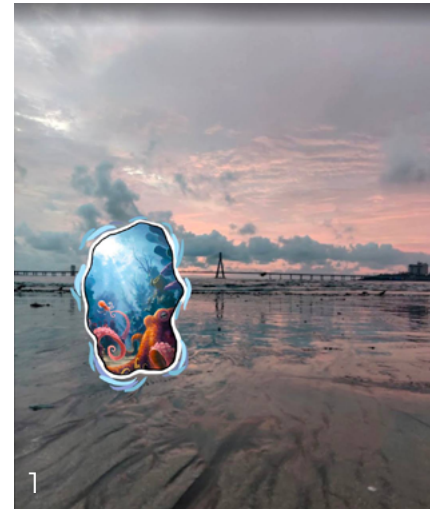
You get a slider, past to present, you are in the past.

As you slide, you see fishermen casting nets above you and fish existing and the reef flourishing

Suddenly the water darkens the fish reduce so do the boats (construction of the sea link)

(As you move towards the end that is the present, you are buried in rocks as the road is being built,

The perspective will be from underwater as you look onto another reef in the distance



C

You go to the location , detect a plain, place object to start story

Splash screen 15 years ago, and a small coral reef system spawns, with fish activity and boats going around

Slider moves forward to come to the present date.

As you move forward, you see the reef reducing, boats dwindling. And then a rocks falling over and the road being constructed over all of that



The final narrative is a mixture of all the narratives, where you see a coral reef popping up in the center, being populated with fish, slowly the fishing boats arrive and as it progresses the world become a little dull and the reef starts to decrease, fish vain. finally it is crushed under rocks as a road starts to build over it.





Secondary Experience

Once the user is done with the story they might want to experience the shore and the wildlife it has to offer, but how do they do that? Without knowing what to look for? The shore-walk guide.

The shore walk guide uses photos taken by fellow enthusiasts on the shores of Mumbai itself, along with more detailed information about the creatures. Another problem with a lot of creatures is that they tend to be tiny, not many larger than 5 cms. The information also contains a size comparison chart so that you get an idea of what to expect. along with 3D models viewable in AR to simulate their presence.

It is a conscious decision to not include UGC in this part. People logging in their sightings can be very useful but the drawback of that can be a few bad actors who would misuse this information.

Screens and Flow

The next job was to bring these individual experiences together to be stitched into an App.

Following are the screens developed for the experience, if you would like to view a prototype instead please scan or click on the QR code given.

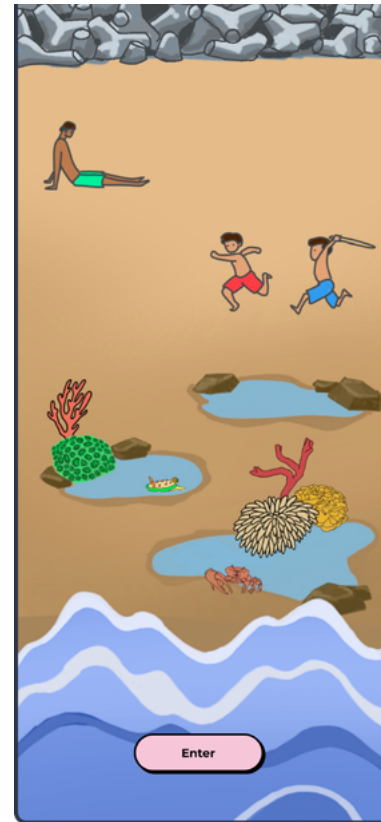


Communication Design Project III



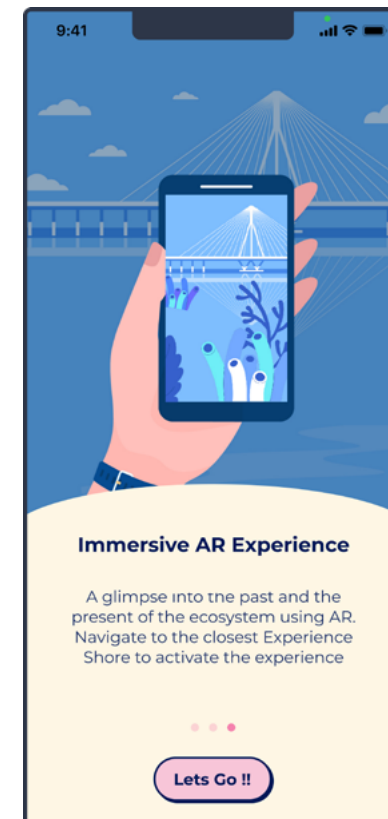
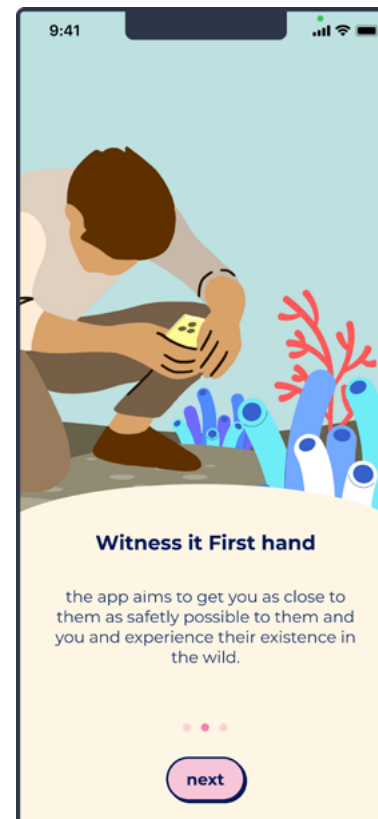
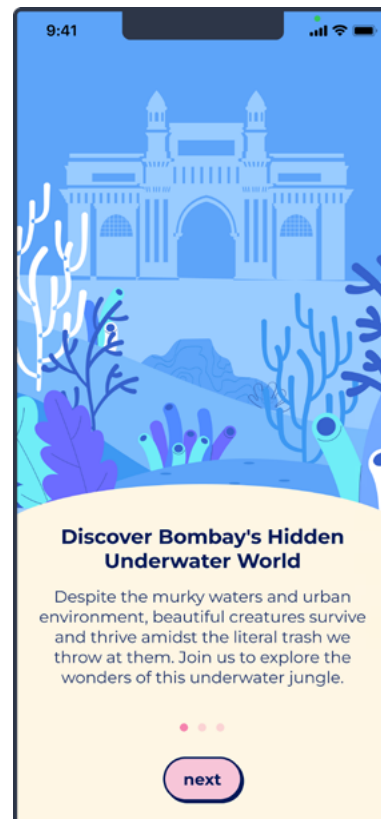
Splash Screens

Upon opening the app you see the title with a city backdrop, a n animation prompts you to scroll down, as you scroll down you see a frolicking beach, as you scroll down further the tides being to recede, revealing the world hiding beneath



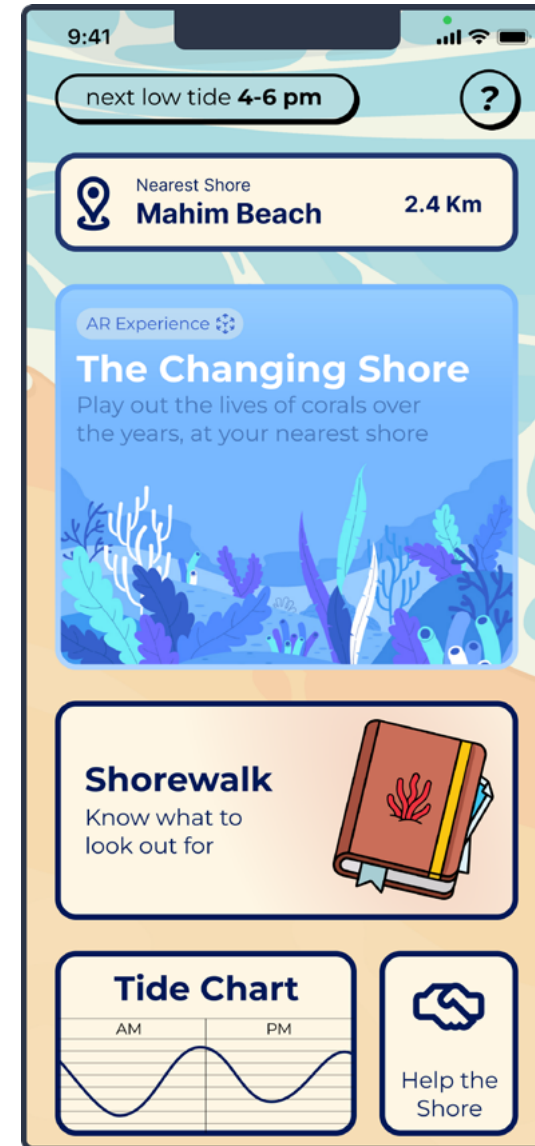
First Time User Experience / On boarding

3 screens summarize what the app has to offer



Home Screen

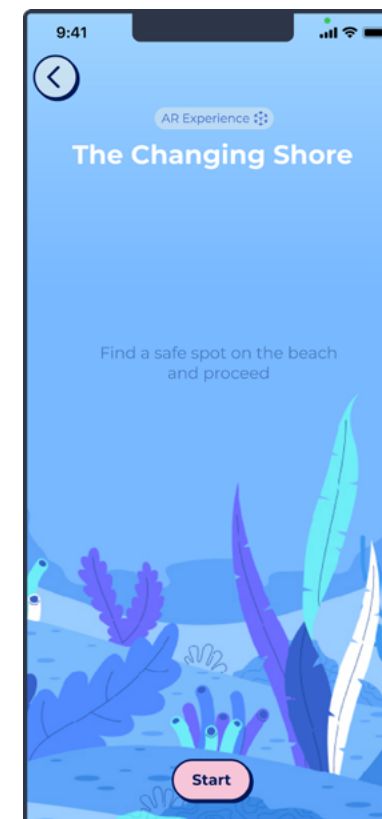
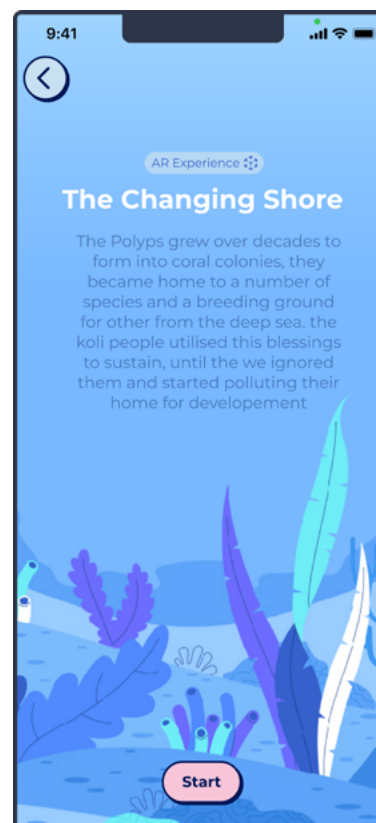
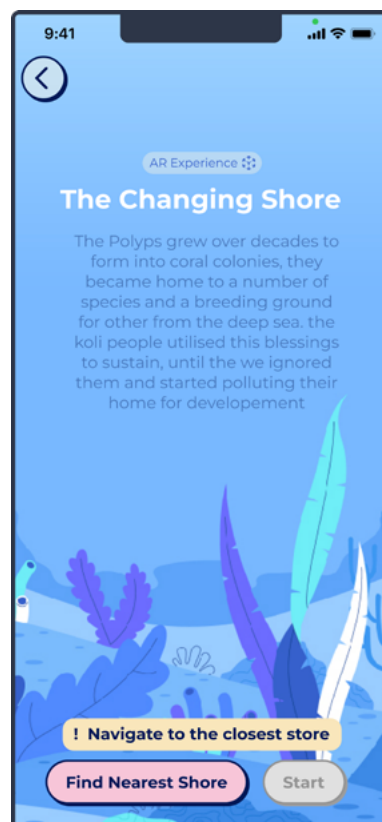
The Home screen Shows all the important information to access and have a smooth experience and access the features of the app.



The Shore Experience

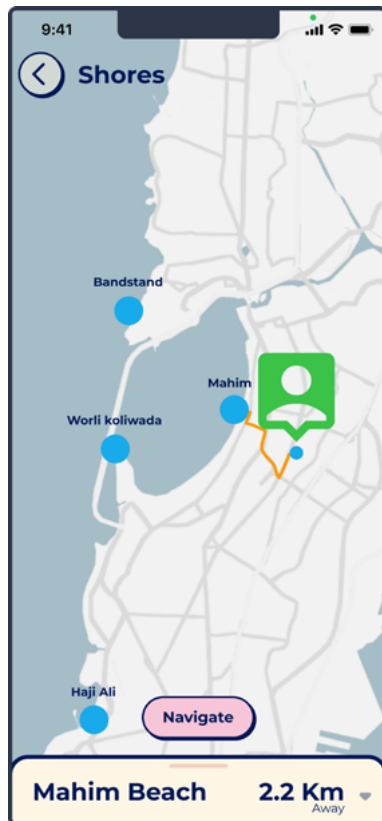
The main highlight of the app, where you get to view the corals, how they started, grew, a ecosystem building around them and then the road collapsing upon it.

The experience can only be started once you are at the location.



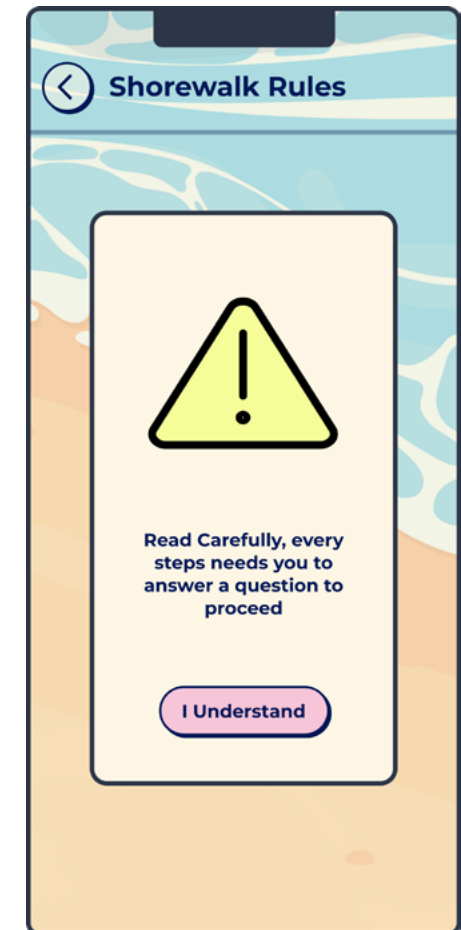
Navigation

This page shows you all the nearest shore experience zones, and lets you quickly navigate to it. You can find more detailed information about these experience zones upon clicking it.



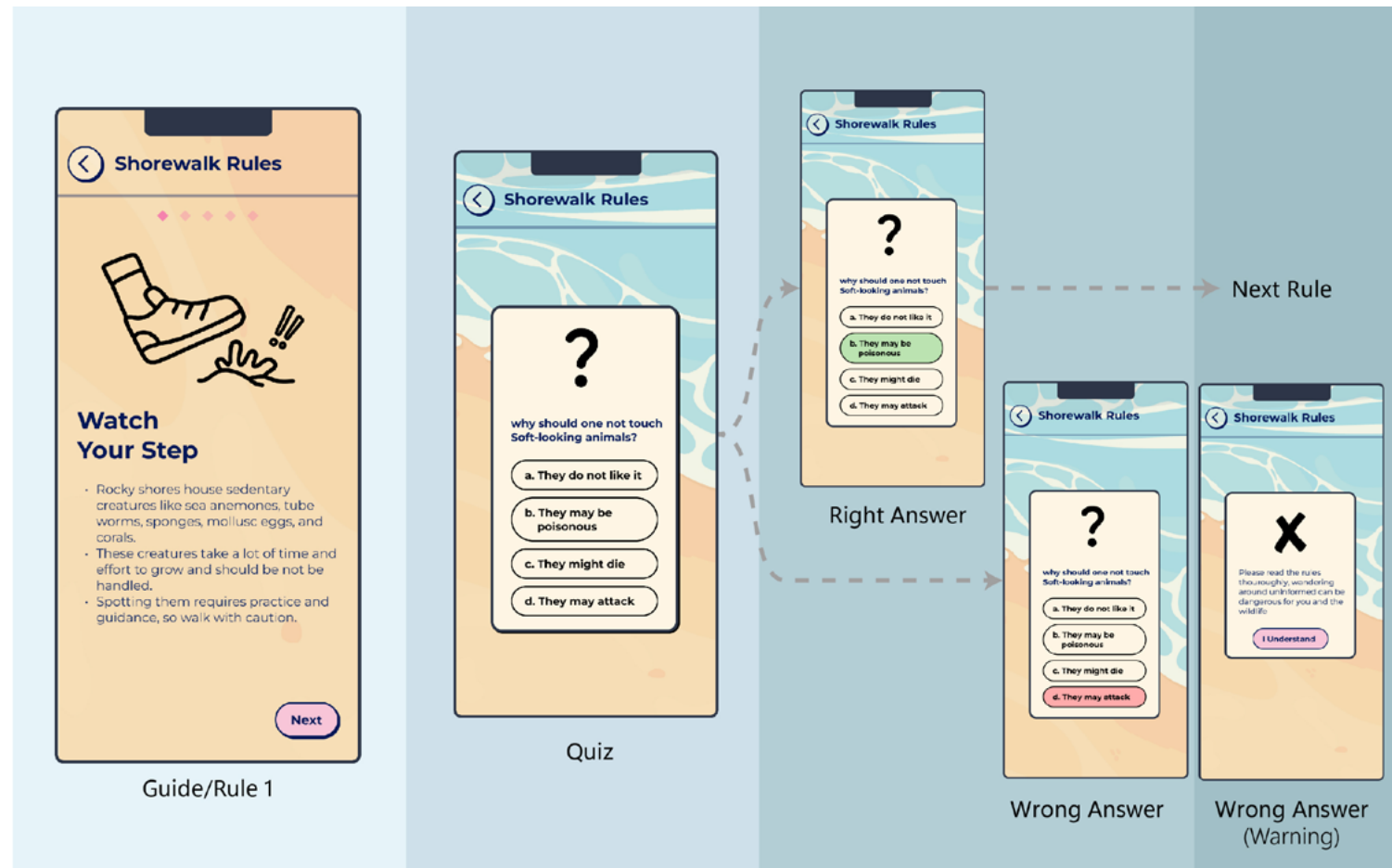
Shorewalk guide / Rules

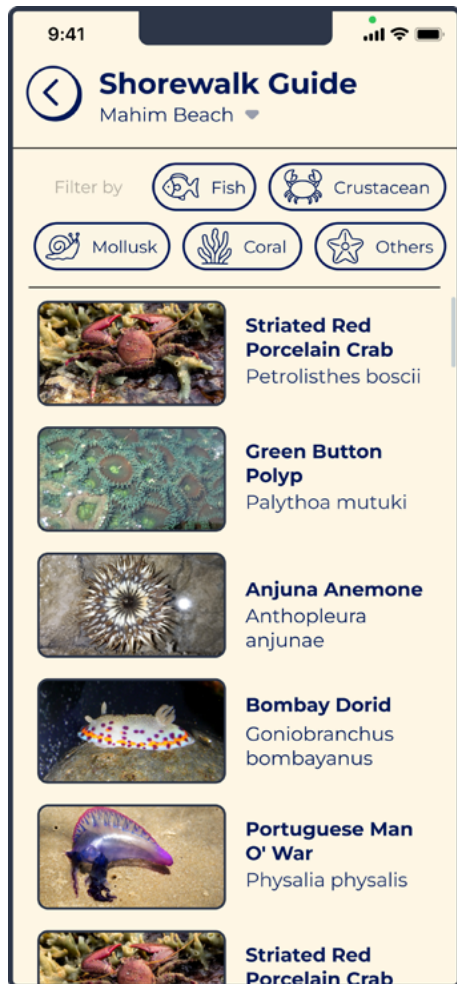
The introductory screens, explain what the guide provides, and a warning to let you know how to go about the rules.



Shorewalk / rules / questions

Every rule has a question which checks if the rules have been read before going on to the next rule, if answered wrong a message as to why the rules are important is shown and you are taken back to the rule to be reread



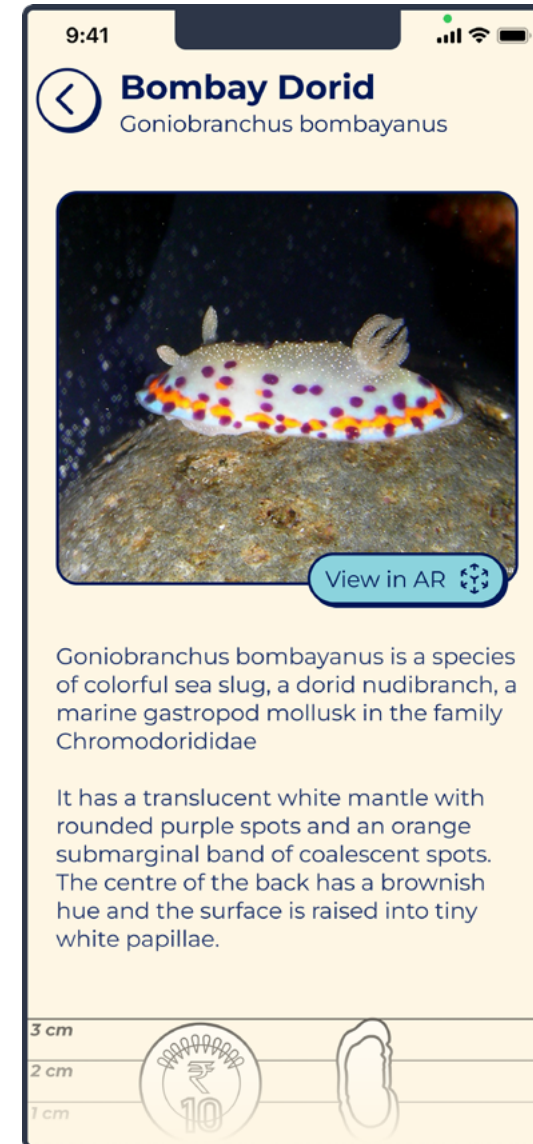


Shorewalk / Species list

The species are sorted by default as to most likely to be sighted in a specific area, you can browse through other areas as well.

Shorewalk / Species list / Detailed

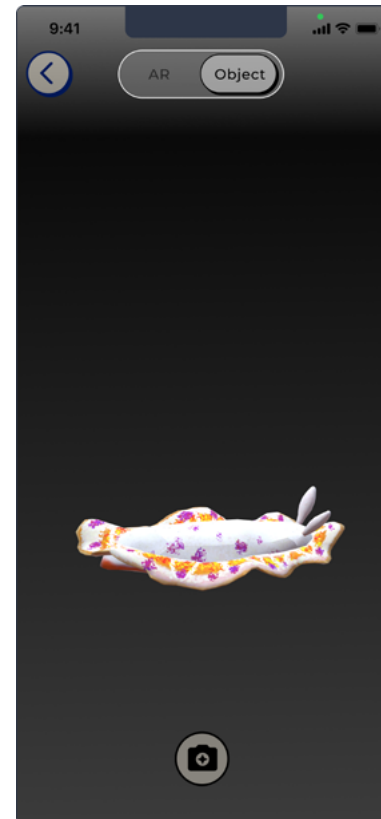
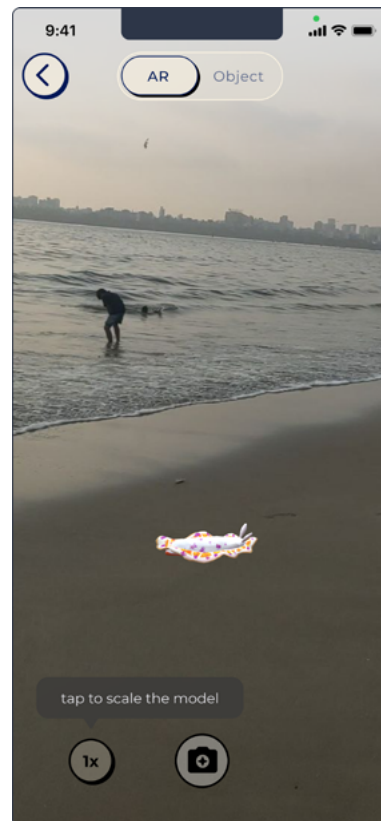
Clicking on any specific species opens the detailed screen where you can know more about that specific species, a size comparison is also given along with in as these species tend to be quite tiny (>5cm) and anyone can be easily misled by the magnified views in the photos.



Shorewalk / Species list / Detailed / AR

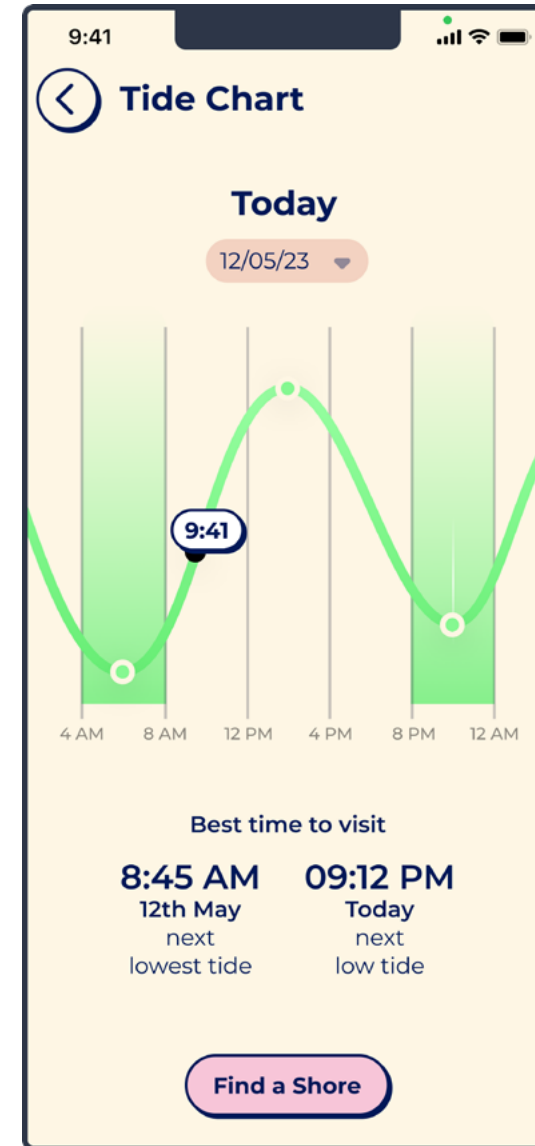
You can view any species model in AR, view them true to size in their environment and/or a magnified view to explore the beautiful details.

Can be viewed in AR or just the Model.



Tide Chart

The tide is the most important aspect of a shore walk, the hidden world is exposed during low tides, which are the best times to go for a shorewalk.



Spreading the word

The Experience may spread awareness about the corals and marine life but how will the people become aware of the App itself?

The Usual Marketing efforts can be effective in reaching a number of people. Social Media Ads, Influencer and Brand Collaborations are highly popular for getting the word out.

But they might not be as effective in compelling the people to visit the shore unless they have any prior interest in it, Unorthodox methods should be used to create intrigue amongst people. Corals painted on walls across the city and most importantly along the shores where they can be experienced along with a link to download the app instantly and use it.



Reflection on overall design process and learnings

Undertaking the project proved to be a valuable learning experience. It allowed me to understand the complexities of developing an AR app and the importance of collaborating with experts in the field. In retrospect, I could have benefited from seeking the guidance of a more experienced AR developer or team. Nonetheless, I was able to make progress and gain insights into the AR development process, which will inform my future projects.

Conclusion

The location Based AR Experience has the ability to increase awareness about corals and the significance of the intertidal ecosystem and then in turn the marine ecosystems and the challenges they face. The app can engage users and help them to recognize the influence of human activities on the ecosystem and promote them to take action to preserve the coast and wildlife through their action and opinions.



Corals in Bombay

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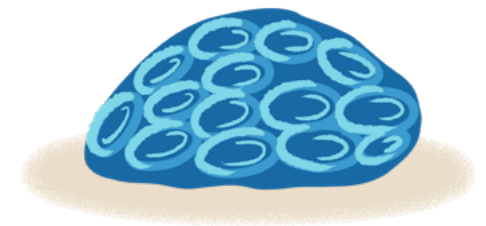
Digital Activism

Awareness is a crucial aspect of activism because it serves to draw attention to issues and build a sense of urgency surrounding them. People are more inclined to take action to remedy a problem if they are aware of it. Because it delivers an immersive experience that attracts people's attention and inspires them to connect with the issue on a deeper level, AR is an effective technique to raise awareness. Activists can use AR to educate and inform people about issues in a way that is both interesting and memorable. People are more likely to support solutions and take action when they are informed about an issue.

Limitations and challenges

One of the main challenges of the app is the accuracy of its data, on the coral population and the biodiversity surrounding it. Not all shore walks can be successful and might lead to discouragement for those on the fence, the challenging nature of the field (dirty water, rough stones, wet sand that tend to sink,Etc) are a common hurdle while going on a walk.

Matching timings to the tide is another hurdle the users might face, as there is only a short window, when the water recedes and one gets to explore the area



tl;dr

This report explores the use of Location Based AR technology for Awareness about coastal ecosystems(corals) in Mumbai. The app aims to raise awareness about coral conservation and its impact on the local ecosystem and community. The report also discusses the potential impact of the app as well as the limitations and challenges of the project.

The main takeaway is that AR is a powerful tool for promoting awareness and activism, and increased awareness can lead to better-informed decisions and policies that prioritize the preservation of delicate ecosystems like coral reefs.

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Approval sheet

This project report entitled "Shore - Spreading Awareness Using Location Based AR" by Vedang Pathre, 216450004 is approved for partial fulfillment of the requirements for Masters of Design Degree in Communication Design.

Project Guide



Chair Person

Internal Examiner: SUDESH BALAN :


30.05.2023

External Examiner: KUMAR AHIR

