Wollaton Park Scavenger Hunt Game: An Augmented Reality Experience

Report for Mixed Reality Coursework 1

Research

After visiting multiple places of interest in Nottingham, Wollaton Park was the place that re-ignited my creativity. Wollaton Park is a magnificent 500-acre public park situated in Nottingham, England. The park is the perfect location for an Augmented Reality photo scavenger hunt game because of its diverse species, beautiful scenery, and interesting history. I'll go through why Wollaton Park was selected for this augmented reality game and how the research done on the park was crucial for the game's design in this report.

1) Researching the Setting:

Online Research

Before visiting Wollaton Park in person, I decided to do an online search to know more about this beautiful park and also other parks in Nottingham before visiting it in person. The analysis of various online resources, such as websites, blogs, social media pages, and online forums, was part of the online research component. These resources provided a wealth of information about Wollaton Park, such as its history, features, and visitor reviews. Additionally, these resources helped identify popular tourist attractions within the park and the best times to visit.

To choose the perfect location for the Photo Scavenger Hunt Game, extensive research was conducted on various public parks in the Nottingham area. This research included visiting different parks in person and assessing them based on their accessibility, diversity of landscapes, and historical significance. Wollaton Park stood out among other parks in the area due to its unique features, including:

Diverse Wildlife: Wollaton Park is home to various animals, including red and fallow deer, which can be easily spotted by visitors.

Visitor Movements: Observing how people moved about the park gave me important information about which parts of it were the most well-liked and often visited. The Formal Gardens, Deer Park, and Boating Lake were found to be the most frequented parts of the park, according to the observation. Also, visitors spent the most time in these locations, partaking in pursuits like boating, picnics, and wildlife observation. Cyclists and long-distance runners were also observed as this park is well known for its peace and tranquility which allows fitness enthusiasts to have a great time without worrying about urban issues such as motor accidents.

Visitor Demographics: Wollaton Park is the perfect setting for an augmented reality game because it attracts a variety of visitors, including families, tourists, and nature lovers. The game's tasks and quests can be tailored to the various visitor demographics, ensuring that they are interesting and pertinent to their interests.

Sharing on social media: Owing to the park's popularity on Facebook and Instagram, there is a high possibility that visiors might share the game's goals and difficulties. Social media sharing by visitors will certainly spread the word about the park and draw additional people there while helping the park not only profit but also gain new visitors in the long run .

Accessible Location: Wollaton Park is an excellent choice for visitors of all ages because it is conveniently accessible via public transport like the tram, buses and taxis plus this park has plenty of parking spaces for cars.

To have firsthand insight into the park's characteristics and visitor behaviors, observations of the park were made in person. The observation focused on the park's landmarks, natural elements, and visitor movements. Additionally, I played Pokemon GO , which is a popular AR-based game that focuses on exploring the outside world beyond four walls and capturing pokemon in the wild to get inspiration for this AR game even though both games have completely different themes. Understanding other games within a particular niche/genre can aid designers to come up with ideas for new games.

2) Importance to Design:

The research conducted on Wollaton Park was crucial to the game's design. The goal of the photo scavenger hunt game is to entice visitors to explore the park and to also gain opportunities to interact with fellow AR gamers in the vicinity, thus facilitating social interactions between visitors with similar interests and likes. The game is designed to include landmarks and features that are historically significant, including Wollaton Hall, which served as a prototype for Batman's Wayne Manor in the Batman movie series. Other significant landmarks included the

lake and the deer park, which provided ample opportunities for visitors to capture photos with the game's augmented reality features. Visitors playing this AR game shall have to hunt for “treasures” that shall be randomly dropped in various places located inside the park and these items shall only be visible inside the mobile Apps AR interface. Hints shall be provided inside the app to ensure that participants do not lose hope cause at the end of the day this is a unique AR game that shall aid visitors not only explore the park but also meet new people thus creating an amazing social atmosphere. To click images and video footage of the park, a 2022 Google Pixel 7 smartphone was used

3) Challenges Faced While Researching Wollaton Park

While researching Wollaton Park several challenges were encountered, which impacted the quality and scope of the research. These challenges include:

Weather: Like with any outside research activity, the quality and safety of the study can be greatly impacted by the weather. Inclement weather was experienced during the observation component, which reduced the extent of observations.

Time Restrictions: Because of the project's limited time, it was difficult to analyze the park thoroughly. Ideally, it takes several months of research to come up with a rough design for a game, especially a Mixed Reality game that involves real surroundings.

Entrance restrictions limited the opportunity for observation and photography in some park sections. Access to some of the park's well-known tourist attractions was prohibited because repair and maintenance work was going on.

Wollaton Park's unique features, visitor demographics, familiarity with smartphone technology, and potential for social sharing make it an ideal location for an AR game. The in-person observation gave insightful information about the parts of the park that were the busiest and most often used. By incorporating these insights into the game's design, the Scavenger Treasure Hunt AR game can enhance the visitor's overall experience, making it a must-try activity when visiting Wollaton Park.




These images were clicked by me and it shows the true potential of Wollaton park as an exciting location for an AR Scavenger Treasure hunting game. Victorian Era Architecture along with vast open lands and a deer park are the unique selling points for Wollaton Park, not to forget the Wayne Manor from Christoper Nolan's batman trilogy so designing an AR Game for this magnificent park shall not only set it apart from its competitors but also boost local tourism as more locals shall come to play this game and potentially "reap" it's rewarding. At the end of the day, gamification should be rewarding and this game is no different so this shall be explained in the ideation part.

Ideation

Introduction:

Any successful augmented reality (AR) game is developed through a process called ideation.t entails coming up with an original and cutting-edge concept that is in line with the preferences of the intended audience while also considering the viability and usefulness of the game. This report explains the ideation process behind the development of an AR Scavenger Treasure Hunt game for Wollaton Park. The report also presents a formal description of the game.

Ideation Process: To ideate the AR game concept, I used mixed reality game ideation cards that facilitated the generation of creative and novel ideas for the game. The ideation cards included prompts that allowed me to brainstorm around key aspects of the game, such as gameplay, rewards, and the overall user experience. During the ideation process, I focused on creating a game that aligned with the interests of visitors to Wollaton Park. I thought about many gaming mechanisms that would provide consumers a distinctive and interesting experience, like treasure seeking, exploration, and social engagement. Incentives for players to participate in the game and complete it in the specified time were another thing I thought about.

Wollaton Treasure Raiders: An AR Experience

Wollaton Treasure Raiders: An AR Experience is an immersive and interactive game that combines exploration, social interaction, and reward-based gameplay. The game must be downloaded from the app store, and users must log in with their social Identities (Google Account, Facebook or Twitter). Once logged in, they need to roam around the park and locate treasures hidden within the park. The game has a time limit of one hour and 30 minutes to find all treasures located within Wollaton Park. The total number of treasures is 4 for all players. Upon clicking the start button, users need to keep their app open and start searching for the treasures located within the park. The game employs an AR navigation feature that automatically activates when the user is within 50 meters of a treasure. The navigation feature helps guide the user to the treasure's location within the park. Those who are having trouble finding the treasure shall receive clues every ten minutes to aid in their search. The treasures are viewable only inside the AR camera present within the app, and users must use the camera to view them. Users who manage to complete the challenge in the shortest time span for the day shall gain an E-coupon within the app, which they can redeem for 2 free large Pizzas. However, players shall be capped to one coupon per week. A social component will also be included in the game, enabling users to observe, communicate with, and interact with other players while they are playing in Wollaton Park. Users may watch other players and meet new acquaintances while playing the game thanks to the "See who's nearby" function of the game.

The AR Scavenger Treasure Hunt game is a novel and creative concept that provides an immersive and interactive experience to users. The ideation approach included connecting the game's essential components with the interests of the target audience. The game offers a special experience that is exclusive to Wollaton Park by fusing exploration, social interaction, and reward-based gaming.

Fig 2: Ideation Card

Wollaton Treasure Raiders: An AR Experience

Introduction

Welcome, fellow Wollaton Scavengers! Get ready to embark on an exciting treasure hunt adventure like no other! Download our AR Scavenger Treasure Hunt game from the app store, log in with your social ID, and start exploring the beautiful Wollaton Park. You'll need to use your quick thinking and keen vision to uncover all the hidden riches around the park with only one hour and thirty minutes to finish the task. Follow the AR navigation and hints, and be the first to complete the challenge to win an E-coupon for 2 free large pizzas! Join our community of Wollaton Scavengers, interact with other players, and create new friendships. Let's go, Wollaton Scavengers, the treasure hunt awaits!

Ideation Cards

Ideation cards have been included . To simplify , here are the 3 types of ideation cards-

Question Cards- This shall aid in designing the game
Opportunity Cards- This shall aid in developing the game
Challenge Cards- Understanding problems and issues that might arise during a gameplay session

The Player

This is a single player game where you have to search for 4 treasures by roaming around the park campus within a time span of 1.5 hrs (feel free to add your personal opinion) but
at the same time you can meet and interact with other people using our social feature and make new friends. Who does not love a small pinch of competition ? Also the size of the in game map shall play a big role in the treasure hunt mechanic so do give your views .

The Gameplay

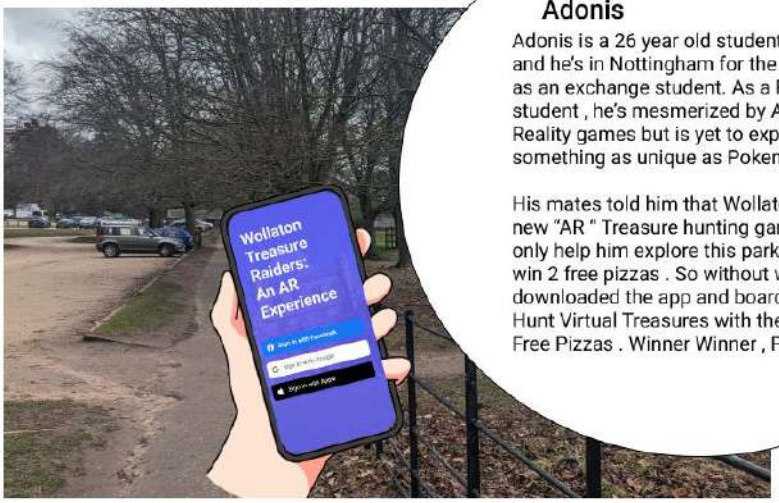
After pressing the start button, you must keep your app open and begin looking for the hidden riches throughout the park. When you are 50 metres away from a virtual treasure, the game's AR navigation system immediately starts. The navigation tool aids in directing you to the treasure's location. Those who are having trouble finding the treasure can receive clues every ten minutes to aid in their search. The treasure shall be a 3D model that you need to click (imagine catching a pokemon while playing pokemon go but without the hassle of throwing a pokeball and just claiming it). Best of luck fellow

Issues that might arise

There are various concerns and problems that need to be addressed, despite the fact that the AR Scavenger Treasure Hunt game offers its players a distinctive and thrilling experience. First of all, Nottingham's weather can be erratic, with rain and chilly winds being frequent occurrences. As this game is an outdoor activity, players may face difficulties and discomfort in unfavorable weather conditions, which could hinder their experience and discourage them from participating. To overcome this challenge, players can be encouraged to check the weather forecast before embarking on the treasure hunt, and appropriate clothing can be recommended to ensure their comfort.

Second, battery usage for AR games is high, which may be a concern for users who may not have access to charging stations in the park. This can lead to a reduction in playing time or possibly the complete abandonment of the game. Players can be instructed to completely charge their devices before playing and to carry a portable charger or power bank with them to increase the battery life as a solution to this problem.Also, the design of the game can be improved to consume less power, such as lowering the brightness and graphics quality and offering options to turn off particular aspects that are not required for gaming.

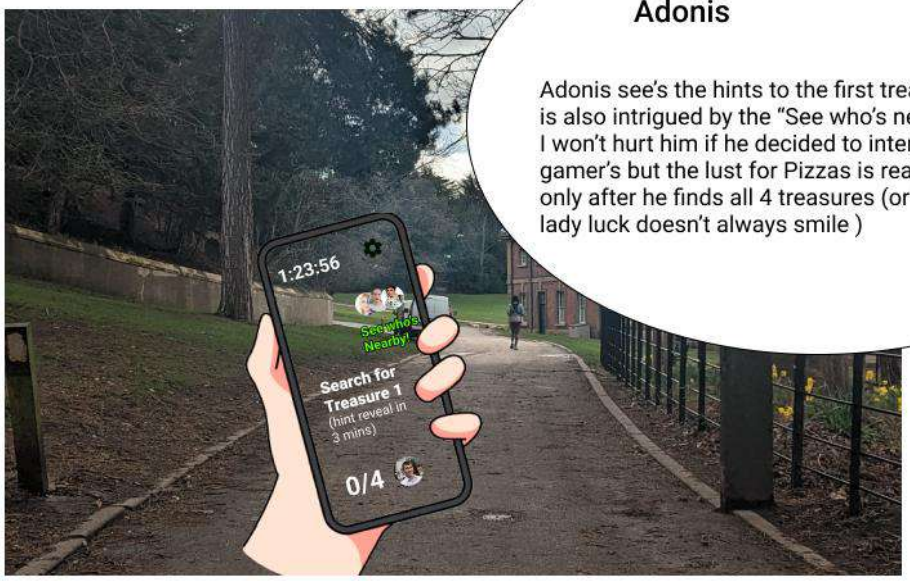
Storyboard



Player/Visitor Name:
Adonis

Adonis is a 26 year old student from Ireland and he's in Nottingham for the next 4 months as an exchange student. As a Product Design student , he's mesmerized by Augmented Reality games but is yet to experience something as unique as Pokemon Go.

His mates told him that Wollaton Park has a new "AR " Treasure hunting game that shall not only help him explore this park but also he might win 2 free pizzas . So without waiting Adonis downloaded the app and boarded the tram to Hunt Virtual Treasures with the hopes of winning Free Pizzas . Winner Winner , Pizza Dinner ?



Player/Visitor Name:
Adonis

Adonis see's the hints to the first treasure and is also intrigued by the "See who's nearby " button. I won't hurt him if he decided to interact with other fellow gamer's but the lust for Pizzas is real . He shall socialize only after he finds all 4 treasures (or if the timer runs out , lady luck doesn't always smile)

Player/Visitor Name:
Adonis

Adonis see's the hints to the first treasure and apparently it's pretty close to the Wayne Manor (Wollaton Hall) . This shall be interesting . Also once Adonis is close to the treasure (around 50m away) , AR navigation directions shall be active to make it easier to pin point the location .

Player/Visitor Name:
Adonis

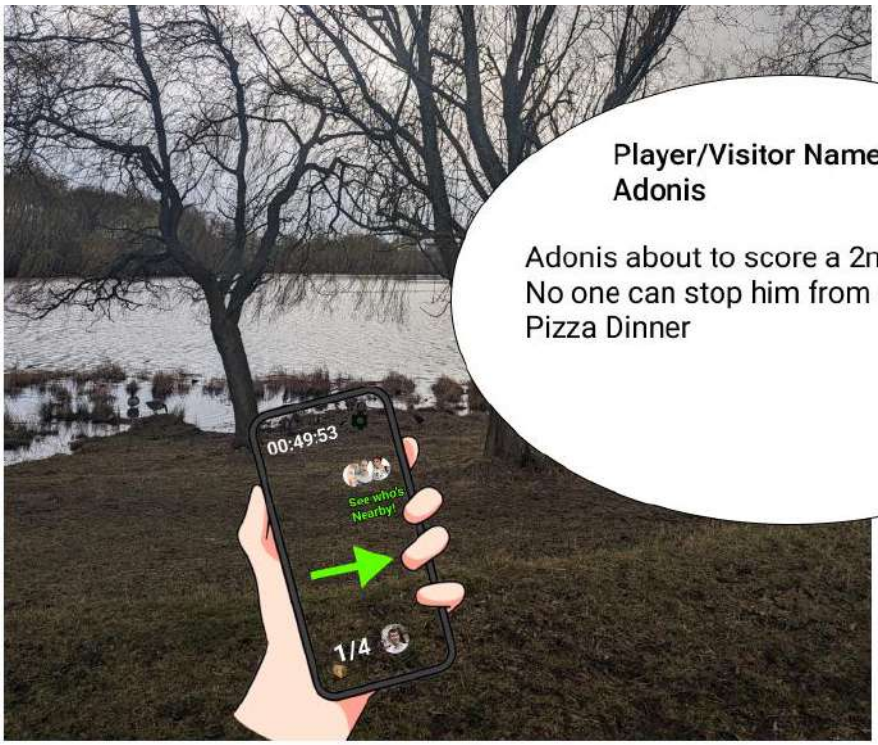
Ah , Adonis is pretty close to his first treasure . Also it's near the Wayne Manor ! Adonis is excited to claim is first treasure and get one step close to his free Double Pizza. The AR navigation mode is active too so there's nothing stopping him


Player/Visitor Name:
Adonis
It's time to claim the Treasure ! Adonis clicks on the Claim Treasure button to secure the loot all for himself
1:04:56
See who's Nearby!
CLAIM TREASURE!
0/4


Player/Visitor Name:
Adonis
THE FIRST TREASURE HAS BEEN CLAIMED BY ADONIS !
1:04:53
See who's Nearby!
TREASURE CLAIMED !
TREASURE CLAIMED !
TREASURE CLAIMED !
1/4

Player/Visitor Name:
Adonis

Adonis is on his way to secure his second treasure
Will he win? Stay tuned. This time , the treasure is near the lake . Interesting



Player/Visitor Name:
Adonis

Adonis about to score a 2nd treasure !
No one can stop him from securing the Pizza Dinner


Player/Visitor Name:
Adonis
There's Treasure 2 !
00:48:53
See who's Nearby!
CLAIM TREASURE !
1/4


Player/Visitor Name:
Adonis
Wollaton park has a new Treasure hunter, beware cause winning the pizza dinner shall not be an easy task for Adonis's competitors
00:48:53
See who's Nearby!
TREASURE CLAIMED !
TREASURE CLAIMED !
TREASURE CLAIMED !
2/4


Player/Visitor Name:
Adonis
Adonis decides to take a small break and try out the “see who’s nearby” feature.
Ah, Adonis finds Sarah cute and he won’t mind chatting with her over a coffee even if it means losing the game . But the game is Not over yet , Stay tuned !
00:48:53
back
See who's Nearby!
Sarah
Jenny
Fahad
2/4

WOLLATON AR HUNT – AN INFORMATIVE PLUS AR TREASURE HUNT EXPERIENCE

Antariksha Kumar
MSc in Human-Computer Interaction

REPORT FOR MIXED REALITY COURSEWORK 2

The Tech

Designing an Augmented Reality Experience Prototype is a herculean task as it involves a high degree of knowledge in HCI, Design, and programming with a deep understanding of multiple tech tools and even programming languages. As a former UI Designer and Front End Developer , Coming up with this prototype concept was not an easy task but eventually, I managed to create this Experience. Tech tools/programming languages/frameworks Used-

1) Figma(for UI/UX Design of the App)
2) Flutter (To code the Front End of the App) + Dart as the programming language
3) Blippar (To prototype the AR Game front-end display concept) on a Google Pixel 7 Pro Smartphone to Display the AR Prototype
4) 3D Object Tracking (Inside Blippar)
5) Blender (to Design the treasure model)
6) Photoshop (Assets overall)
7) Oneplus Nord to record footage at the Location - Wollaton Park Wayne Manor (Wollaton Hall)

What I tried to use but failed to complexity and multiple errors -

1) Node.Js for the AR backend
2) WebAR using AR.js
3) MapBox (for AR Location-based services)

Based on my first Assignment, the 2nd Assignment carries forward the same idea which is -Wollaton Park is a great place for an AR Treasure Hunt especially for younger tech-savvy people interested in Mixed Reality tech so for my 2nd Assignment I created an AR Prototype along with an App Design and Front End to support my vision. AR is an excellent tool to market a place but at the same time, I included an information section that users can check out to know more about the beautiful park. Back to the tech side of the project, Figma was chosen as the software to prototype my Mobile App concept thanks to its convenience and powerful prototyping capabilities. Flutter was used to create a rough front end for mobile phones as it's easy to use and has the capability of rendering apps for both iOs as well as Android Devices. Blippar helped me with creating an Augmented Reality Prototype& Experience thanks to its No-Code AR-creating platform that can be integrated into apps provided the prototype makes it

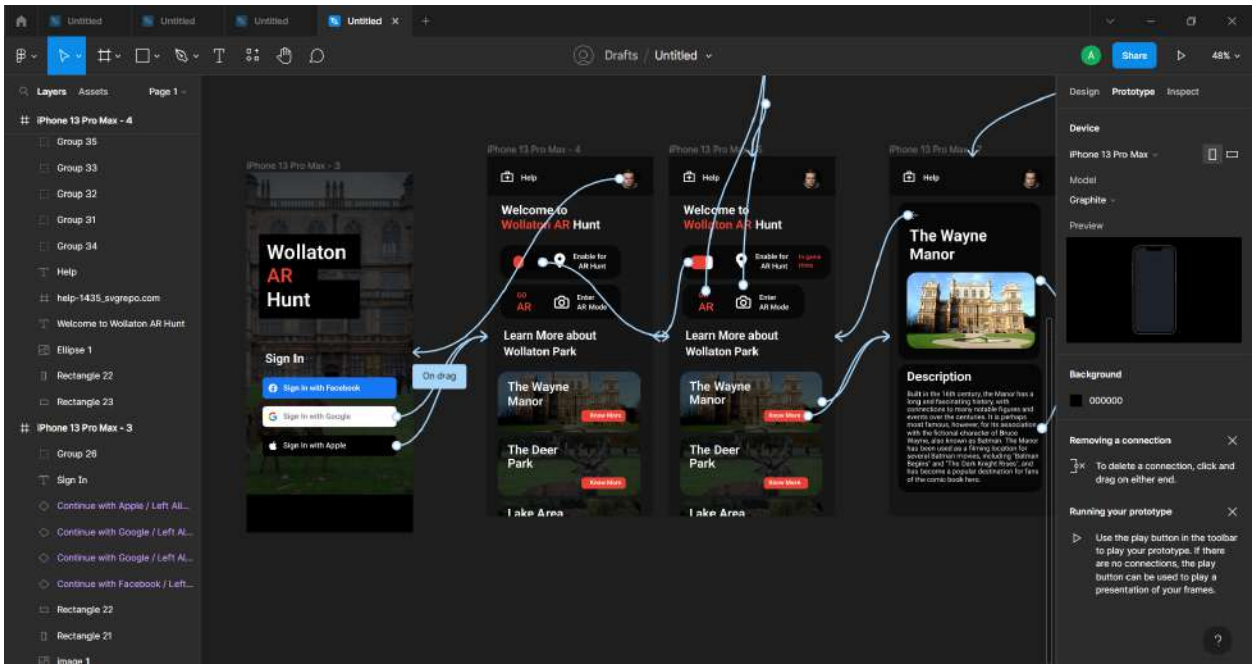
to the final stage as a full-fledged product for which a team of Experienced Backend, Front-End, Devops and XR Developers are required. Blender was used to create a simple 3D Model for the treasure model and Photoshop was used to create 2D Assets for the App prototype.

Talking about functionality, the App front-end is functional along with the AR Prototype but there's no backend cause it would have taken an experienced team to develop a Minimal Viable Product with complexity but as independent entities the App and AR Prototype are functional on their own. The AR Prototype detects the surface and then tracks the 3D treasure as well as the text while displaying an Information card that's also tracked to the Wollaton Manor within my prototype. With a team of experienced Designers and developers, this prototype can be further evolved into a full-fledged Product with a working backend.

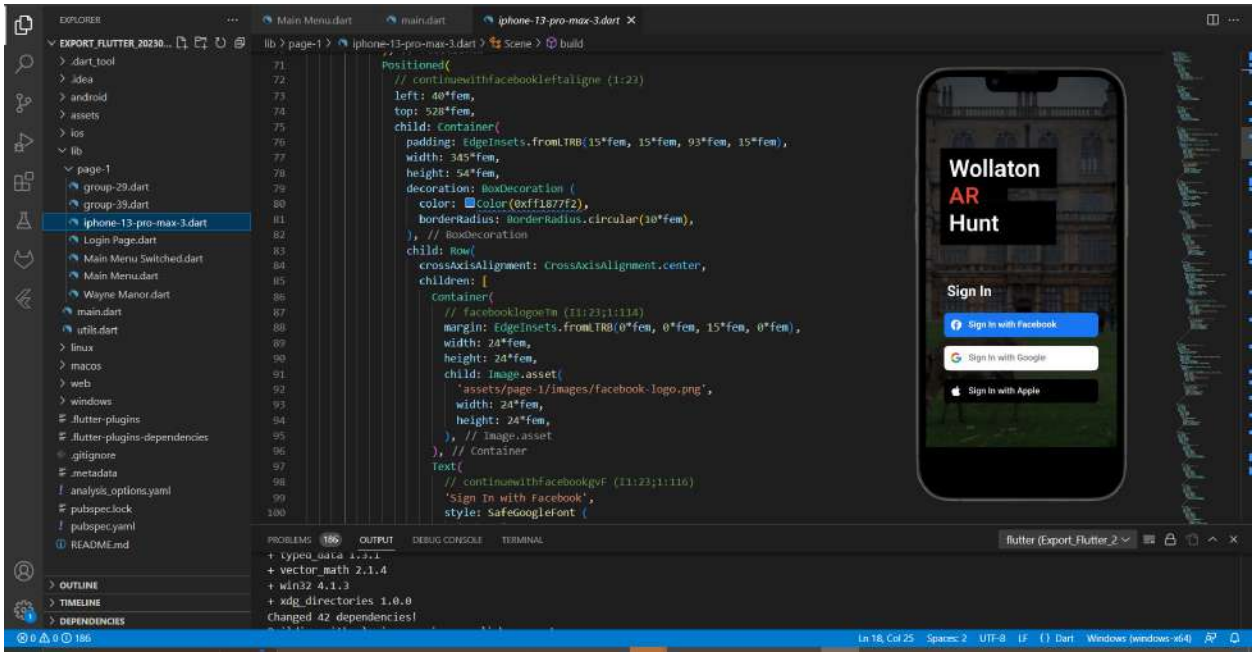
For now, all this app Needs is a smartphone to run the Front End prototype and an outdoor setting with a tree/house/building/large object for object tracking capabilities (for the 2D and 3D Assets) to display the AR experience cause it's still in its early prototype stage. As a Front End Dev and UX Designer, this is what I was able to come up with -

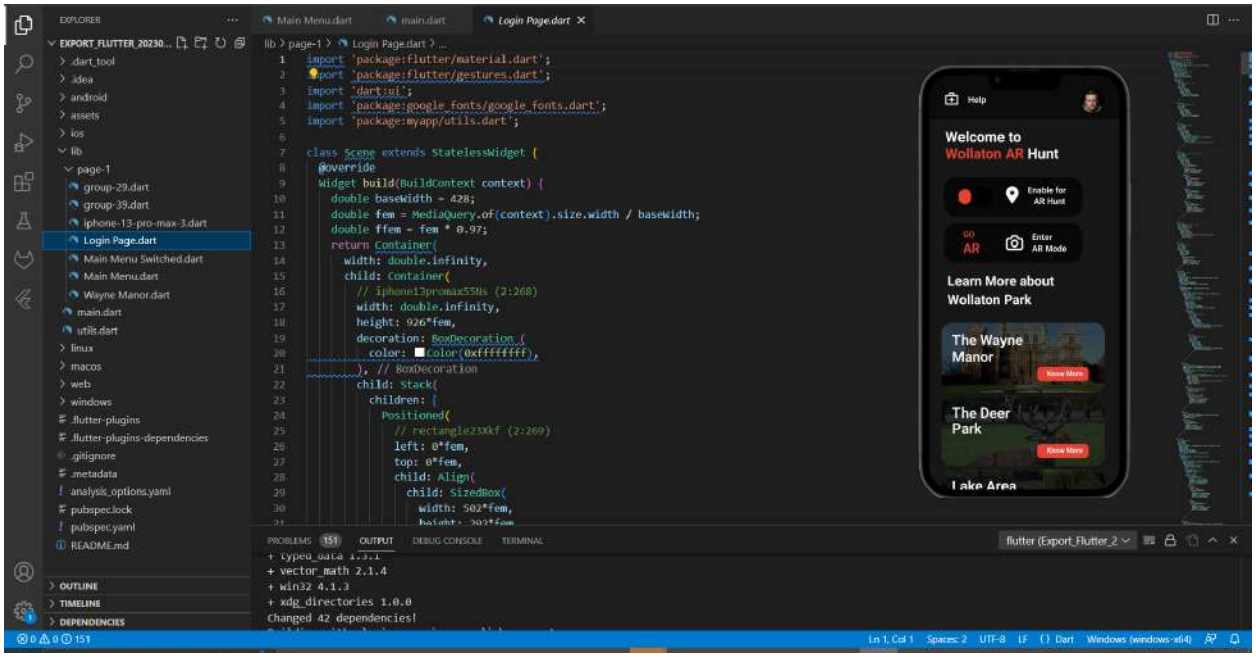
Evidence

.

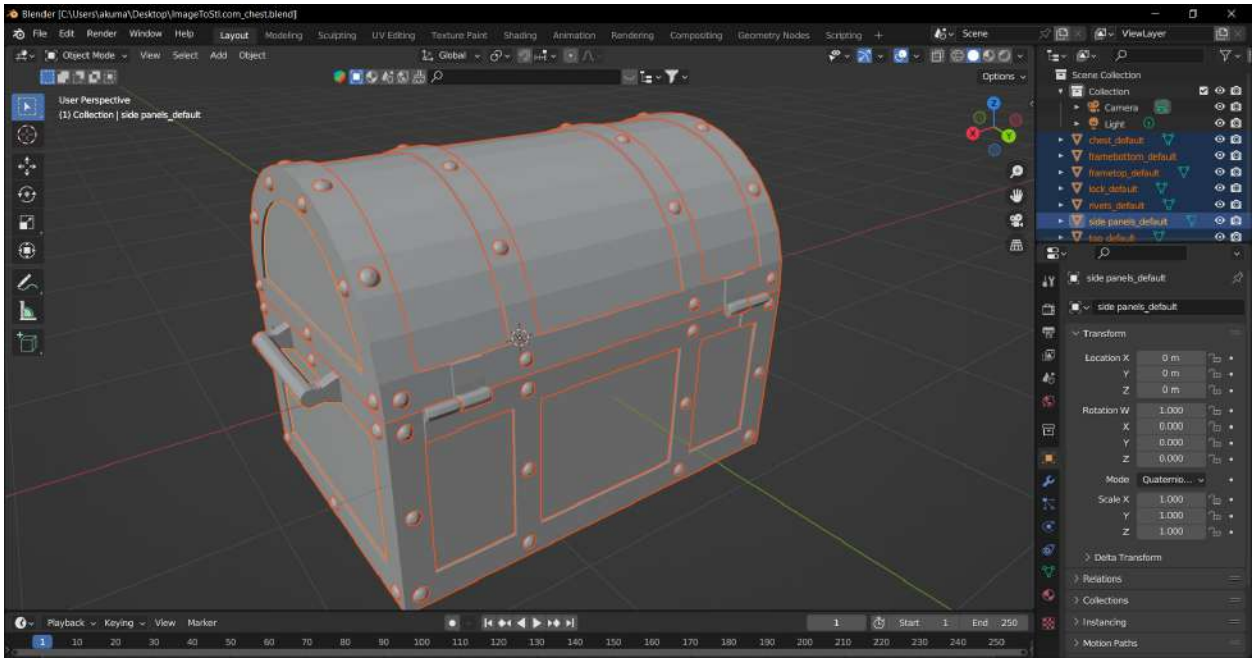


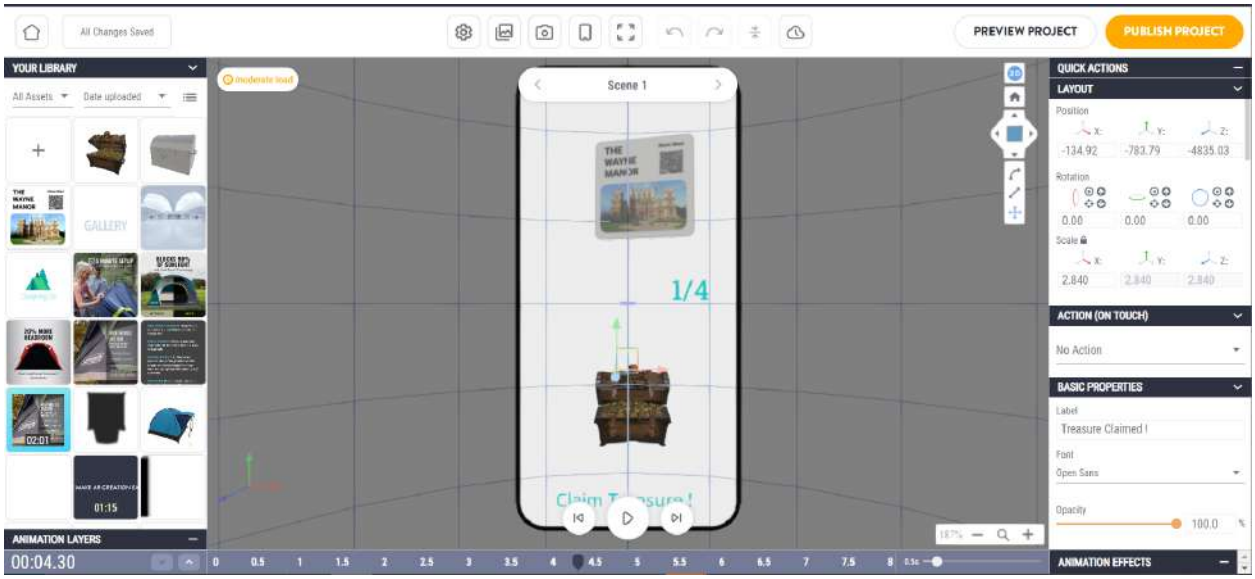
Figma Prototype Design



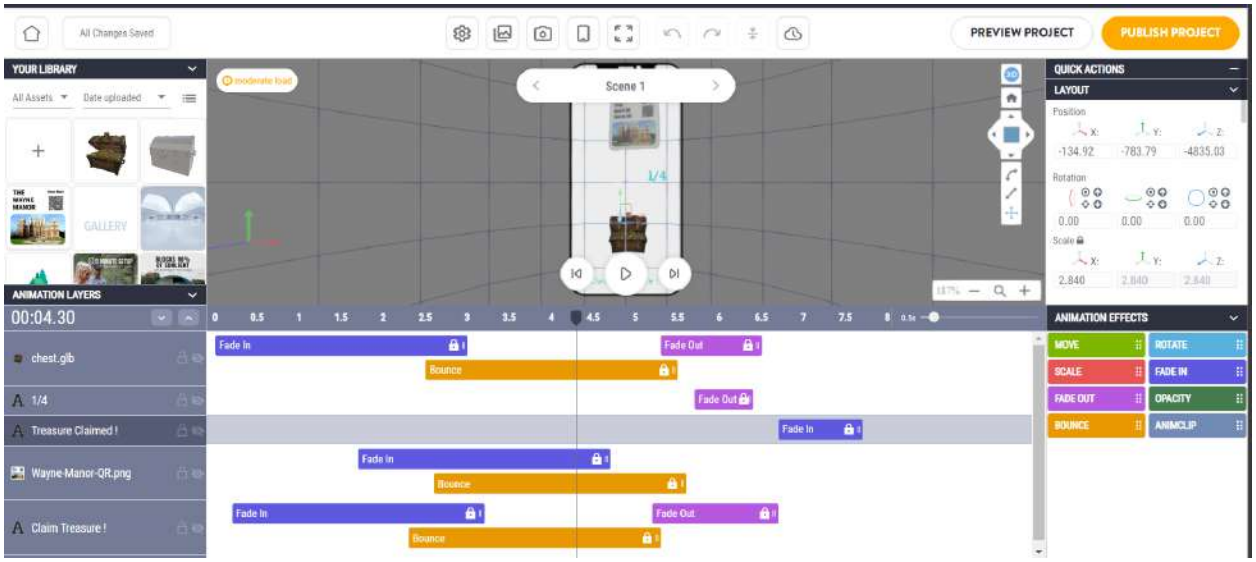


Flutter Front End Dev work





AR Prototype using Blippar and Chest Design in Blender



AR Interaction Design Using Blippar

Testing and Evaluation

The Wollaton Information + AR Treasure Hunt App is a concept prototype aimed at providing a unique and interactive experience to visitors of Wollaton Park. The app and AR concept was designed and conceptualized by me to provide users with a front-end concept for an AR treasure hunt game, which would encourage visitors to explore the park and learn about its history in a fun and engaging way.
The following report discusses the testing and evaluation activities that I performed on the app prototype personally on site, along with the issues identified and how they can be addressed in future iterations of the prototype.

Testing Activities:
The testing activities performed on the app prototype included user testing of the app's front-end concept and testing of the AR feature which was created using Blippar, a third-party AR tool with powerful capabilities. The user testing involved testing the app at the site of the game, assuming that Wollaton Hall has a "hidden treasure" within the AR game. The AR testing involved testing the object tracking and interaction design of the AR prototype.

Form of Testing and Evaluation:

The form of testing and evaluation applied in this context was Usability testing. Usability testing involves evaluating a product or system's usability by testing it with actual users and here I used myself as the user with a friend recording footage on the side for me to see what the interaction looks like from a third-person perspective. This approach was appropriate in this context as it allowed for the identification of issues with the app's user interface, user experience, and the AR feature's interaction design and object tracking.
Improved usability and user comfort should be developed for AR applications, which will call for new evaluation techniques(Ko, Chang and Ji, 2013).

Management of Physical and Ethical Risks:
Physical risks associated with testing the app included the possibility of accidentally bumping into other visitors or objects in the park while testing the AR prototype. Ethical risks involved the potential for capturing footage of other visitors without their consent. To manage these risks, the testing was conducted in a quiet area of the park, away from other visitors. Additionally, the app's testing and evaluation were done discreetly, ensuring that other visitors were not captured in any footage or photos taken during testing. Although it's perfectly legal to record footage of people in a public place, morally and ethically it's not a great practice.

Location of Testing:
The testing was conducted near Wollaton Hall, at Wollaton Park, where the app would be used. This location was representative of the real space in which the app would run. The testing location was carefully chosen to provide an environment that was ecologically valid, ensuring that the testing accurately reflected the user's experience of using the app in the actual location. Although the final version of the fully developed app shall have multiple secret treasure sites that spawn randomly, for this prototype only Wollaton Hall was chosen cause developing a complex backend and front end for an AR treasure-hunting app requires a team of developers along with Capital to run the servers.

Issues Identified:

Issues were identified during the testing and evaluation of the app prototype. The first issue was related to the object tracking of the AR prototype. The object tracking was not always accurate, causing the AR image to drift away from the target object. This issue occurred in circumstances where there was low light or the target object was at a distance from the user.
The second issue was related to the ethical concern of recording footage of other visitors. Although it is legal to record footage at Wollaton Park, ethical concern arises due to the potential for capturing other visitors' images without their consent.
The third issue was related to the app's interaction design. The interaction design flow involved users clicking the screen to select the treasure and "claim" it, gaining a point within the Wollaton AR Treasure Hunt game. However, this interaction can be more intuitive in future versions.

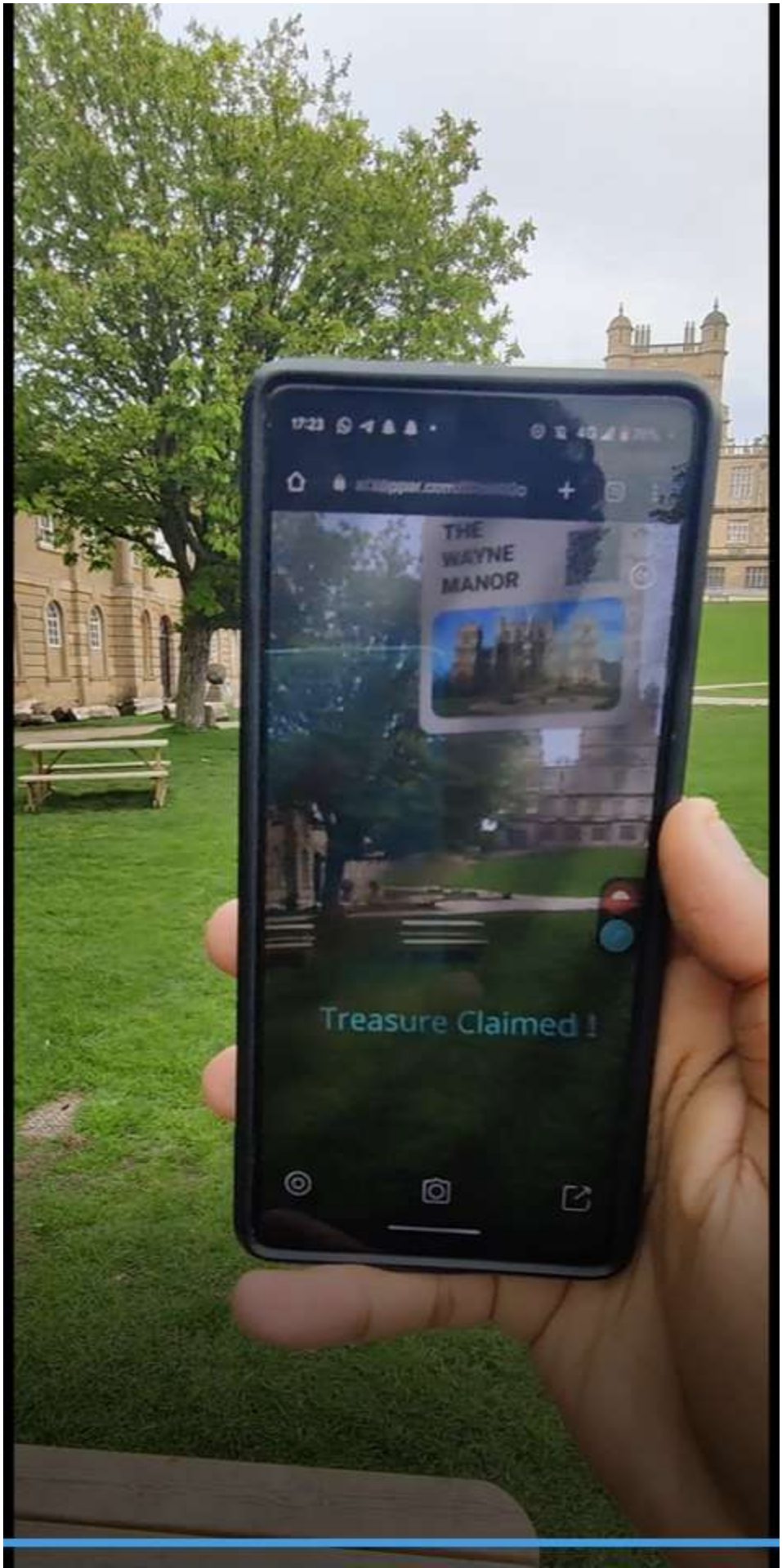
The first issue with object tracking was a minor issue, but it affected the user experience of the AR treasure hunt game. If the object tracking does not work consistently, users may become frustrated with the game and lose interest. The second issue was more serious, as it raised ethical concerns. Although I did not encounter any negative consequences during my testing, it is possible that someone in the area may have objected to being recorded without their consent. To address the issue with object tracking, I would need to refine the AR prototype by improving the accuracy of the object tracking feature. This may involve using a different software or algorithm to track the object or improving the lighting conditions in the area to make it easier for the software to track the object. As Computer Vision and AI get better, tracking objects in the AR space shall get much easier. In addition, I could conduct more user testing with a diverse range of users to identify any other issues that may arise.

Images + Video Proof on Site

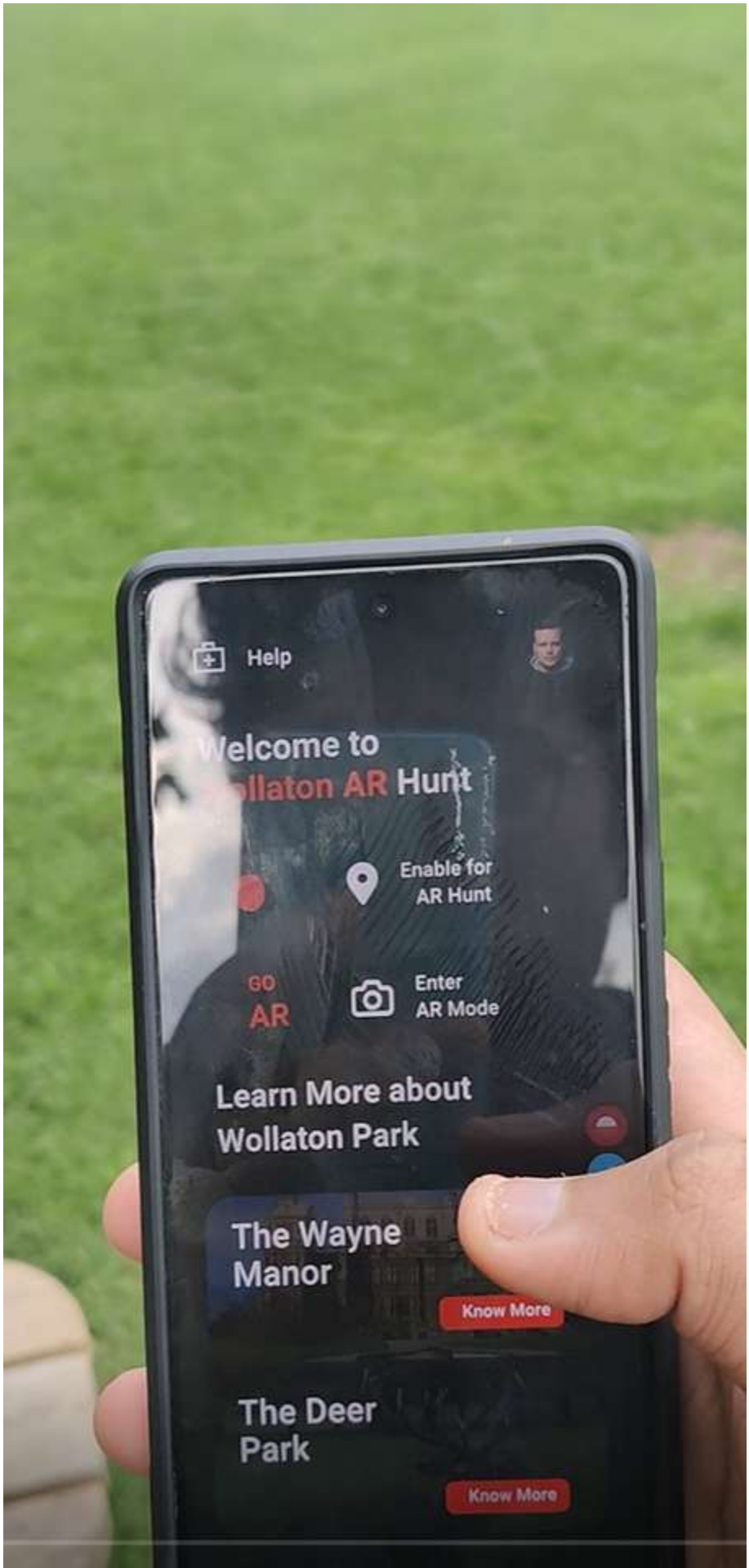
Video of the App + AR Prototype in Action -

https://youtube.com/shorts/zQ6_eEj3Dtw?feature=share


THE
WAYNE
MANOR
1/4


THE
WAYNE
MANOR
Treasure Claimed !


Wollaton
AR
Hunt
Sign In
Sign In with Facebook
Sign In with Google


Help
Welcome to
llaton AR Hunt
Enable for
AR Hunt
GO
AR
Enter
AR Mode
Learn More about
Wollaton Park
The Wayne
Manor
Know More
The Deer
Park
Know More


Help
The Wayne Manor
Description
In the 16th century, the Manor has
long and fascinating history, with
connections to many notable figures and
events over the centuries. It is perhaps
most famous, however, for its association
with the fictional character of Bruce
Wayne, also known as Batman. The Manor
has been used as a filming location for
several Batman movies, including "Batman
Begins" and "The Dark Knight Rises", and
has become a popular destination for fans
of the comic book hero.

Reflection

I had the chance to use important Human-Computer Interaction (HCI) principles while building, prototyping, and assessing an Augmented Reality (AR) gaming application. Usability and User Experience (UX) were two of the ideas that applied the most to my project. Software development in the Human-Computer Interaction (HCI) industry heavily relies on usability. The user is frequently left out of the system design process in contemporary AR research, and user interface design principles are not given much consideration during development(Dünser et al., 2007). This might be in part because augmented reality is a relatively new technology. The "supplementing" of real-world objects with virtual ones or overlapping information is made possible by augmented reality technology and as a result, real-world and virtual items coexist in the same area(Al-Obaidi, 2022). However, this comes with its own set of complexities and as UX Designers we are responsible for curating User experiences that make it easy for users to adapt and use Mixed Reality Products.

The design of the AR and App Prototype benefited greatly from the concept of usability. I concentrated on creating a user-friendly layout and making sure the app was simple to us and it took great effort to adhere to the User-Centered Design (UCD) principles when I was designing, which emphasises creating products with the needs of the user in mind. The idea of UX was pertinent to my project as well because it was crucial in determining how well the AR game application worked. The software was assessed based on how well it made for a memorable and pleasurable user experience.

I would advise designers to closely follow the Usability and UX principles as guidance for future designers working in this field and also collaborate with a team of front-end and backend developers that shall allow visions and ideas like these to come to reality cause at the end of the day, these complex AR applications cannot be created by a Full Stack Developer or Designer alone. Mixed Reality is a multi Disciplinary field so it requires specialists with a different set of skills.

Regarding other academics in this field, I discovered a few instances of analogous augmented reality games, however, they did not quite match the one I created. Instead of being purely entertaining, several of these games were intended to promote tourism or education which is great. On the other spectrum, games like Pokemon GO purely focus on Entertainment and no learning which is fine but my main aim is to bridge the gap and create an Unique educational plus entertaining AR experience for young the Gen Z generation. This app idea can be applied to other tourist destinations such as Museums and also major Urban Areas like Times Square in New York and Trafalgar Square in London to name a few examples

References

Ko, S.M., Chang, W.S. and Ji, Y.G. (2013). Usability Principles for Augmented Reality Applications in a Smartphone Environment. *International Journal of Human-Computer Interaction*, 29(8), pp.501–515. doi:https://doi.org/10.1080/10447318.2012.722466.

Al-Obaidi, A. (2022). Usability Principles for Augmented Reality Applications in Education. *IJCSNS International Journal of Computer Science and Network Security*, [online] 22(1), p.49. doi:https://doi.org/10.22937/IJCSNS.2022.22.1.8.

DÜnser, A., Grasset, R., Seichter, H. and Billinghurst, M. (2007). *Applying HCI principles to AR systems design*. [online] Available at: https://ir.canterbury.ac.nz/bitstream/handle/10092/2340/12604890_2007-MRUI-Applying_HCI_principles.pdf?sequence=1&isAllowed=y.

Word Count - **1901** excluding Headings and References