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**Self-Guided Virtual Tour using
Augmented Reality (AR)**

Name of presenter

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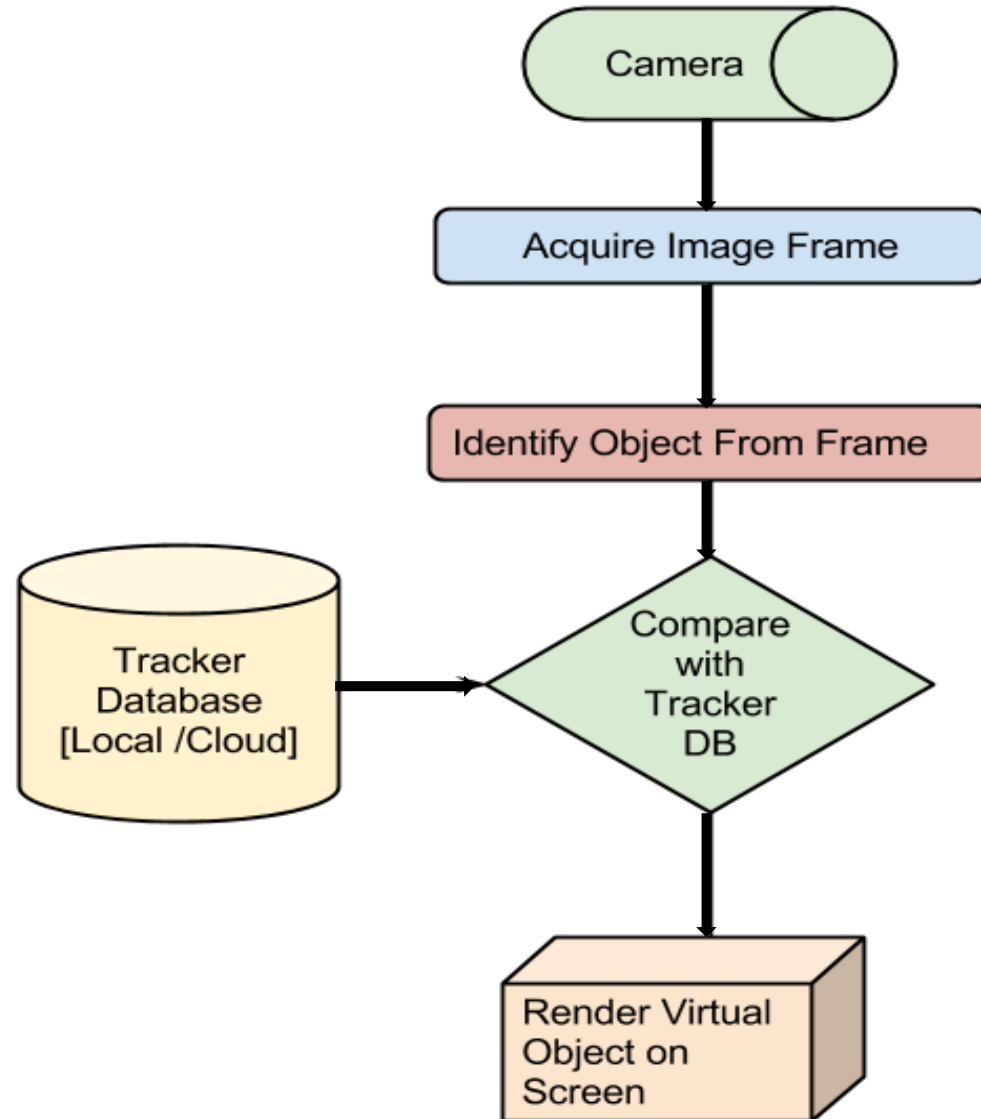
Background and Project Description

- The Cape Flats Nature Reserve on the campus of the University of the Western Cape provides refuge to over 200 plant species, many endemic to the Western Cape.
- As part of the reserve's recreational activities, the environmental education officer offers guided walks on the ecological importance of the reserve.
- This often takes over an hour and can be daunting, hence done only once a day.
- This project therefore develops an Augmented Reality (AR) mobile application that would allow visitors to experience the nature reserve in their own time without a guide.
- AR markers are situated at interest points around the reserve and in conjunction with a mobile application, provide information about plants of interest in a similar manner that a sign board would.

Related Work

- **Pokémon Go:** Is an augmented reality mobile game developed and published by Niantic for iOS and Android devices.
- **Ingress:** Is an augmented reality mobile game developed and published by Niantic for Android and iOS devices.
- **DecorMatters:** It allows users to browse their inspiration feed for ideas, save or share them with friends, virtually scale 3D furniture into any space, measure room dimensions with AR ruler, and interact with real-time users.
- **SketchAR:** Using augmented reality, machine learning, and neural networks, this app places virtual images on paper, wall, canvas – wherever you want to draw, and then, it lets you trace the lines from your mobile phone.
- **Prototyping 3D Mobile Augmented Reality Systems for Exploring the Urban Environment:** A research paper based on an application that presents information about the university campus (Columbia University, New York, USA).
- **Exploring MARS:** Developing indoor and outdoor user interfaces to a mobile augmented reality system.

Implementation



The Application

The following is a preview of the developed Android application. For video of how the application works, visit

<https://cs.uwc.ac.za/honours/2019/akondlo/services.html>



Testing Strategies

- The first testing that was performed was unit test of which it was done by the developer and one of our peers.
- The second testing was performed with the involvement of users where we did mobile app testing.
- The two types of tests were chosen with the intent of making a mobile application that the users wanted and which will be usable and reliable.
- The software items and features that were tested were as follows: for unit test we were testing the code, for mobile app testing we checked user experience testing, device compatibility testing, and performance testing.

Testing Results

The below tables show testing results of both unit testing and user experience testing.

Iteration	Test Results	Bug fixes
First	Compilation error	Modified the method "CreateSinglePixeltexture"
Second	Long compilation time	Replaced if statements with nested loops.
Third	Inconsistent results	modified "OnRenderObject"
Fourth	Success	No change required

User questions	User responses	Required/Suggested Changes
Did the user struggle to launch the application?	The user launched the application without assistance.	Suggestions on logo design.
Did the users find the application usable?	Yes but it was noted that the incorporated Google maps was redundant.	The application was usable according to the users.
Did the users manage to exit the application?	Yes and had to be assisted by the moderator.	The inclusion of an exit button was suggested.

Conclusion

- AR markers were placed at interest points around the nature reserve and tourist, having installed the accompanying application on their capable mobile phones can simply scan the markers with their phone camera to get as much information as needed about plants of interest.
- The application was developed in Android and was rigorously tested to ensure robustness.
- The application currently only works on Android devices, future works would include support for iOS devices. Also, incorporation with Google maps for navigation would be a potential addition.

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Thank you!



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