

Context-Aware Augmented Reality

Digitizing Nature: From Field Visit to 3D
Experience



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Introduction

Context-Aware Augmented Reality

This project bridges the gap between physical botanical exploration and digital information.

By leveraging collected field data as AR markers, we create an immersive educational tool.

The Field Visit

Our journey began at the [Alliance University, Campus](#). The goal was to observe diverse flora in their natural habitat and collect the primary data required for our application.

We focused on capturing high-resolution images of unique plants and flowers to serve as reliable tracking markers.



Data Collection: Marker Acquisition



Target 1: Vibrant

Bloom



Target 2: Texture

Detail



Target 3: Color

Patterns




These images were processed to create unique "fingerprints" for the AR engine to recognize.

The Immersive Gap: Limitations of 2D Photography

- 📄 **Lack of Depth & Spatiality:** 2D images flatten complex 3D structures, losing vital information about form and volume.
- 🔗 **Disconnected from Context:** Photos are isolated frames, removed from their original environment and ecological relationships.
- 👁️ **Passive Engagement:** Static imagery invites passive viewing rather than active, exploratory interaction.

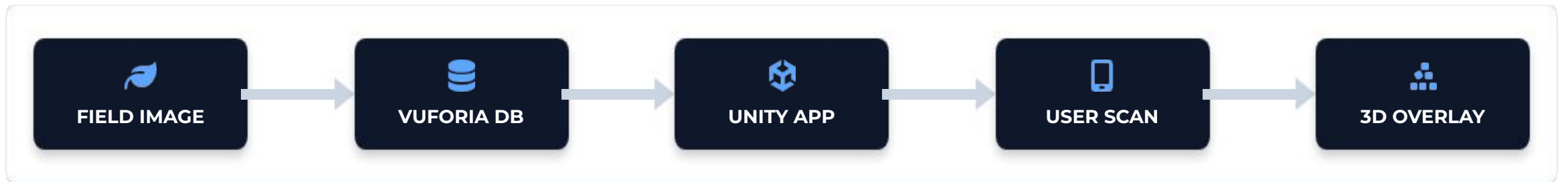


The Solution: Interactive Overlay

-  **Instant Recognition:** The user points their camera at the printed photo of the plant.
-  **3D Visualization:** A digital twin of the flower augments the view immediately.
-  **Contextual Data:** The scientific name and key facts appear alongside the model.



APPLICATION WORKFLOW



Data flows from physical capture to digital database, ending in the user's augmented view.

TOOLS & TECHNOLOGIES

UNITY ENGINE

Used for creating the core application logic, 3D environment, and compiling the final app. It serves as the development backbone.



VUFORIA ENGINE

A powerful AR SDK integrated into Unity. We used Vuforia for its robust "Image Target" recognition capabilities, allowing the app to detect our specific photos.



The Result

The final application successfully recognizes the photos taken during our field visit.

As shown here, the **digital overlay** seamlessly integrates with the physical marker, providing a rich, multi-layered viewing experience that static images cannot achieve alone.

