

# **Context-Aware Augmented Reality**

Digitizing Nature: From Field Visit to 3D

Experience



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# Introduction

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## 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

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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

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**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

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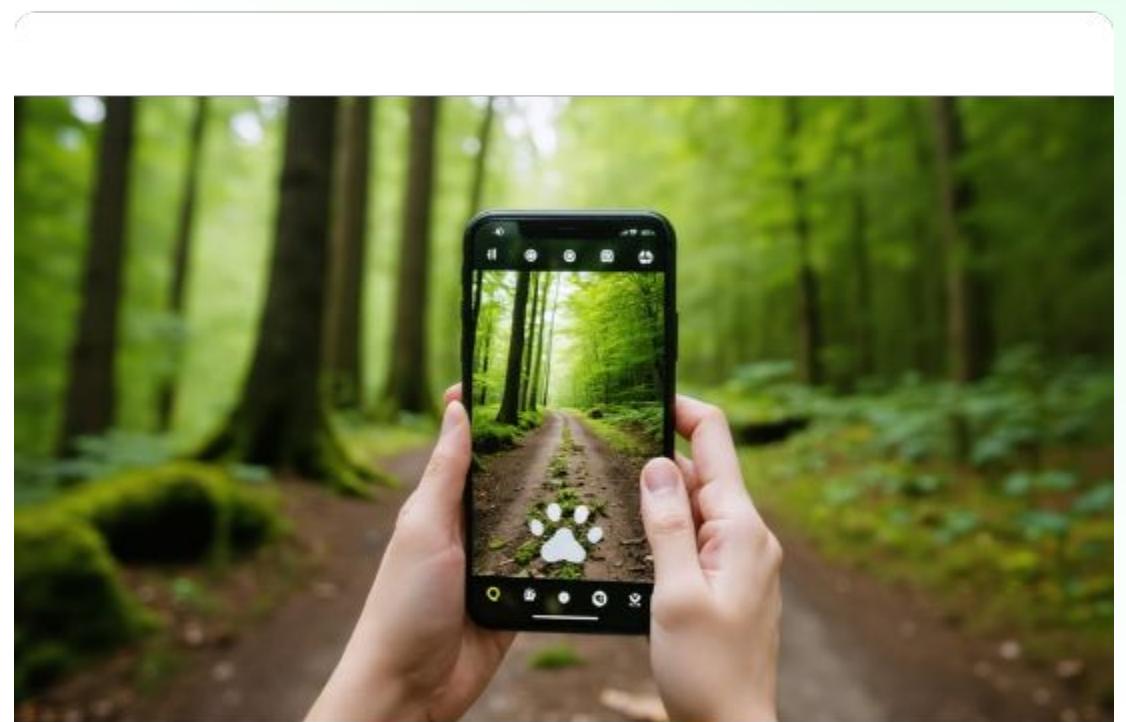
-  **Lack of Depth & Spatiality:** 2D images flatten complex 3D structures, losing vital information about form and volume.
-  **Disconnected from Context:** Photos are isolated frames, removed from their original environment and ecological relationships.
-  **Passive Engagement:** Static imagery invites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



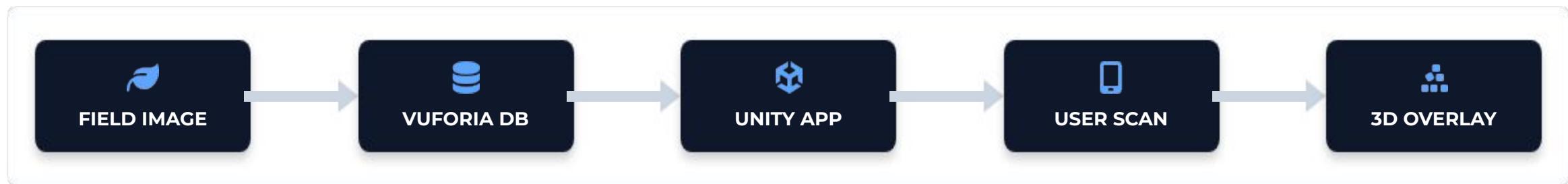
# The Solution: Interactive Overlay

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-  **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

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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.

