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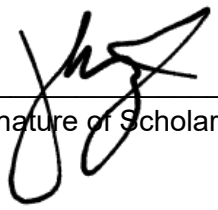
FloorPlanAR: Leveraging Augmented Reality for Optimal Floor Plan Selection on a Plot of Land
Title of Thesis

Brief Rationale:
Conventional 2-D drawings and desktop 3-D models often fail to convey how a proposed house will occupy a specific plot, leading to costly revisions. By integrating Generative Adversarial Networks (GANs) with mobile Augmented Reality (AR), FloorPlanAR enables developers, architects, and homeowners to instantly generate and visualize custom floor plans at full scale on-site, streamlining early-stage decision-making while reducing time and cost.

Objectives:
The study seeks to develop and evaluate a lightweight AR-GAN system that tailors floor plans to user-defined plot boundaries. It aims to:

- Develop an Android-based AR application capable of generating and rendering custom floor plans in real time.
- Train a GAN model that produces accurate, user-specific layouts conditioned on plot size and entrance location.
- Investigate the synergy of AR and ML in selecting the most suitable plan for a given parcel of land.
- Assess the system's effectiveness—via functional, performance, and TAM-based user testing—in visualizing plans and supporting construction decisions.

Methodology:
This study employed an Iterative Waterfall model to guide system development and evaluation. During the requirement gathering phase, hardware and software needs were identified to support GAN training and AR visualization, with a focus on mobile usability. The system was designed around four core modules: Floor Plan Creation using a GAN model, 3D Model Generation, AR Visualization via Unity and AR Foundation, and User Interaction for input and display. Development involved training a PyTorch-based GAN hosted on AWS EC2 and building a Unity-based Android app for devices running Android 11.0 or later. Deployment included bundling the app for Android and exposing the GAN via a Flask REST API. Finally, user feedback was evaluated using the Technology Acceptance Model (TAM), focusing on Perceived Usefulness, Ease of Use, Intention to Use, Visualization Quality, Technical Experience, and Feature Satisfaction.



Signature of Scholar

Printed Name and Signature of Thesis Adviser

Date

Date