TECHNOLOGICAL UNIVERSITY OF THE PHILIPPINES – TAGUIG
Km. 14 East Service Road, Western Bicutan, Taguig City

RenderHaus: Design Your Dream Home Inside and Out

In Partial Fulfillment of the Requirements for the Subject

IT ELECTIVE 4

Submitted by:

Fabila, Crislhan V.

Nagallo, John Leonard O.

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Submitted to:

Prof. Maracris M. Lappay

Technological University of the Philippines

Taguig City

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Introduction

RenderHaus is a user-oriented design application developed to assist homeowners in visualizing and planning their ideal living spaces. Available on both desktop and mobile platforms, the app offers a collection of pre-defined architectural templates for both interior and exterior layouts. Users can personalize these templates by selecting colors, furniture, and finishes through an intuitive point-and-click interface. This approach supports non-designers in making confident decisions about their homes, as the app facilitates real-time rendering and iterative exploration without the need for professional expertise. By streamlining the design process and reducing the risk of costly visual mismatches, RenderHaus empowers users to efficiently shape their personal environments.

Background

Central to RenderHaus's functionality is its artificial intelligence engine, which dynamically suggests color schemes, furniture combinations, and layout improvements based on principles of spatial aesthetics and color theory. As users make selections, the AI analyzes spatial relationships and stylistic coherence, then offers complementary suggestions, such as matching a cool-tone rug with a warm wall shade to achieve balance. These recommendations are justified through explainable AI (XAI) techniques that communicate the rationale behind each suggestion in accessible terms. Such transparency transforms RenderHaus from a passive tool into an educational assistant, enhancing both the experience and design literacy of its users.

Functionalities

1. **Template Selection**: Users shall be able to browse and select from pre-defined architectural templates for interior and exterior layouts.
2. **Component Selection & Configuration**: The system shall allow users to place, move, rotate, and resize furniture, finishes, and decor elements via intuitive point-and-click interactions.
3. **Color & Material Customization**: Users shall be able to change colors, textures, and material finishes (walls, floors, etc.) with immediate visual updates.
4. **Real-Time Rendering**: The system shall render live previews of changes in real-time (or near real-time) as users customize layouts.
5. **AI Suggestions**: The AI engine shall analyze user selections and suggest color schemes, furniture combinations, or layout adjustments.
6. **Explainable AI Feedback**: Suggestions from the AI shall be accompanied by clear, human-readable explanations (e.g., "Balance achieved by...").
7. **Save / Export Designs**: Users shall be able to save projects, load previous projects, and export high-resolution images of their designs.
8. **User Accounts & Project Management:** The app shall allow users to sign up, log in, and manage multiple projects with user authentication functionality.