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UrbanGrid - Realtime Construction and Property Management System

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Abstract: ***The UrbanGrid is a real-time and web-based platform system built to improve construction and property management to make it simpler and more transparent for addressing common issues in real estate. The real estate industry often faces some problems, such as poor communication, unclear information, a lack of transparency, delays in updates, and UrbanGrid helps to minimise these problems by offering a simple and centralised system developed using HTML, CSS, and JavaScript. The user can easily browse property listings, and they keep track of the construction progress, send and raise a ticket for enquiries when its needed. The platform also has an AI chatbot that assists users in navigating and helps them find information quickly. Which features a search filter, dynamic and property displays, and a progress tracker. The platform system is straightforward to use and provides a user-friendly experience.***

Keywords: Real estate management, construction tracking, web application, chatbot, frontend development, property listings

I. INTRODUCTION

In the current era, finding a house that fulfils human desires has become difficult. Individuals often invest their lifelong savings in property to secure financial stability for themselves, their families, and future generations. Property investment is considered one of the safest avenues, offering valuable assets, consistent returns, and long-term benefits that can be inherited. Moreover, it can provide a source of regular income. Despite its importance, traditional methods of buying and selling property have become outdated and inefficient. This research aims to develop a platform that streamlines and secures property transactions, enabling buyers and sellers to conduct business conveniently and safely, while also providing opportunities for brokers and ensuring a faster, more efficient, and problem-free process. Everyone has a dream of owning or building a spacious and comfortable home at least once in their life. While planning to buy or construct a house, a person expects proper guidance from someone who can provide detailed information about construction and basic human needs. So for those people, we have designed a web application that makes it easier to find their dream home/plot/flat. These are the fundamental expectations that every customer has. Moreover, people prefer to build or purchase a home that is legally secure, genuine, and safe for the future. Therefore, our real-time web-based platform assists clients in finding homes tailored to their individual preferences.

We guarantee that every property is legally verified and authentic. For any part of the transaction or questions, clients benefit from direct, one-on-one communication with us, ensuring complete clarity and transparency. To ensure it, our real-time, web-based platform helps clients find homes tailored to their individual preferences. Our Chatbot feature guides users through the application, answering questions and providing support as they search. The ChatBot has been fully trained as a chatbot its been easy to use for every user. And most importantly, a client expects that whether they are buying a plot or constructing a home, it should fit within their budget. Based on the client's expectations, needs, and role, we have highlighted all the important requirements and implemented a feature called the "Budget-Wise Filter."Using this feature, clients can view flats, homes, or plots on our platform according to their budget. The system is designed such that, upon successful authentication, the administrator is redirected to the dashboard. The dashboard presents a detailed progress report, including the total tasks assigned and the number of tasks completed. The administrator can update task statuses, and the system automatically recalculates and reflects the updated progress. additionally, when a customer logs into the system, they will be directed to their dashboard. From the dashboard, the customer can explore available options and, based on their preferences, can choose to buy, sell, or rent a house.

The main issue is that there is no unified system to collect and share real-time information. As a result, delays are not detected quickly. Since there are no automated or predictive tools, it becomes difficult to find problems early and fix them before they become serious. Considering this,a web-based platform has been developed to enable customers to effectively address issues and manage associated risks. While advanced technologies such as Building Information Modelling (BIM) and cloud computing provide valuable tools for digital project management, their adoption and integration remain fragmented and limited in practice.

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In earlier times, property buying and selling were mostly done through offline methods such as face-to-face meetings, advertisements, and marketing. Sometimes, different websites were used, but they were not properly connected. As a result, the process was very time-consuming, lacked transparency, and did not always provide clear or complete information to buyers and sellers.So our web-based property management provides a comprehensive solution to these challenges.

It eliminates the need for traditional face-to-face interactions and significantly reduces the time involved in the property search process. Through our platform, clients can efficiently explore verified listings and secure their dream home in a convenient, transparent, and time-effective manner.

II. RELATED WORK & SHORTCOMINGS

1) Paidi S., Vemula P.(2021) – The authors created this system to make the old way of managing properties easier by moving it to an online platform. With this system, people can ask questions or get details through a website instead of doing everything offline. Their main aim is to make property details simple to find and manage, so records don't have to be handled manually all the time. But even though the system improves many things, it still has some drawbacks and is not completely perfect.

2) Alan (2018) – This was a UK property website, created in 2017 by a single developer named Alan. Its purpose was to simplify the process of buying a home in the UK by putting everything online. The idea was to reduce cost, effort, and stress for buyers by allowing them to handle the whole process through the internet instead of traditional methods.But they made a mistake that they didn't asked users that what they actually need .They made an interface which is very confusing and hard for the user to navigate , they didn't do any user testing .

3) Michael Marks (2015) – Katerra was established in 2015 in California by Michael marks with a big and exciting idea to use technology to completely change how construction works they wanted to handle everything themselves from designing buildings to making the parts and putting everything together on-site all through one digital platform .

4) but things didn't go as planned construction is not simple every project is unique and each location has its own rules materials and workers Katerra tried to do everything from start to finish and also wanted to standardise and automate the whole process in reality this was too difficult to manage and their approach became hard to execute which eventually led to their failure.

5) Richard Barton & Lloyd Frink et. al (2018) - also made a system name Zillow Offers Program, they develop by an Zillow, a service where Zillow itself would buy houses directly from sellers using an AI algorithm, renovate them, and resell them for profit. It was a fully digital, website-based platform. The problem was — the algorithm kept overestimating prices. It told Zillow to buy houses at prices that were too high.

III. LITERATURE SURVEY

Over the past decades we have seen that te users are facing some difficult challenges while using existing real-estate platforms.

By keeping this in mind we have designed a website which is more efficient and user-friendly for the users , so they can easily search for the property as per their budget. The user can trust on our system or a website for a secure and trustworthy experience .

We ensure a reliability and trust for its users.Also we have seen that all the builders & developers cannot visit there sites individually, so for that we made a solution that we made construction tracker so it will be visible for the developer only that how much contrusction progress has been done. In 2021 Paidi S., Vemula P. et. al (2021) carried out one of the web-based platform, that allowing users to search and manage the property records easily through a website to maintain records easily through a website. We have also created the same thing to but the issue is they fully depend on the internet connection they also raises concern about data security and unauthorised access and may it has been difficult to the users which are not tech-savy. By seeing this we have given an tel no. on our website if there is any internet connection issue or server so the user can contact us on our no. if they have already sign in on the page they get a whatsapp message from our no. so they can also contact us from there. The storage of sensitive property information on online platforms increases the risk of data breaches, hacking, and unauthorized access.

It is often difficult to ensure that uploaded documents are genuine in an online environment. This creates a risk of false or altered records being entered into the system, which may compromise data accuracy and user trust. Later in, Richard Barton & Lloyd Frink et. al (2018) also made a system name Zillow Offers Program, they develop by an Zillow, a service where Zillow itself would buy houses directly from sellers using an AI algorithm, renovate them, and resell them for profit. It was a fully digital, website-based platform. The problem was — the algorithm kept overestimating prices**.** It told Zillow to buy houses at prices that were too high. So Zillow paid more for homes than they were actually worth in the market. The system was highly dependent on historical data and lacked real-time adaptability, making it unable to respond to sudden market changes.

Integration between pricing, buying, and operational modules was not well-balanced, leading to inefficiencies. The absence of human validation further increased the impact of algorithmic errors.

These technical limitations resulted in incorrect decision-making, large-scale financial losses, and ultimately led to the shutdown of the Zillow Offers program. The haven t trained an AI algorithm well we haven't add any kind of AI in our project we made it simple and minimalist so it will be easy for the user to access. The platform should incorporate periodic updates aligned with dynamic market trends and user behavior to enhance system adaptability and overall performance. Zillow was buying homes faster than they could renovate and resell them, our company focuses on both at a time.

The Kambiz Radman et al. (2025) Studied with there team of researchers in the field of construction management they study the RealCONs framework for real-time tracking system and analysis an construction project. By the research time the identifies same major limitations in existing system, such as poor integration between different technologies to address these issues, the proposed framework integrates multiple data sources to provide real-time monitoring and improved decision-making the system also faces challenges such as complexity and integration difficulties. The construction Progress doesn't track properly due to poor integration.

The proposed "UrbanGrid-Realtime Construction and Property Management System" aims to bridge this gaps. Unlike previous works, it combines property management and a construction tracking system within a single framework while providing a practical web interface for real-estate management. The inclusion of database storage and easy record retrieval makes it suitable for real-world use in real estate. In this way, the system not only improves the efficiency and accuracy of real-estate operations but also ensure the better decision – making and user satisfaction

IV. PROPOSED SYSTEM

The system we have developed, Urban Grid, is designed to address and overcome the limitations of existing real estate platforms. It integrates multiple functionalities into a single unified platform by combining property management with construction tracking, which are typically handled separately in traditional systems.

Most conventional real estate platforms primarily focus on property listings and basic search functionalities. In contrast, Urban Grid provides a comprehensive solution by incorporating dedicated modules for every key aspect of real estate operations. This integrated approach enhances transparency, reliability, efficiency, and overall usability. As a result, Urban Grid streamlines real estate processes and makes operations significantly easier and more effective for users, offering a more advanced and user-friendly experience compared to traditional systems.

Urban-Grid system that helps us by providing a integrated platform for both property management and construction tracking that improves the overall usability of the system by offering a simple and user-friendly interface. This platform increases

Transparency by giving an accurate and real-time data about the properties and thte construction progress. It also minimize the dependency on agents by allowing direct access to property details. The system enhances efficiency by efficiency by organizing data in structured and centralized the databases.

The platform is having and dominant objective that simplifying the property search process while also enabling the users to monitors the construction progress in a real- time, this kind of dual functionality make an platform more unique from other. Because not everyone is using this kind of dual functionality in them this made our platform more unique from others real-estate system. It combines both the domain, the system eliminates the need for users to relu on multiple platforms, consequently saving time and improving convenience. There is one key feature of the proposed system that it works on real time data updates. In many other existing platforms propertys information is often outdated or it doesn't get syncronized with a actual availability. UrbanGrid keeps property info live and fresh, so people don't get burned by old data when making big decisions.

Also, the UrbanGrid platform incorporate firebase authentication that manages a secure Login and Sign Up page for different user roles, including admin, and sub-admin and customers. Firebase is used in the system to provide a secure and scalable authentication mechanism without managing complex backend security logic manually. The FireBase ensures and reliable and secured authentication with real-time user verification. Thus it also maintaining the data security and also it restricted the unauthorized users to access the sensitive information, only the authorized one can only access the data, where here the admin will only have to access the information or the sensitive data, Admin user is responsible for managing property listings and system operations, and the customer is only having the access of property searching and using the chatbot for Queries.The Sub-Admin user is accessible for managing and updating and maintaining system data accuracy.Thus the integration of firebase is that enhances overall system Security, efficiency and ease of user management.

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The UrbanGrid platform system follows a three-tier Client-side architecture that segragates the application into distinct functional layers,where each is responsible for having an specific role in the overall system operations. Since UrbanGrid is a developed as a frontend-only web application uaing HTML, CSS and JavaScript, the architecture has been designed to be lightweight, modular, and browser-independent. The System does not relu on any kind of server, backend framework, making it fast, portable, and easy to deploy.

This Urban-Grid System complete architecture is consist of four components: the user(client)Layers, the Presentation Layers, the Application (Logic Layer) and the Data Source/Static Content Layers. Each layers that communicates with the one directly below it in a sequential, top-down flow of data and iteraction

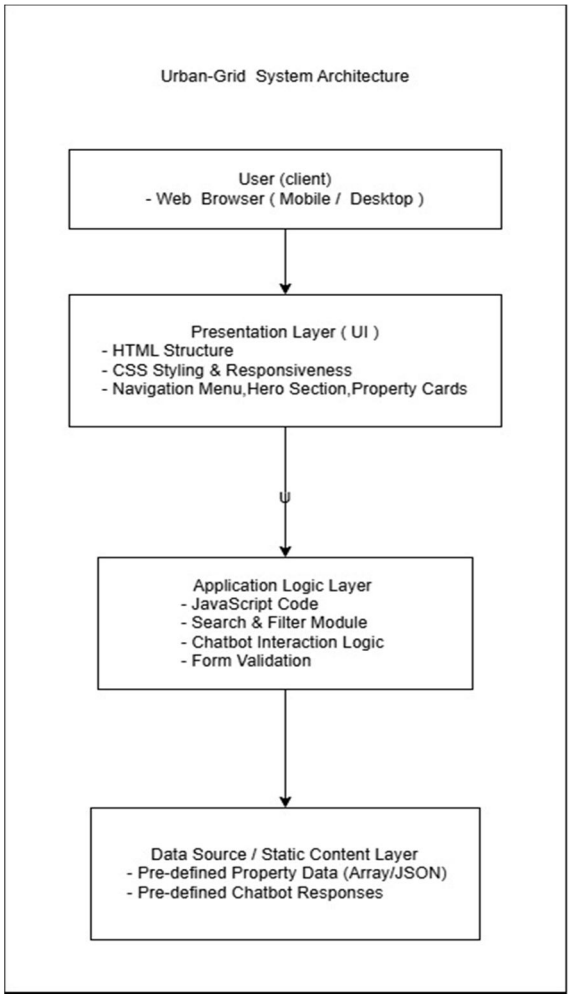


Fig. 1 UrbanGrid - Flow of Architecture

The system architecture of UrbanGrid consists of a user interface, backend server, and a centralized database. The user interacts with the system through a web interface, which sends requests to the backend server. The backend processes the data and communicates with the database to store and retrieve information. The system also includes a construction tracking module that provides real-time updates. This architecture ensures efficient data flow, scalability, and improved system performance.

A. User(client) Layer

It's the topmost part of the UrbanGrig system is simply the **person using the website.** This could be anyone — a property buyer looking for a home, a builder tracking construction progress, a real estate agent managing listings, or an administrator overseeing the platform. To use UrbanGrid, the person just needs to open a web browser like Google Chrome, Firefox, Microsoft Edge, or Safari on their phone, tablet, or computer — nothing else is needed.

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This layer does not do any technical work on its own. It is simply the starting point — the place where the user sees the website and begins interacting with it. When a user clicks a button, fills a form, searches for a property, or types a question in the chatbot, the system below this layer takes over and handles everything.

One of the biggest advantages of this design is that users do not need to install any app or software. As long as they have a browser, they can access UrbanGrid from anywhere, on any device.

B. Presentation Layer(UI Layer)

This is the Layer that user can actually sees on their screen (display) – the visual face of the UrbanGrid website.Everthing that is related to how the website works looks, feels, and organized is handled here uasing two technologies: HTML and CSS3.

HTML is used to build the basic structure of each page — like the skeleton of a building. It defines where the navigation bar goes, where property cards appear, where forms are placed, and how content is organized from top to bottom on the page.

CSS is used to make everything look attractive and professional. It adds colors, fonts, spacing, animations, and makes sure the website looks good whether you are viewing it on a large desktop screen or a small mobile phone screen.

The main things built in this layer include:

1) Navigation Bar: The menu at the top of every page that lets users jump to different sections like Home, Properties, Projects, and Contact.
2) Property Cards: Neat, organized cards that show each property's photo, location, price, and availability in a clean and easy-to-read format.
3) Construction Progress Section: A visual section showing how far along a construction project is — for example, 40% complete or fully ready.
4) Chatbot Widget: A small chat icon that floats on every page and opens a chat window when clicked, allowing users to ask questions and get instant replies.

C. Application Logic Layer

This is the brain of the website — the layer that makes everything actually work. It is built entirely using JavaScript, which runs directly inside the browser and handles everything that happens when a user interacts with the website. Whenever a user does something — clicks a button, types in the search box, submits a form, or chats with the bot — this layer picks it up, figures out what to do, and sends the result back to the screen instantly.

1) JavaScript Core Engine: Manages all user actions and updates page content dynamically without reloading the page.
2) Search and Filter Module**:** Allows users to search and filter properties by location, type, or price range with instant live results.
3) Chatbot Interaction Logic: Matches user input with pre-written keywords and returns the most relevant response for common property-related queries.

D. Data Source / Static Content Layer

This is the bottom layer of the system — think of it as the website's memory or storage room. Since UrbanGrid is a frontend-only website with no real database or server, all the information the website uses is stored directly inside the code using JavaScript Arrays and JSON files.

There are two main types of data stored here:

1) Property Data (Array/JSON): All the property listings shown on the website are stored as organized data objects in JavaScript. Each property has details like its name, type (residential or commercial), location, price, how much construction is complete, and an image. When a user browses or filters properties, the website reads from this stored data and displays the matching results on screen instantly.
2) Chatbot Responses: The chatbot's replies are also stored here as a simple list of questions and answers. When the chatbot receives a message from the user, it looks through this list, finds the best matching answer, and displays it in the chat window.The biggest advantage of storing data this way is speed — since there is no server involved, the website responds instantly without any delays caused by internet requests. It also means the website can work even in areas with slow or limited internet connectivity.

In the future, this layer can be upgraded by connecting UrbanGrid to a real database like MySQL, MongoDB, or Firebase**,** which will allow property data to be added, edited, and updated live by administrators without touching the code.

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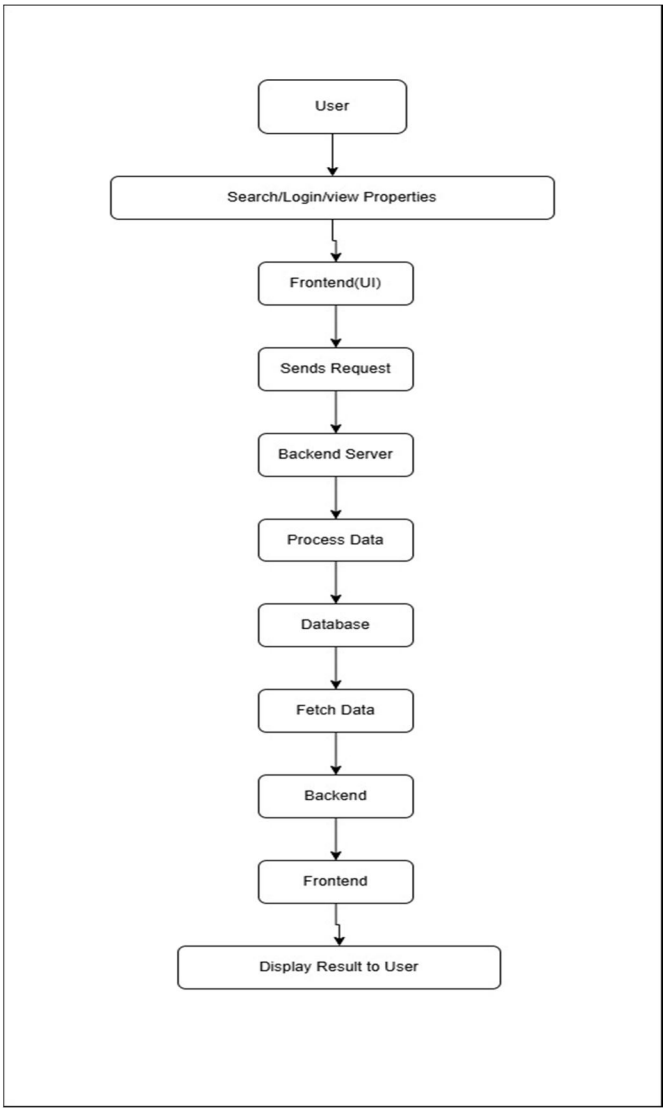


Fig. 1 UrbanGrid - Model Architecture Diagram

The data flow originates at the User node, which represents any individual accessing the UrbanGrid platform through a web browser. The user serves as the primary source of input in the system and may hold any role such as property buyer, builder, contractor, or administrator.The integration of onstruction tracking s a significant improvement over existing real estate systems. Users can monitor the progress of construction projects, view updates, and stay informed about project timelines. This feature enhances trust and transparency, as users are able to verify the status of properties before making decisions. The user's input is first received and captured by the Frontend layer, which constitutes the visible interface of the application developed using HTML5, CSS3, and JavaScript. The frontend is responsible for rendering all UI components and collecting user inputs before forwarding them to the backend for processing.

Upon receiving the user's input, the frontend formulates and transmits a structured request to the backend server. This request encapsulates the user's action — such as a search query, login credentials, or a filter selection — and is sent via standard HTTP/HTTPS communication protocols. The backend server receives the incoming request from the frontend and acts as the central processing unit of the system. It interprets the nature of the request, applies the appropriate business logic, and determines the type of database operation required to fulfill the user's query. The backend server receives the incoming request from the frontend and acts as the central processing unit of the system. It interprets the nature of the request, applies the appropriate business logic, and determines the type of database operation required to fulfill the user's query.

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At this stage, the backend executes the necessary data processing operations, including input sanitization, logic evaluation, and query construction. The processed request is then translated into a structured database query that is forwarded to the data storage layer for execution. The database layer serves as the permanent storage repository for all system data, including property listings, user account information, construction progress records, and enquiry details. Upon receiving the query from the backend, the database performs a search operation across its records and retrieves the most relevant matching data. Following the successful execution of the database query, the retrieved data is fetched and returned to the backend server. This fetched dataset contains the specific records that correspond to the user's original request and is passed back for formatting and preparation.

The backend receives the fetched data from the database and performs the necessary formatting, filtering, and structuring operations to prepare a clean and organized response. The formatted data is then transmitted back to the frontend layer for visual rendering. In the final step of the data flow, the processed and rendered output is displayed to the user on their screen. The user is presented with the result of their original interaction — such as a filtered list of properties, a successful login confirmation, or a real-time construction status update

V. RESULT

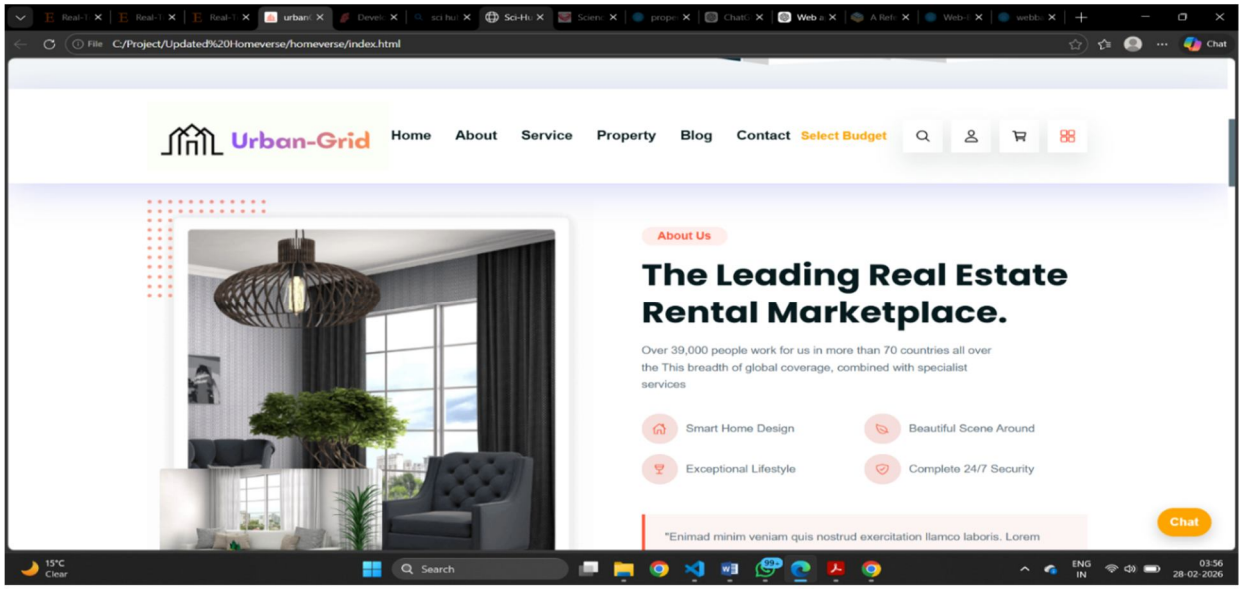


Fig. 3 UrbanGrid - Cutomers WebPage Dashboard

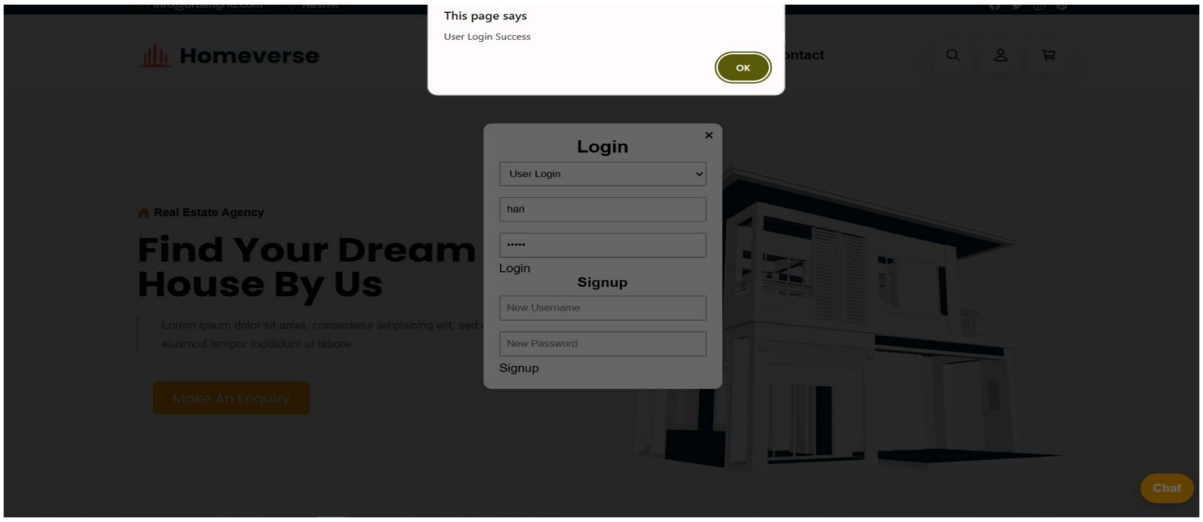


Fig. 4 UrbanGrid – Login Successful Page

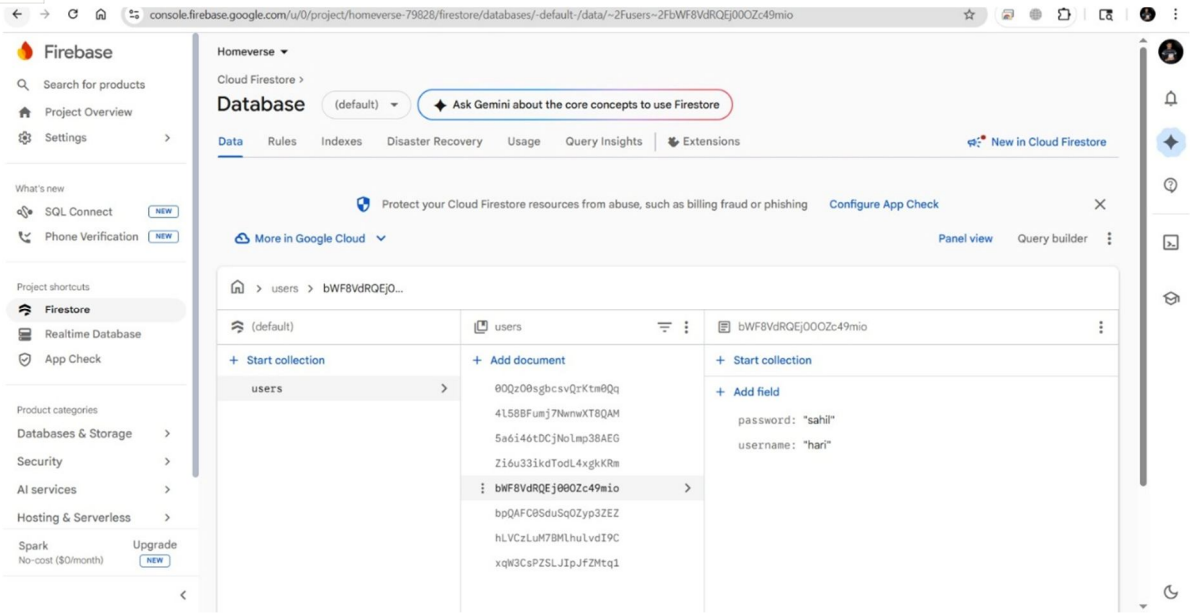


Fig. 5 UrbanGrid – Firebase Connectivity- Cutomers Login Entries

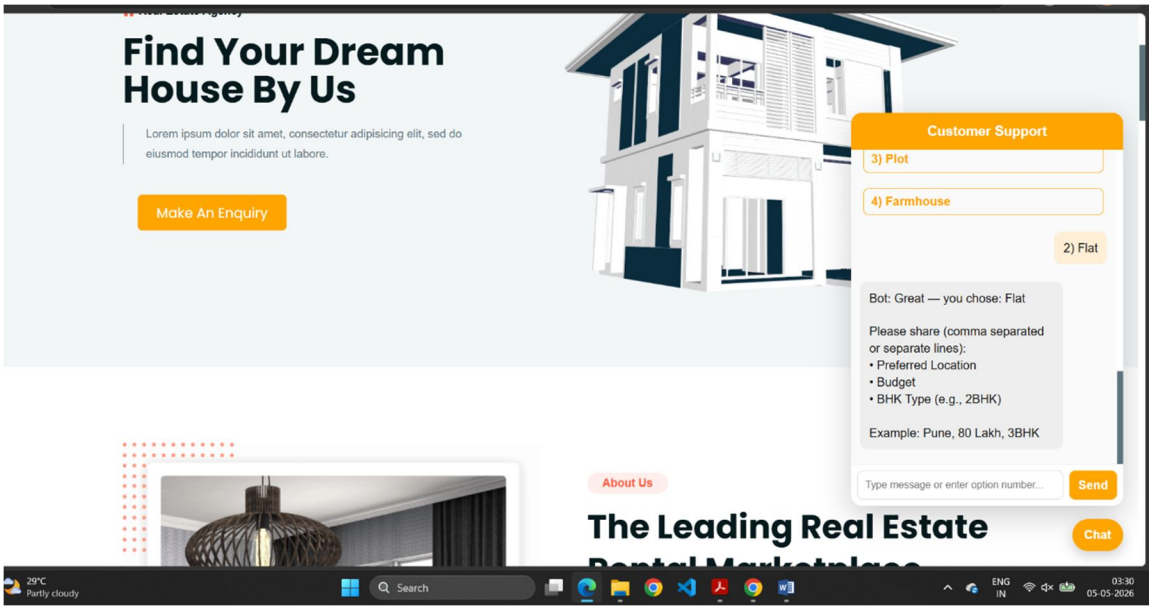


Fig. 6 UrbanGrid –Chatbot Working

VI. CONCLUSION & FUTURE SCOPE

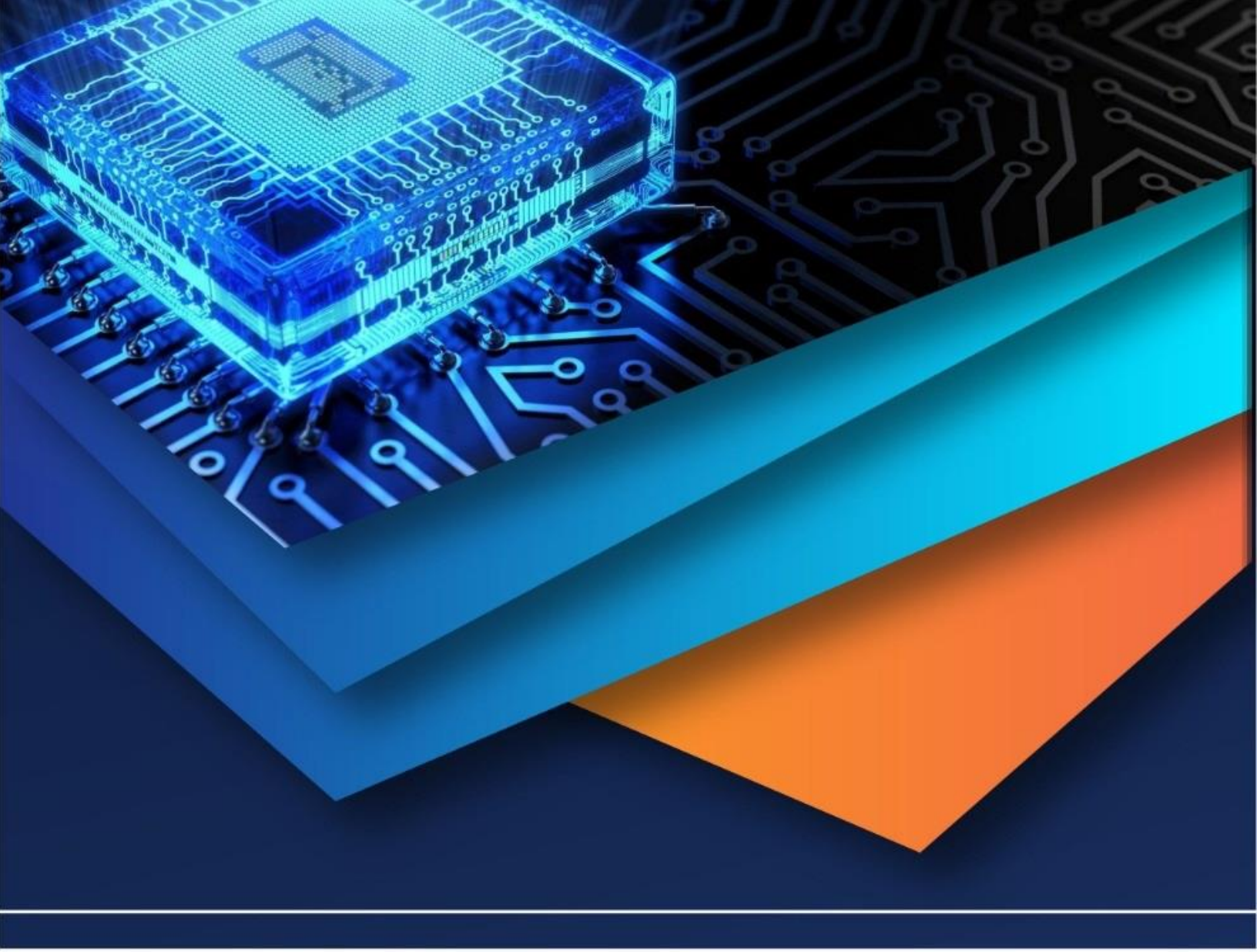
Overall this survey demonstrate the need of digital platform in real-estate plays a major role to store the data digitally, or can also have a progress report of contruction sites, this web application is successfully developed as a responsive and interactive web platform using HTML, CSS, JavaScript. nd a rule-based chatbot for automated user assistance. The three-tier client-side architecture ensured a modular, lightweight, and browser-independent design that performs efficiently across all devices and platforms without requiring any backend infrastructure or complex server-side processing.

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