

**International Journal of  
Engineering Research and Science & Technology**



**ISSN : 2319-5991**

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## Roomie Finder smart Roommate and Rental Space Matching Platform with Budget Filters and Compatibility Score

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### Abstract:

This project introduces a user-friendly house rental platform designed to enhance the property search process. The platform features a budget filter that allows users to easily find rental properties within their financial limits, and compatibility scores, which recommend properties based on personal preferences like location, amenities, and proximity to services. These smart features help renters discover homes that align with both their budget and lifestyle needs. The platform offers a seamless user experience, enabling landlords to manage property listings while renters can browse, apply filters, and interact with listings effortlessly. By incorporating budget constraints and personalized recommendations, the system makes the rental process more efficient, accessible, and tailored to user preferences.

**Keywords:** House rental platform, budget filter, compatibility scores, rental listings, landlords, renters, property search, personalized recommendations, location, Search facility.

### Introduction

The commercial real estate industry has been progressing slowly in innovating its core business processes, facing an array of challenges. Currently, commercial brokers and other intermediary entities continue to grapple with outdated technologies, data sharing mechanisms, inefficient cash flow management, and real-time performance data issues. These problems collectively result in collusion among tenants, landlords, and investors, consequently yielding adverse impacts [1]. With the development of the traditional real estate market, many problems have gradually been exposed, such as a lack of transaction transparency, a lack of transparency in intermediary services, frequent leakage of user privacy, and limited rights [2]. However, the

rapid development of the Internet at the beginning of the 21st Century has brought opportunities. Online rental models, with the advancement of technology and the popularity of the Internet, have rapidly risen and achieved significant growth in the past 10 to 15 years. It has a large enough list of properties, and users can freely change the prices of the properties [3]. Although online rental platforms leverage the convenience of the Internet and mobile apps, providing landlords and tenants with a more-convenient and -efficient rental experience, there are still problems with third-party organizations and personal privacy protection. The real estate industry faces multiple challenges including complex, time consuming, and security-threatened property registration procedures. These problems can lead to high transaction costs, low efficiency, and even errors at times [4,5]. The control of transaction data by intermediary agencies makes the transaction process opaque, and end-users usually have limited access to this kind of information [6]. Intermediaries may control the market and may even monopolize the housing rental market [7]. To solve these problems, new technological means must be sought to improve transaction efficiency and security [8]. Blockchain technology is recognized as a pivotal component of the industry 4.0 paradigm. It plays a crucial role in enhancing transparency in land registration and resource management, effectively mitigating instances of fraud and unlawful land seizures [9,10]. Forward-thinking companies are exploring the application of blockchain technology in the real estate sector. For instance, aassio is a blockchain-based platform that enables individuals to easily invest in, hold, purchase, or sell real estate with other cryptocurrencies or crypto assets. Furthermore, AgentMile aims to become the world's first decentralized commercial real estate leasing platform driven by artificial intelligence (AI), and Properbuz plans to decentralize the USD 217 trillion global real estate market through the development of a blockchain-based decentralized protocol.

## **Methodology**

The interval pricing auction is an innovative method for property auctioning, incorporating the strengths of both the double-auction and sealed auction. The implementation of the double-auction on blockchain has provided buyers and sellers with a fair competitive environment, where all transaction records are permanently stored on the blockchain, ensuring transaction transparency and traceability. Correspondingly, sealed auctions achieve information symmetry by executing on the blockchain, protecting the confidentiality of bids, and publicly recording transaction results on the blockchain to ensure their credibility and auditability. Figure 1 depicts a blockchain-based range price auction model, which primarily consists of the landlord (i.e.,

the seller), the tenant (i.e., the buyer), and the Ethereum smart contract. The landlord's role is to announce when the auction will be open to all interested bidders. Moreover, the provided information includes the auction start time, end time, minimum price, maximum price, deposit amount, and threshold for refunding the deposit. The landlord is also responsible for initiating the auction contract and deploying it on the blockchain network. Potential tenants participate in the auction by submitting a deposit at the beginning of the auction. Eligible tenants compete with each other through range bidding until the auction concludes. Buyers evaluate each other based on necessary credentials, such as their qualifications and transaction record history. Smart contracts are coded using Solidity 0.8.0 within an open-source tool called Remix. The Remix IDE supports the deployment, debugging, and testing of Ethereum contracts. The contracts within this framework are designed to cater to open-range-price auctions

### Algorithm 1:

Algorithm 1 outlines the detailed information that the landlord must provide as input to initiate the auction process. This includes the direct link to the file hashes stored in a decentralized storage system. This step is exclusively executed by the landlord's address. Additionally, the provided information comprises the auction's start time, end time, minimum price, maximum price, deposit amount, and time thresholds for refunding the deposit: 30 min before the auction, tenants can fully withdraw the deposit, and 10 min before the auction, tenants can withdraw 50% of the deposit. Subsequently, the tenants in the network are notified to participate

```

Input: StartTime, ndTime, minimumPrice, maximumPrice, deposit,
         refundThreshold1, refundThreshold2
1 if EA = landlord's EA then
2   | Allow the input to be added as a valid transaction.
3   | Notify the sellers that they can participate in the auction.
4   | Set the leading bid to the pre-auction price.
5 end
6 else
7   | Do not accept transactions from unauthorized EA.
8 end

```

### Data Simulation

During our auction testing phase, we simulated ten tenants, each assigned a range of maximum and minimum bid amounts they were willing to pay (The unit we used in this process is gas). Figure.

Tenant	Min Bid Amount	Max Bid Amount
Tenant 1	124294919847367000	165781019886771000
Tenant 2	145010739821928000	186442379771051000
Tenant 3	198883822570780000	240317952273025000
Tenant 4	116015563166288000	157422005857052000
Tenant 5	116015563166288000	145010739821928000
Tenant 6	227847640056260000	248561061879556000
Tenant 7	186358925410434000	198782853771130000
Tenant 8	103532736339130000	124258139097542000
Tenant 9	132542015037378000	136683953007296000
Tenant 10	116015563166288000	124258139097542000

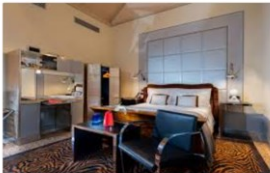
**Figure:** The maximum and minimum bid amount each tenant is willing to pay

The peer-to-peer network operates under normal conditions, with supply and demand for block space in an equilibrium state. Furthermore, gas consumption for each function was calculated in accordance with the specifications outlined in the Ethereum Yellow Paper. Furthermore, we considered the gas fees paid by both the landlord and tenants throughout the auction process. In the Ethereum network, every operation requires the payment of gas fees, such as executing and deploying smart contracts. Consequently, every line of code in Solidity incurs a certain amount of gas cost. There are two primary components to consider: execution cost and transaction cost. Ethereum gas is a unit used to measure the computational workload required for transaction execution.

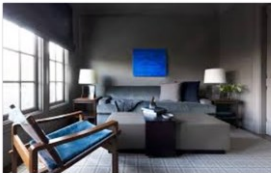
### Rental

Live in your dream house


Apartment - Recommended for You.



**₹12000**  
NICE PLACE TO LIVE N...



**₹11000**  
NICE AND CLEAN APPAR...



**₹11000**  
NICE AND CLEAN PLACE...

The screenshot shows a 'Sign up' form with the following fields and values:

- Name: rithvik
- Email: user@host.com
- Location: alambagh
- City: lucknow
- State: uttarpradesh
- Phone Number: (empty)

The user profile page for 'rithvik RENTAL USER' includes:

- Navigation: Overview, Account Settings, Tasks, Help
- Statistics: 0 ROOMS POSTED, 0 HOUSES POSTED, 0 REPORTS
- About rithvik: Authenticated user of the Rental. Have permission to post ads on the site.
- Buttons: POST AD FOR APARTMENT, POST AD FOR HOUSE

The search interface includes:

- Search bar: Search here... (House selected) GO!
- Filter: ALL, Type, Price, Location
- Popular locations: Mumbai, Delhi, Bangalore
- Trending locations: Hyderabad, Bhubaneswar, Chandigarh
- POPULAR TAGS: Delhi, Mumbai, 2BHK, 3BHK, Bangalore, Hall, 5K, Non AC, Family, AC, Flat, Near me, House, Room, Clean, Room

## Conclusion

The development of a "Roommate Allocation System with AI Integration" represents a significant advancement in addressing the challenges faced by individuals seeking particularly in student compatible roommates, and shared housing environments. By leveraging artificial intelligence, this system provides a data-driven approach to matching potential roommates based on compatibility factors such as lifestyle preferences, personality traits, and individual habits. Through this research, it has been demonstrated that traditional methods of roommate finding are often inadequate, leading to mismatches that can result in conflicts and

dissatisfaction. The AI-driven system not only enhances the accuracy of roommate recommendations but also streamlines the search process, making it more efficient and user-friendly. Furthermore, the emphasis on user privacy and data security within the system ensures that participants can engage with confidence, fostering a safe environment for users to find their ideal living arrangements. Ultimately, the implementation of an AI-integrated roommate allocation system holds the potential to revolutionize the way individuals approach shared living, paving the way for more harmonious cohabitation experiences and enhancing the overall quality of life for students and young professionals alike. This research not only highlights the capabilities of AI in personalizing the roommate search but also sets the groundwork for future innovations in smart living solutions.

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