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Uni-Rent: A Mobile System for Student Housing

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Abstract
Undergraduate and graduate students (whether international or domestic) often encounter various settlement difficulties when enrolling and moving from one place of residence to another, which has become a prominent issue. This work serves students and landlords in Egypt. Getting appropriate housing close to their universities is frequently difficult for students. Meanwhile, property owners also encounter challenges in efficiently reaching their intended audience. To address these issues, we propose the "UniRent" a mobile application designed to streamline the process of finding rental properties for students while enabling owners to easily showcase their listings. This work is a mobile application since in today's world, almost everyone has a smartphone, and hence, a smartphone can be utilized efficiently to supply accommodation facilities to the students. The primary objective is to provide students with a convenient platform to search for rental properties. Furthermore, it helps property owners effectively market their properties to a target audience of students. What's more, UniRent allows former students to sell their furniture and appliances. This benefits the new students, as they can get what they need at a low cost. In addition to the essential functions for the student/the owner, we implemented a variety of advanced functions, such as blocking, reviews and ratings for rental properties and landlords, allowing users to save their favorite properties, and an in-app messaging system.

Keywords: Mobile applications, students' accommodations, reviews and ratings, in-app messaging, user authentication.

1. Introduction

Students (international or local) suffer from various settlement difficulties while transferring from one accommodation to another. Getting an appropriate accommodation is the most difficult one [1]. While numerous investigations have been performed on the accommodation & its impacts on the students' achievements in numerous Western countries, fewer investigations were performed in numerous countries, such as in Malaysian universities [1], the Philippines, India, and Egypt, where getting an accommodation is hard & takes time [2]. Additionally, there exists a shortage of off-campus housing in most college towns. Moreover, in many nations such as the UK and Ireland, student housing has become financialized, leading to inappropriate and expensive housing that has a detrimental impact on students' health and academic performance. This forced them to look far and wide for less expensive options [3], [4]. Students require more amenities, such as facilities for fire safety

considerations, which are now considered very crucial [5]. Properties and individuals are highly distressed by fire breakouts. If the fire gets out of control, it can be catastrophic [5].
Students often have difficulty getting appropriate accommodation near their university. A significant amount of brokerage is ultimately paid by some students [4]. At the same time, property owners struggle to connect with their target market. For both the landlord & tenants, there exist numerous issues, such as:

- Restricted access to rental listings: Students see it as challenging to locate rental properties close to their university as a consequence of restricted access to thorough listings.
- Inefficient property seeking: Students see the existing property search methods to be time-consuming & ineffective.
- Lack of Transparency: Students are concerned about the rental market's transparency since they see it as hard to assess the creditworthiness of landlords.
- Communication Challenges: There's a shortage of effective communication channels between property owners & students for scheduling viewings & inquiries.
- Fragmented Community Engagement: The missing of a centralized platform resulted in fragmented housing community engagement among students.
- Geographical accessibility: identifying how far a property is from the university may be hard for students.
- Underutilized Owner Resources: Because of landlords' inability to adequately advertise their accommodations to students, properties are underutilized.
- This work is to provide tenants with an easy, comprehensive system to find rental properties near the university. At the same time, it helps property owners market their properties to a student target audience. In other words, it tackles all the prior issues as follows:
- Simplify Property seeking: offer a user-friendly platform for students to streamline getting rental properties close to their university.
- Streamline the renting procedure: Promote consistent interaction between landlords & students.
- Encourage openness by employing a rating & review mechanism to guarantee reliability & transparency in the rental market.
- Boosted user experience: offer sophisticated search capabilities, map integration, and convenient communication procedures to boost the overall user experience.
- Support Brokerage Efficiency: Enables landlords to effectively advertise their accommodations to the student population, which optimizes occupancy ratios.
- Expand Access: Allow rental listings & housing resources to be more accessible to students from diverse geographic locations & backgrounds.
- Build Value: Offer a valuable service that simplifies the student housing procedure, minimizes effort & time, and advances to a better overall living atmosphere.
- The work is structured as follows. The related work is in Section 2. Section 3 depicts the structure of this work. Section 4 addresses the key functions of this work. Section 5 focuses on the tools used to create the work. Explaining the proposed system is in Section 6. The discussion is addressed in Section 7. The last section finishes up the article and highlights the potential work.

2. Related Work

Student accommodation plays a crucial role in a student's life. Previous investigations proved that accommodation provides a crucial role in the

physiological requirements of the students, and that is viewed as a factor for the students' good learning, health, and achievement [1].

There is a lack of research analyzing the experience of insecure housing and homelessness for youthful individuals looking for higher education at universities in spite of the progressively critical situation [6]. Kornbluh et al. [7] investigated the relation between housing instability and mental health and academic results. The large ratios of unsafe housing & homelessness among college students have ended up a public health concern inside the USA. Students who had unsafe housing & homelessness were most likely to get small GPAs and bad mental health results. Consequences encompass the requirement for housing strategies & extra financial aid in an exertion to reinforce mental well-being and students' scholarly execution. Young individuals in higher education are vulnerable to unsafe housing & homelessness due to structural inequalities like precarious work, nourishment insecurity, little income, unstable income, inaccessible income, and an excessively expensive housing market. Unsafe housing & homelessness affect students' scholastic accomplishment, engagement, and prosperity [6]-[7].

Affordable housing can influence students' educational results in a variety of ways. Affordable and stable housing can enhance students' opportunities for educational achievement and complement the educators' work, resulting in enhanced accomplishment. Furthermore, it can optimize the psychological well-being of these students by decreasing mobility and providing a safe, nurturing living environment [8].

Briton's study [9] depicted that housing insecurity was a statistically crucial indicator of scholastic accomplishment. Particularly, hous¬ing insecurity is correlated with an 8 to 12 percentage point decrease in the likelihood of later earning a degree or attending school. In addition, in the short term, housing insecurity is correlated with a smaller mean GPA, a smaller likelihood of getting at least a 2.0 GPA, and a larger likelihood of being a part-time student. This depicts that housing insecurity influences students' accomplishments in many ways [9]. Consignado et al. [2] proposed an Android mobile application that employs Google Maps. It provided significant information, such as the contact details, as well as a filtering feature.

Every college student is aware of how challenging it is to get housing in dorms because there aren't enough spots. The same is true for Jamia Millia Islamia University and Jamia Hamdard University. Finding a suitable room and apartment in the area surrounding the aforementioned universities is a challenge for almost all students [4]. Malik et al. [4] introduced Roomate4U, a mobile and web application that offers JMI and Jamia Hamdard University students housing and roommate services. It serves as a conduit between the students at the aforementioned universities and the apartment owners in the surrounding areas. Only students from the aforementioned universities are able to access the system and locate accommodations and roommates with ease. Additionally, it offered information about the nearby PGs, canteens, and Xerox locations for these universities.

The work of Penmetsa [10] allows only for browsing, searching, and creating ads for apartments. It only provides a subset of our work, the same as the work of Chye

and Mubin [11]. Similarly, Hamzah et al. [12] offered only searching for a boarding house (a firm that offers accommodation renting services for a fee, which can be paid annually or monthly) and missed many advanced tools that we provide.

3. System Architecture

The system is divided into two main different user groups or roles according to their access authority and permissions:

A. Admin User: The admin user is the creator and owner of the system and can manage the entire system configuration as well as registration requests for ordinary users, account suspension, and deletion of ordinary users.

B. Normal User: Normal users are classified into two types of normal users' accounts:

1) Property Owner.
2) Student.

These normal users have different permissions on system functions:

3.1 Administrator User Options

- The administrator can create extra administrator user accounts.
- The administrator can build regular user accounts.
- The administrator manages users' activation in the sign-up process for the normal users in the verification step.
- The administrator can deny or endorse the sign-up request.
- The administrator can suspend/deactivate users' accounts.
- The administrator can delete user accounts.

3.2 Regular User Options

- Regular users can register an account by selecting the user type (student or owner) and filling in the required information.
- Regular users can log in to the system after approving the registration request.
- Regular users can view their profile.
- Regular users can update the information.
- Regular users can change the password.
- Regular users can send messages.
- Owners can edit property details.
- Student users can utilize the search function to find housing.
- Student users can utilize the filtering feature to customize search results.
- Student users can select housing and view detailed information.
- Student users can add housing to their favorites list.
- Student users can communicate with the owner through messaging.
- Normal user's student user type can rate the property owner.
- Normal users can view the rating of the property owner.
- All the users can log out.

Table 1. Allowed permissions for the property owner and the student

System Functions	Property Owner	Student User
Sign-up	T	T
Login	T	T
Edit user	T	T
Edit account	T	T
View profile	T	T
Logout	T	T
Delete user account	T	T
Create profile/bio	T	T
Edit profile/bio	T	T
List/Post properties	T	
Edit posted properties	T	
View properties list		T
Select and view property		T
Send message request		T
Add properties to favorite list		T
Use chat dialog	T	T
Use search tool		T
Use filter tool		T
View owner/rating	T	T
Rate owner		T

4. The main functions of the proposed system

This system has the following key functions:

1. User Registration and Authentication:
   Once opening the app and selecting the registration:
   - Let users (both property owners & students) build an account.
   - Authenticate users throughout the sign-in procedure to guarantee privacy & security.
2. Property Listing Management:
   - Empowers property proprietors to include, alter, and oversee property postings accessible for rent.
   - Involve fields such as property demonstration, contact data, location, and rental cost.
   - Incorporate the accessibility dates of the rental properties.
   - Upload photos of the rental properties.
3. Advanced Filtering and Search:
   Supply customers with sophisticated search capabilities to filter accommodations, rental charge range, quantity of beds/rooms, proximity to universities, and amenities.
4. Favorites List:
   Enable the users to save the favorite items for rapid comparison and access.
5. In-App Messaging Mechanism:
   Enables users (owners & students) to communicate directly through an in-app messaging mechanism to arrange viewings, inquire, and negotiate. There are numerous benefits for landlords who invest in communicating with nearby educational institutions. Universities may help landlords make wise investment decisions by giving insightful information on preferable amenities, occupancy ratios, and student housing patterns.

Proactive communication, such as listing a property on the official student housing portal or at on-campus events, can promote potential long-term goodwill. Having ties to universities can guarantee that the property stands out in the student rental market and pave the path for a steady flow of reliable students.

6. Review and Rating System:
   Establish a system that enables students to assess and rate rental properties and their owners so as to boost their transparency and trust in the platform.
7. Notification System:
   Send users notifications of new property listings, messages from other users, and updates relevant to their preferences.
8. User Profile Management:
   Permits users to control their profiles, involving altering personal data, preferences, and profile photos.
9. Admin Panel:
   - Offers an admin dashboard to control users, notifications, reviews, listings, and the platform tasks.
   - Grants administrators the ability to prohibit users who violate policies.
10. Support and Help Desk:
    Offer users access to assistance features so they can obtain assistance with any inquiries, concerns, or issues.
11. Incorporate external features like third-party APIs for features related to mapping & location.
12. Reporting: A variety of reports can be generated in the proposed system.

5. The Used Technology

We employed a variety of software tools:

- Visual Studio for the development [13].
- Android Studio for the development [14].
- Flutter for reusing the code across various operating systems like Android and iOS. This is to make the system interact directly with the platform services [15].
- Git (/git/) for tracking versions of files [16].
- Python language for its broad applicability and readability [17].
- Django for designing & swift development [18].
- DRF for creating the web APIs in Django and efficient authentication [19].
- GitHub for providing a centralized location in order to control the application and review it [20].
- Automation utilities & visual interface supplied by cPanel [21].
- MySQL for dealing with the database [22].
- Postman for simplifying the creating, documenting, and testing of APIs [23].
- Firebase Cloud Messaging for sending messages to users on various platforms, such as Android [24].
- JavaScript for enabling dynamic behavior and interactivity in web pages [25].
- CSS for depicting the presentation of an HTML document [26].
- HTML for building the web application and its pages [27].

6. Navigating the proposed mobile application

Introduction Screens: There are 3 consecutive screens to illustrate the main idea of this system (Figure 1).

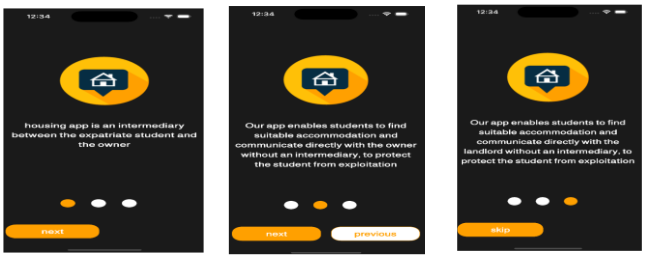

Figure 1. Introduction screens

The Login: When the user skips the introductory screen, this screen appears and allows him to log in to the application. For each field, we executed suitable validation (Figure 2).

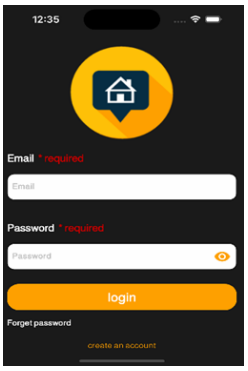

Figure 2. The Login screen

Changing the password: when he presses the "Forgot Password key". It encompasses 3 steps: 1) Type his email. 2) Enter the emailed confirmation code. 3) Continue to the webpage with the novel password (Figure 3).

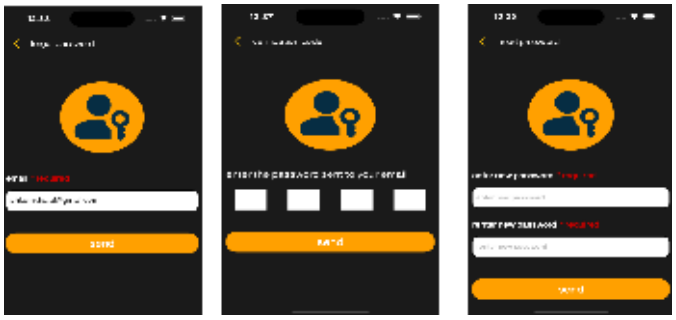

Figure 3. Resetting the password screens

The registration: This interface appears once pressing the "Create Account" key, allowing building a novel account with the necessary validation for every field (Figure 4).

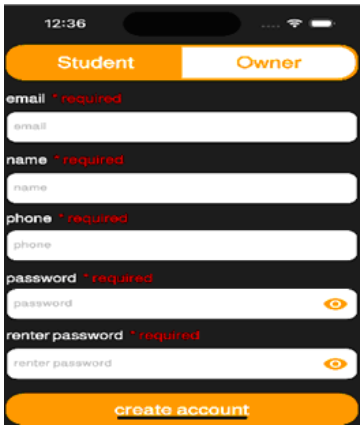

Figure 4. The register screen

The user is necessitated to verify his registration after completing all the fields and pressing the "Create Account" key, besides, upload his national ID& faculty ID if he is a student (Figure 5).

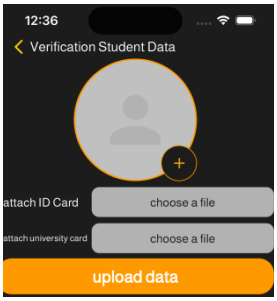

Figure 5. The verification screen for the student

If he is an owner, he must upload his national ID as well as the contract of the property he wants to add to the system (Figure 6).

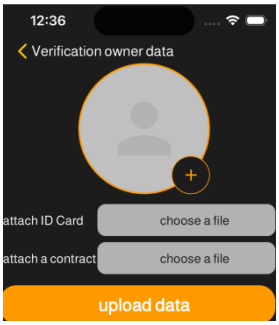

Figure 6. The verification screen for the item owner

List of properties: After a user successfully logs in, the main screen appears, showing the properties that have been loaded and displaying their data (Figure 7). If there aren't items, a screen will indicate this.

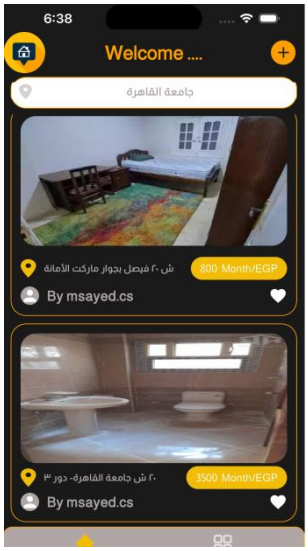

Figure 7. List of properties screen

Add property: Pressing the Add key enables the user to include an item and displays it once the administrator approves it (Figure 8).

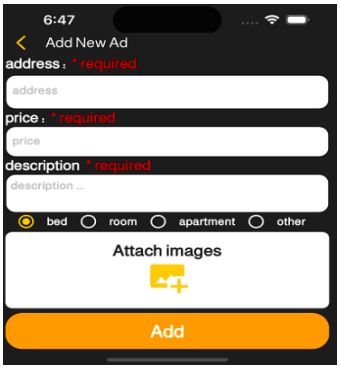

Figure 8. Add property screen

Add other items: This screen appears when the user clicks the Add icon; it enables the user to add a new item and displays it after the administrator approves it (Figure 9). This is because a user may need to sell his previously used furniture, griddles, pots, kettles, etc.

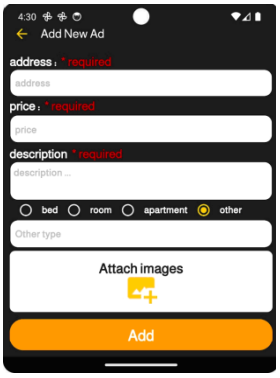

Figure 9. Add other items screen

The user then can view the items he added under “Approved” once the admin approves them (Figure 10). Additionally, he is able to see his declined and awaiting items.

Figure 10. View my other items screen

The user can then erase/alter his element (Figure 11).

Figure 11. Delete/Edit my other items screen

Blocking an owner/tenant: To enable a user to block an owner and vice versa. When a user clicks on the owner's name, the Review and Block Owner screen appears (Figure 12). Then, he can click on "block".

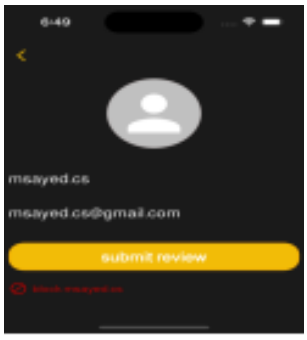

Figure 12. Disabling a user

Displaying the Disabled Users List:
When the user presses the "Blocked Users" tab, their list appears (Figure 13). Press on Unblock to enable. If there are no disabled users, a screen will open announcing this.

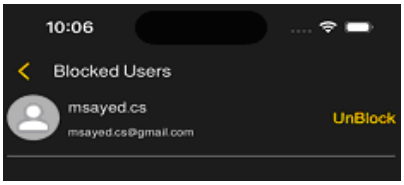

Figure 13. Blocked users screen

Displaying the **favorite accommodations:**
When the user presses the Favorites tab, the favorites that were included in the favorites appear. If there is no element, a page will show up telling the user this.
Reviewing the **property:** To empower the user to review the property. The reviewing screen opens once the user presses the item to view its details.
Reviewing an owner/renter: To empower the user to assess an owner/renter. When the user clicks on the project owner's name, the review owner interface appears (Figure 12). He can start his review by clicking "Submit Review".
Rating: A user can evaluate the user, landlord, or element by clicking on the "Submit Review" (Figure 14).

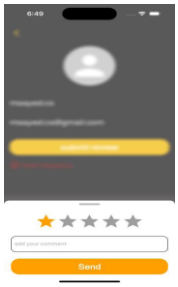

Figure 14. Rating an item, a user, or an owner

More: Permitting the user to show the remainder of the app's screens (Figure 15) when he presses on the "More" tab.

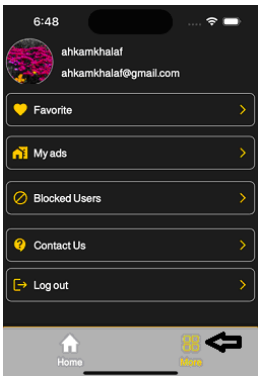

Figure 15. The More screen

Contact us: Filling out this form (Figure 16) enables the user to communicate with the management of the proposed system. It appears when the user clicks on the “Contact us” tab (Figure 15).

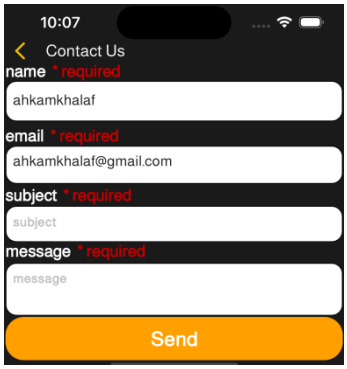

Figure 16. Contact us screen

A confirmation message indicating "message sent successfully" shows once the user presses the send key (Figure 17).

Figure 17. The confirmation message

Various reports can be built in the proposed system (Figure 18).

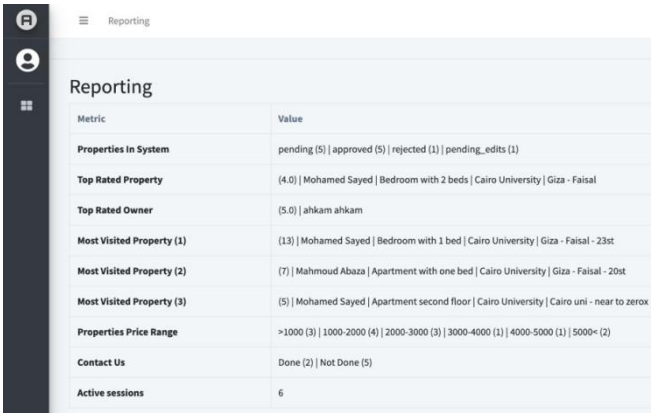

Figure 18. An example of reports

Chatting: The system provides chatting for many reasons, such as negotiating, water or power outages, etc.

7. Discussion

In the current educational environment, the great majority of students decide to continue their education after high school, and many of them must relocate to different governorates in order to achieve their academic objectives [11]. This phenomenon highlights how crucial it is to take accommodations into account for these students as they start their academic journey away from the comforts of their families [11].

In many countries, like Egypt, universities don't tackle finding accommodations for their students except for their own limited number of rooms that are not sufficient for all of their students. Another instance is employing the conventional approach for dealing with the students' accommodation staff, such as the accommodation center for the students in University of Utara Malaysia [1].

In many countries like Egypt, there are students from other governorates who study in universities in another governorate (too far from where they are originally from). This does not incorporate international students. These students need trusted applications to find suitable properties around the university. Meanwhile, owners want to advertise their properties and get appropriate renters. For both the students and landlords, we developed this work.

So, tenants can now use the proposed application to manage their bookings and receive support throughout the contract period. What's more, all the activities that were performed by the tenants now have their corresponding functions in this system. Furthermore, there is chatting between the landlord and the tenant for setting a meeting date, a problem in the property, etc.

Various works were advanced for this issue. However, they only offer a portion of our effort, such as browsing, seeking, generating advertising for flats, and communicating, which are permitted under Penmetsa's work [10]-[11]. In short, this work is a comprehensive system that benefits both landlords and tenants as it provides everything they both need, as follows:

- The system allows users to register for an account and authenticate users during the sign-up process.
- The system permits owners to include, edit, and control listings of available properties.
- The system offers sophisticated search capabilities to filter properties depending on distinctive criteria.
- The system allows users to save their favorite properties for quick access and comparison.
- The users can review and rate rental properties and property proprietors.
- Users are alerted of new property listings, hints from other users, and updates associated with their preferences.
- The system allows users to control their profiles, involving updating personal data and profile photos.
- The system offers an administrative dashboard for platform administrators to control reviews, notifications, listings, users, and the platform tasks.
- The system offers insights & analytics to the owners & properties, such as reviews & ratings.
- The system allows individuals to tailor preferences & configurations, including search filters and notification preferences.
- The system streamlines direct interactions between users (property owners and students) through an in-app messaging system.

As explained above, this work is a comprehensive system that, in addition to providing many complex tools not offered in previous works, facilitates direct communication between owners and students. For instance, all that Malik et al. [4] provides is just viewing

the apartments. Email verification, chat, reports, and other advanced features we offer are not available. Similarly, Hamzah et al. [12] offered only searching for a boarding house (a firm that offers accommodation renting services for a fee, which can be paid annually or monthly) and missed many advanced tools that we provide. Furthermore, we concentrated on user comfort & experience, yet research in this field remains sparse. Moreover, we took into account the protection of accounts while verifying users during the login process to ensure privacy and security, a feature absent in prior studies. While there are many online applications, they focus more on buying and selling apartments than on renting accommodation to students, such as [28]. Also, there are many web applications, but they are not free applications and are not focused on students, such as [29].

8. Conclusion and future work

This work serves students and landlords in Egypt, and it is the first system of its kind. It provides tenants with an easy, comprehensive system to find rental properties near the university. At the same time, it helps property owners market their properties to a student target audience. Also, the system allows alumni to sell their old furniture and appliances. In addition to the must-have features for students and property owners, we have developed a variety of advanced features such as blocking, reviews and ratings for rental properties and property owners, allowing users to save their favorite properties, and an in-app messaging system.

As a research direction, more services need to be added for the benefit of the user. We intend to communicate with educational institutions such as Cairo University to incorporate this system into their web applications. Furthermore, we intend to boost this work to make it compatible with various web browsers and devices to guarantee a seamless user experience across distinctive platforms. In addition, we will boost this work to be able to tackle a large quantity of concurrent users without performance degradation.

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CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflicts of interest related to the development of the study.

DATA AVAILABILITY

Data and code are available upon request from the corresponding author.