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An Improved Android-Based Real Estate App

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***Abstract*— In recent time, Android based applications are getting wider popularity and applicability across range of problem domains. However, literature investigation shows that most existing Real Estate Management Solutions are either web based or cloud based, and very few designed for Android platform. The existing Android based Real Estate Management Systems lack capacity to display property on map, and lack navigational support which could guide client to physical location of property. Consequently, this paper proposed and developed an improved Android based Real Estate Application, named AREA, for advertising/finding properties for sale or lease. The proposed system, AREA, was evaluated in comparison with two existing Android based Real Estate Management Systems, namely: Airbnb and Realista. Purposive sampling was used to select respondents who evaluated the three Apps in terms of Functionality, Usability, Content and Reliability. Evaluation results show that AREA achieved higher mean Functionality, Usability, and Reliability over Airbnb and Realista. However, Airbnb achieved higher mean Content over Realiata and AREA. Thus, the system is worthy of use as an improved Android based Real Estate Management Solution that provides better and easier way of advertising/finding properties.**

***Index Terms*— Mobile app; advertising properties; navigation support; property images**

I. INTRODUCTION

Android is a mobile operating system which is built based on modified version of Linux. Android OS is undoubtedly the fastest growing mobile operating system in the world [1]. According to Gartner [2] reports, by the end of 2016, over 430 million smartphones were sold with 81.7 percent running Android, 17.9 percent running IOS, 0.3 percent running Windows 10 Mobile and the other Operating Systems cover 0.1 percent. Android alone is more popular than the popular Microsoft Windows desktop operating system. In general, use of smartphones outnumber use of desktop computers. Android operating systems combines features of personal computer operating system with other features useful for mobile (or handheld) device, including: touchscreen, cellular, Bluetooth, Wi-Fi Protected Access, Wi-Fi, Global Positioning System (GPS), mobile navigation, video/picture cameras, speech recognition, voice recorder, music player, near field communication, infrared blaster, and finger print capture, among others.

Several cloud/web applications and few mobile Apps have been developed for Real Estate Management Services. These includes HAYBOL [3], Realista [4], Airbnb [5], and so on. However, the existing solutions have some limitations. For example, most of the Android based Real Estate Management Apps do not displays properties on map, and most do not provide navigational support which could guide prospective client to the physical location of the property [3, 6]. This paper proposed and developed an Android based Real Estates Application, named AREA, with improved features over existing Android based solutions by displaying all properties on map and providing navigational support that guides prospective clients to physical location of the property. The introduction of map and navigation in AREA achieved the following performance improvements. AREA is able to display all available properties on the map embedded within the application. It guides client to the direction of the physical location of property. It is able to display multiple Markers of all available properties on the map. In addition, clients can see all major buildings/structures around the target property such as Schools, Hospitals, Churches, Mosques, Highways, etc. The remaining of this paper is organizes as follows. Section II presents review of related works. Section III discusses methodology followed while conducting the study. Section IV presents the proposed system, The Section presents system's architecture of the proposed system, followed by results and discussion. Limitations are presented in Section V. The paper presents conclusion and future work in Section VI.

II. RELETED WORKS

The demand for real estate management service is on the rise. Frequently, people want to buy, sale or lease property. This suggest the need for automation of the real estate management services. Currently, there are good number of real estate management systems which are cloud or web based, but very few Android base. For examples, there is corporate real estate management software developed for the real estate industry [7]. It tracks client's interactions and automates workflows. It enables buying and selling agents to close more deals faster. In this solution, a home buyer fills out an online form requesting to see a property listed on the Agent's website. A signal will show up in the agent's dashboard and then automatically convert the form's data into contact for that buyer. Property manager is automatically alerted that an agent opened a new deal. Some benefits of this software to real estate professionals include enhanced visibility, reliable data across all corporate real estate functions, reduced costs of application/infrastructure support and maintenance, decreased vacancy rates and improved personnel efficiencies through automation of manual and duplicate processes [7].

Apartment managerXp [8] is another cloud base property management system that centers all the estate business in one system accessible anytime anywhere. It is lease management software that supports both landlord and tenant. It provides an effective way to track real estate for critical financial and reporting needs. It has many features that enable managers to update information dynamically and also allows owners and property managers to adapt to a wide range of contingencies that occur in managing property. It integrates with Accounts Receivable, and Accounts Payable system. Primary features of this system includes Recurring and manual tenant billing, processing of receipts, calculation of security deposits, Reporting of sales over-age billing, Processing revenue fees, assessing fees and interest, creating rent projections, among others [8]. Evaproperty.com [9] is a cloud base property management system that centers all estate businesses in one system and makes it accessible anytime, anywhere. It is a user-friendly, easy to use, fully interactive experience that efficiently manage all businesses functions for world class professional property management in one system. It is shown by Ibisola, Oni and Peter [7] as property management software which offers iPhone simplicity in design and function coupled with high powered application that offers the multi-tasking functionality at touch of button or click of a mouse. Evaproperty provides user with a free customizable marketing website where the user can list all his/her available properties, units, rentals, plus schedules. The website takes minute to launch and potential rentals can view and tour all available properties within the company portfolio. Within a minutes, the interior and exterior images of properties can be uploaded with details of features and benefit of available properties. This allows interested renters to make well informed decision [9].

Airbnb [5] is a website that offers exclusive accommodation in a house, apartment, boat, or room. It is free for host to create listing. The host decides how much to charge per night, per week or per month. Each listing allows host to promote properties through titles, descriptions, photographs with captions and host's profile where potential guests can get to know a bit about the host [5]. While Agoda.com [10] serves a variety of information about hotels needed by tourists, it only accepts payments by credit cards. Agoda shows names of hotels, their average users rating and prices for rooms. Clicking on a hotel takes a customer to a page where customer can have the option to see the hotel's policies and listing of its facilities as well as other useful information [10].

Realista [4] is Android based app developed to provide increased access to real estate on a global scale. The platform simplifies the process of uploading and advertising property by enabling agents to list from their apps directly to buyers and renters. This provides sellers with increased exposure of their property for free, whilst buyers and renters benefit by seeing more properties than ever before [4]. HAYBOL [3] is Android based Apartment Locator Application. It can be used to easily find apartments and boarding houses as well as to help owners promote their businesses [3]. Hosing.com [6] is a popular app for hunting a house. With the help of this app, user can post a flat for sale, find a new apartment to rent or buy, search for a hostel, and look up new localities. This app has detailed data and pictures of every property. User can filter and search specific details if needed [6].

Royce & Kinn, [13] reported/proposed PropertyGuru application as reliable and user friendly. Its' popular features include filtering of multiple categories ranging from nearest location to price. It provide newsfeed and bookmark functions, as well as notifications and alerts for nearby property and newly developed property. However, its major weakness is lack of real time navigation feature and lack of rating and review features. IProperty is another popular mobile app that provides huge amount of real estate information to users. IProperty provides detailed search interface that can search for real property using multiple categories of search, and can also search for nearby properties within a radius of 3KM proximity. It also provides newsfeed function that enables users to have access to news relating to property market. Some major weakness of IProperty include lack of GPS navigation function and lack of rating and review feature [14].

Another popular real estate management app is Zillow [15] [16], which is available for both Android and iOS devices. The app can display your house (or your name) on map, and allow people to access it with a single click. Notable advantage of the app is provision of new Video Walkthrough feature that provides buyers with more realistic view and allow sellers to create their own customized video walkthroughs. However, the app is labelled with a lots of fraudulent and fake listings.

HomeSnap [16], often called the Snapchat of real estate, is an app for real estate agents that sources information from the MLS listings, and allows agent to send private messages to clients, even when the clients' do not have the app on their devices. Moreover, the app provides incredibly effective location tracking mechanism. However, notable short coming of the app is lack of advanced filter options, and inability to display all properties on map.

III. METHODOLOGY

This section presents methodology followed in conducting the study. It starts with description of the software development methodology adapted, followed by description of system testing and evaluation procedure.

A. *Software Development*

The study adopted waterfall model in developing the proposed system [11]. The development spans across four phases, namely: Analysis, Design, Implementation and Testing. During the Analysis phase, requirements specifications were defined through structured interview with five (5) different estate agents and five (5) randomly selected properties owners in Yola, Nigeria. In addition, focused group discussion was held with twenty (20) students as prospective renters or buyers. Concept of the proposed system was first discussed followed by benefits that could be derived from it once developed. Deliberations were held on project scope, and potential issues were argued including the business requirements, functional requirements, and user preferences. At the end of the Analysis phase clear proposal of the new system was produced as deliverable. In design phase, the new system was transformed from concept to detailed design by adopting object-oriented concepts using unified modelling language UML tools, which has become a standard modeling language for objected oriented development [12]. All the requirements specifications defined and descriptions from Analysis phase were designed using Use Case diagrams, Activity diagrams, and Class diagrams. The system's architecture was also designed. At the implementation phase, the new system was built in Android Studio where the codes are written, and compiled into an operational application. Database and text files were also created based on the design specified in

previous phase. At testing phase, the resulting application was tested to verify working of all components and to ensure that the system meets the original requirement specifications. All errors discovered were corrected to ensure proper functioning of the resulting application. By the end of testing phase, a fully operational application was produced. The application, AREA, was used for performance evaluation described in the next subsection.

B. *System Evaluation*

Experiment was carried out for empirical evaluation of the proposed system, i.e., an improved Android based Real Estate Application (AREA), in comparison with two existing Android based Real Estate management Apps, namely Airbnb and Realista. Purposive sampling was used to select 30 respondents for the experiment. 22 of the selected respondents are postgraduate students while the remaining 8 are undergraduate students, all from Bayero University, Kano, Nigeria. The respondents downloaded and installed all the three (3) Apps, i.e., AREA, Airbnb, and Realista. A questionnaire was developed based on four performance criteria, namely: Functionality, Usability, Content and Reliability. Each criterion utilized several indicators as shown in Table 1. The questionnaire was completed by the respondents after they have examined and tested all the three Apps. Using a 4 point scale, the average weighted mean was computed and interpreted as 3.50 - 4.00: Excellent, 2.50 - 3.00: Very Satisfactory, 1.50 - 2.00: Satisfactory and 0.00 - 1.50: Not Satisfactory. Results of the experiment were used for the performance evaluation and comparison.

IV. THE PROPOSE SYSTEM (AREA)

This section presents the proposed system. The section starts with presentation of System's Architecture followed by presentation of experimental results and discussion.

A. System Architecture

The system's architecture of the proposed AREA (an improve Android based Real Estate Application) is shown in Figure 1. It depicts the interactions and privileges of the four (4)

TABLE I COMPONENTS OF THE PERFORMANCE EVALUATION QUESTIONNAIRE.

Criteria	Indicators
Functionality	Ease of operation
	Provision of comfort and convenience
	User friendliness
Usability	Intuitive design
	Ease of learning
	Efficiency of use
	Memorability
Content	Accuracy
	Presentation
Reliability	Conformance to desire result
	Absence of Failure
	Accuracy in performance

Source (Consignado et al 2017).

end-users who can access the system, namely: Client, Properties Owner, Administrator and Agent. The Client and Properties owner access the system via Android Based mobile device that requires Internet connection and satellite capability. Administrator and Agent accesses the back-end application, hosted on cloud based server, through web browser. Information accessed by all the users are stored on (or retrieved from) the Server. Key activities for each of the four users is briefly discussed below.

1) Properties Owner: Property Owner is a person that want to sale or give out property for rent. This kind of use is required to register as shown in Figure 2. The user will then login with email and password to his/her profile activity, as shown in Figure. 3. For uploading property, the user has to be at the location of the property so as to capture property's coordinates, i.e., latitude and longitude of the property. Property's images and other details are then captured and saved, as shown in Figure 4. After successful upload of a property, the system finds the nearest Agent based on distance and availability, and automatically assigns the property to that Agent.

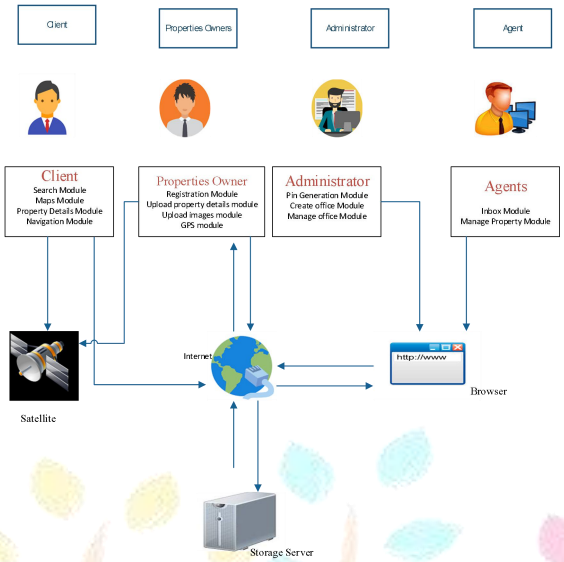


Figure 1. System Architecture

2) *Client*: Client is a person who wants to buy or rent property. When Client searches for property, the result is displayed on map as shown in Figure 5. The map shows markers of relevant properties as well as Client's current location. When Client clicks on any property marker, the system shows images of the property in slider window, with three buttons for Details, Call, and Trace as shown in Figure 6. Details button display property details, Call button calls the agent in charge of the property, whereas Trace button guides Client to navigate to the physical location of the property as shown in Figure 7.

3) *Administrator*: This refers to the system's administrator. The Administrator handles controls and authentications, such as creating new Agent and Property Owner, Temporary suspension of users, re-activation of users, and so on. The Admin Dashboard is shown in Figure 8.

4) *Agent* **activity:** This is the person who provides real estate agency services to Clients and Property Owners. Agent can manage all properties assigned to him/her by the system (based on the Agent's availability and proximity to the property's location). The Agent can approve uploaded property assigned to him/her, and can change status of property when sold or rented out. Agent's Dashboard is shown in Figure 9.

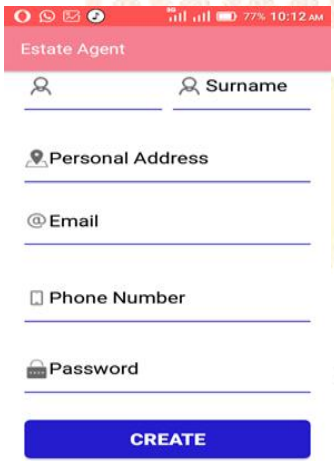


Fig. 2. Property Owner Registration Activity

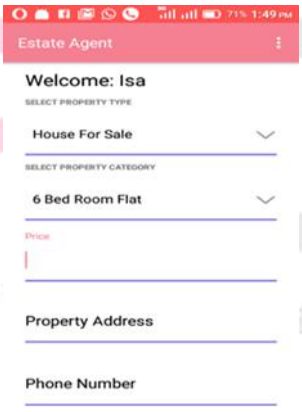
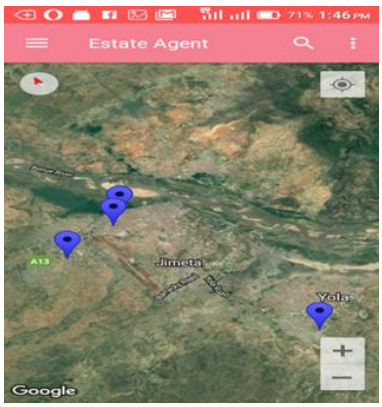


Fig. 3. User Profile Activity

Fig. 4. Property Upload Activity



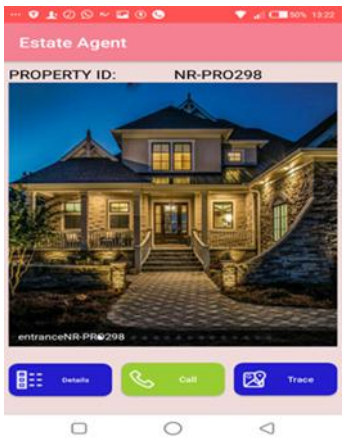


Fig. 5. Properties Shown on Map

Fig. 6. Property Details Activity

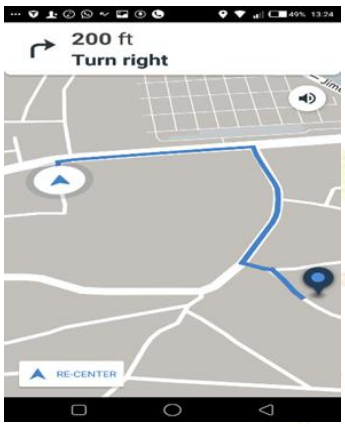


Fig. 7. Navigation Activity

Fig. 8. Administrator Dashboard

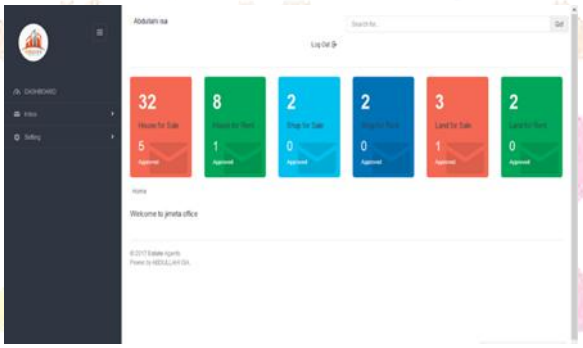


Fig. 8. Agent Dashboard

B. Results and Discussion

Experimental evaluation of the three (3) Appas, namely AREA, Airbnb and Realista, was conducted using 30 respondents as described in the Methodology Section above. The results obtained from the experiment is aggregated to compute mean value for each performance criterion with respect to each app. SPSS was used for this aggregation and mean computations. The computed mean values are shown in Table II. First column of the table shows names of the Android based Apps evaluated. Second column shows Mean Functionality achieved by each app. Third column shows Mean Usability achieved by each app. Fourth column shows Mean Contents achieved by each app, and finally, the fifth column shows Mean Reliability achieved by each app. The results is plotted on a line graph shown in Figure 10.

Evaluation results show that the proposed system, AREA, achieved the highest mean Functionality of 3.56 which can be verbally interpreted as excellent. Airbnb was next with 3.42 which can be verbally interpreted as very satisfactory. Realista was rated lowest in terms of Functionality with mean value of 3.02 which can be verbally interpreted as very satisfactory. With regard to Usability, AREA also achieved highest mean value of 3.59 which can be interpreted as excellent, followed by Airbnb with mean

value of 3.25 and Realista with mean value of 3.06, which can be interpreted as very satisfactory both. Thus, the respondents were highly satisfied with functionalities and usability provided by AREA over the other two apps.

However, Airbnb was graded highest mean Content value of 3.12, followed by AREA with mean content value of 3.08, then Realista with mean content value of 3.03. With respect to contents, the performance of all the three apps could be interpreted as very satisfactory. With regards to Reliability, AREA achieved the highest mean value of 3.30, followed by Airbnb and Realista with mean value of 3.07 each. The Reliability for all the apps could be interpreted as very satisfactory. The evaluation results suggest that users (who evaluated the apps) were not very satisfied with the Contents as well as Reliability provided by the three app. However, our study has taken note of this findings by planning for feature enrichment for AREA in our future work. Finally, it can be deducted from the experimental results that the newly developed Android based Real Estate Solution, AREA, is user friendly, easy to operate, and reliable, though not providing contents experience compared to Airbnb.

TABLE II. RESULT SUMMARY OF ALL THE APPLICATIONS

Application	Mean Functionality	Mean Usability	Mean Content	Mean Reliability
Airbnb	3.42	3.25	3.12	3.07
Realista	3.02	3.08	3.03	3.07
AREA	3.56	3.59	3.08	3.30

Fig. 10 Result Summary

V. LIMITATIONS

The study acknowledges some limitations which could affects validity of our findings as well as the resulting mobile App, i.e., AREA. For instance, in the course of the study, it was not possible to obtain and analyze all existing Real Estate solution. This is partly because some existing solutions might not be available or accessible in the country where the study was conducted. However, this limitation was mitigated by conducting thorough review of related and popular existing Real Estate solutions, namely Realista and Airbnb. In addition, it was not feasible to develop different versions of AREA for all existing mobile platforms like Windows O/S, Apple O/S, BlackBerry, and others. The current version of AREA is limited to Android based smartphones and Tablets.

VI. CONCLUSION AND FUTURE WORK

An improved Android based Real Estate Application (AREA) was proposed, developed, and evaluated in comparison with Airbnb and Realista. Evaluation results show that the proposed system meets its objectives. In particular, it provides better and easier way of advertising and finding properties for sale or lease purpose. However, every application has a space for improvement and can be modified to further improve its functionality. In the future, the functionalities provided by AREA can be enhanced by addition of more feature. For instance, notification message feature can be added to notify users when new property is available, Advanced Search can be added to enable search of property by state or local government, or to search for property nearest to user based on specify range of kilometer from current user's location.

VII. ACKNOWLEDGMENT

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REFERENCES

[1] Xu, Rubin, Hassen Saïdi, and Ross J. Anderson. "Aurasium: Practical Policy Enforcement for Android Applications." *USENIX Security Symposium*. Vol. 2012. 2012.

[2] Gartner, L. G. (2016). *worldwide sales of smartphone grew 7 percent in the fourth quater of 2016.* Retrieved January 15, 2017, from http://www.gatner.com/newsroom/id/3609817

[3] Consignado, Mark Lloyd Lester S., et al. "HAYBOL: An Android-Based Apartment Locator Application." *International Journal of Computing Sciences Research* 1.2 (2017): 1-9.

[4] Realista, [Online]. Available: http://realistatoken.com/public/assets/files/RealistaToken (RE) whitepaper.pdf. [Accessed March 1, 2018]

[5] Guttentag, Daniel. "Airbnb: disruptive innovation and the rise of an informal tourism accommodation sector." *Current issues in Tourism* 18.12 (2015): 1192-1217.

[6] Singh, H. (2015). *Best mobile app for hunting house.* Retrieved february 3, 2017, from http://technomedia.in/205/04/best-mobile-apps-forhunting-the-house-28858

[7] Ibisola, A. S., A. S. Oni, and Nkolika Joy Peter. "The Relevance and Application of ICT in Estate Surveying and Valuation in Ogun State." (2015): 112-120.

[8] ApartmentmanagerXp.com, [Online]. Available: http://www.apartmentmanagerxp.com/ [Accessed february 3, 2018]

[9] Evaproperty.com, [Online]. Available: http://ww5.evaproperty.com/ [Accessed february 3, 2018]

[10] Montenegro, B.. *The Agoda mobile app makes short work of hotel booking.* , [Online]. Available: http://www.gmanetwork.com/news/scitech/content/382558/review-the-agoda-mobile-app-makes-short-work-of -hotel booking/story. [Accessed january 16, 2018]

[11] Sommerville, Ian. *Software engineering*. New York: Addison-Wesley, 2010.

[12] Booch, Grady. *The unified modeling language user guide*. Pearson Education India, 2005.

[13] Royce, F. W., & Kinn, B. A. *Eureka: Analysis, Design And Implementation Of A Smartphone Application For Real Estate Seekers*. International Journal of Information System and Engineering, 5(1) 2017.

[14] Nurul , N. S., Nurul , H. A., Noorsidi , A. M., Nurul , S. M., & Mohd , S. A.. *E-Commerce In The Malaysian Real Estate Agency Industry*. International Journal of Real Estate Studies, 11(5) 2017.

[15] Williams , E. *Best Apps for Real Estate Agents and Agencies*. Retrieved june 26, 2018, [Online]. Available: https://pdf.wondershare.com/business/apps-for-real-estate-agents.html. (Accessed: 28th June 2018).

[16] Emile , L. (2018). *29 Best Real Estate Software & Tools for Top Agents in 2018*., Available: https://fitsmallbusiness.com/best-real-estate-software/. (Accessed: 28th June 2018).