eHAJJ GUIDE: AN ATTEMPT TO MAKE THE WORSHIP OF PILGRIMS EASIER

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ABSTRACT

Islam is the second-largest religion in the world based on the population, and Muslims are the people who believe in Islam. On the other hand, Hajj is one of the main fundamental duties of Muslims. Every year the Muslims who have the ability to offer Hajj gather in Saudi Arabia for the purpose of performing Hajj. As a result, managing a large number of people's activities is quite complex and difficult. Therefore, modern technology has a good scope to utilize Hajj management to make it easier. Under these circumstances, different mobile applications have been introduced to solve the problems in this scenario. However, all existing projects that are available in the mobile application marketplace still have some limitations. This paper presents an innovative mobile application that solves a wide range of difficulties and guides pilgrims during the holy Hajj, named the eHajj Guide. eHajj Guide is compared with other popular seventeen (17) applications with fourteen (14) several features. It is shown that the proposed application would facilitate more flexible ways of reducing people's suffering than other applications.

INTRODUCTION

All the people of the world are followers of one or another religion. In the same way, about 1.8 (one and eight tenths) billion people around the world follow Islamic ideology. In the Islamic religion, there are five momentous pillars (Good evenness, prayer, bounty, fasting & pilgrimage) and each pillar has played a role of great significance for all-around the people of the universe. Hajj is one of the significant pillars of the Islamic religion that is perform ed every once a year by capable Muslim pilgrims around the world in Saudi Arabia. According to the provisions of Islam, Hajj is obligatory for a person who has a fair amount of money to travel to Mecca, excluding family expenses, until he returns from Hajj. In addition, Hajj is obligatory for those who are physically and financially able to get out of debt. Every worthy Muslim is responsible for accomplishing his/her Hajj worth-ship in his/her life only for a single time but if he wishes can perform hajj immolation more than one time.

Hajj is the biggest gathering of Muslims in the world. During the Hajj, all the pilgrims wear the same kind of very ordinary clothes and all of them perform the same religious work which shows the unity of the Muslim community all over the world. And the people of Islam can realize that all are equal before the Lord and all must return to the Lord. Each of the religious rituals has its specific period, region, and guidelines to execute. Around 2.5 million pilgrims from various nations visit Kaaba Sharif each year to undertake the Hajj. (Saudi Arabia Limits Number of Hajj Pilgrims to One Million This Year,

n.d.) The Hajj pilgrimage has been carried out by the Saudi Arabian government in and around Mecca and Medina for many years. To complete their Hajj, all pilgrims must be present at the same location and time. The final lunar month, from the eighth to the twelfth, is when it takes place. The pilgrims must move from one location to another throughout these Hajj days and finish the required work for each location.

In an effort to make Hajj easier for pilgrims, we have created an innovative project "eHajj Guide" through which pilgrims will get a smart and digitized service from the beginning to the end of Hajj. eHajj Guide has designed a checklist facility so that pilgrims automatically can know what he/she needs and how much he has prepared for performing Hajj. In addition, He/she will be able to prepare and update his checklist, in this way he can take preparation for his fruitful Hajj without any hassle. On the other hand, before going to Hajj, one has to learn from other pilgrims or has to take training learning about Hajj which is time-consuming, delusional, and costly. Hence, it has a feature to teach all about Hajj a step-by-step guide to the pilgrims in a modern, free of cost, and enjoyable way by staying at home.

Additionally, finding nearby places such as a hotel, department store, saloon, food shop, etc. for new pilgrims may be so difficult. Additionally, finding nearby places such as a hotel, department store, saloon, food shop, etc. for new pilgrims may be so difficult. Considering all these, eHajj Guide will have shown to pilgrims the location of any service or place nearby them. Moreover, how to reach the desired place and the location of the destination from the pilgrims are also shown on the direction map. As millions of people will have gathered for performing Hajj, pilgrims may get lost from their group. In this case, it is necessary to contact their group member and have to share their location. Through eHajj Guide system, pilgrims will be able to instantly communicate with their group members by using a private chat group. Subsequently, any group members will be able to share their location with the lost member, and also the lost member will be able to share his location with other members. The national language of Saudi Arabia is Arabic and also people of different languages flock to Kaaba from different countries but it is so difficult for pilgrims to understand the other language without their native language. For that reason, we have added a language translation facility in eHajj guide system.

While performing circumambulation (Tawaf) in Pilgrims Makkah Sharif, they have to circumambulate a certain number of Makkah Sharifs. So sometimes the subconscious mind forgets how many times they have circumambulated. So, we have the Tawaf Counter system in eHajj guide system so that pilgrims can complete circumambulating work in the right way. Furthermore, any type of purchase or transaction has to be made in the currency of another country, one has to know how much it is in the currency of one's own country in order to get an idea of its value. That is why eHajj guide has a currency conversion calculator facility. Through eHajj Guide system, 'Halal' (which is approved in Islam) entertainment arrangements have been made for the pilgrims. For example, they will be able to enjoy Islamic radio facilities, and live video of Hajj activities in various places. We have added some more utility services in our e-Hajj guide such as: 'Smart Quran' reading facilities, Electronics Hadith' practice, 'Digital Tasbih' counter service,' e-kiblah' founder tools. Finally, we have made the whole Hajj procedure as more as easy, more efficient, and more effective through our eHajj guide System.
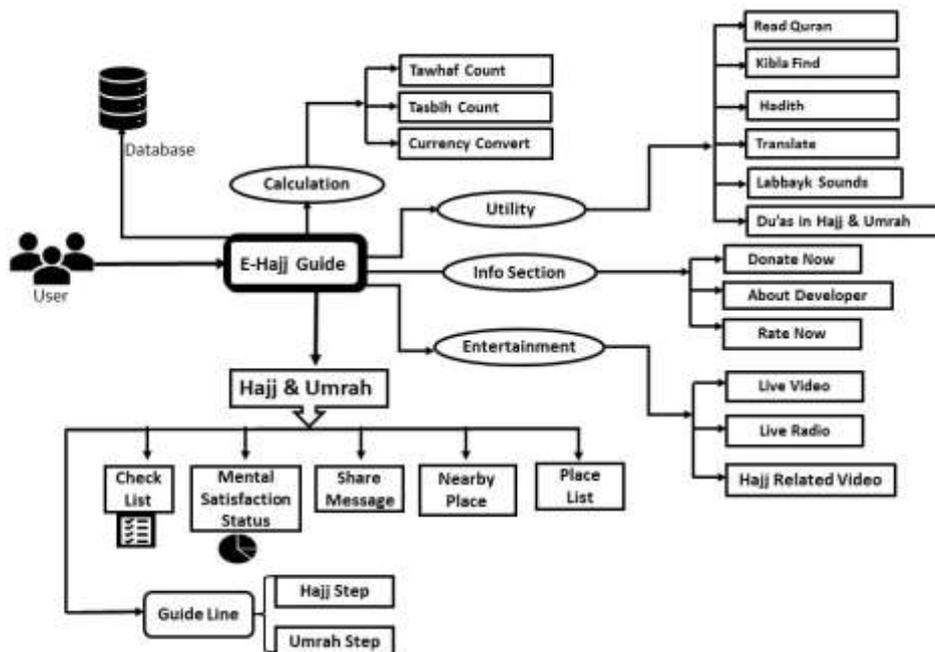

Figure 1. Systematic Architecture of eHajj Guide

The rest of the paper is as follows. Section B represents the previous works, then the systematic architecture of the system is presented in section C, where four subsections present Hajj and umrah, calculation, entertainment, and utility respectively. In Section D, the proposed system is compared with other existing systems for performance analysis. Finally, the concluding words are in section E.

LITERATURE REVIEW

As a major event of the world's second-largest religion, there are quite a few works in this area. One of them, a mobile base guidance system targeted toward Malaysian pilgrims, was created (Alssayh, 2009). Another mobile phone-based system that can deliver information regarding Hajj routes, lodgings, roadways, and cafes was examined (Anad, 2009). In (Mantoro et al., 2015), it is noted that a huge number of people congregate during the Holy festivities, and difficulties like missing pilgrims, finding lost, accidents, and health issues regularly develop. So that the monitoring and localizing may be done simply, a mobile app-based Hajj pilgrim monitoring system is proposed. Additionally, the same study (Amro & Nijem, 2012) demonstrated a GPS-based pilgrim monitoring system. Following that, a study focused on the three primary issues of crowd movement management for such huge gatherings, getting lost, and direction information (Owaidah, 2015). This study uses the mobile augmented reality alone side GPS and the RFID- Radio Frequency Identification devices. Another augmented reality-based study was found in (Nassr et al., 2018). Other than that, there aren't many apps that are specific to certain aspects of the Hajj. A smartphone app for making dua and zikr for hajj pilgrims, for instance, was demonstrated by (Al-Aidaroos et al., 2013). Akram M. Zeki et al. then demonstrate a dictionary application tailored for Hajj pilgrims (Zeki et al., 2012).

The main limitation of those apps is that a pilgrim has to download and use a different app for different purposes as a result it becomes not only complex for the elderly people but also causes financial and time wastage. Besides that, in some cases, it requires higher technical knowledge and high configuration of mobile devices to use some of those apps. To solve this issue this paper is focused to develop a user-friendly, low-resource usable mobile application that has all the features in one place. In addition, this proposed mobile application "eHajj Guide" has lots of extra features to make easier the whole process of holy Hajj such as searching nearby place, pilgrim's group chat, digital tasbih, 'e-kiblah' founder tools, e-activity process bar, etcetera.

RESULTS

Systematic Architecture of eHAJJ Guide

User (pilgrims) will access the eHajj Guide system via internet connectivity. After that, they will be able to see different features which can be divided into four sections such as, Hajj & Umrah, Calculation, Entertainment and Utility, shown in Figure-1. Hajj & Umrah have subsections as follow: check list, mental satisfaction, share massage, nearby places and place list. Respectively, the Calculation section has important features as like as tawhaf count, currency conversion etc. Then the Entertainment section is consisting of live radio, video and others Hajj related video. Lastly, Utility section have features like digital Quran reading, kibla founding, translator and so on.

(a) Hajj & Umrah and Calculation Section (English)

(b) Hajj & Umrah and Calculation Section (Bangla)

(c) Entertainment and Utility Section (English)

(d) Entertainment and Utility Section (Bangla)
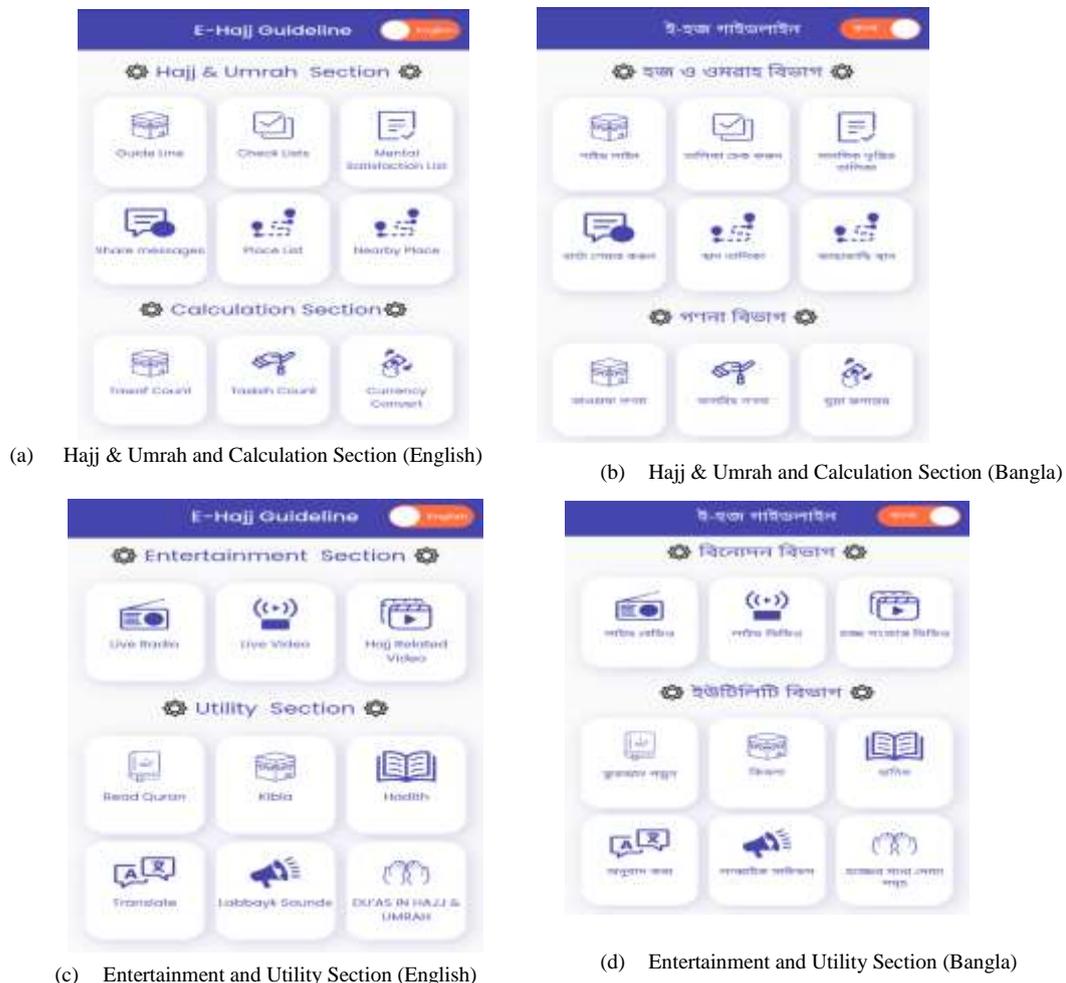
Figure 2. eHajj guide system features and classifications

In the figure 2 the sections of the eHajj guide are shown. Where the Hajj & umrah section has a guideline, a checklist, mental satisfaction list, a share messenger, a place list, and a nearby place. Then in the Calculation section, the key features are tawaf count, tasbih count, and currency convert shown in figure 2(a, b). Subsequently, the Entertainment section is consisting of features like live radio, live hajj video, Hajj-related video. In addition, the Quran reading, kibla finder, hadith reader, and a language translator, labbayk sound playback and du'as in hajj and umrah is in utility section that is shown in figure 2 (c, d). A brief description of each section is as follows:

Hajj & Umrah Section

The first and most important section of eHajj guide is the Hajj and Umrah section where the Hajj can perform on a specific date every year but the Umrah can be performed any time of the year. In this section, we have described all the activities of both Hajj and Umrah. To be mentioned, the activities of Hajj and Umrah have a lot of similarities. However the Hajj have some additional activity such as, from Meeqat, one must take Ihram, then complete the farewell circumambulation, stay on Arafah till dusk, spend the night at Muzdalifah, spend the night in Mina during Tashreeq, stone the Jamarat, shave their hair, and spend the night at Muzdalifah.

To ensure an effective and user-friendly interface for both Hajj and Umrah, we have classified this section into the following sub-sections: Guide Line, Check Lists, and Mental Satisfaction List, share the message, Place list and nearby place are in 'Hajj Umrah Section'. Hajj and Umrah is an occasion with obedient rules provided by Allah SWT as a result it is a duty of a Muslim to perform the Hajj and Umrah by following proper guidelines and maintaining the order of the tasks. Whereas, rules and regulation maintain is too hard without a guideline. Moreover, for a non-Arabic knowledge person, it's not quite tough. In our proposed eHajj system, all steps have been described elaborately so that the pilgrims can easily follow all the rules in both English and Bengali language, as shown in the Figure 3 (a, b, c, d).

(a)   Guideline for Hajj (English)   (b)   Guideline for Hajj (Bangla)
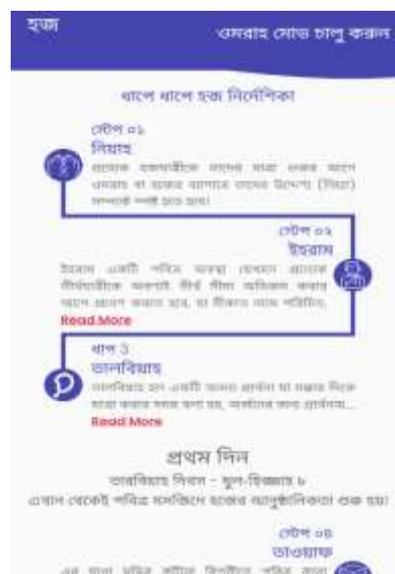
(c)   Guideline for Umrah (English)   (d)   Guideline for Umrah (Bengali)

Figure 3. Features of guideline for Hajj and Umrah (English and Bengali)

To complete the Hajj successfully, proper physical, economical as well as mental preparation is essential. For getting mental satisfaction they need the necessary checklist for preparation. Before the Hajj journey checking different essentials such as money, paperwork, clothing and shoes, toiletries and medical and daily essentials, etc. is important. In this "eHajj Guide" there is a special and easy-to-use checklist feature with a graphical representation of competence percentage. As a result, pilgrims can take preparation without any trouble shown in Figure-4(a, b) where the red color represents the percentage of remaining parts (Due) and the other color represent the complete task's percentage of preparation.

In addition, "eHajj Guide" have another check list feature to keep track of the on-going Hajj or Umrah process. Hajj activity check list helps to complete the Hajj or Umrah process with perfect rules and regulations. Figure 4(c, d) shows the progress percentage of done and incomplete with different color as before.

(a) Graphical representation of check list	(b) Representation of remains task & completed task of Check list
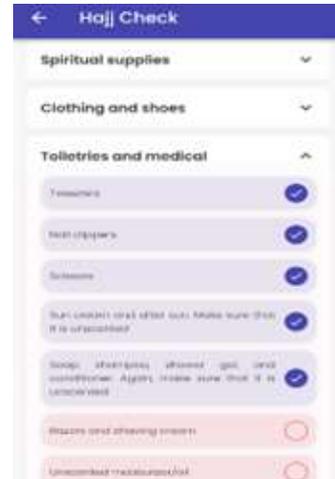
(c) Representation of On-going process of Hajj in check list	(d) Representation of On-going process of Umrah in check list

Figure 4. Performed task represent in Checked list

With the blessing of technical advancement, the live chatting feature is getting more popular day by day. As the pilgrims are unfamiliar with the Hajj area, this live chatting feature will help the pilgrims to communicate among them simply manner using our system. Every user can create their own channel. Therefore, invited to their personal chat room. Using this feature, from the same region performers can create a chatroom. As a result, monitoring will be more efficient and find someone who is going away from their residence. Besides that, a large number of pilgrims lost their path in the unfamiliar place so using this chat room, they could communicate with their community using their mother tough shown in Figure 5 (a, b).

(a) Creating a chat group	(b) Messaging with groupmates

Figure 5. features of chat room for group chatting

Hajj places in Saudi Arabia highly populated places at the time of Hajj and pilgrims are usually inexperienced in the various places. Such as hospitals, mosques, shopping malls, historical places, and hotels. In addition, pilgrims can find out his auspicious nearby place. eHajj Guide has added important features so that the pilgrims can complete their Hajj process easily and interactively named as 'Nearby Place' by using Google Map API shown in Figure 6(a, b, c, d).


(a) Populated place in Saudi Arabia around Hajj place
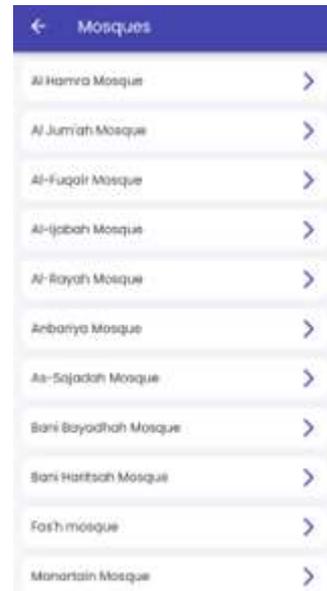
(b) Populated Mosques in Saudi Arabia

(c) Necessary nearby places
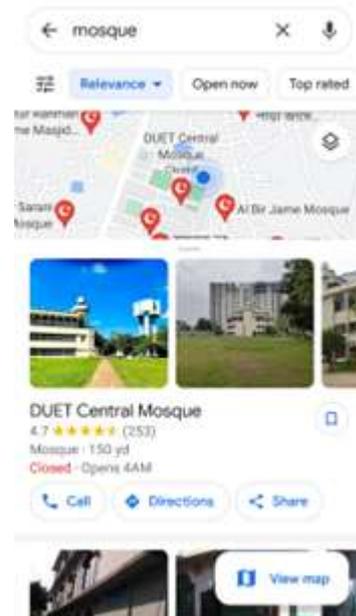
(d) Nearby mosque from user(pilgrims) current place (DUET)

Figure 6. Features of Place List

Calculation Section

Since Hajj is performed for the pleasure of Allah, everyone wants to perform this task correctly. One of the essential tasks of performing Hajj is to circumambulate Makkah Sharif seven times, 'Tawaf'. But sometimes it is seen that most of the old pilgrims have forgotten the number of cycles in the subconscious mind if there is no specific system of counting. During the Hajj, the pilgrims want to spend more and more time remembering Allah Subahanautayala and reciting Tajbeeh. More ever, keeping track of the numbers of Tajbeeh helps to increase concentration at Zikir. It is important for pilgrims to have an understanding of currency conversion for various financial transactions. That's why we have added a counter section and a currency conversion section in the calculation section.

Count Section

Tawaf is an essential duty for Hajj and Umrah. And it is wajib to perform Tawaf a certain number of times (seven times). In an effort to make this task easier, the Tawaf Count feature has been added to the recommended system eHajj Guide. As a result, pilgrims would manually count each circle at the end of each Tawaf and complete it accurately that is shown in figure 7(a). Additionally, eHajj Guide, are included sixteen (16) Zikirs for correct remembrance of Allah Ta'ala. For example: 'Subahanallah', 'Alhamdulillah', 'Allahu Akbar', 'la-ilaha illalah', etc. Among these zikirs, the pilgrims would select any zikir and remember Allah cordially by digitally counting it at any time that is shown in figure 7(b).

(a) Tawaf Count	(b) Counting Tasbih (La ilaha illah)

Figure 7. Features of Count Section

Currency Convert

Pilgrims must have an understanding of currency rates for traveling and purchasing daily necessities. Moreover, many times pilgrims are cheated by local currency converters and given less than what they deserve during transactions. To solve this problem, our system has included currency conversion feature. By doing this, Pilgrims can be informed about the value of currency exchange according to the current day's currency rate. Shown in figure 8(a, b).

(a) Currency Convert	(b) Converting Currency (USD to BDT)
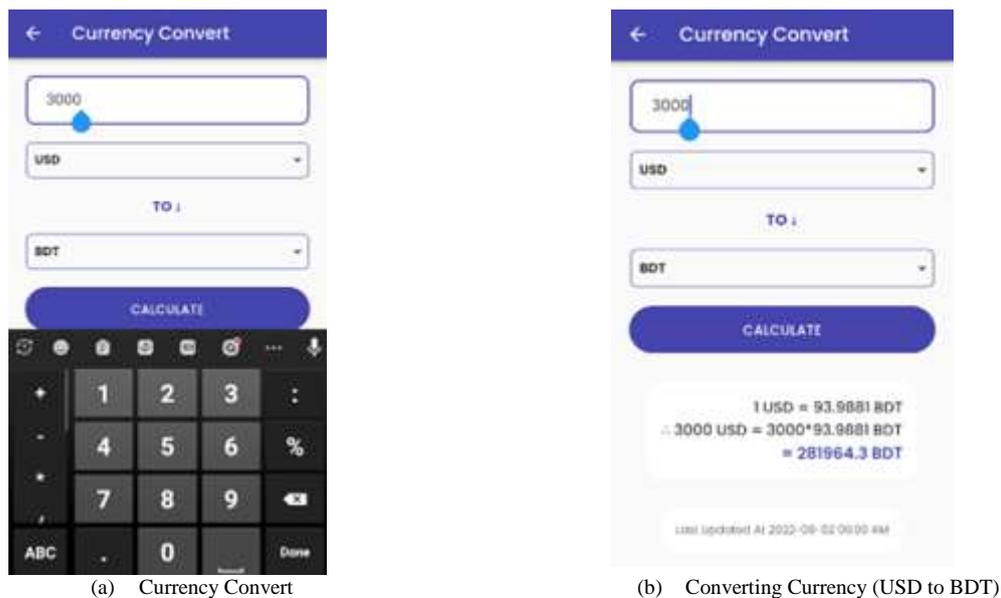
Figure 8. Demonstrations of currency conversion

Entertainment Section

Recreation is a part of life; it can be done by Muslims when it is allowed by Islamic Shariah. Online live Islamic radio channel featuring 'Halal' entertainment like Islamic 'Nasheed', 'Quran Recitation', and 'Discussion on various Islamic topic'. In addition to, live videos on various Hajj spots, through which pilgrims can enjoy a live broadcast of all places scheduled

for Hajj. Also, videos related to the history and traditions of Hajj have been added for pilgrims to spend their free time. Figure 9(a, b) has shown the 'Entertainment section' of our proposed system eHajj Guide.


(a) Radio list (live streaming)	(b) Playing radio channel (Medina Live)
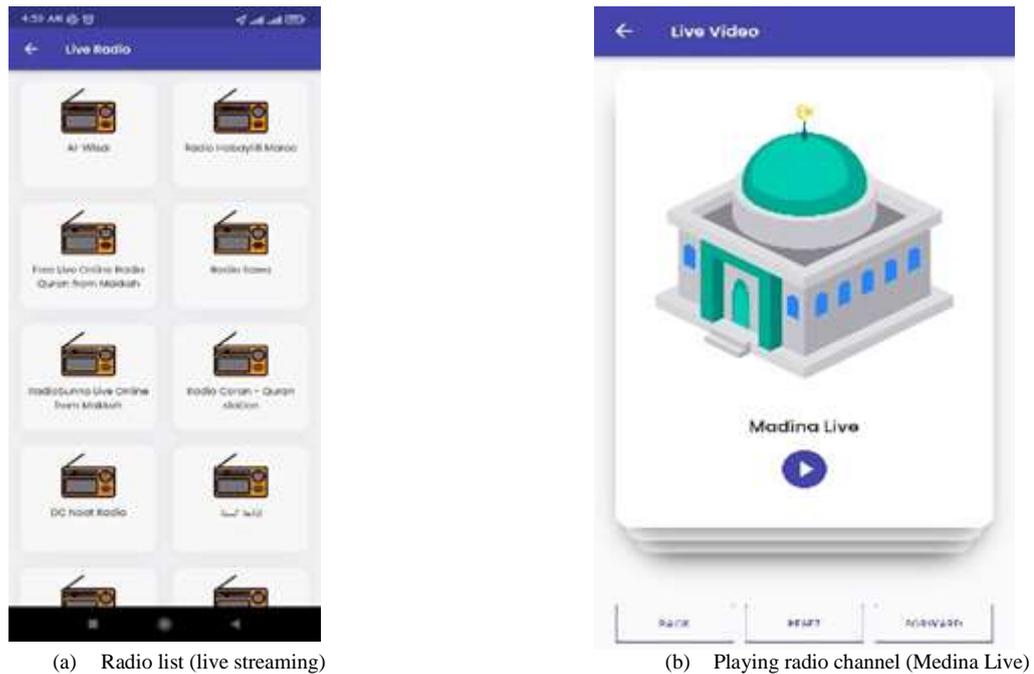
Figure 9. Demonstration of Entertainment Section

Utility Section

We have added a utility section to eHajj Guide for various utilities of the pilgrims during their Hajj process. In which there is the 'Read Quran' feature where pilgrims can listen to the Qur'an if they want or can recite the Qur'an. In addition, for 'Qibla' direction the 'Qibla finder' feature is added. There is also a hadith sub-section from where Pilgrims can learn the daily necessary 'Hadith' and 'Masayel(rules of Islam on specific topics)'. Here we have expanded our utility section with a 'translate' sub-section in languages through which pilgrims can learn the required language and can do it instantly if they need to convert any language. For this, we used Google Translator API. There is also 'Labbaik Allahumma' sound through which Haji can listen to this 'Zikir' at leisure and can recite it when necessary. The last sub-section in the utility section is a complete guide to all the 'Du'as in Hajj and Umrah ' to be recited while performing Hajj. Figure-10 has shown the Utility section of our proposed system eHajj Guide.
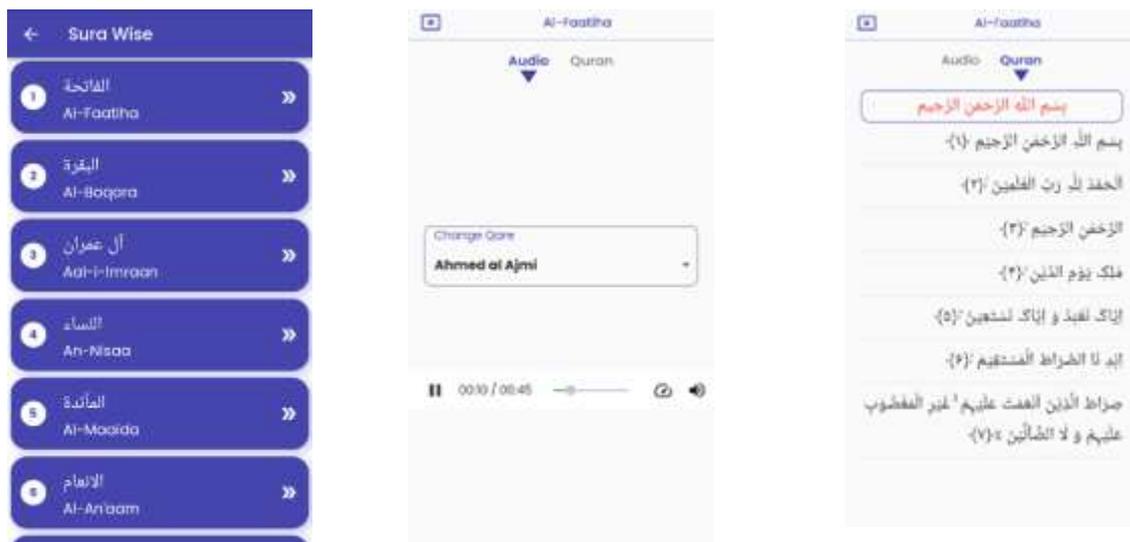
Quran Surah wise	Surah audio recitation with different Reciter	Surah in Arabic font

Hadith (Sahih al-Bukhari)

Authentic narration (Arabic) hadith
With English translation
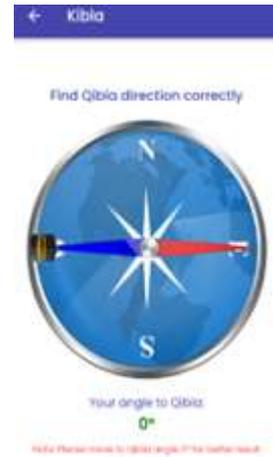
showing the Qibla
from current position

Google translator feature
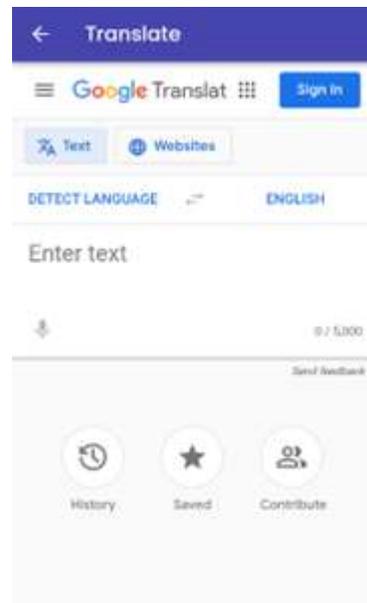
Translate from native language to English
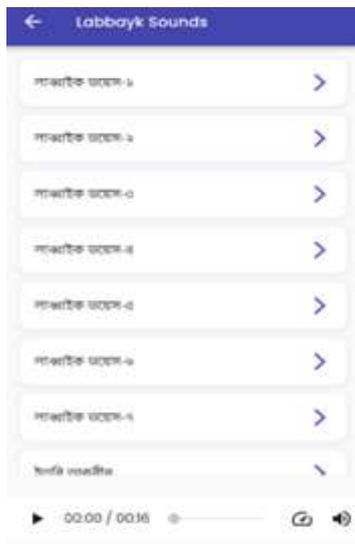
'Labbaik Allahumma' Sound in various voice

DU'AS for Hajj and Umrah
(English & Arabic)

Figure 10. Demonstration of Utility Section

DISCUSSIONS

In this section, we are comparing other hajj guide-based application systems to our proposed 'eHajj guide based on its features. We have selected seventeen (17) Hajj guide-related mobile application systems from 'Google Play Store' based on good ratings and reviews for feature-wise comparison. Then, fourteen (14) features have been selected that may require support from the Hajj guide while performing Hajj shown in Table 1.

Here, the Category Names denote A to N where we assigned weights based on the necessity and importance of these features. A total of 100 weights is assigned to the category features which are divided among 14 features based on their significance. All of the categories are listed below with their weights:

A-(10)= Hajj & Umrah Guide Line, B-(5)= Hajj Check List, C-(5)= Find me Group Wise Chatting, D-(10)=Tawhaf Counter, E-(5)= Currency Converter, F-(10)= Hadith (Hajj Related), G-(10)= Translation Language, H-(10)= Mecca and Madinah place List with direction, I-(10)=Hajj Related Video, J-(5)=Labbayk Allahumma Labbayk Sound, K-(5)=Read Quran, L-(5)=Kiblah Find, M-(5)=Hajj Dua List, N-(5)=Hajj Day weather check. For example, SI No. presents serial number where one (1) application name (Apps Name) is 'Android Apps Salaam Hajj- Hajj & Umrah Guide' [10] has some special features such as, find me Group Wise Chatting (C), Currency Converter (E) and Kiblah Find (L) signed by tik (√). Consequently, serial number where four (4), application name is 'Android Apps Hajj and Umrah (Hajj and Umrah - Apps on Google Play, n.d.)' has some special features such as, Hajj & Umrah Guide Line (A), Hajj Check List (B), Currency Converter (E) , Mecca and Madinah place List with direction (H) and Hajj day weather check (N). On the other hand, our proposed system 'eHajj Guide' has all features except 'Hajj Day weather check (N)' assigned in bold.

In Figure -11, The x-axis of the bar chart is taken as the weight of features and the y-axis is expressed as the name of the application. SI No. 1 application got 15 weights for C-(5), E-(5) and L-(5). In addition, for A-(10), B-(5), E-(5), H-(10), N-(5) SI No. 4 application achieved 35 weight which is comparatively better than other current system. Finally, our eHajj Guide obtain 95 weights for **A -(10), B -(5), C -(5), D -(10), E -(5), F -(10), G -(10), H -(10)**

I – (10), J – (5), K – (5), L – (5), M – (5).

Table 1. Grading different types of projects according to their properties

| SI No.	Apps Name	A -(10)	B -(5)	C -(5)	D -(10)	E -(5)	F -(10)	G -(10)	H -(10)	I -(10)	J -(5)	K -(5)	L -(5)	M -(5)	N -(5)
1	Android Apps Salaam Hajj-Hajj & Umrah Guide(*Salaam Haji-Hajj & Umrah Guide - Apps on Google Play*, n.d.)			√		√							√		
2	Microsoft Store Salat and Hajj (*Get Salat and Hajj*, n.d.)	√													
3	Android Apps Hajj Guide(*Hajj Guide - Apps on Google Play*, n.d.)								√			√			√
4	Android Apps Hajj and Umrah(*Hajj and Umrah - Apps on Google Play*, n.d.)	√	√			√			√						√
5	Android Apps Umrah & Hajj Guideline(*Umrah & Hajj Guide - Apps on Google Play*, n.d.)	√													
6	Android Apps Hajj World(*Hajj World - Apps on Google Play*, n.d.)	√													
7	Android Apps Hajj Umrah Guide English Free(*Hajj Umrah Guide English FREE - Apps on Google Play*, n.d.)	√													
8	Android Apps Hajj & Umrah Urdu Guide(*Hajj & Umrah Urdu Guide - Apps on Google Play*, n.d.)	√													
9	Android Apps Duas for Hajj and Umrah(*Duas for Hajj and Umrah - Apps on Google Play*, n.d.)										√				
10	Android Apps Harmain Hajj Umrah(*Haramain Hajj Umrah - Apps on Google Play*, n.d.)	√													
11	Android Apps Hajj Umrah Guide(*Hajj Umrah Guide - Apps on Google Play*, n.d.)	√	√												
12	Android Apps Hajj and umrah Guide in URDU(*Hajj and Umrah Guide in URDU - Apps on Google Play*, n.d.)	√													
13	Android Apps Hajj & Umrah(*Hajj & Umrah - Apps on Google Play*, n.d.)	√													
14	Android Apps Hajj & Umrah Guidance in English. New Muslim Guide	√													
15	Android Apps Hajj, Umrah and Makka-Madina Ziyarat (English)(*Hajj, Umrah, and Makka - Madina Ziyarat (English) - Apps on Google Play*, n.d.)										√				
16	Android Apps Hajj Malayalam Guide(*Hajj Malayalam Guide - Apps on Google Play*, n.d.)	√													
17	Android Apps Ang Gabay sa Hajj at umrah (*Ang Gabay Sa Hajj at Umrah - Apps on Google Play*, n.d.)	√													
18	**eHajj Guide**	√	√	√	√	√	√	√	√	√	√	√	√	√	
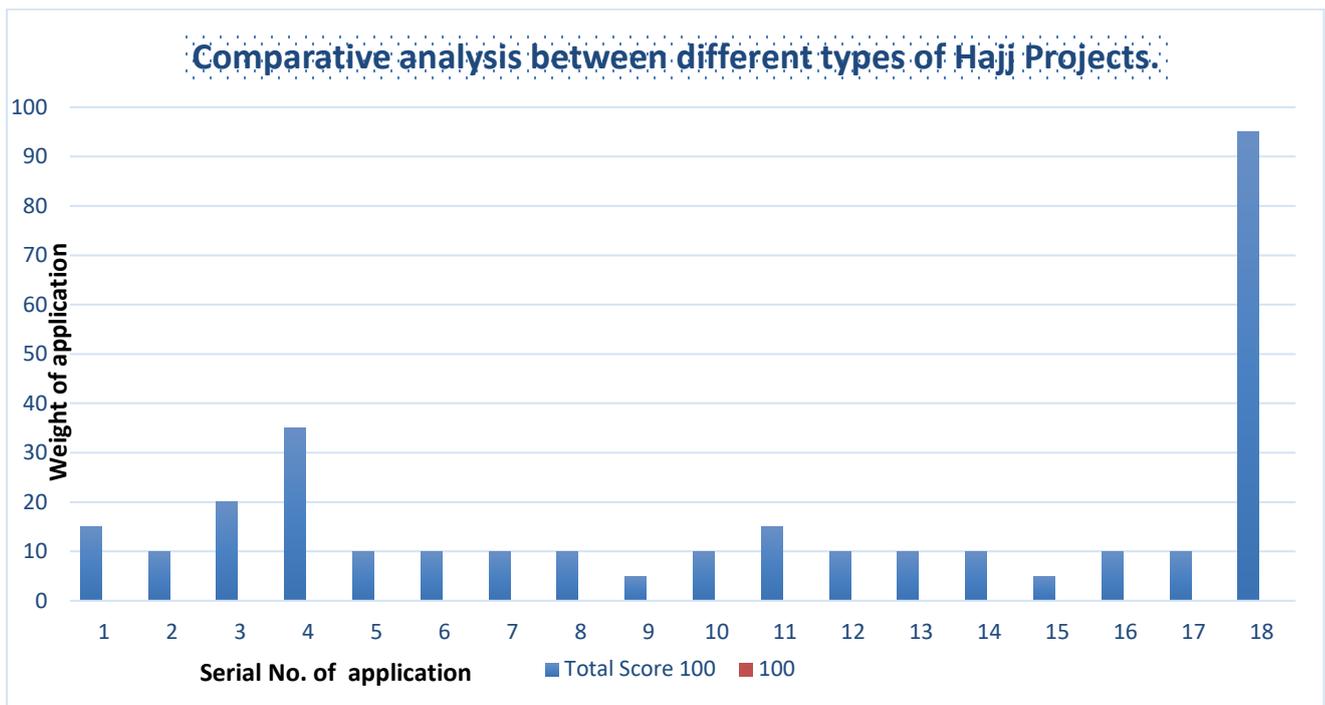
Figure 11. Comparative analysis among the different types of Hajj Guide Projects

CONCLUSIONS

It is the absolute duty of every Muslim to achieve self-purification and protect the sense of Muslim brotherhood. And, self-purification is achieved by performing Hajj and since Muslims from all over the world come together in Hajj, Muslim brotherhood is also maintained. Our proposed Hajj guide system 'eHajj Guide' combines all the Hajj-related guides and digital services on a common platform as an android mobile application. As a result, pilgrims do not need a separate application or a separate Hajj guide system. Furthermore, people can get Hajj training through our proposed system 'e-Hajj Guide' without spending any money. In this way, billions of amounts of money that were spent on training would have been spent on national development. There is some concern among people about Hajj as the issues of the Hajj process are complicated. And when people get knowledge about Hajj and get complete guidance for performing Hajj, their anxiety about Hajj will be removed, thus they will be interested in performing Hajj. Apart from that, if the people of the country perform Hajj more and more, their souls will be purified. As a result, they will be motivated to work honestly for the country.

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