

Smart Token Booking System for Hospitals

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Abstract—Queues are one of the worst problems all over the world. Management of high patient loads at hospitals presents a major challenge in streamlining hospital services. This paperwork aims to provide ease and comfort to patients while taking appointments from doctors. Here the proposed system is designed to resolve the problems that the patients have to face while making an appointment for Govt. Medical College Chest Hospital Thrissur. Patients in a remote area from the hospital can book or cancel the appointment through an Android app. Also, those who are unfamiliar with android phones can book through the hospital by a virtual kiosk system. A dedicated server timely updates the information regarding the availability of the doctor. The mobile app acts as a client whereas the data set containing the details of patient's, doctors and booking details are maintained by the web site that acts as a server. Compared to the usual queuing method, the Android app TOKEN appointment system could significantly increase patient's satisfaction with registration and reduce total waiting time effectively. The motivation behind this undertaking is to build up a Queue Management System for getting sorted outlining framework that can examine the line status and take choice which client to be served first.

Index Terms— Queues, appointment booking, Token android application, Virtual kiosk system.

I. INTRODUCTION

Nowadays, queue management is high in demand because of the kind of services offered by banks, hospitals, schools, shopping centres, and big organizations where a heavy flow of customers happens. The inappropriate administration of such lines will cause pressure and stress among clients furthermore, representatives. Clients will then move to other administration organizations that offer better types of assistance and it diminished occupation fulfilment of the representatives. Medical clinics and banks are the major two spots where it is important to have a good queue management system. The medical field has made remarkable progress at end of the twentieth and the initial twenty-first centuries. This emerges high specialized medical clinics for serving patients. The scheduling of appointments and bookings is an important task in hospitals for queue management. Online appointments are growing more by the growth of technology and internet; therefore, we need more researches and harder work to keep up with the rapid changes and developments [1]. Life is getting too occupied to even consider getting clinical arrangements to face to face and to keep up proper medical care. Designing a powerful queue management system makes shortening of waiting time and increasing the medical care accesses. As mobile communication technology is increasing rapidly, these applications can be used to overcome such problems and inconvenience for patients [2].

The principle thought of this work is to give simplicity and ease to patients while taking appointments from specialists and it additionally settles the issues that the patient needs to face while making a booking. In this research we are trying to implement and adopt all important features and functions depending on the needs in Thrissur Medical College Cancer Center, in order to add important function for a simple consultation and selecting doctor using Android application TOKEN, as expert system for taking an appointment with most suitable specialist for particular case depending on providing correct information be patient.

A. Survey on Existing Systems

Conventional appointment scheduling requires manual support for paper arrangement plans, for updating telephone decisions or SMS scheduling [3]. This manual management of appointments and reservations can drive up working expenses, for example, overtime pay or the need for an extra worker to deal with the booking cycle or tasks. This accompanying situation can happen in any sized association like business organizations, hospitals, etc. Time is an important quantity, which has to be effectively managed. Unless the association is open and staffed 24 hours per day, there is a restricted window for people to plan their appointments and reservations. This is not a present challenge for individuals planning as they might not have the intends to contact the associations during typical working hours. Time-consuming, consistent manual administrations, insecure, inefficient, and as a rule, disappointing are the basic issues through the conventional arrangements.

B. Proposed System

The proposed system is an android application 'TOKEN' (Token management system) that covers all the parts of making appointments to doctors. It empowers health care providers to improve operational effectiveness, reduce costs, decrease clinical blunders, decrease time consumption and upgrade the quality of care. This framework also helps to reduce the issues that happen when utilizing the manual framework and helps patients to skip endless queues. Also, it will make it simpler for the information record and retrieval. This app stores all the patient details, unit details, doctor details in the TMC Cancer Centre. This system enables users to choose specialists and to make appointments. Other than that, the framework is easy to understand and manage the appointments. Users can see accessible specialists and their timings and can make arrangements as indicated by it. Additionally, the user gets a choice to drop their appointments. Users can see their impending appointments and past appointments are deleted automatically.

The system also permits doctors to sign in and view their upcoming appointment lists. Also, in this system, there is an admin section who is a solitary individual who can oversee the whole framework ie, the receptionist or hospital office staff. This section is designed on the website. The information is shared by using API between the website and the android application. All the users and doctors cannot register themselves, so they are registered and eliminated by the admin section. Also, corresponding doctors' availability is given by these sections and the management of overall booking details and data backup will be done by the admin.

II. RELATED WORKS

Ayman Odeh, Raghad Abdelhadi, Hussien Odeh [1] is supporting Smart Cities Approach in UAE by planning and carrying out a framework and portable application "Mwa3edk" to add new ideas for the cycle of consulting's with specialists in emergency clinics and hospitals by moving this cycle into the online world innovation. This framework will actually want to interface a colossal number of clinics and hospitals with clients over UAE and empower individuals to search for specialists in various areas and make arrangements that suit them. Sumit Soman, Sudeep Rai, Priyesh Ranjan, Amarjeet Singh Cheema and Praveen K Srivastava [4] present a versatile idea with a mobile framework that can be effectively designed with an operational Hospital Management Information System (HMIS). This includes appointment scheduling, collection of medical reports and payment details from medical stores, etc. The user employs the android app to produce a token for the service needed on a specific day. When the patient has produced the token, that information is passed to various counters in the hospital to provide notifications and alerts. These counters will display the token statuses.

Manoon Ngorsed and Poonphon Suesaowaluk [5] described queue management for reducing the efforts of general people. The author conveys that the main inspiration of this framework was portrayed from the observations of individuals waiting in queue for services in medical clinics and also, in the public authority workplaces without focusing on the assessed time for their request. Here they build up the framework to deal with the queue without providing any arrangements or individuals to screen their line but by using a simple handheld remote gadget. The main objective of this apparatus was to deal with the medical queues online where

clients, patients also, partners can get to their lines distantly over the Internet through a web application. Deepti Ameta, Kalpana Mudaliar, and Palak Patel [6] presented a Medication reminder and healthcare android application. This is an Android-based application in which a programmed alarm ringing framework is developed. Patients need not recall their medication measurement timings as they can set an alarm on their medicine timings. From the doctor's, patient will get the schedule of medicine takings such as starting and ending date of medicine course, these are notified through SMS or emails and also from the automated alarm.

III. METHODOLOGY

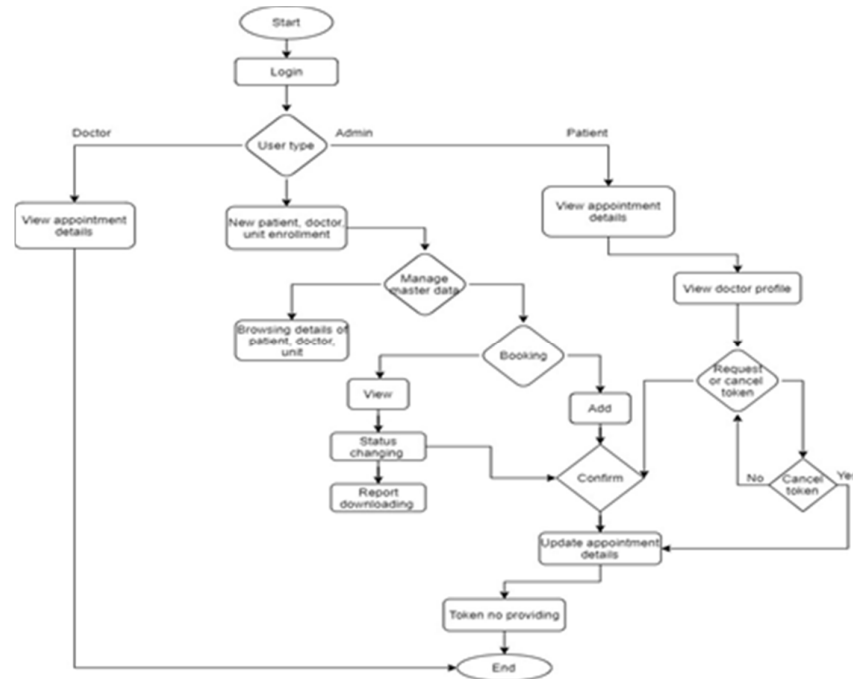


Figure 1. Flowchart of the system

The front-end configuration of the 'TOKEN' application is straightforward and easy to use. By signing in to the application, user can make appointments. Users can select the units working on the next day and book or cancel the appointment. These arrangements are overseen by the admin through a website. The admin can manage overall booking details such as add or view bookings, doctors, patient's records, etc. Also, by the same application doctors can sign in and check their appointment details. The back-end configuration incorporates a cloud server which goes about as a unified data set. All the information of the enlisted doctors and patients and the information with respect to the bookings are put on the dataset. The information is drawn closer and shared by utilizing API between the site and the android application.

The client will initially download the application and introduce it on their mobile phones. Once this application is installed it will remain permanently in the phone until the client erases or uninstalls it. By the android, platform user can make an appointment with the doctor in an easy manner. The patient's details and doctor's details are placed in the database on the server. So, if the user requests the token or cancels the token using the android application, that data will be updated to the server automatically. From the website, hospital staff can enrol new doctors or patients and manage the data. Doctors also can log in to the android application for viewing the appointment details. Android-based online token booking application "TOKEN" contains three modules ie, user module, doctor module, and admin module. The proposed system flow diagram is shown in Fig. 1.

In the user module, the user can log in to the system; can view the details of doctors and make suitable appointments. The admin module (website) can manage overall data. New users, doctors, unit enrollments, and virtual kiosk bookings are done on the admin side. From the doctor module, doctors can log in and view their appointment lists. Software tools used for the TOKEN development process are Android Studio 4.1.1 and SDK tools, XAMPP server, and Sublime Text 3.

IV. RESULT AND DISCUSSIONS

The different screenshots of the android application TOKEN are included in this section. First of all, the user needs to install the TOKEN application file after its compilation. Users can download it on any android device. Mainly this application is designed for two users; Doctors and patients. In this app, the initial registration is done by the admin section. After the installation when the user clicks on the app icon, the first TOKEN logo screen opens as shown in Fig. 2. Later when the user clicks on the logo, it will pass to the next screen ie, the user selection mode, Fig. 3. By selecting each user's mode, they can enter into their profile.

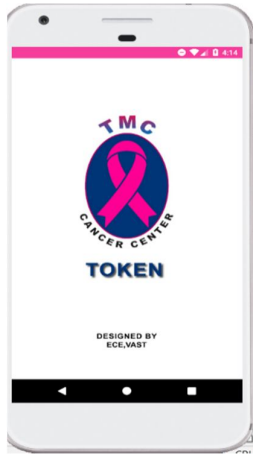


Figure 2. First display screen

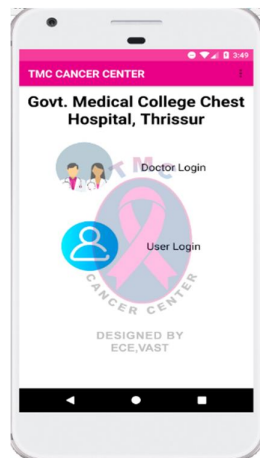


Figure 3. User selection screen



Figure 4. Hospital destination



Figure 5. User login screen

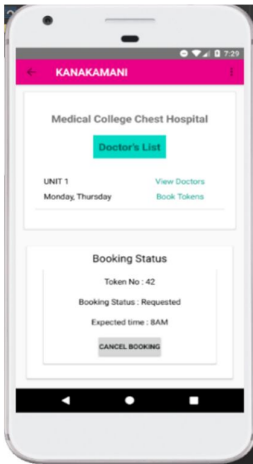


Figure 6. User profile

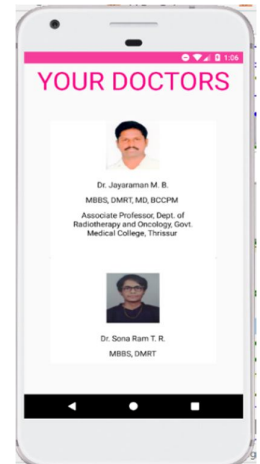


Figure 7. Doctor list



Figure 8. Doctor login screen

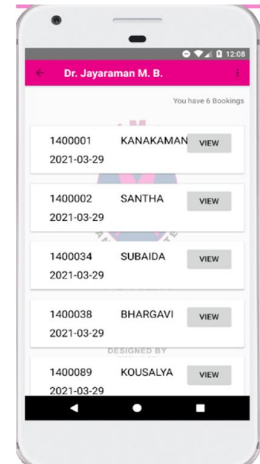


Figure 9. Appointment list

In the settings option users can contact and reach the hospital by destination option as in Fig. 4. Users can contact the hospital either by sending email or via, phone calls. For each user, there will be a login process. In the case of patients, the hospital will provide a CR number (Cancer registration) for their consultation. That CR number will be their username. Fig. 5. shows the user login screen. In the user's screen, the doctor list and booking status will be shown, as in Fig. 6

Here from the doctor's list users can view different doctor's profiles in that department Fig. 7. With this app, users can book only for the next day's appointment. So as per the day schedule user can book tokens for the next day if tokens are available. User can also cancel their bookings by the cancel option. Here when the user books the token, booking status will change to requested state. When a user visits the hospital and reports the reception

in time, the receptionist(admin) will change the status to approved. Later after consultation, doctor will change the status to visited.

Fig. 8. shows doctor login screen. Similar to the users, doctors also have a login process. The username of each doctor will be provided by the hospital in the registration period. The next screen is doctor's profile. Fig. 9. shows, appointment list. Here each doctor can view their booking list and change the status of booking to visited after consultation.

As shown in Fig. 10. admin module in the system is located in the website section. The website is uploaded in the shared host, so that everyone can access the site by entering the URL address <https://gmcchstrtoken.in>. Here admin can manage the units, users and doctor's settings in the hospital as shown in Fig. 11, 12 and 13.

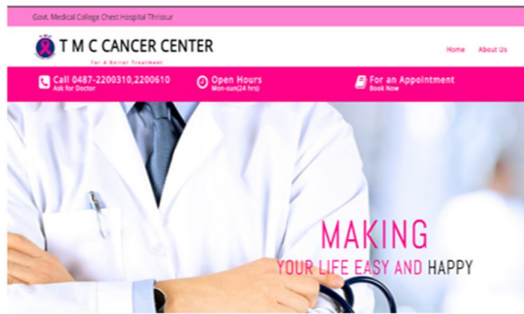


Figure 10. T M C Cancer Center

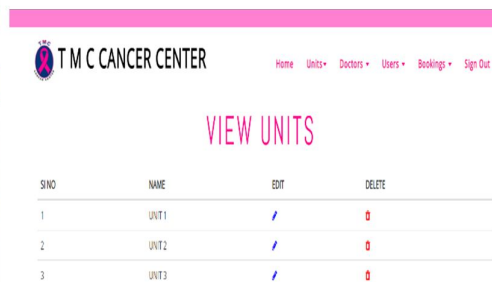


Figure 11. View units

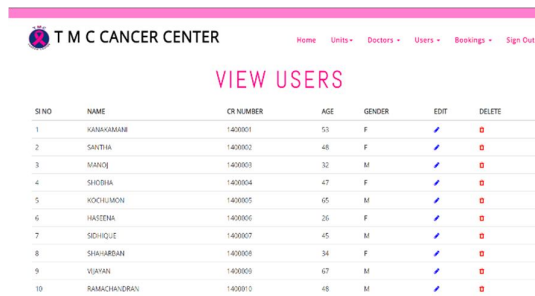


Figure 12. View users

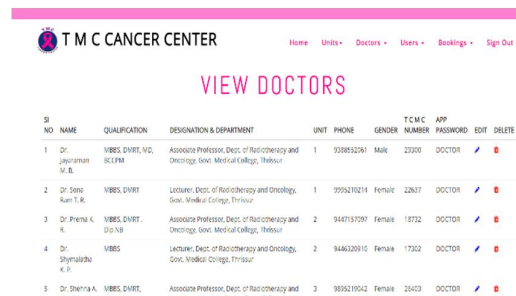


Figure 13. View doctors

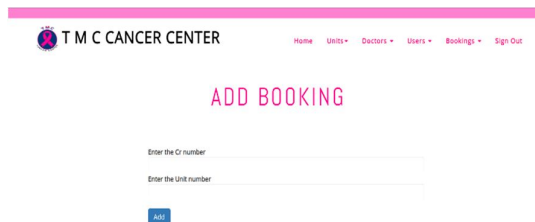


Figure 14. Add new bookings

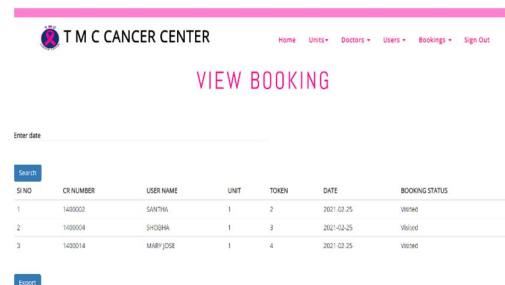


Figure 15. View booking lists

TMC Cancer Center consists of three working units with each unit working two days per week. In this section around 10 years of user details have been added to the database. Admin can add, view, edit and delete units, users, doctors from this website.

Users who are unfamiliar to use the android phone can book the tokens through the virtual kiosk ie, by entering the CR number and unit number in the website as shown in Figure 14. Also, the admin can view all booking lists as in Fig. 15. From this page admin changes the requested booking status to approved. Also, from the complete

list admin can sort bookings as per date and export the data in a pdf file for storing the report details as in Fig. 15.

V. CONCLUSION AND FUTURE SCOPE

The proposed system TOKEN is an android application for token booking in Govt. Medical College Chest Hospital Thrissur. This online arrangement framework has been executed in android studio for application advancement and the website is created utilizing PHP. The assignments associated with this work are separated into modules. The information is drawn closer and shared by utilizing API between the site and the android application. The proposed framework is productive and has an amicable UI. The details needed for the android application are updating and storing in the database. This new system is expected to give benefits increased overall productivity, performance, and efficient records management. Currently, this system provides many user-friendly options for token booking. The system can also modify towards directing the appointment to other departments in the hospitals (such as pharmacies, scanning rooms, etc.) Adding reminders or system calls for giving alerts to patients and doctors for their appointments. By adding some number of payments for appointment booking may avoid unethical users.

ACKNOWLEDGMENT

I would like to earnestly acknowledge the sincere efforts and valuable time given by my project guide Mrs. Divya Unni Asst. Prof., Dept., of ECE project coordinator Mr. Rakesh V. S. Asst. Prof., Dept., of ECE and Dr. S. Swapna Kumar Head of the dept. ECE. Their valuable guidance and feedback have helped me in the completing this project.

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