# Medicus: An E-Medic Consultancy for Hospital Management System

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**Abstract**

This project is to computerize the Front Desk Management of a Hospital by developing software which is user friendly, simple, fast, and cost – effective. It deals with the collection of patient's medical history and diagnosis details, etc. While the traditional method employs the use of manual power, we aim to make a system to register and store patient and doctor details and assess the database to book appointments and provide prescriptions, whenever the need be. The data is well protected for personal use and makes the data processing very fast to reduce the time taken by the patient to book a hassle free appointment to consult a doctor. System input requires patient details, diagnosis details, while system output is to produce these details on the screen. The developed GUI enlists several user experience features that make the system easier to use. The main objective of this paper is to connect the doctor and the patient very quickly and easily from any remote possible location, without involving any third party members or applications. This system can also be used to notify the doctor and the patient through apps and reminders about the request of doctor's appointment and prescription within the shortest possible time. The improved appointment framework is practical and assists in the decision making of hospital managers.

***Keywords:*** *GUI, Hassle, Prognosis, Prescriptions.*

## 1. Introduction

Human Body is a mind boggling and refined structure and involves a huge number of functions. All these muddled capacities have been comprehended by man himself, part-by-part their exploration and trials. As science and innovation advanced, medication turned into an indispensable piece of the examination. Bit by bit, clinical science turned into a completely new part of science. Monitoring all the exercises and their records on paper is a bulky and mistake-prone task. Observing the continuous increase in population and number of people visiting the hospital, recording and keeping up every one of these records is profoundly problematic, wasteful and error inclined. It is additionally not monetarily and actually possible to keep up these records on paper. The essential working of different emergency clinics in India is still on paper instead of mechanized administration. The conventional technique for booking appointments, taking op tokens are tedious and inefficient in-case of emergencies. Through this application, patients can book hassle free appointments.

The manual handling of the records is cumbersome and exceptionally inclined to blunder. The remedy for this task is to computerize the system. Generally, patients need to hold up quite a while in the lines to book the appointment of the specialist. Then again, this long holding up time may prompt patient dropping and even no-show which presents extra vulnerability and can cause extreme wasteful aspects. In the event that all arrangement spaces on a specific day are completely reserved. This situation prompts a long potential holding up time, which is the period beginning from the time that a patient emotionally wishes to make an arrangement until the time that he/she gets it effectively.

The presentation of health information technology (HIT) into the medical administration procedure holds the guarantee of decreasing adverse drug events (ADEs), expanding productivity of care conveyance, improving

nature of care, diminishing expenses, and saving cash over the long term. Nonetheless, regardless of whether these innovations are compelling, they are mind boggling and costly to obtain, actualize, and keep up.[8] As mobile technologies continue to evolve and grow in popularity, the health-care sector needs to rapidly adjust so as to fulfill the needs of current patients and medical experts. Beginning of 2015 saw Android as the greatest presented base of each and every working structure, and as the most conspicuous compact working system by a long shot the vast majority of countries; in various countries wherever all through the world, Android is the most celebrated tablet organization.[9] We have created an android application without buying and utilizing another additional gadget and furthermore no physical installment is required for this development. This application will support patients and specialists to speak with one another for appointments and prescriptions whenever utilizing mobile with the internet.

Patients, policymakers, suppliers, payers, managers, and others have expanding enthusiasm for utilizing individual wellbeing records (PHRs) to improve medicinal services costs, quality, and productivity[6]. The issue of structure and usage of HMS is vital in present day modern hospital. The framework must be made of a few sections such as: stamping card, enlistment, clinical treatment, medicate proceedings, drug store administering, emergency, data reference support, database reinforcement, report printing and so on.[7]

The proposed framework, an android based online doctor appointment application "MEDICUS" contains three modules. The patient module is designed for the patient that contains a login screen. The patient has to register himself, for the purpose of authentication, in order to login to the system. After logging in, the patient can select a hospital and may view the hospital details. The patient has the choice of choosing a doctor from the list of doctors and may view the doctor's details. The patient can request for a meeting on his/her preferred day/time. The chosen day/time slot will be reserved and the patient will receive the notification of the successfully added appointment. Additionally, the patient can contact the hospital and therefore the doctor by making a call or sending an email to the doctor. The admin module that is designed is capable of viewing all the details of doctors and appointments. Doctors cannot register themselves. The admin is authorized to add doctors, view patient details and doctor details along with the booked appointments also. All the doctors of the specific clinic are registered by the admin, thereby creating a doctor module for the specialists.

## 2. Literature Review

In this section we performed the rigorous literature survey on the Hospital management system carried out during the last one decade. However, we listed here very few for discussion.

Jie Song [1] et.al.proposed a model called "A doctor recommendation algorithm based on doctor performance

and patient and patient preferences". This is aimed at relieving the problem of doctor information overload, helping patients to schedule a medical appointment successfully. The algorithm implemented is designed via combining the characteristics of patient preferences to the framework of the doctor performances mode. The applications and the advantages include time-cost saving and the proposed algorithm can effectively increase the successful-reservation rate. Limitations include the return patients who are willing to reserve the same doctor as they did, which weakens the impact of the recommender system.

Premkumar [2] et.al.proposed a paper titled "E – Hospital Management & Hospital Information Systems – Changing Trends". This paper reviews the understanding of the performance indicators with respect to the Hospital information systems (HIS), summarizing the latest commonly agreed standards and protocols. The study is qualitative and descriptive in nature, where the data is based on the secondary sources of case studies and survey data. This proposed approach finds it's applications in Healthcare Monitoring Systems and Online Hospital Management Systems. Its benefits include streamlined operations, enhanced administration & control, superior patient care, strict cost control and improved profitability. While the paper strictly focuses from a descriptive approach, more research methodologies need to be inculcated to compensate for the lack of algorithms.

Cristian Cola [3] et.al.discussed how a video appointment solution can be added to the existing online Healthcare Management Systems. Based on automated questions using a forward chaining algorithm and with the help of WebTV and XMPP technology, the system automatically can choose if the patient should make an office consultation or they could have a video conference. One major limitation of the WebRTC technology is that no browser supports WebRTC technology.

Digvijay H [4] et.al.authored a paper titled "Hospital Management System". This paper is to computerize the Front Office Management of Hospitals to ensure a user friendly, simple and fast system for both Doctors and Patients. Using DBMS, Significant improvement can be observed in terms of operational control and thus streamline operations. Major limitation is that communication gap exists between employees and management, as seniors don't share the necessary information and problems associated with subordinates.

Md. Abdul Majid [5] Proposed a paper titled "Smart Doctors Appointment and Prescription System" is an application that provides services to the Doctors and Patients. With the advent of science and technology, by using android applications, patients can use online appointments to save time and money. The developed system is efficient, effective and the interface is very user friendly. Involvement of third party applications for the purpose of survey data and informatics may, to some extent, deter the performance of the system.

## 3. Hospital Management System (HMS)

### A. Definition

The complete set of rules & procedures related to Hospital's day to day activities and generating reports is called Hospital Management System (HMS).

### B. Need for a HMS

The following advances explain the need of the proposed framework:

i) Performance/Execution: During recent decades, details of patients, drug suppliers, all the day-to-day transactions and proceedings in a hospital are maintained using records. The manual handling of these records is tedious and exceptionally inclined to blunder. To improve the overall performance of the administration, the manual administration is to be taken a step further. It calls for the need of an automated management system. The Medicus HMS is completely mechanized and user-friendly so that it can be understood and perceived easily by everyone authenticated.

ii) Proficiency: The fundamental need of this undertaking is productivity. The undertaking ought to be proficient enough so that at whatever point another patient is conceded, and consequently a specialist is allocated to the patient as indicated by the patient's sickness.

iii) Integrity/Control: The full oversight of this venture is under the hands of an approved individual who has the authorization to access the application, thereby restricting illicit access. Role-based control is exercised so that different individuals reserve the privileges to simply observe the records meant for them respectively and not to alter any exchange or section.

iv) Security: Getting hold of manual records through corrupted means is a possible and known fact. Therefore, considering security as one of the primary criteria for the proposed framework, illicit access has to be eliminated as it degenerates the integrity of the database, thereby bringing about false or incorrect information to the front. Comparatively, automated systems are not bound to errors and can be trusted upon for security measures.

## 4. Existing System

Several clinics and multi-specialty hospitals were observed to gather information for this project. Following is an overview observed at one such hospital called Sunrise super-specialty Hospital, Kadapa, AP, India.

The data stream utilized is a one directional framework where the assistant alludes patients to specialists, specialists alluding patients to the drug specialist either in or out patients and a similar way out. The framework that is as of now being utilized in the medical clinic is totally manual. At the point when a patient solicitations drugs from the staff, all the data is recorded physically from the medication distributor (Drug specialist). Additionally when the provider conveys drugs all the data from the gadget to the record on drugs is recorded physically. Coming up next are the shortcomings of the present framework at the emergency clinic:

1. The hospital staff thinks that it's tedious and time expending when registering patient details and medical history, and computing payment receipts. This prompts delay in clinical reports.
2. The hospital administration, as of now, maintains documents for patients' and medication supplier's data. This arrangement of data stockpiling is helpless to security issues, for example, unlawful alteration and updation of records.
3. The staff normally burns through a ton of time in recovering information.
4. The desk work decreases the productivity of the System.

On the whole, generalizations can be made on the disadvantages that the currently existing hospital administration has to offer. The manual clinic framework incorporates enrollment of patients, putting away their subtleties in a document as a record and furthermore the patients' bills of the medical clinic. Physically it is hard to deal with the whole medical clinic framework. It requires some investment to discover specific records of the client and is hard to oversee the number of records that pour in with each passing day. Numerous issues have been discussed and debated about such frameworks. A portion of the issues are depicted beneath.

• Lack of quick retrievals: It is extremely hard to recover specific data such as a patient's illness treated an year ago. The working personnel needs to examine numerous record books and this procedure is both tedious and time-taking..
• Lack of prompt data stockpiling: The data created by different transactions and proceedings requires significant time and effort to be put away at the correct spot.
• Lack of proper and timely refreshing: Changes are hard to make as it includes overwhelming paperwork that demands lots of time and effort.
• Error inclined manual figuring: Manual computations are not necessarily bound to contain errors. However, it is inherent in human nature to make blunders. And any such blunder, during a medical-related transaction between any two patients, can prove to be extremely fatal. So it is safe to say that manual computations are error inclined, demanding a great deal of time and may bring about incorrect data.
• Preparation of exact and precise reports: It is a troublesome errand to gather data from different record books.

The above mentioned issues might be limited by building up an automated framework. However, just the way the manual system has disadvantages and issues, a computerized system is also likely to cause complications eventually. As referenced previously, development of an efficient HMS is the subject of this examination. We expect the mechanized framework to demonstrate proficiency, thereby streamlining activities, enhancing organizational skills and control, to furnish a superior

patient consideration with severe cost control and improved offices.

## 5. Proposed Work and Pseudo Code for Modules

The general challenges for mobile app developers are moving towards fragmentation rather than unification, monitoring, analysis and testing support, open/close development platforms, data intensive apps and keeping up with frequent changes. We have kept all these challenges under consideration and have developed an efficient and easy to use mobile application which is intended to digitalize the front desk management of a hospital system.

A social database (RDBMS) plan was utilized to structure the database. RDBMS sorts out enormous measures of information and characterizes the connection between the datasets in a steady and reasonable manner. RDBMS likewise gives a structure which is adaptable enough to suit practically any sort of information. Information word references were utilized to give meanings of the information utilized; these incorporated the last information structures for the different tables and their comparing information fields, portrayal and sizes the client application projects and interface were created utilizing java and FireBase. FireBase was utilized to make and associate social tables to the database. XML was utilized to build up the GUI.

Table 1: Procedure for the Proposed Work.

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**User Module**

Users can Registerfor the application for the very first login and use the details for future Logins and gain access to the dashboard.

The user is able to Book Appointments by selecting the doctor and available time slots. The users are also able to View the Booked Appointments , and also the Prescriptions given to them by the Doctor after the consultation.

The users will have an option to give their details (blood grp,address etc) if they are interested in donating blood. In addition there is also an option to update their Profile details.

**Doctor Module**

The Doctors are able to login into Dashboard using their details after which they can View Appointments booked in their name, give prescriptions to the targeted patient and view them in future.

The Doctors can also view the list of users willing to donate blood in case of emergency and contact them, in addition they'll have an option to update their profile details.

**Admin Module**

The Admin can Login to their Dashboard after which they can view the list of Doctors and their details, View the details of the Users and the Prescriptions provided to them and also the list of users who are willing to donate blood.

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## A.Patient/ User Module

The patient/user module is designed to be used by the end user in order to use the functions of the application

such as book appointments, view prescriptions etc. Figure1 shows the details about the First Level DFD of User/Patient Module.
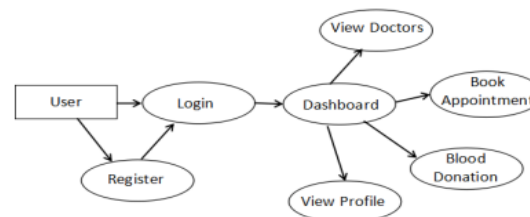


Figure 1: First Level DFD of User/Patient Module.

## 6. Doctor Module

The Doctor Module is intended to be provided only for the doctors who are working for the hospitals which have agreed with our work and affiliated with us. The doctors will be able to create their profiles and upon successful registration he/she will be able to select their specialized field and their available timings so that it enables patients to book appointments as per their need.Figure 2 shows the First level DFD of Doctor Module.
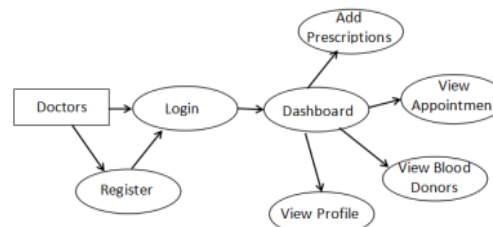


Figure 2: First level DFD of Doctor Module

## C. Admin Module

The admin is a trustworthy person with technical knowledge who is selected on behalf of the hospital since he has the ability to add or remove doctors, view stats, view patients, view scheduled appointments, add specialist field and also handle any small issues when occurred. Therefore, the admin module must be used carefully for prevention of unauthorized usage of the data available to the admin. Figure 3 shows the First level DFD of Admin Module.

Table 1 shows the detailed steps and pseudo code for Patient/User Module, Doctor Module and Admin Module respectively.
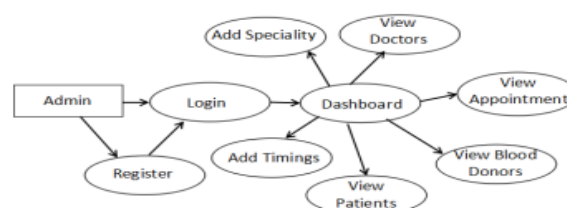


Figure 3: First level DFD of Admin Module

## 7. Result Analysis

Results and findings of the project are noticeable. All the modules of the proposed system are working properly. Patients are able to take appointments, get registered using a token, proceed to the doctor for prescription and also purchase medicines from pharmacies and so on. Given below are few of the pictures representing the successful working of the application.

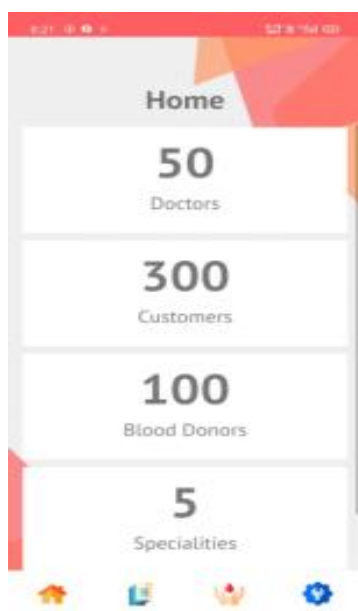We first look at the results of the Admin Module.



Figure 4: Home Screen of Admin

Figure.4 shows the Home screen of the admin module. The data flow between the *Admin module* and the database is shown in the following Figure 5.
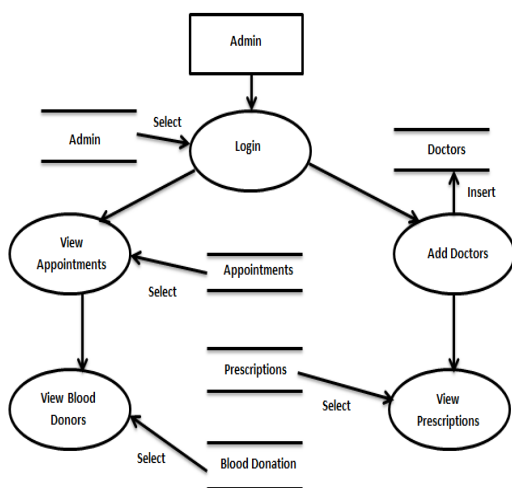


Figure 5: Data flow between Admin and Doctor

We now look at the results of *Doctor Module* which shows it working as shown in Figure 6.
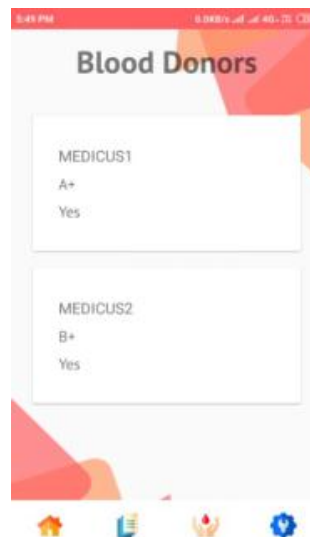


Figure 6: List of Blood Donors being viewed by Doctor

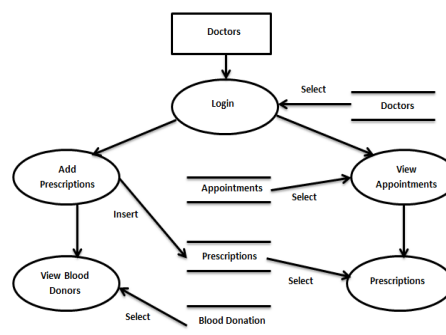The data flow between the *Doctor module* and the database is shown in the following Figure 7



Figure 7: Data Flow between the Doctors and the Database

We now look at the results of the patient Module which shows it working as shown in Figure 8.
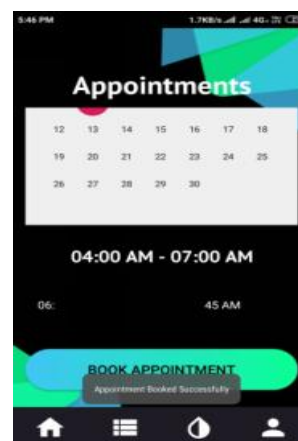


Figure 8: Successful Booking of Appointment

The data flow between the Patient Module and the database is shown in the following Figure 9.
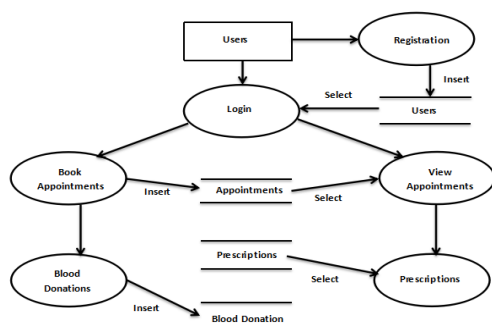


Figure 9: Data Flow between Database and Patient

We compared our proposed system MEDICUS with other available apps on the market and the results are shown in the given Table 2.

Table 2: Comparison

|  | **Medicusd** | **Doctorola** | **Smart Doctor Appointment** |
|---|---|---|---|
| Appointment booking | yes | yes | yes |
| prescription | yes | no | Yes |
| Blood Donor details | yes | no | No |

Let us assume that a patient's consulting period has completed within the actual appointment time and then some time will be left over. So that particular doctor will remain free for that left-over time. This results in wastage of time which can be compensated by allocating to the patients waiting who haven't booked appointments through the app.

The following Figure 10 shows the graph for the patient consultation period.
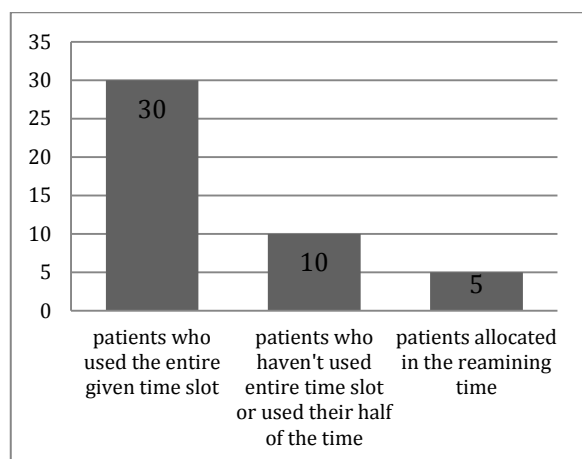


Figure 10: Graph showing patient consultation period

As shown in the above graph, let us consider that there are 40 patients who have their appointments to consult a doctor with the time slot of 30 minutes each. Out of those only 30 patients used the entire time slot that they have been provided and there are 10 patients who haven't used the entire slot or used only half of the time(i.e.15 minutes) given to them in order to finish their consultation. So there will be wastage of 150 minutes where these 150 minutes can be provided to the 5 patients who haven't booked appointments through online.

We hosted our complete module in a secured website which provides the websites data from being hacked. We have also purchased the SSL certificate and hosted the website. The PHP code written is completely validated and is ensured to be safe from SQL Injections. The data is also validated both at the frontend and backend for the security purposes hence the data cannot be hacked or cannot be accessed. The website is secured using HTTPS protocol.

## 8. Conclusion and Future Work

The significant objective of this application is to make an online connection among specialists and patients. Medicus framework for Android meets a large portion of the usefulness to manage appointments and medicinal proceedings for specialists and patients accordingly. The quest to make it more effective is never ending. The assistive structure the app offers between a Doctor and a Patient is an extraordinary chance to make it a particular, productive and conveying hospital management model. It mechanizes various everyday tasks and empowers smooth collaborations of the clients. Usage of this venture assists with putting away all sorts of records, thereby giving coordination and client correspondence, executing strategies with ease, improving the benefits in everyday tasks, organizing the store network, making hospital administration easier to understand and evolve. This useful choice covers the requirements of the patients, staff and clinic specialists and streamlines their communications. Numerous facilities have just encountered its favorable circumstances and are aiming to keep growing in the areas of establishing a fortified HMS framework.

Further, we may extend this idea and concentrate more on the patient's feedback, time preferences and his/her go-to physician because these factors are likely to affect their cancellation behavior.

## References

[1] Jie Song, YaqingBai and Jianpei Wen, "Optimal Appointment Rule Design in an Outpatient Department," IEEE transactions on automation science and engineering, Vol. 16, No. 1, January 2019.

[2] Premkumar Balaraman, Kalpana Kosalram, "E-Hospital Management & Hospital Information Systems - Changing Trends," I.J. Information Engineering and Electronic Business, 2013, 1,

50-58.

[3]    Cristian    Cola, HonoriuValean.    "E-Health Appointment Solution, A Web based approach," E-Health    and    Bioengineering    Conference (EHB), 2015, 185-190.

[4]    Digvijay H. Gadhari, Yahnyesh P. Kadam, Prof. Parineeta    Suman,    "Hospital    Management System," International Journal for Research in Engineering Application & Management, Vol-01, Issue 11, February 2016.

[5]    Md. Abdul Majid, Mohammad Jahangir Alam, Md.    Nurul    Mustafa,    "Smart    Doctors Appointment and Prescription System," IOSR Journal of Computer Engineering, Vol-19, Issue-6, Nov-Dec 2017.

[6]    David C. Kaelber, Douglas Johnston, "A Research Agenda for Personal Health Records (PHRs)," Journal of the American Medical Informatics Association, Volume 15, Issue 6, November 2008.

[7]    Matarlo, Marlou J. and Oniot, John Barth, "Hospital Management System",Undergraduate Capstone Project, May 2018.

[8]    O'Reilly D1, Tarride JE, Goeree R, Lokker C, McKibbon KA, "The economics of health information    technology    in    medication management: a systematic review of economic evaluations", JAMIA 2012, May-June.

[9]    JinatAfsana Tinny, "Hospital Management System (Android Application)", M.ScThesis March,    2018.    Available: http://dspace.uiu.ac.bd/handle/52243/186