Advancement of Online Medical Consultation for Future

Abilash.L[1], Danushan.R[2], Agash.V[3], Abinaya.T[4], D.I.De Silva[5] and Dulanji Cooray[6]

[1]Department of Computer Science & Software Engineering, Faculty of Computing, Sri Lanka Institute of Information Technology, Malabe, SRI LANKA
[2]Department of Computer Science & Software Engineering, Faculty of Computing, Sri Lanka Institute of Information Technology, Malabe, SRI LANKA
[3]Department of Computer Science & Software Engineering, Faculty of Computing, Sri Lanka Institute of Information Technology, Malabe, SRI LANKA
[4]Department of Computer Science & Software Engineering, Faculty of Computing, Sri Lanka Institute of Information Technology, Malabe, SRI LANKA
[5]Department of Computer Science & Software Engineering, Faculty of Computing, Sri Lanka Institute of Information Technology, Malabe, SRI LANKA
[6]Department of Computer Science & Software Engineering, Faculty of Computing, Sri Lanka Institute of Information Technology, Malabe, SRI LANKA

[1]Corresponding Author: it20132682@my.sliit.lk

ABSTRACT

The internet has been a best source for the medical service previously, anyhow the internet has been using to maintain the best patient-doctor relationship. Applications offering healthcare services on the move have recently become more prevalent on the market. They have been the trending in worldwide. Our online medical consultation is secured for the users to login individually and to process their services. This study presents an analysis of the published surveys and reports as well as the literature on online medical consultation from different databases. According to published studies, reports, and surveys, there has been a dramatic increase in online medical consultations due to several causes, including convenience, changes in illness patterns, cost-effectiveness, privacy, and second opinions.

Keywords-- Medical Consultation, Security, Health Care, Smart System, User Friendly, Access Control

I. INTRODUCTION

Online Medical Consultation (OMC) term has been used in the paper to refer the web- based application to maintain good relationship between patients and hospitals. Many people have turned to online web-portals in order to receive an online consultation because of the advent of broadband and video conferencing.

Our web-based application (OMC) also contributes many advantages to the users while using the app. By the end of using the app, users are satisfied and fulfilled towards the end. The work can be done within a brief time and the app is also easy to use. Utilizing this technology advancement has many benefits for the patient, such as cost savings, comfort, accessibility, improved privacy, and improved communication and time serving. Also, OMC will give a solution to the users for the existing problems, and it will consider the future problems to solve instantly with quality services [1].

Since most of the people live in remote rural areas, the healthy rural population is considered as an assert of any nation. Particularly in rural and suburban areas, there is a severe dearth of healthcare facilities and skilled healthcare personnel. Furthermore, having access to high-quality healthcare at reasonable costs is a fundamental entitlement of every person of the nation. Travel and time-related expenditures can be reduced for both users and hospitals by using Online Medical Consultation. The platform could be utilized to improve the nation's population's health-seeking behavior by increasing health literacy.

Due to such reasons OMC has been developed. The motive of our OMC is that people can receive their medical needs from different areas of the country, especially patients can access any specialist or general practitioner who is available online may be chosen by patients or assigned to them. They can also choose their doctor for the consultation. OMC carries a way the patient seeks in emergency. With OMC, the service is often accessible to patients from various geographical locations and with a variety of medical needs. Relevant doctor or healthcare practitioner who is accessible online may be selected by patients or assigned to them. They are not constrained to a particular supplier because of prior experience or proximity to them. OMC will be very supportive website for all the patients.

In addition to this OMC provides facilities to manage from the hospitals side like manage appointments, manage employees, manage doctors, etc. Therefore, this OMC will play a vital role in medical industry. Because the focused requirements are justifiable, and the solutions are very simple to use, and it can manage easily without much technical skills. Therefore, uneducated people also can use

this OMS with multi language features. So, OMS can easily spread all over the world easily without any advertisements.

II. RELATED WORK

Numerous programs that offer tracking systems and anti-theft features are available on the market [3]. Recently, researchers and developers have paid a great deal of attention to anti-theft software, where various functions are provided. A web-based application was proposed, and which empowers patients to submit medical information to healthcare professionals (Doctors) [2], consult relevant doctors and book doctors and manage their critical statistics data [1]. The proposed approach starts by proposing a user management like login, registration. Other than these doctor management functionalities like add, edit, delete, and search doctors were proposed. However, these functionalities were limited within a circle and some old user interfaces were proposed to do. So, it won't be user friendly to the users who use the application interfaces.

On the other hand, some researchers focused on the waiting time of the doctor consultation. Therefore, a subcomponent was introduced to manage appointments to reduce the waiting time of the users and the hospital [2]. The figure 1 illustrates the approximate waiting time so, you can understand the importance of the system [2].
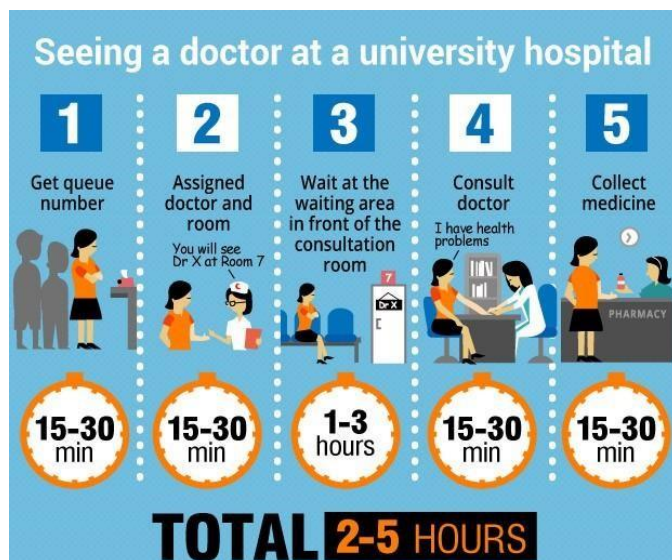

Figure 1: The Approximate waiting time for the doctor appointment, and consultation.

Our proposed system focuses on the above-mentioned issues together and additionally OMS provides functionalities to do the work for hospitals or medical cares. Also, some role base access controls were introduced to restrict the data access. This would make sure the security of the data. For the security this system can use come

cryptography mechanism to encrypt the medical data to store secretly, also our proposed OMS enables the multi factor authentication to ensure the correct user access the correct data.

In additionally, system uses some machine learning techniques and datamining techniques to make some decisions. These will be increasing efficiency and the availability of the OMS. OMS has multiple sub systems. There are,

1. Profile Management
2. Appointment Management
3. Doctor Management
4. Employee Management
5. Payment Management
6. Inquiry Management
7. Pharmacy Management
8. Laboratory Management
9. Test Management
10. Access Control Management
11. Medical History Management

Here the users can have profile management, medical history management and appointment management. But Hospitals can have all the above mentioned all sub systems to coordinate the whole processes.

III. METHODOLOGY

A. Tools & Technology

Many people are adjusting to construct software products using frameworks and libraries as a result of technological advancements. because these frameworks and libraries are simple to use, secure, and constantly updated. So that system was developed by MERN stack technology for this Online Medical Consultation (OMS). React js, Node js, Express js, and Mongo DB are just a few of the frameworks and libraries that make up this technology. In this system, the Backend is created using Node js and Express js, and the Frontend is created using React js. MongoDB serves as the system's database. Additionally, system can be connecting the client and server sides via the Rest API.

i. React js:

This system frontend can be developed using react js and it is free, and which is used to create re-usable components. [4]. Meta community is owner of this. To implement user interfaces or reusable elements like the navbar, footer, etc., we can construct many JSX files. This JavaScript and XML collection, or JSX, makes it simpler to build and incorporate HTML into React. Additionally, all of these APIs and components are connected using the App.js file. React.js has many benefits, including asynchronous operations, separate operation from other processes, performance that is

good across platforms, handling dependencies, outstanding developer tools, UI-focused designs, and ease of adoption.

ii. *Node js and Express js:*

The server side of this system was developed by express js [6] and node js [7]. Node.js is an open-source, cross-platform, back-end JavaScript runtime environment that runs on a JavaScript engine and executes JavaScript code outside of a web browser designed to build scalable network applications. Express js is a backend web application framework for building RESTful APIs with Node.js and is released as free, and open source.

iii. *MongoDB:*

MongoDB is a source-available cross-platform document-oriented database program. Classified as a NoSQL database program, MongoDB uses JSON-like documents with optional schemas. And it is available in two ways like MongoDB atlas and MongoDB compass. The advantages of using this database are a full cloud-based developer data platform, adjustable document schemas, user-friendly design, powerful querying and analytics, simple installation, cost-effectiveness, full technical support, and documentation.

iv. *REST APIs:*

The most popular choice for backend API development is REST APIs. Furthermore, it denotes a representational state shift. There are typically four Rest APIs available. GET, POST, PUT, and DELETE are the four.

GET - retrieve information from a database

POST - stores the information in the database

PUT - replace the database's data

DELETE - removes the database's data

These REST APIs can be used to manage the functionalities of this project with all messy operations.

v. *Tools:*

Some tools can be used to manage this job portal management system project. First, an IDE should be selected to implement the project source code. So, VS Code was chosen an IDE. GitHub can be used in project management and integration. We can use Microsoft azure board to manage project time and workload. Check out the project test cases using Selenium. Identify bugs and errors in the project source code using SonarQube.

IV. PROPOSED SYSTEM

OMC System has two major sides. One is the admin side and other is the user side. So, when considering the current problems, there are some difficulties in both users or patients' side and the hospital side. The system high level view level is in figure 2 with the sub system details.

On the one hand, users/patients should have the basic profile management functionalities like login, register, view, update profile details. In additionally this system introduces a functionality to delete the profile. Because if the patients don't want to be a part of the system, they can simply delete their details from the system. However, the whole system will have some security protocols or secured authentication to access the data. Users can check the details of the hospitals and the details of the doctors for their reference.

Also, users can check the availability of the doctors and they can book an appointment to the particular time and date.
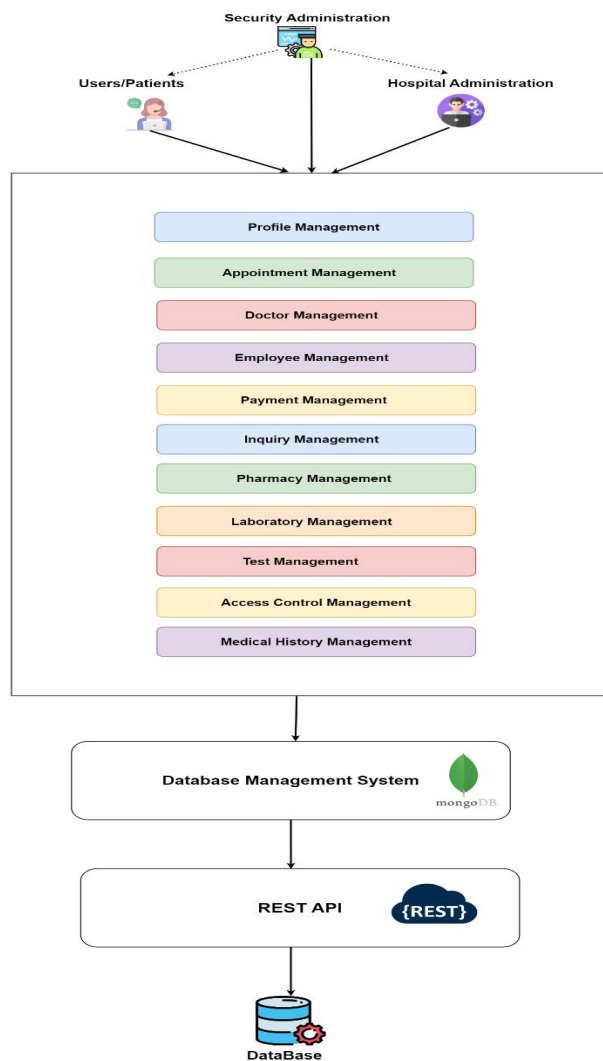

Figure 3: High level view level with the sub system details

However, they should make the payment for the doctor through secured payment gateways. If they finished the payment the appointment will be confirmed, and the status of their appointment will be changed. As per the user's need, users can download the payment summary with the appointment details. Users can also cancel the appointment within certain time period. In this application to increase the effectiveness, while users are making the appointment, the supportive documents like medical history. So, it would be easy for the doctors to diagnose the diseases. So, here system can be implemented some mechanism to figure out the critical medical histories using some machine learning algorithm to give some priority to the users/patients. This feature would be very useful to the users/patients and doctors for early diagnose. If needed, users can use the live chat system with the hospital receptionist to clarify the doubts. The doctor page is in figure 3, login page is in figure 4, user appointment page is in the figure 5, and register page is in figure 6.
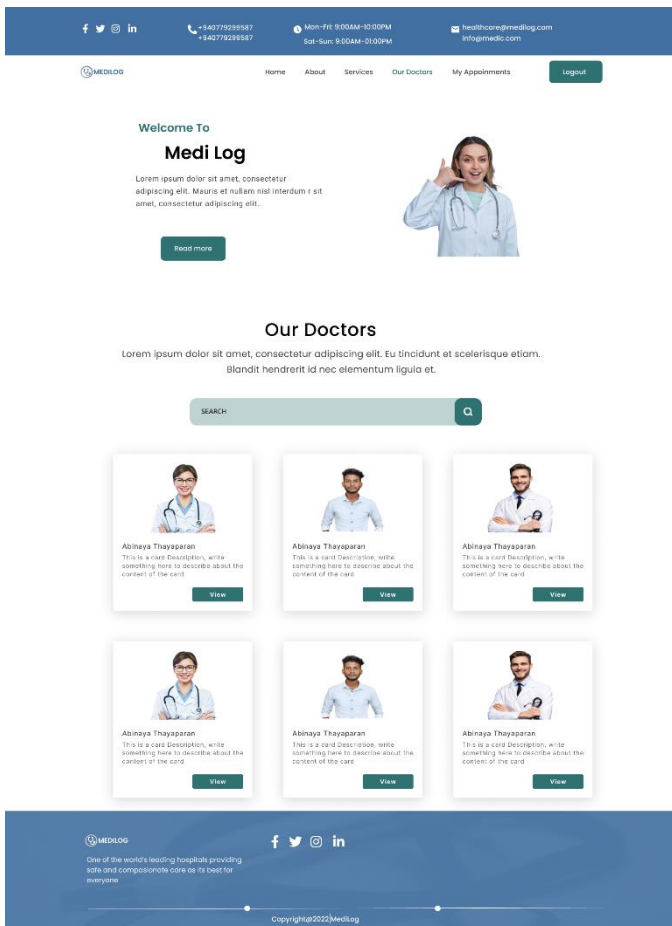

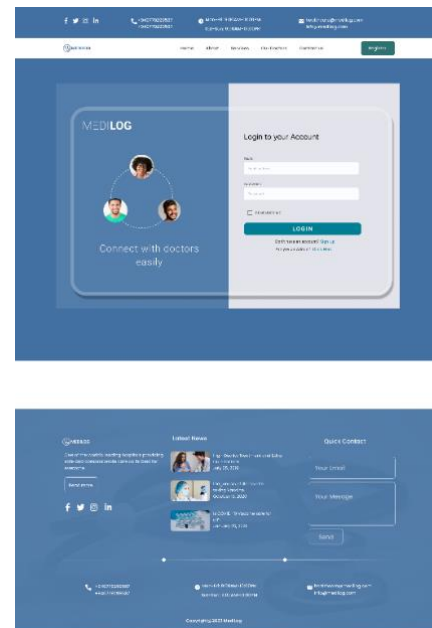**Figure 5:** User Registration Page

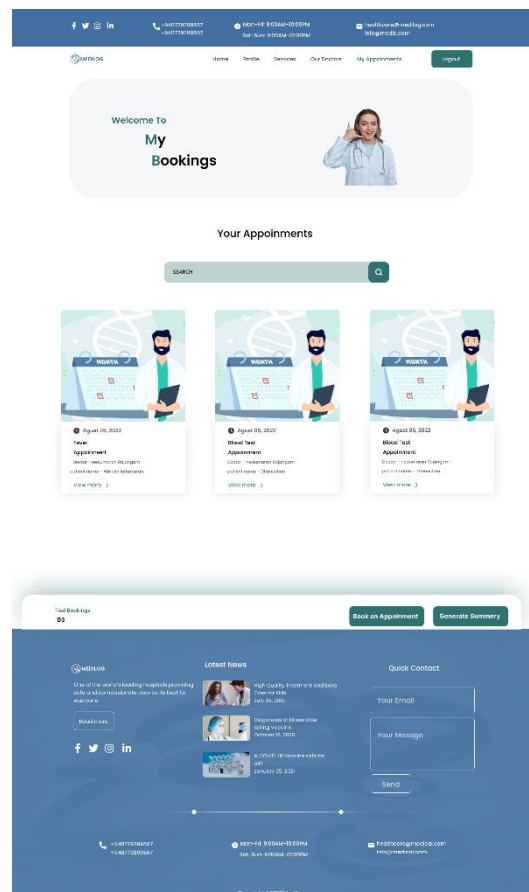**Figure 4:** View all doctors page- User Side

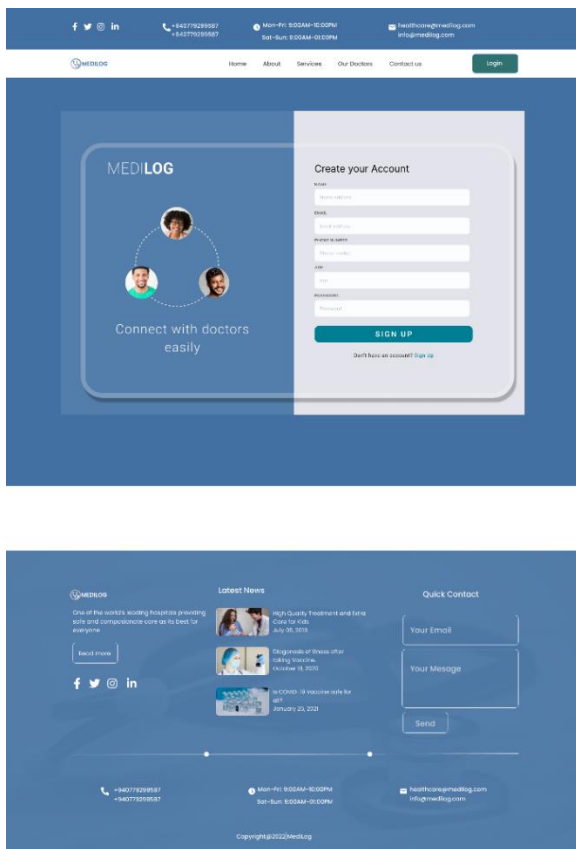**Figure 5:** View all user appointments- User side

Figure 6: User Register

On the other hand, hospitals side have some set of functionalities according to the roles. Here, the security administrator is responsible to grand the permissions to the users according to their user roles.

When considering the receptionist role, they can have the basic profile management functionalities and they are responsible to manage the appointments. Therefore, using the respect page they can view all the appointments which are coming from users. There are some filters to filter the appointments according to the date, doctor's name, and the priority. So, they can view the appointments and they can change the appointment date and time according to the doctor's availability. Here, once the existing appointment details changed, the user will be notified by the email which is auto generated. Other than this they can work with the live chat system with the users. If the receptionist is not available, they can enable the AI system to the live chat according to the previous question and answer log. This feature would increase the availability of the system.

When considering the administrator role, they can have some functionalities to manage the employee profile of the hospital, manage the doctors with the basic profile management. Using the employee management pages, they can add, edit, delete, and view the employee histories. Also,

system has the pdf generator to provide the employee details as a table and individually [5]. This would make the works easily instead of manually keep the records. For the doctor management also the doctor's details can be added, edited, deleted, and viewed. Here also, administrators can generate the pdf of the doctors' history. For both pages there will be the search bar and filter options to find the records easily.

When considering the finance management, they can easily manage the finance related works and calculate the expenditure and income according to the appointment money and the employee salary with the maintenance cost. Here also they can get the pdf summary to keep the records manually.

When considering the doctor role, they can have some profile management functionalities with some more additional functionalities, such as view user's medical history, view lab history details and send the prescription to the pharmacy directly with the user details. So, users can easily get the medicines without any confusion and time delay.

In addition to this, when considering the sub-systems there are so many sub-systems and the Test sub system will be directly integrated with the Lab sub system. So, the lab administrator can easily send the lab report details directly to the test's history of the users. So, doctors and users can easily check the test reports easily. Also, the doctor sub system is directly connected to the pharmacy sub system to send the patient prescriptions to the pharmacists. So, this Online Medical Consolation (OMS) system has defined workflows to make the works easily. Therefore, this system reduces the conflicts and the work overloading. The interconnection between the sub systems is in the figure 7. Also, the user payment gateway in the figure 8, user book appointment is in figure 9.
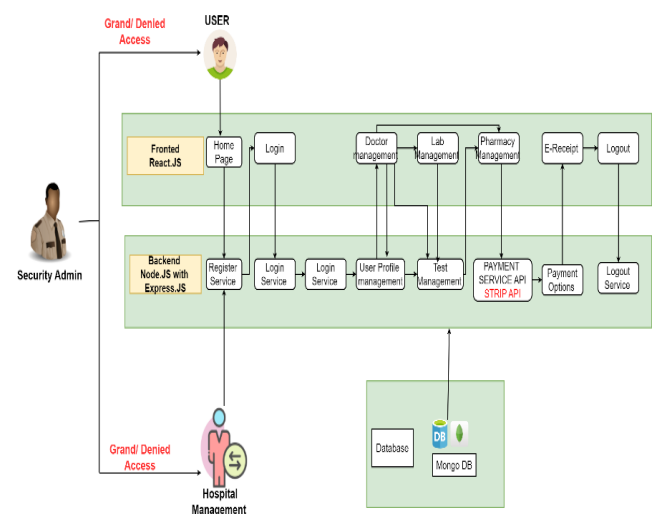

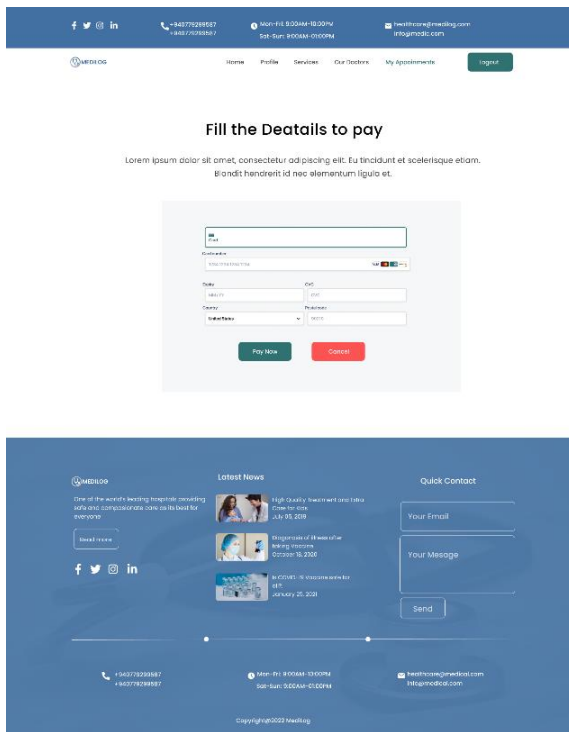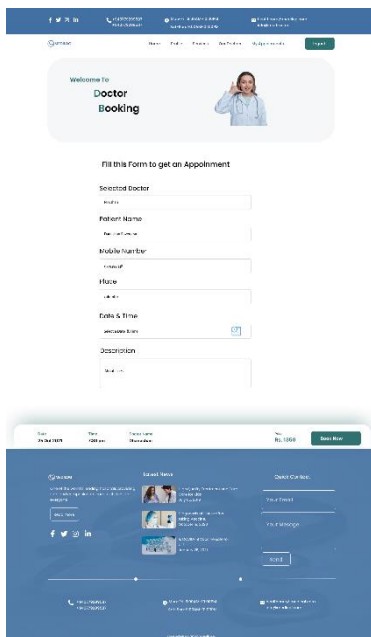**Figure 7:** Interconnection between the sub systems

Figure 8: User Payment Gateway

V. DISCUSSION

Medical industry plays a vital part in this world, and it is one of the most profitable and essential industry. However, currently the medical industry is facing many troubles because of Covid 19 and the travelling issues. Therefore, the patients could not get treatment on time.

Nowadays all people need a system to make our works easily. When considering the system, set of rules were followed to come up with the best solution [8].

With the enhancement of technology, many problems can be solved. Using software developments, problems in the doctor consultation and hospital management can be easily analyzed and solved. According to the proposed solution, people can save their time as well as effort in the doctor consultation as this system provides everything in an online platform. It will only need a working internet connection and basic knowledge of technology. Since usability and security are considered in this system design it will be easier to use for anyone who needs this service, and the data will be stored with strong security protocols [7]. This will focus the user requirements on a clear way. But some sections can be included in the later stages with this minimal system design. The facilities such as some machine learning integrations. Based on the success of the system, a mobile application can be designed for this proposed system.

VI. CONCLUSION

In the modernized world people now have easier and more accessible solutions to handle their everyday difficulties. Thanks to science and technology Researchers and scientists also pay the attention in the medical industry to improve the quality of services, and they are creating a useful system to save lives and take care of living things in all over the world. This research presents a web-based application called Online Medical Consultation health care app that can be provided to the general public. The app offers a variety of advantages that can alter how individuals respond in emergency situations. They can save their time by viewing all the essential details on a same web app. With the use of this app, people may discover a quick and efficient way to get at the solution rather than feeling panicked. In the future, system will be having with many features to overcome the issues, but notably the poor. Additionally, using artificial intelligence is anticipated to assist people in identifying diseases based on their symptoms. In this way, it is envisaged that a health care system based on mobile devices will become an integral part of daily life.

REFERENCES

[1] A Study of Advanced Hospital Management System : IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 16, Issue 2 Ver. III (February. 2017), PP 127-134 www.iosrjournals.org
[2] Doctor Appointment System Using Cloud : Special Issue of Second International Conference on Advancements in

Research and Development (ICARD 2021: International Research Journal on Advanced Science Hub (IRJASH)

[3] Olusanya Olamide.O,Elegbede Adedayo. W And Gunseye Abiodun. A, Design And Mplementation Of Hospital Management System Using Java[Internet].April 2015[Cited 2015 March 02];32-36.Available From: Http://Iosrjournals.Org/IosrJmca/Papers/Vol2-Issue1/F0213236.Pd

[4] "ReactJS," [Online]. Available: https://reactjs.org/docs/getting-started.html.

[5] Danielle Hayday,"Online Appointment Scheduling", 2014

[6] "ExpressJS," [Online]. Available: https://expressjs.com/.

[7] Fatma PoniMardiah, Mursyid Hasan Basri, "The Analysis of Appointment System to Reduce Outpatient

[8] Karthikeyan A.G.; Kishan K; Pattabiraman M; Prathiv S. "Medical Assistive Robot (MAR)". International Research Journal on Advanced Science Hub, 2, Special Issue ICAMET 10S, 2020, 71-75. doi: 10.47392/irjash.2020.201