LifeLine

An ultimate solution for Hospital Management System

A thesis submitted in partial fulfillment of the requirements for
the Degree of **Master of Technology** in **Computer Technology** in the
Department of Computer Science and Engineering of
Jadavpur University, Kolkata- 700 032

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2022

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Certificate of Recommendation

This is to certify that the dissertation entitled "**LifeLine:An ultimate solution for Hospital Management System"** has been conducted by **Somen Das**, University Roll No. **001910504004**, Examination Roll Number: **M6TCT22006**, Registration Number: **149839** of **2019-20,** under the guidance and supervision of **Prof. Sarmistha Neogy,** Department of Computer Science and Technology, Jadavpur University, Kolkata, is being presented for partial fulfillment of the degree of Masters of Technology in Computer Technology during the academic year 2021-22. The research results in the thesis have not been included in any of the papers submitted to award any degree at any other university or institute.

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Declaration of Originality and Compliance of Academic Ethics

This thesis, entitled "**LifeLine:An ultimate solution for Hospital Management System**" contains a literature survey and original research work by the undersigned candidate, as a part of her M.Tech degree in Computer Technology.

All information in this document has been obtained and presented by academic rules and ethical conduct.

I have fully cited and referenced all materials and results that are not original to this work as per these rules and conduct requirements.

_____

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Acknowledgement

Now that I've arrived at the point in my studies where I can write this page, I realize I still have a long way to go. This paper would not have been possible without the close collaboration, inspiration, and advice of a large number of people.

First and foremost, I'd like to express my gratitude and obligation to Prof. Sarmistha Neogy, my advisor and guide, for her ongoing involvement and guidance throughout the study process. Indeed, her technical knowledge and intuition have aided me in the investigation of a number of intriguing security issues. Overall, her advice has made it much easier for me to continue with my research.

I had the good fortune of having supportive and caring parents. There are no words to express my gratitude for their care and concern for me while I was working on my thesis.

Somen Das

Abstract

India's healthcare system is dealing with an increase in demand for medical treatments and services. Because this document serves a multitude of purposes, it must contain all of the patients' medical history and may only be read by authorized individuals. In practically every industry, web-based technology provides numerous online services. Almost everything can now be done online, reducing the number of chores, costs, and effort.

As the patient checks in and out of the hospital, these computer-based systems create the patient report. It also creates information on the doctor and nurse assigned to the patient. This study seeks a more accurate, dependable, and efficient technique of computers to enable hospital record keeping in general hospitals in order to provide an efficient output that would save time. According to the study, the design of hospital management records will be a solution to the difficulty that the existing manual technique of storing patient medical records is experiencing.

The current web-based system does not allow for any contact or provision for a patient who has enrolled in two distinct hospitals or clinics. As a result, patients must complete the relevant paperwork each time they register at a new hospital.

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Chapter 1

Introduction

1.1 Introduction

The transmission of medical data has been viewed as a breakthrough in the development of new treatments and medicines for healing ailments in modern civilizations, cultures, and organized groupings. The digitalization, electronic storage, and remote accessibility of medical data by specialists is the driving force behind the above-mentioned assertion. Because these data are created by hospitals during patient visits, patients are the exclusive proprietors of electronic medical records.

With the rising curiosity for Web Security and its acceptance in many companies and sectors, healthcare has emerged as a prominent area where a number of use cases for the use of Web Security have been established. However, because Web Security is a relatively new technology with a lot of hype in the press and *grey publications* in the form of opinion pieces, commentaries, blog posts, interviews, and so on, there is a lot of incorrect information, speculation, and uncertainties about its potential utility in the healthcare industry. Members of the research community and practitioners would like to learn about the specific areas of application or use cases of web security in the healthcare business, as well as the use cases that have been found. Web Security has a lot of promise to overcome the existing interoperability difficulties in health IT systems and to become the technological standard that allows individuals, health care providers, health care institutions, and medical researchers to safely communicate electronic health data.

Interoperability issues between multiple provider and hospital systems add to the obstacles of successful data exchange. Health records are fragmented rather than coherent due to a lack of coordinated data management and interchange. Due to economic incentives that support "health information blocking," patients and providers may encounter considerable challenges in commencing data retrieval and exchange. A new ONC study provides multiple examples of health IT developers interfering with data flow by demanding unreasonable costs for data sharing interfaces.

We must prioritize patient agency while creating new systems to overcome these constraints. Patients benefit from having a complete picture of their medical history. Patients who mistrust the security of their data may refrain from full, honest disclosures or even refuse treatment, which is critical in developing confidence and sustaining involvement in the medical system. Patients are more ready, able, and desirous of handling their data on the web and on the go in the age of online banking and social media. However, suggested systems must understand that not all provider data can or should be made available to patients (for example, provider psychotherapy notes or physician intellectual property), and they must be flexible in dealing with such record-onboarding exceptions.

Medical records are also useful for research. According to the ONC study, biomedical and public health researchers "need the ability to evaluate information from many sources in order to identify public health hazards, discover novel treatments and cures, and allow precision medicine." Though some data from clinical trials, surveys, and teaching hospitals makes its way to researchers, we see a rising desire among patients, care providers, and regulatory agencies in ethically sharing more data and so enabling improved care for others. In this paper, we investigate a security mechanism for EMRs.

1.2 Motivation

"The more I learn, the more I realize how limited my knowledge is"

The true objective for the hospital management system project is to simplify all management activities such as patient registration, billing, doctor's appointments, doctor prescriptions, and so on. We frequently notice that in order to learn about a patient's history, the user must search through many registries. This wastes time. As a result of this system, it will be easier to handle all procedures. So, using the inspiration of this situation, which is commonly used in hospitals, we are currently building this system that may benefit both patients and medical employees. So, we'd like to have this system that allows hospitals and patients to do tasks quickly and effectively.

Prior to the implementation of the computerized Hospital Management System, it was impossible to keep adequate records of the daily operations of hospitals, patient information, the maintenance schedule of hospital equipment, and how money was distributed and used. This resulted in a waste of money, time, and personnel. A hospital management system is an information management system developed to assist in managing the numerous components of a hospital (administrative and clinical). It aids in the monitoring and control of the hospital's daily transactions as well as its performance. It also contributes to meeting the hospital's crucial needs. The Hospital Management System offers access to the correct information and the automation of complicated operations, allowing personnel to spend more time caring for patients.

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So this Hospital Management System is customized to fit the individual needs of any size hospital or clinic anywhere in the world, as well as the portability and accessibility of individual patient records between this medical center to achieve better the patient's user experience.

Chapter 2

Analysis of the Existing System

2.1 The Existing Systems

Most hospitals encounter numerous obstacles with the hospital management system since some still utilize manual methods, and others who use computerized techniques have the issue of adjusting to it. Among these issues are:

1. cost-effective software development, deployment, and enhancement.

2. There is difficulty in migrating from manual procedures because both employees and patients are accustomed to manual processes and are thus unable to quickly adapt to the new system.

3. A lack of IT-savvy medical workers is also posing a number of issues.

4. The large influx of patients attending government hospitals makes the transition to automated systems extremely challenging. They lack the patience to wait for registration and data submission and frequently fail to comprehend how automated operations work.

In short, hospitals currently use a manual system for the management and maintenance of critical information. The current system requires numerous paper forms, with data stores spread throughout the hospital's management infrastructure.

Often, information is incomplete or does not follow management standards. Forms are often lost in transit between departments, requiring a comprehensive auditing process to ensure that no vital information is lost.

Multiple copies of the same information exist in the hospital and may lead to inconsistencies in data in various data stores.

2.2 Security Threats in Healthcare Systems

Healthcare cybersecurity has emerged as one of the most serious risks to the healthcare business. Because of the specifics outlined in the Health Insurance Portability and Accountability Act (HIPAA) laws, as well as the ethical commitment to help patients and the damage that healthcare security breaches can have on their lives, IT professionals must constantly address healthcare data security issues.

Electronic health records, or EHRs, include a fortune of sensitive information about patients' medical histories, making hospital network security a top IT priority. EHRs allow physicians and other healthcare professionals, as well as insurance companies, to exchange critical information. This makes it easy to coordinate treatment and deal with insurance issues. Never before have medical professionals been able to work together in such dynamic ways to satisfy the needs of patients.

Because EHRs are so sensitive, as well as the fact that healthcare providers must follow the privacy and security requirements specified in HIPAA, dependable storage and backup data solutions are critical to keeping your organization in compliance and maintaining your industry-leading reputation. HIPAA mandates healthcare providers to keep their patients' data safe, therefore it's vital that EHRs be kept, transferred, and disposed of securely and in accordance with legislation. While this may appear to be a simple task, healthcare data security offers a number of obstacles that are both typical in the IT profession and particular to hospital cybersecurity.

2.3 Reasons for Security Threats

The paradox of shared healthcare information is that it both makes patients safer and puts them at danger. The wider the network, the more beneficial it is in providing high-quality medical treatment; nonetheless, its data becomes more appealing to thieves. Healthcare cyber risks are a significant issue for several reasons:

1. Medical provider networks, in addition to a patient's data, might contain vital financial information..
2. Because very few individuals do not visit healthcare providers, almost everyone's personal information is available in some manner.
3. Because EHRs are linked, hackers have access to data that has been collected under patients' identities for years. Sharing patient information is critical to giving the best possible care to patients, but it also makes networks incredibly desirable targets.

In many cybercrimes, the attacker's purpose is to obtain information — either to sell or to utilize for personal gain. With the information available in electronic health records, a stranger may set up appointments, conduct costly medical procedures, or get prescription drugs in the patient's name. In such circumstances, the patient or the healthcare organization may be held liable for the expenses or drugs.

In other cases, healthcare organizations have been subjected to more direct attacks. Once a hacker gains access to a network, they can install ransomware to encrypt files or disable vital services until a certain ransom is paid. Because healthcare is such a time-sensitive industry, businesses are sometimes forced to pay the ransom and hope that the money is eventually retrieved.

Although less prevalent, network-connected devices can potentially be hijacked to deliver wrong medicines or modify the operation of a machine. These innovations endanger patients' lives since a hacker may use this access to commit terrorism or take a health practitioner hostage. Healthcare providers cannot afford these possible hazards in medical scenarios when a decimal point or a tiny adjustment in dose might mean the difference between life and death. Regardless of the hacker's motives, it's clear why network security is so critical.

2.4 Common Security Threats

Unfortunately, numerous healthcare security flaws might jeopardize patient data. Without rigorous management, electronic health data, as well as other vital information, can easily slip into the hands of malevolent individuals. Consider the following while assessing possible threats:

1) **Staff:** Patient files are easily accessible to employees. While the majority of people will not misuse this authority, there is no guarantee that individuals will not take important information. Criminals can use this information to steal identities, but it can also be used to bully or blackmail victims. Employees can steal documents in a variety of ways. Employees may gain access to private financial information and utilize patients' credit card numbers to make a series of fraudulent purchases in some situations. Other employees have been caught stealing face papers, which include demographic and social security information that may be utilized to perpetrate a range of crimes.

2) **Malware and phishing attempts:** Sophisticated malware and phishing methods that install dangerous programmes or steal login credentials on a machine can compromise a whole system. One of the most difficult aspects of dealing with malware is that it just takes one seemingly legitimate link to inject a malicious cyber presence into your network. It is critical to teach employees to spot common phishing efforts. One popular fraud involves emails from legitimate-looking websites requesting login credentials, which trustworthy firms never do through email. The hacker on the other end can log in to the system after the user supplies such information. Various viruses will harvest records-related data and automatically send it back to the originating host, or they may keep a backdoor entrance available for later usage..

3) **Vendors:** Healthcare providers frequently collaborate with suppliers without first analyzing the associated risk. If a hospital employs a cleaning business, for example, its personnel may acquire access to computers. While patient information should be secured in ways that the typical employee cannot access, it might be problematic to restrict all sources of access because cleaning and maintenance are necessary for a healthy work environment.

4) **Unsecured mobile devices:** Mobile logins at healthcare institutions are not usually required to meet security standards. Because all of the organization's planning and security do not affect employee communication devices, its networks are open to viruses and hackers. This problem is exacerbated when staff disposes of equipment during an update – network information or passwords may still be accessible, providing a natural entry point for crooks. Employers have little options unless they establish rigorous standards or prohibit the usage of user devices entirely.

5) **Lost and stolen mobile devices:** Similarly, lost or stolen gadgets pose a significant danger. When a mobile device needed to access a facility's network is lost or stolen, it becomes a liability. Once in the wrong hands, the user might simply get access to the system by utilizing outdated or saved login details. Once a thief has gained access to a network, it might be difficult to notice their presence or close the breach.

6) **Online medical devices:** Online medical equipment' security is frequently poor, making them ideal targets for hackers. Infusion pumps, for example, used to solely transmit information to the clinician and patient involved. However, as the Internet of Medical Things (IoMT) expands, these gadgets are designed to export data to external sources and otherwise connect with the world beyond the doctor's office. This data might be intercepted or modified, resulting in a slew of problems. Furthermore, hackers might acquire access to most network-connected objects, including how the equipment functions.

7) **Unrestricted access to computers:** Unauthorized workers can readily gain access to computers that are not in restricted locations. If these open PCs are linked to sensitive patient information, unauthorized personnel or anyone in the vicinity might swiftly discover devastating information. In other circumstances, successful phishing efforts on general-access PCs allow hackers to gain access to more critical portions of the network. Place any computer that has patient information in a safe location.

8) **Inadequate disposal of old hardware:** It's easy to think that after you've destroyed data, you don't have to worry about anyone accessing it. However, when users incorrectly dispose of hard drives, outdated terminals, and other gear used to access a network with EHRs or credentials, such information is easily accessible to criminals. Even after discs have been wiped — and even reformatted — this information may be recovered, implying that whatever the user stored is still susceptible.

Chapter 3

Designing LifeLine

3.1 Background Analysis

We don't frequently visit hospitals unless it's really essential, and our trips there aren't usually enjoyable. There are several problems there for us. There are automated methods for managing hospitals, but they are useless to us. Even medical professionals are unable to access patient data when at home.

Although the healthcare system has been mechanized, not everyone has benefited. *I have determined that there needs to be something for the patients in such a circumstance*. Some basic features\slike confirming appointment, requesting appointment, prescription and test reports\scan decrease the trouble up to 70-80 percent . Considering that we can discover a way out of a lot of difficulties in such areas. We will now be able to do something for which we have been waiting a long time. This is the ideal moment to consider this because the world is heading toward the internet. I looked at a few local programmes and several online hospital management systems that the staff at a nearby hospital use.

Patients will benefit from having a mobile application that keeps them close to important information like medications and test results.Patients will have the option to look up all of the providers and make appointments with the doctors of their choice.

The same benefits apply to medical professionals. It will simplify things for everyone concerned and eliminate a lot of paperwork.

I've had some first-hand experience of going to the hospital, and I've also learned from other people by asking them questions and spending time with them to see what they do. When a person needs to visit the hospital, their worst nightmares come true. Unless it is absolutely necessary, no one visits the hospital. People grow irrationally angry yet have nothing to do.

The correct motivation was given to me by this so that I could create something for them and help them when they most needed it.

3.2 Programming Language

1. **Angular:** Angular is a TypeScript-based free and open-source web application framework developed by the Angular Team at Google in collaboration with a community of people and businesses. It is also sometimes referred to as "Angular 2+" or "Angular CLI." The same team that created AngularJS also created Angular, which is a full rewrite.

   Although "Angular 2" was the name given to the rewritten version of AngularJS, this confused developers. The team announced that distinct terminology should be used for each framework, with "AngularJS" designating versions 1.X and "Angular" designating versions 2 and upwards.

   In my application I used Angular version 12

2. **Node JS:** Scalable network applications may be created using Node.js, an open-source, cross-platform JavaScript runtime environment that uses the V8 engine and executes JavaScript code outside of a web browser. JavaScript may be used by developers to create command-line tools and for server-side scripting that produces dynamic web page content on the server before the page is transmitted to the user's web browser. Node.js, which unifies web application development around a single programming language rather than separate languages for server-side and client-side scripts, reflects a "JavaScript everywhere" paradigm.

   The event-driven design of Node.js supports asynchronous I/O. These design decisions attempt to maximize performance and scalability for real-time Web applications as well as web applications with many input/output activities (e.g., real-time communication programs and browser games).

   The OpenJS Foundation, which is supported by the Linux Foundation's Collaborative Projects program, has taken over management of the Node.js distributed development project, which was previously managed by the Node.js Foundation[8]. [9]

   GoDaddy, **IBM**, **LinkedIn**, **Netflix**, **PayPal**, **SAP**, **Walmart**, **Yahoo!**, and **Amazon Web Services** are just a few of the companies that employ Node.js in the corporate world.

   In my application, I used Node JS Version 14 (stable).

3.3 LifeLine: System Design

Four different user types are the main targets of this system. The administration comes first. The second is a patient, the third is a hospital service provider, and the fourth is the personnel of these service providers. Doctors, nurses, receptionists, and other hospital staff are included in this last group.

1) **Administration:**
   For these applications, administration is crucial. The hospital or clinic may be accepted or rejected as a legitimate service provider for this application by them. They will keep an eye on ongoing requests, service facilities, patients' comments, healthcare services and their sections. They will be responsible for the most crucial tasks. Their actions will affect a lot of crucial things.
   usually these sort of users will governmental institutions or their chosen members

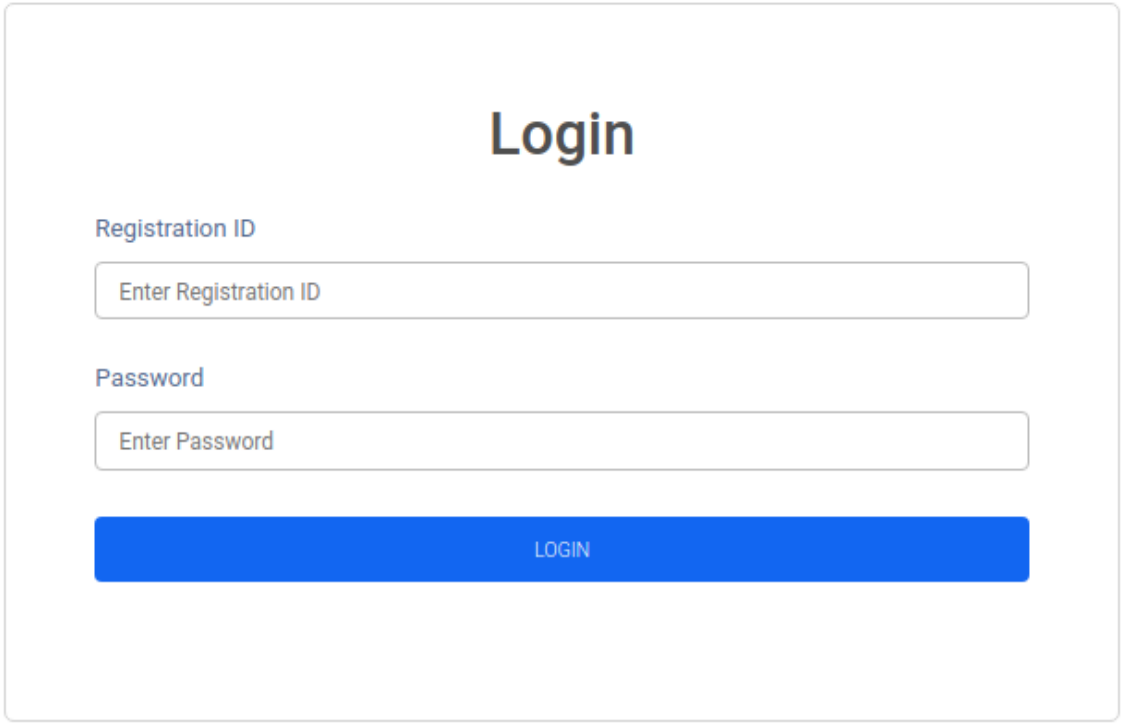
2) **Patient:**
   Patients are regular people just like us. We can go through the available physicians and request appointments. We can also look back on our records. Based on their requirements, the patient's capability is constrained. They will only be allowed to update their personal information and other stuff. Obviously, people may seek their chosen doctors to request an appointment.

3) **Hospital Service Providers:**
   These are essentially healthcare facilities, including hospitals, clinics, and other organizations. They are authorized to offer their amenities to common users, such as patients, as long as they are registered and allowed by the administration.
   They basically add, delete the physicians, nurses, and employees in their services , registered using this program.

4) **staff/personal of the service providers:**
   Most of them are physicians. They have the ability to both check and make their own appointments. They can start prescribing their patients by clicking on the appointment list. It will straighten them for the prescription page. The prescription page contains a number of automated options for the doctor to set items and assign them to their patients. Every field that is essential for a doctor to produce a proper prescription is provided. It will undoubtedly lessen the physicians' burden and allow them to spend adequate time with patients. There would be a few clicks for them to make appropriate prescriptions.

3.3.1 Login System

Every user's first and most critical step is to log in. This page is the same for all users. The user must log in using their registration ID (which is unique and is created at the time of signup) and password. After logging in, each user will be sent to their dashboard page based on their role. Patients will be transferred to the patient dashboard, while hospital employees will be transferred to their own customized dashboard.

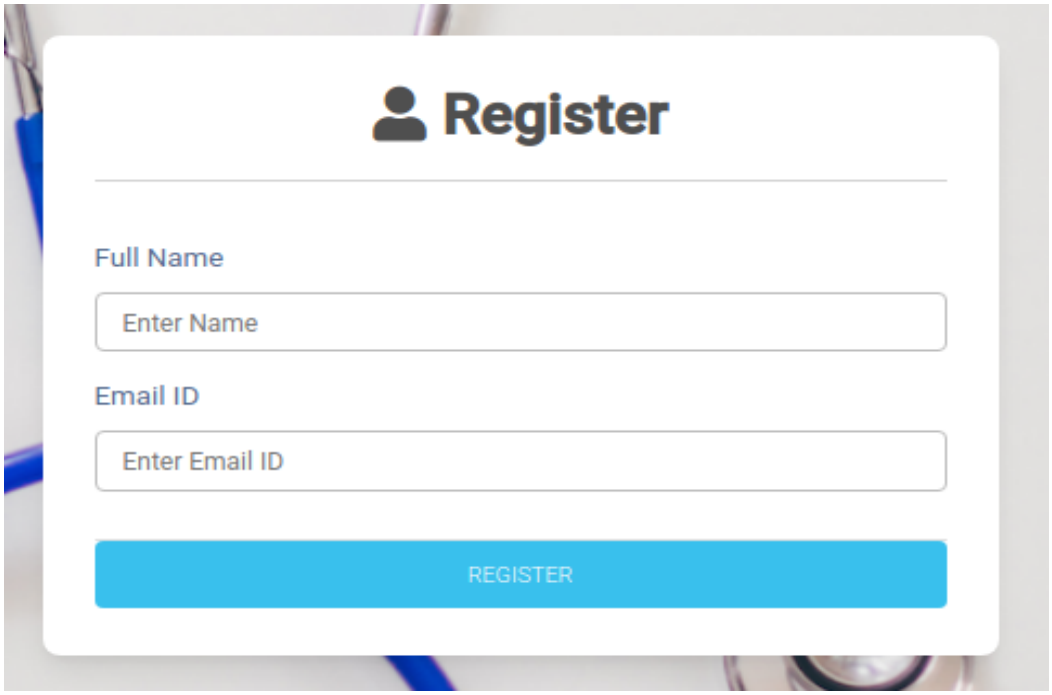


3.3.2 Registration Panel

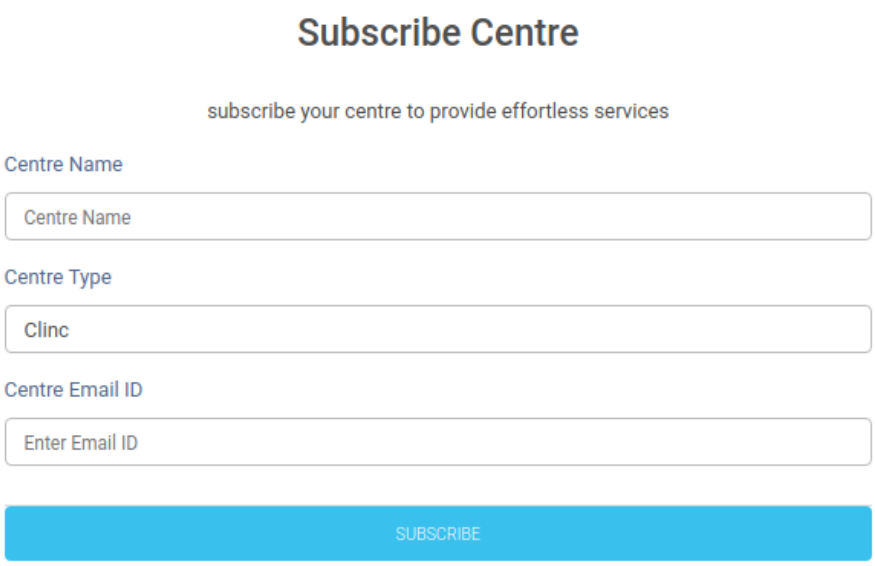
There are three possible registration options. These kinds essentially relate to the different user category types. Two of them are made up of elements from the home pages. These kinds of

1. **Patient Registration:** This is the important and primary sign-up page. Below is a snapshot of these pages. Two main fields are present.
    a. Full Name
    b. Email

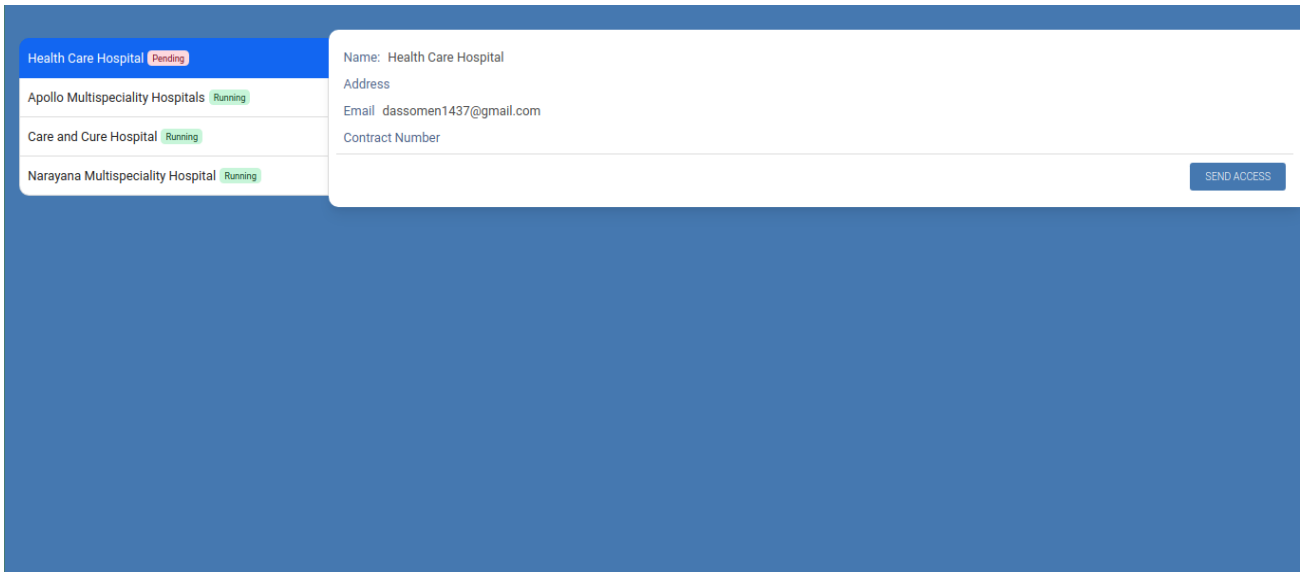
After registering, the user will get an email at that address with a unique **registration ID** and **password**. Now, these two credentials will be required to log in. Therefore, users must provide a mandatory email ID in order to log in properly.



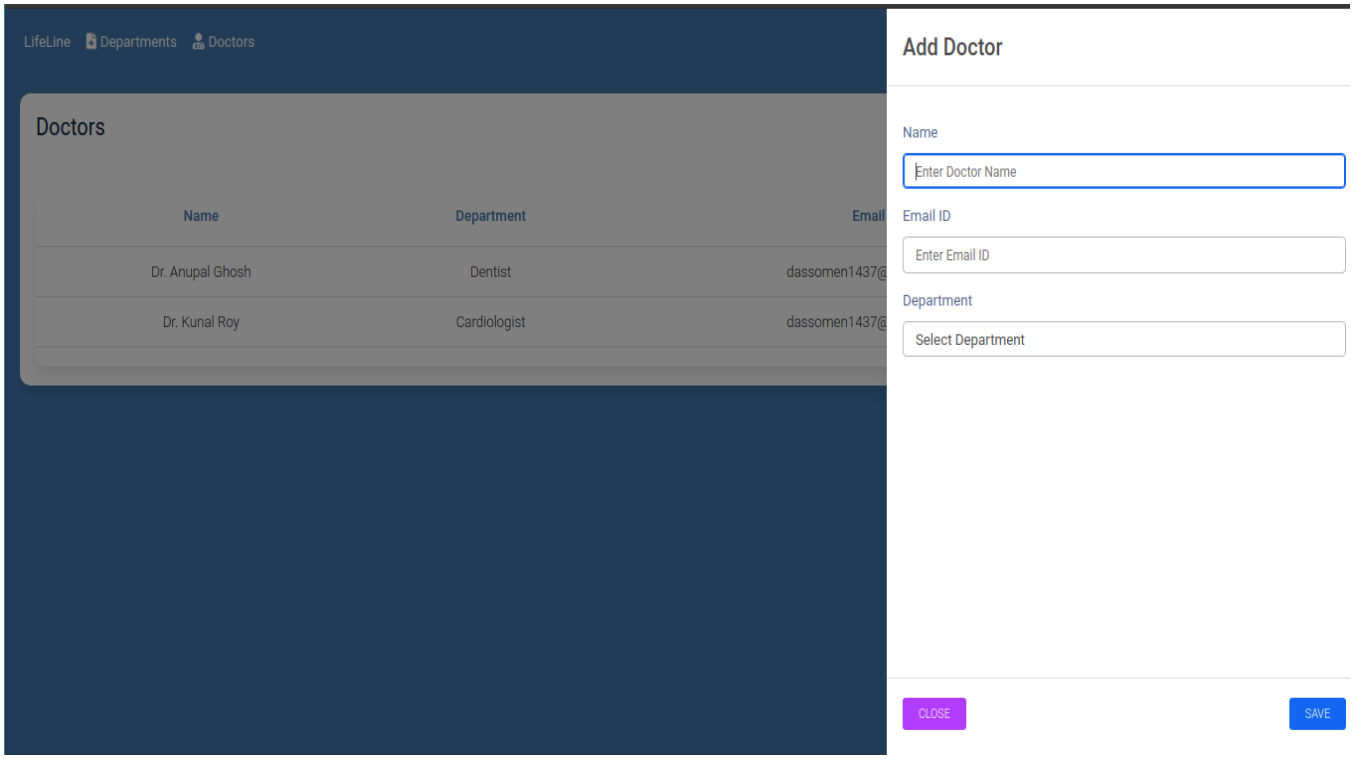
2. **Hospital Registration:** Every hospital,or medical care provider has to sign up for this application in order to offer their services. No medical centers or their amenities will be displayed to users without these registrations. The hospital's registration panel is seen in the image below. There are three fields at the moment. These three main registration inputs are as follows:
    a. Center Types,
    b. Center Name
    c. Center Email Address



The Center will then get an email with details on this service after subscribing. A snapshot of the page is shown below. The center will get an email to the center's email address after the administrator approves the subscription. The center may only log in after that using the **registration ID** and **password** sent to them through email.



3. **Staff Registration:** A doctor or a hospital staff member can only register using this approach. Each employee, including doctors, nurses, and receptionists, has to be registered by the center. According to their requirements, the center will add them and assign them a task. How to add a doctor to a center is shown in the screenshot below.



The center will collect the name, email address, and department of the doctor when adding them. The doctor will then get an email containing his or her login information, including their **registration ID** and **password**.

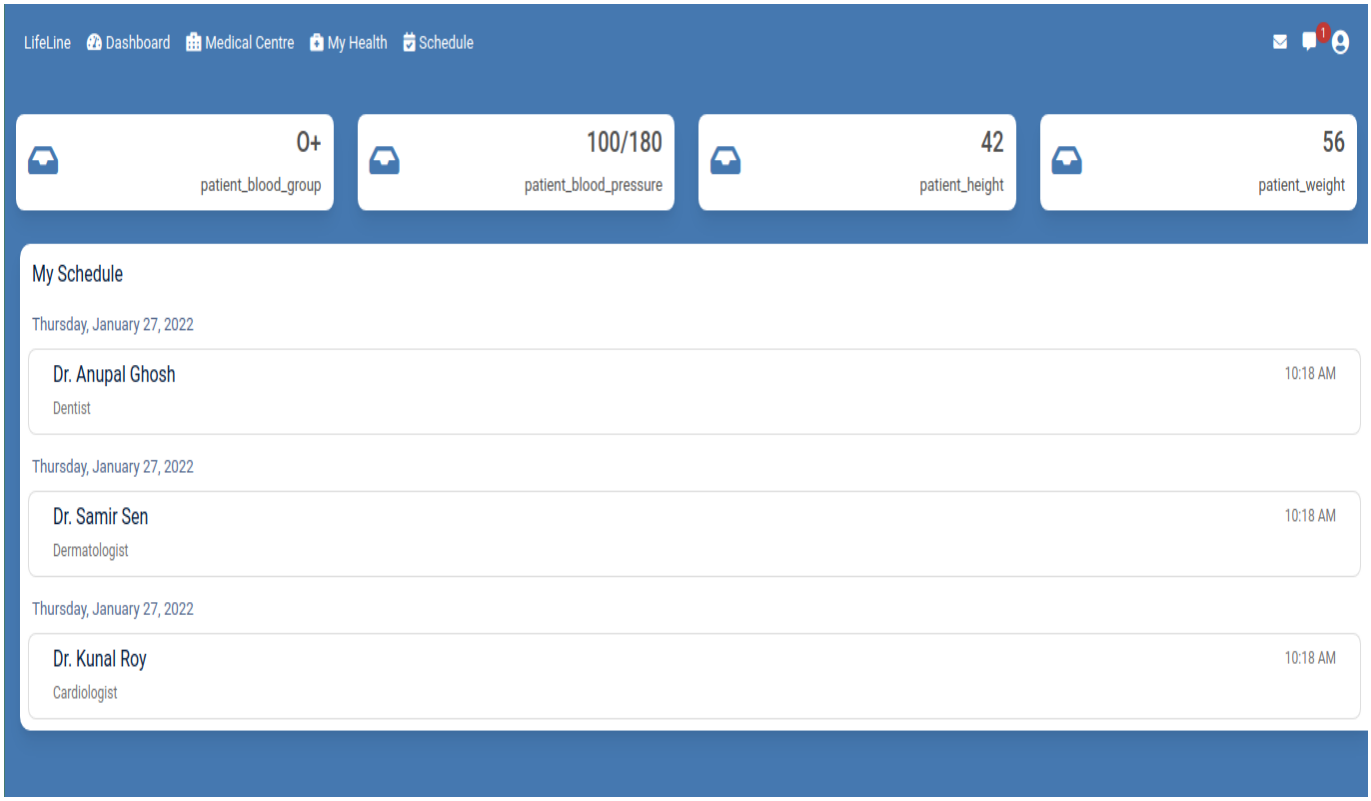
Each piece of information from each section must be properly entered because it will appear alongside the doctor's information. Patients won't be able to access all of the doctor's information if they enter less information. This may result in a circumstance where the system does not give us the advantage it has promised. In light of this, management must exercise caution.

3.3.3 Patient Profile

The pages that can only be viewed by a patient account are generally contained in the patient profile. A role will be assigned to a person when they register as a member. Every time they log in, the patient role is activated and only displays the pages that can be seen by those with this role.

Here are some fundamental page details that are significant to patients and are part of their workflow.

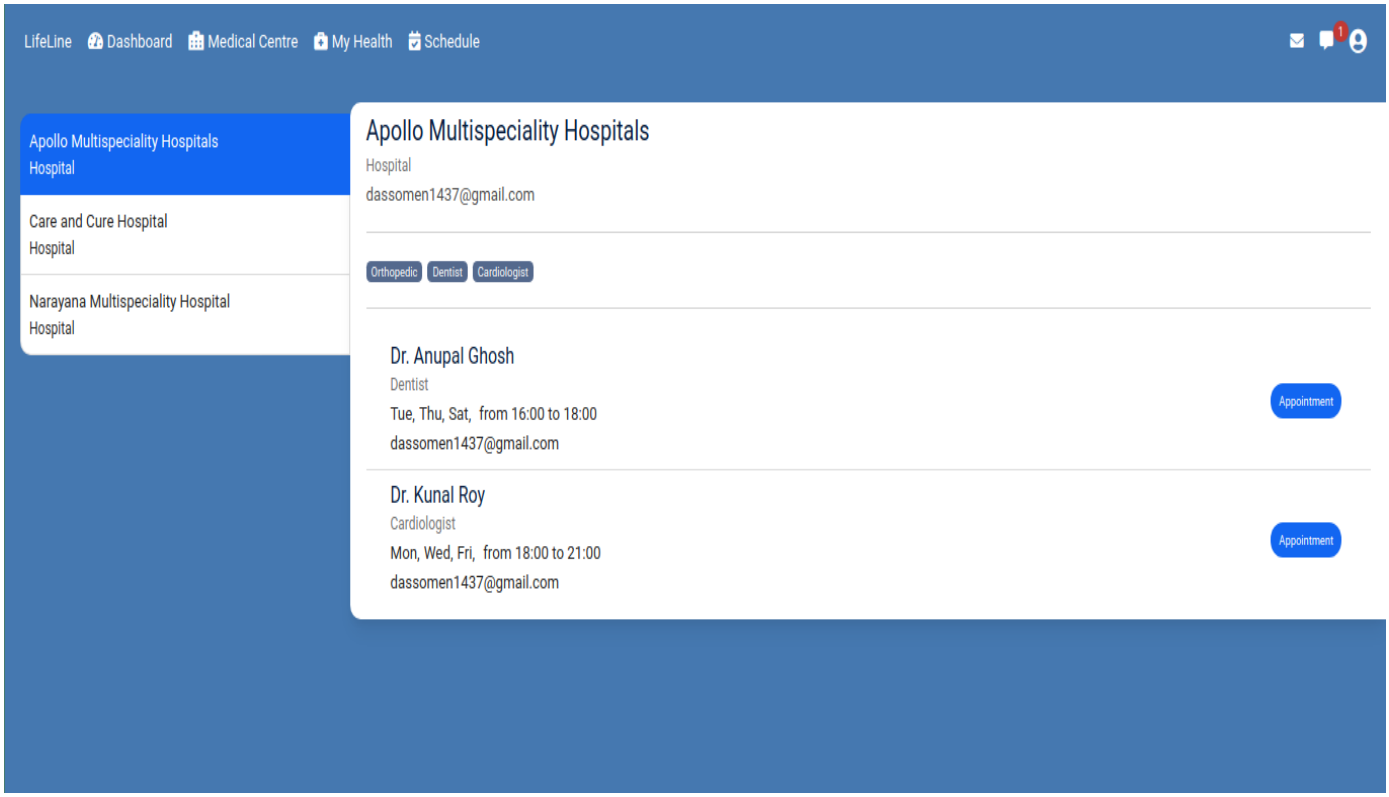
1. **Dashboard:** Patients can view their health-related information on their personal dashboard after logging in. They may also view the times of their appointments. This page's snapshot is shown in the image below.



2. **Medical Center:** Users are able to search and locate information based on their requirements and the services offered by the centers. Users may select the facility from there as well as the physicians they want to schedule appointments with.

   A patient will be able to search through all the physicians in various medical facilities across the world for their availability and request an appointment with the doctor of their choice in this part. When the doctor approves the request for an appointment, they will need to wait for the doctor to confirm.

   Another crucial aspect is the ability for patients to book appointments online with the doctors of their choice. We haven't come up with anything similar yet. Although we can now make phone appointments, it is not as handy as this, where you can obtain what you want with just a few clicks and without having to wait. This page's screenshot is shown in the image below.

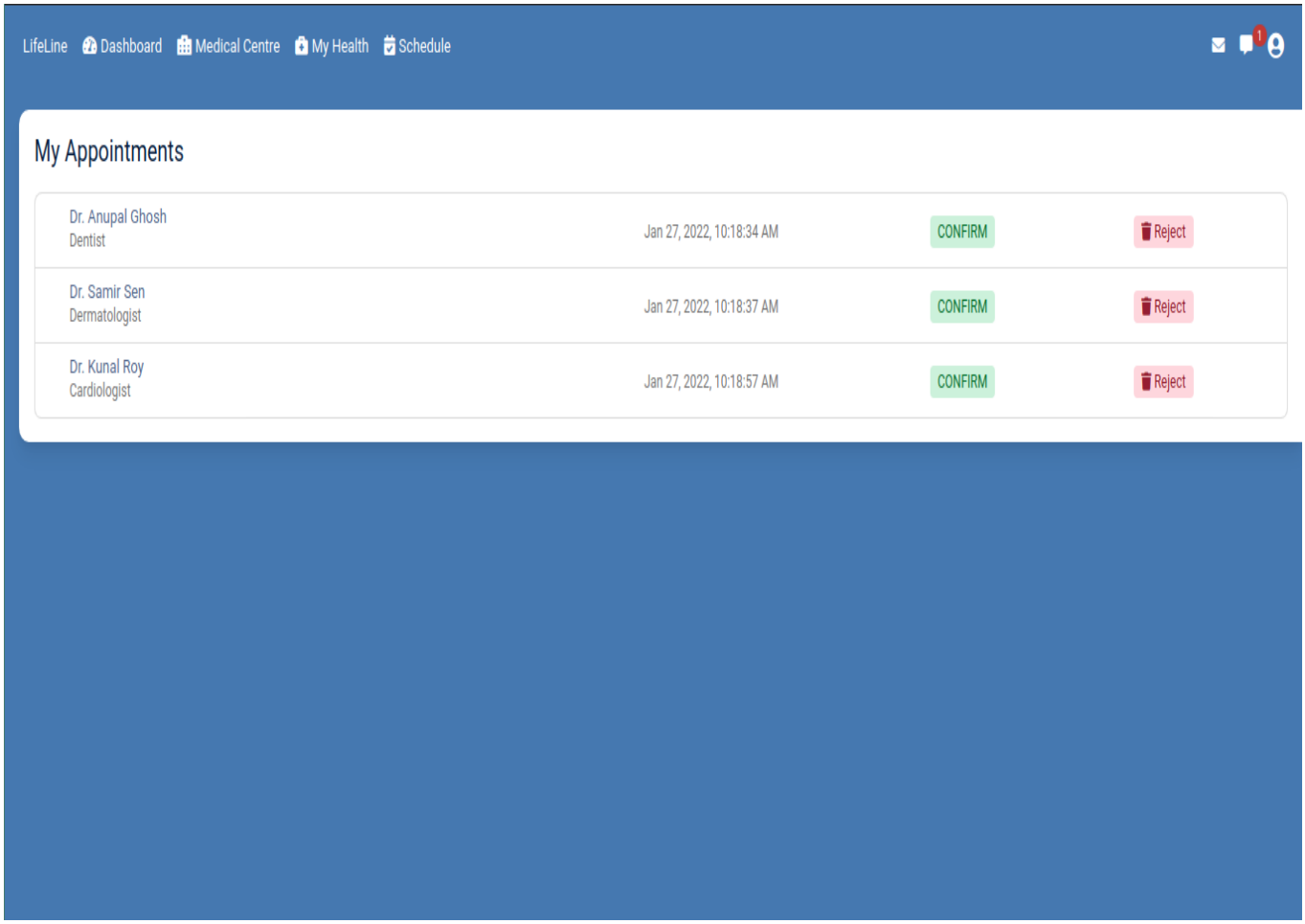


3. **Appointment's Schedule:** If a user requests it, this page will schedule an appointment for them. To add an appointment, they will need to choose the doctor's name and the time. This will result in more appointments for the patient and the doctor.

   The appointment portion is also very significant. This provides everyone the ability to streamline their lives and save time. A patient can simply request an appointment; the doctor must make the appointment.

   Here, the doctor has a significant responsibility. They must confirm if the individual is free or not. This will lessen the possibility of scheduling numerous appointments with the same doctor simultaneously. When necessary, the physicians can also schedule appointments for them.

   This will be directly assigned for them and the center will not have anything to do with

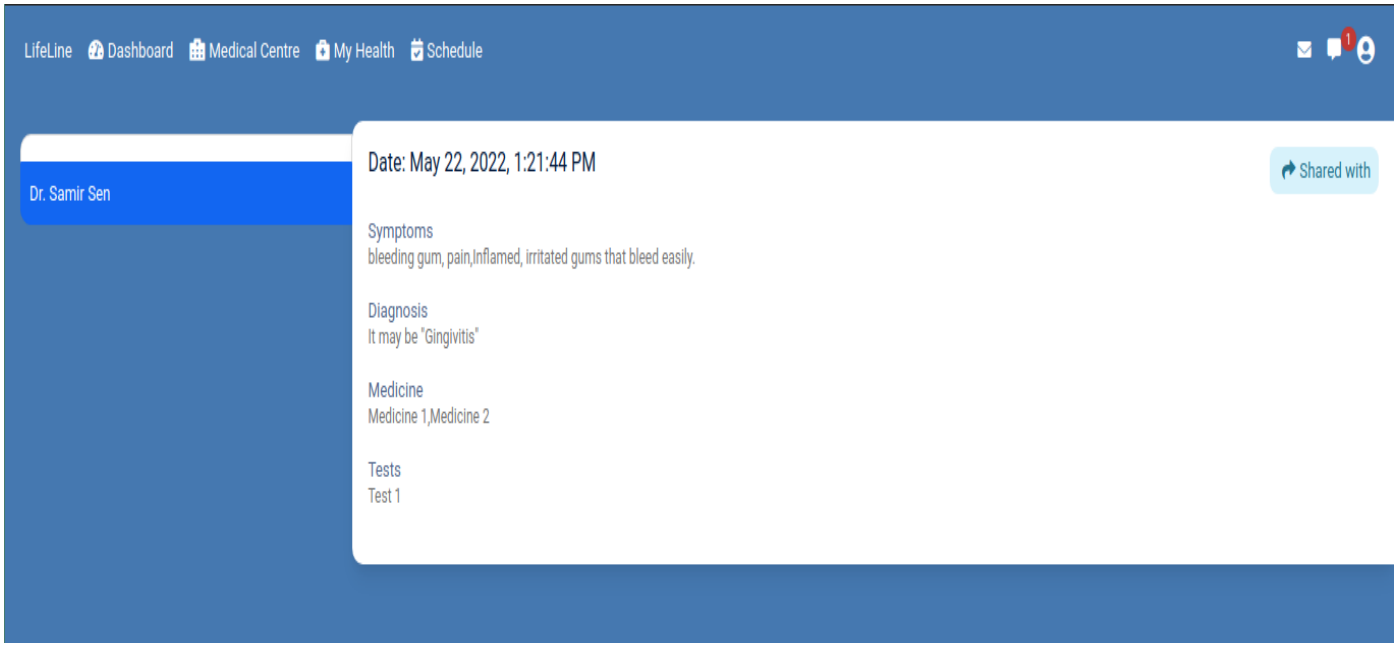


4. **Patient's Health:** Patients can get information about their prescriptions, including their doctor's name. They may look up any past prescriptions they may have in the patient page's history section.

   Many folks will find this useful. We frequently lose our medicines, which happens quite frequently. The most crucial information for a patient is on the history page rather than the profile page.

   From a list, they may check their prescriptions, which are organized by the date they were given to them. We will be able to review either our current or previous medications whenever we want to. This gives you the chance to remain up to date on all the information we need to combat illness and natural disasters.

   Additionally, patients may shared their prescriptions with any doctors related with any medical centers

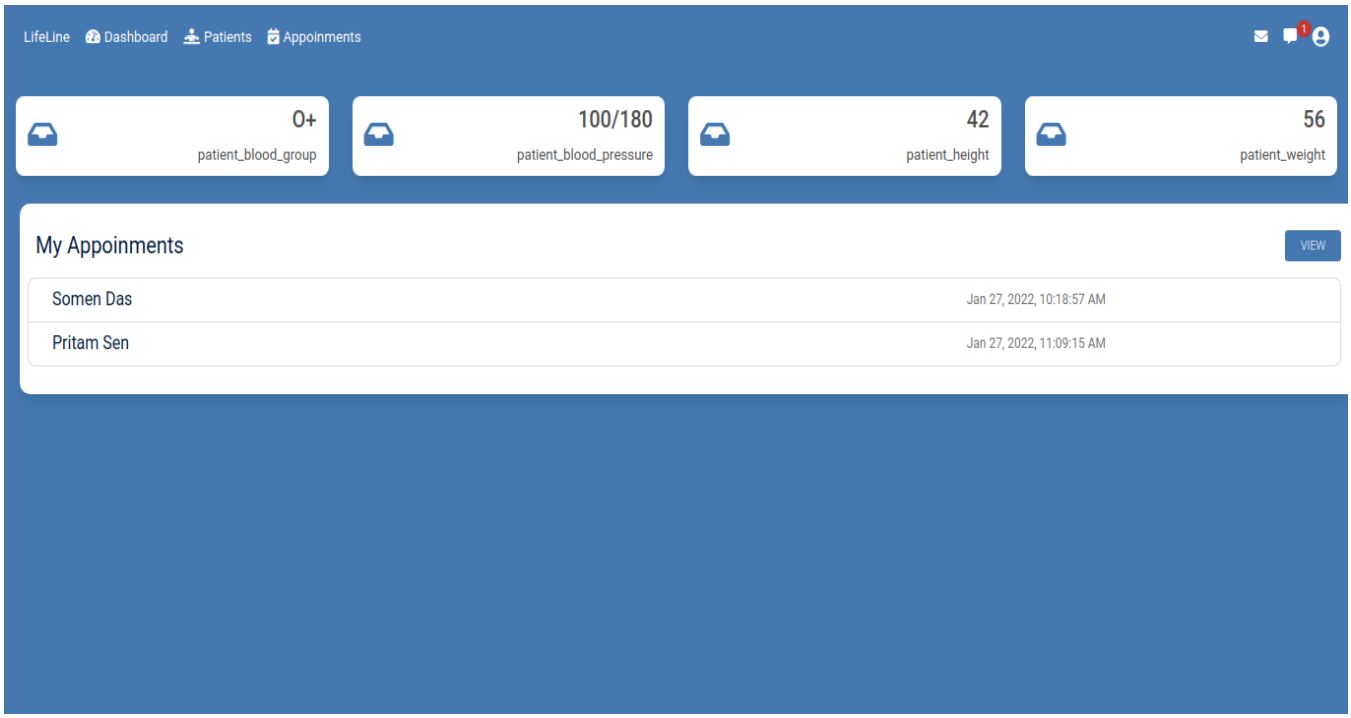


3.3.4 Doctor's Profile

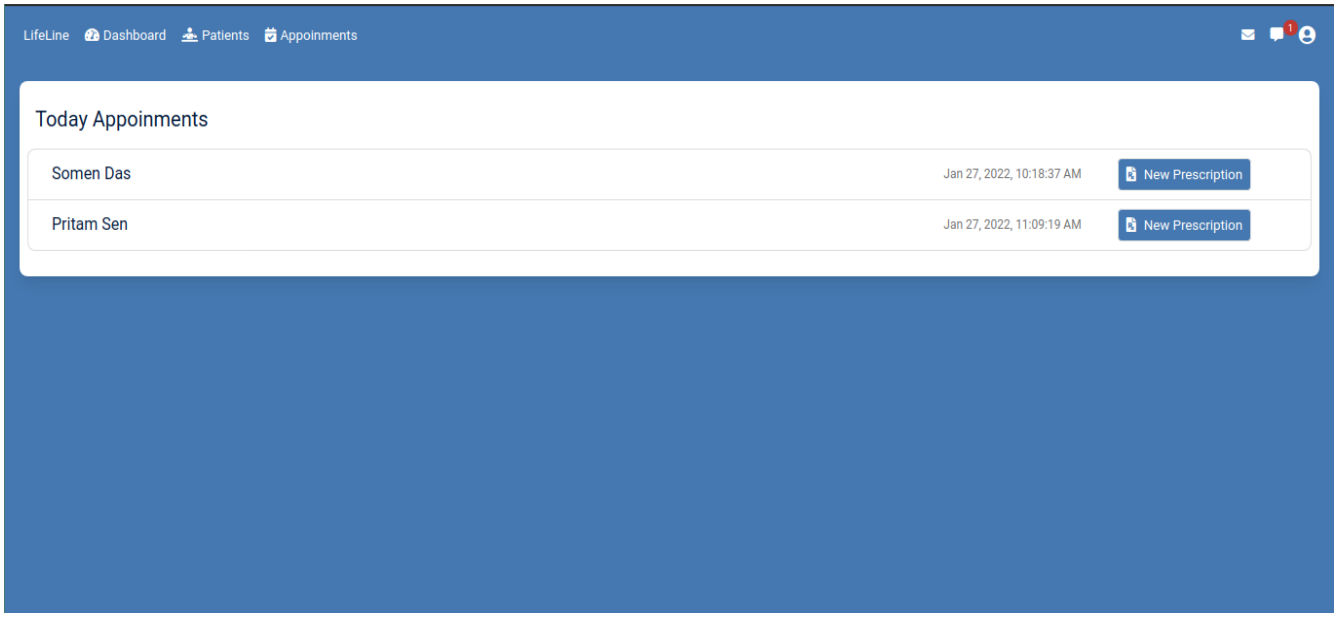
Just like a patient profile, the pages that can only be viewed by a doctor account are generally contained in the doctor profile. A role will be assigned to a person when the center registers them as a doctor. Then, every time they log in, the doctor role is activated and only displays the pages that can be seen by those with this role.

Here are some fundamental page details that are significant to doctors and are part of their workflow.

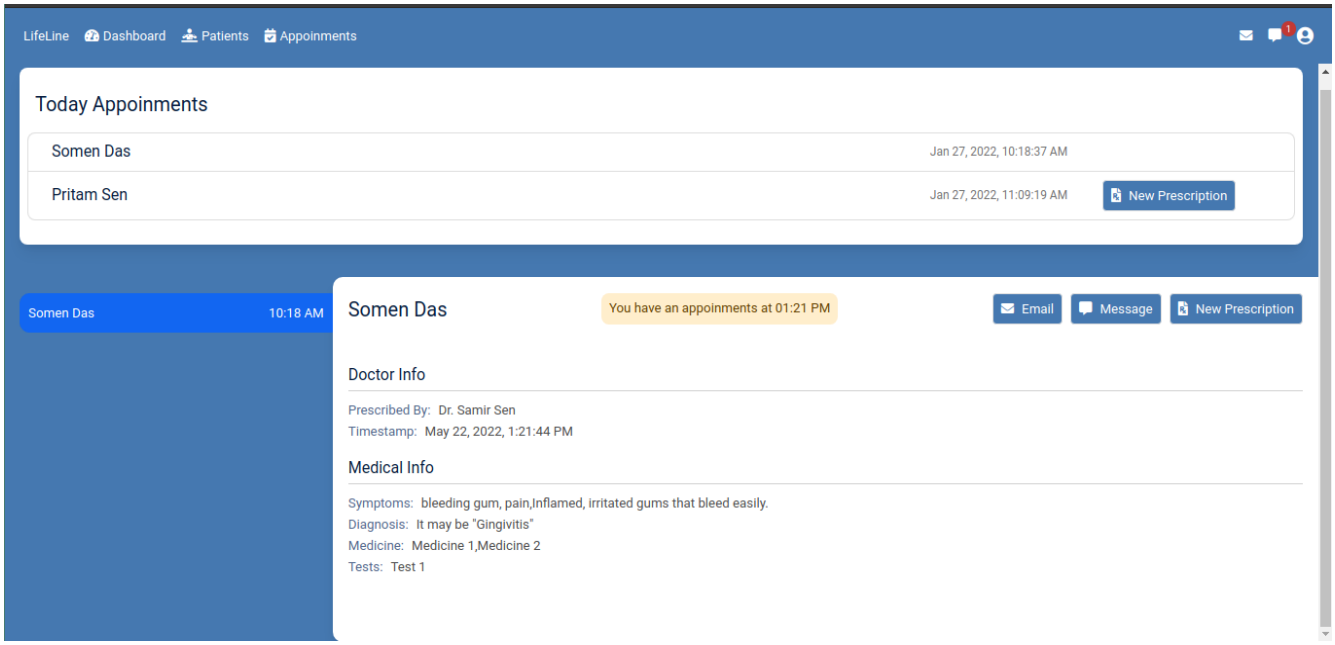
1. **Dashboard:** Doctors may access their dashboards with their own healthcare information after logging in, just like patients can. Additionally, they may see the timing of their appointments. The screenshot below displays this page.



2. **Prescriptions View:** Doctors have access to their patients' schedules and prescriptions based on their medical information. Doctors with no prior patients are shown in the first snapshot below.

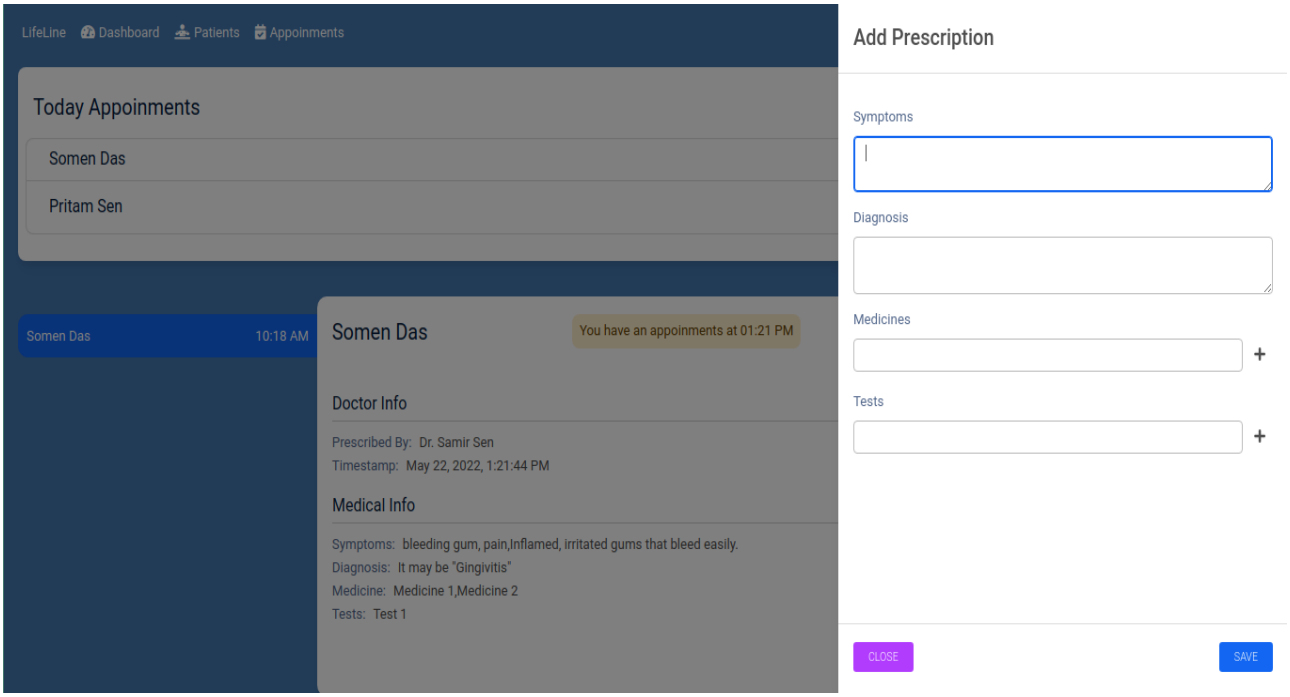


The second image below displays a list of patients and their prescription information. Doctors can view shared prescriptions here as well.



3. **Add Prescription:** Part of these applications that is crucial and necessary is the prescription. These data are also the most sensitive ones. The doctor and the intended patients should be the only ones with access to this data. Below is a screenshot of one of these pages.

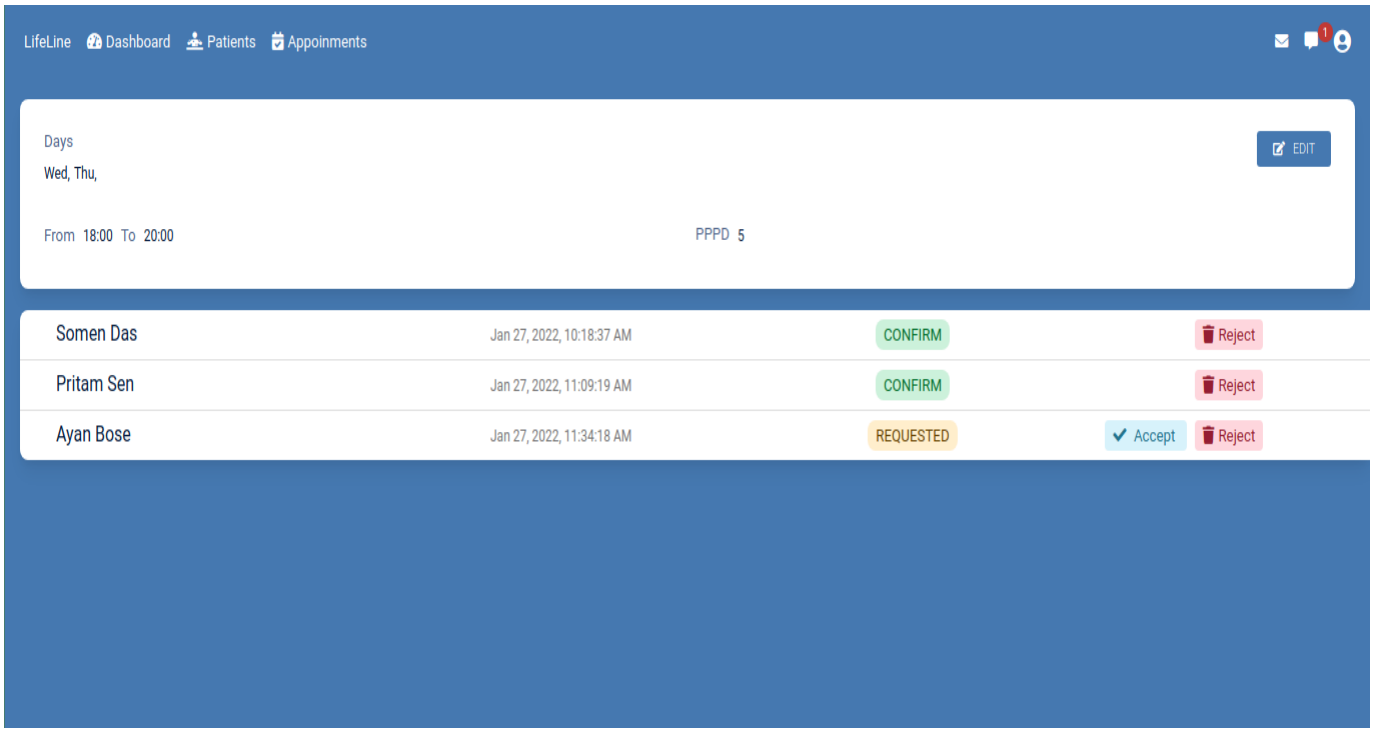
The symptoms, diagnosis, medications, and test information of the patient can be added by the physician. Doctors who have added a prescription can view this in their account information as well as the patients in their own account.



4. **Appointment:** The physicians' duty to authorize appointments is yet another crucial duty. Patients can request an appointment from home, but a doctor must authorize it in order for the patient to be seen. They will discover any pending appointments, and based on their availability, they may either schedule them or delete them. The doctor can take suitable action after seeing all those open appointments here.

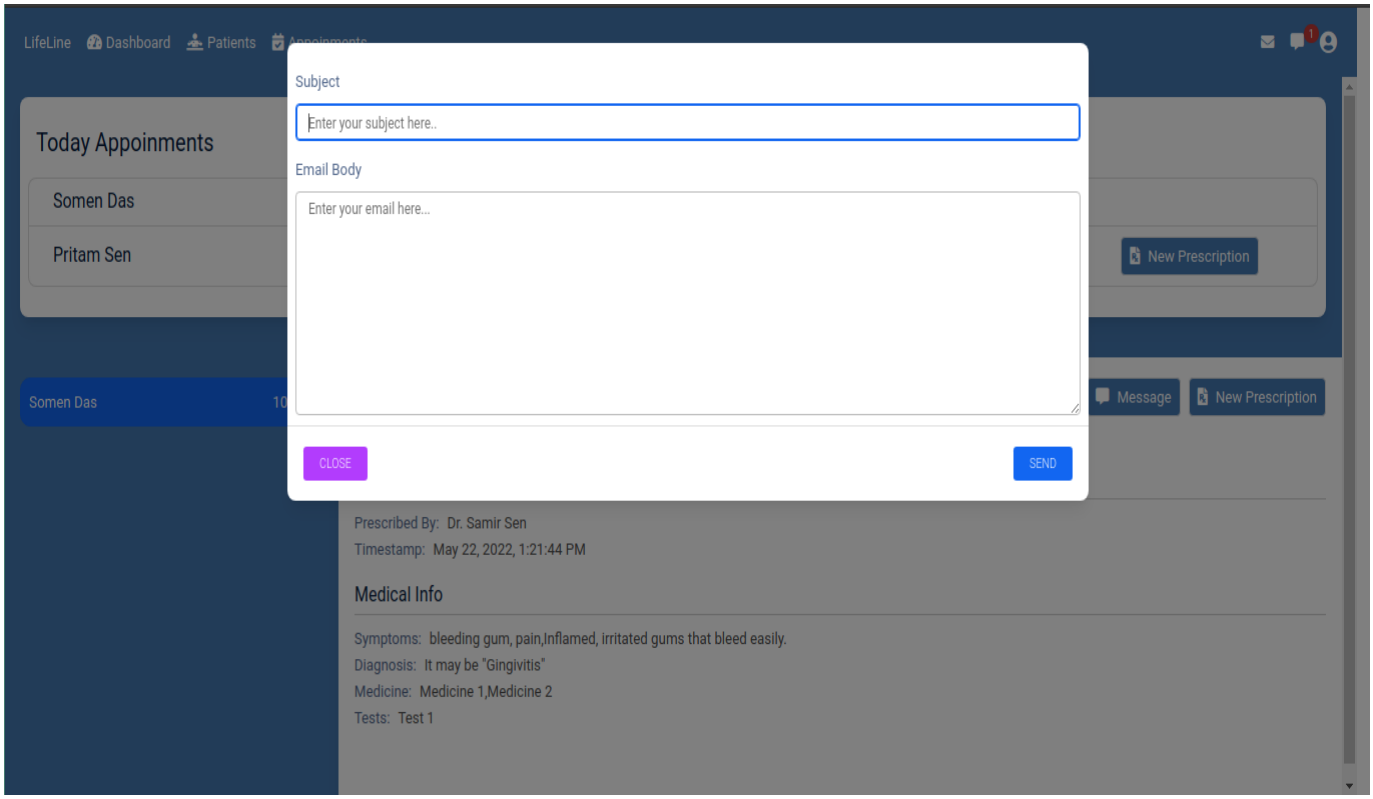
   The doctor will check this first thing in the morning and take appropriate measures. People connected to their activity will be informed following it.

   Following the appointment's scheduling, both the party doctor and the patient will get information about it. This demonstrates how crucial this action is.



5. **Email:** In an emergency or for any other reason, a doctor can send a patient an essential email.This crucial feature gives patients and doctors a simple means of communication.

   Remember that neither patients nor doctors provide their personal contact information for these communications. Hence, this is a crucial feature for many applications to provide security.



3.4 LifeLine: Database Design

Any online application would be impossible without a database. These days, a wide variety of databases are available for creating these apps. Both have benefits and drawbacks. My application was developed using the MySQL database. These types of databases are preferred over NoSQL databases for a number of reasons.

1. **Standardized Schema:** Although the predetermined structure of SQL databases makes them rigid and hard to alter, it does provide certain benefits. The well-known schema of linked tables made up of rows and columns must be followed by all data added into the database. However, it is helpful when data consistency, integrity, security, and compliance are important. Some people may find this to be limiting or restrictive.

2. **Large user Community:** Nearly 50 years old, extremely sophisticated, and still in use today is the SQL programming language. It features a thriving network of experts ready to offer guidance and tried-and-true best practices. There are many opportunities to develop one's skills and work together. If more help is required, consultants and SQL vendors can provide it. SQL will allow your developers to find the solutions they need.

3. **No Code Required:** Languages like SQL are simple to use. Simple keywords and little to no code may be used to manage and query the database. The majority of developers take SQL classes in college.

4. **ACID Compliance:** Due to the relational database tables' highly organized architecture, SQL databases are ACID compliant. This level of compliance ensures that tables are kept in sync and transaction validity is ensured. For executing programs that have no room for error and demand the highest level of data integrity, it is most certainly the best choice. The following are the characteristics of ACID:

    a. **Atomicity**: All changes to data and transactions are made completely in a single procedure. None of the alterations are applied if this is not possible. Either everything or nothing.
    b. **Consistency**: The data must be accurate and consistent at both the start and end of a transaction.
    c. **Isolation**: Transactions run concurrently and independently of one another. Instead, they act as though they are taking place sequentially.
    d. **Durability**: Once a transaction is complete, the associated data is no longer able to be changed.

3.4.1 Tables and Their Purposes

There are 14 tables, designed and created for my web application. These tables are

1. **Profile:** This table stores all personal data of every patient and staff of centers.It stores name,address,DOB, gender,contact number etc. profile_id is the primary key of this table. Metadata of these table is shown below:

#	Name	Type	Collation	Attributes	Null	Default
1	**profile_id** 🔑	varchar(200)	utf8mb4_0900_ai_ci		No	*None*
2	**profile_name**	varchar(200)	utf8mb4_0900_ai_ci		No	*None*
3	**profile_DOB**	varchar(50)	utf8mb4_0900_ai_ci		No	*None*
4	**profile_gender**	varchar(50)	utf8mb4_0900_ai_ci		No	*None*
5	**profile_address**	varchar(200)	utf8mb4_0900_ai_ci		No	*None*
6	**profile_contact_no**	varchar(100)	utf8mb4_0900_ai_ci		No	*None*
7	**profile_email_id**	varchar(100)	utf8mb4_0900_ai_ci		No	*None*

2. **Roles:** This table stores all the roles provided by these application.All default and custom roles will be stored here. It stores role id, name ,description and 'is default' flag.role_id is the primary key of these table.The metadata of these table is shown below:

#	Name	Type	Collation	Attributes	Null	Default
1	**role_id** 🔑	varchar(200)	utf8mb4_0900_ai_ci		No	*None*
2	**role_name**	varchar(200)	utf8mb4_0900_ai_ci		No	*None*
3	**role_description**	varchar(400)	utf8mb4_0900_ai_ci		No	*None*
4	**is_customizable**	varchar(5)	utf8mb4_0900_ai_ci		No	*None*

3. **Pagenames:** This table stores all the page names provided by these application.It contains page names, page's display name, icons etc. page_id is the primary key of these table.The metadata of these table is shown below:

#	Name	Type	Collation	Attributes	Null	Default
1	**page_id**	varchar(100)	utf8mb4_0900_ai_ci		No	*None*
2	**page_name**	varchar(200)	utf8mb4_0900_ai_ci		No	*None*
3	**page_displayname**	varchar(200)	utf8mb4_0900_ai_ci		No	*None*
4	**page_icon**	varchar(50)	utf8mb4_0900_ai_ci		No	*None*
5	**page_order**	varchar(100)	utf8mb4_0900_ai_ci		No	*None*

4. **Profile_Roles:** This table contains relation between *profile* and *roles* tables.The metadata of these table is shown below:

#	Name	Type	Collation	Attributes	Null	Default
1	**profile_id**	varchar(200)	utf8mb4_0900_ai_ci		No	*None*
2	**role_id**	varchar(200)	utf8mb4_0900_ai_ci		No	*None*

5. **Roles_Pagenames:** This table contains relation between *roles* and *pagenames* tables.The metadata of these table is shown below:

#	Name	Type	Collation	Attributes	Null	Default
1	**role_id**	varchar(100)	utf8mb4_0900_ai_ci		No	*None*
2	**page_id**	varchar(100)	utf8mb4_0900_ai_ci		No	*None*

6. **Loginpanel:** This table contains login credentials to login for any users. It contains registration id, password, email etc. profile_id is the primary key of this table. Metadata of these table is shown below:

#	Name	Type	Collation	Attributes	Null	Default
1	**profile_id**	varchar(200)	utf8mb4_0900_ai_ci		No	*None*
2	**profile_reg_id**	varchar(100)	utf8mb4_0900_ai_ci		No	*None*
3	**profile_password**	varchar(200)	utf8mb4_0900_ai_ci		No	*None*
4	**profile_token**	varchar(500)	utf8mb4_0900_ai_ci		No	*None*

7. **Medical_Centre:** This table contains all personal information of any medical centers that has been subscribed. This contains center name, center type id , center address, center email id, rating etc. centre_id and centre_type_id is the combined primary key of this table. Metadata of these table is shown below:

#	Name	Type	Collation	Attributes	Null	Default
1	**centre_id**	varchar(200)	utf8mb4_0900_ai_ci		No	*None*
2	**centre_name**	varchar(200)	utf8mb4_0900_ai_ci		No	*None*
3	**centre_type_id**	varchar(100)	utf8mb4_0900_ai_ci		No	*None*
4	**centre_rating**	varchar(50)	utf8mb4_0900_ai_ci		No	*None*
5	**centre_address**	varchar(200)	utf8mb4_0900_ai_ci		No	*None*
6	**centre_contact_no**	varchar(100)	utf8mb4_0900_ai_ci		No	*None*
7	**centre_email_id**	varchar(100)	utf8mb4_0900_ai_ci		No	*None*
8	**status**	int			No	*None*

8. **Medical_Department:** This table contains all department names.This contains department name, department description etc.department_id is the primary key of this table. Metadata of these table is shown below:

#	Name	Type	Collation	Attributes	Null	Default
1	**department_id**	varchar(200)	utf8mb4_0900_ai_ci		No	*None*
2	**department_name**	varchar(200)	utf8mb4_0900_ai_ci		No	*None*
3	**department_description**	varchar(400)	utf8mb4_0900_ai_ci		No	*None*

9. **Medical_Centre_Doctor:** This table contains all doctor names according to the centers.This table also contains their appointment dates according to their centers. centre_id and doctor_id are the combined primary keys of this table. The metadata of this table is shown below:

#	Name	Type	Collation	Attributes	Null	Default
1	**centre_id**	varchar(200)	utf8mb4_0900_ai_ci		No	*None*
2	**doctor_id**	varchar(200)	utf8mb4_0900_ai_ci		No	*None*
3	**department_id**	varchar(50)	utf8mb4_0900_ai_ci		No	*None*
4	**days**	varchar(500)	utf8mb4_0900_ai_ci		No	*None*
5	**starttime**	varchar(10)	utf8mb4_0900_ai_ci		No	*None*
6	**endtime**	varchar(10)	utf8mb4_0900_ai_ci		No	*None*
7	**ppd**	int			No	*None*

10. **Medical_Centre_Department:** This table contains all department names according to the centers.centre_id and department_id are the combined primary key of this table. Metadata of these table is shown below:

#	Name	Type	Collation	Attributes	Null	Default
1	**centre_id**	varchar(200)	utf8mb4_0900_ai_ci		No	*None*
2	**department_id**	varchar(200)	utf8mb4_0900_ai_ci		No	*None*

11. **Centre_Types:** This table contains all the center types available for these application. This contains type id, center type names etc. Centre_type_id is the primary key of this table. Metadata of these table is shown below:

#	Name	Type	Collation	Attributes	Null	Default
1	**centre_type_id**	varchar(100)	utf8mb4_0900_ai_ci		No	*None*
2	**centre_type_name**	varchar(200)	utf8mb4_0900_ai_ci		No	*None*
3	**centre_type_description**	varchar(300)	utf8mb4_0900_ai_ci		No	*None*

12. **Doctor_Prescription:** This table contains all prescriptions created by doctors.This contains doctor id, prescription details etc.prescription_id is the primary key of this table. Metadata of these table is shown below:

#	Name	Type	Collation	Attributes	Null	Default
1	**prescription_id** 🔑	varchar(50)	utf8mb4_0900_ai_ci		No	*None*
2	**patient_id**	varchar(50)	utf8mb4_0900_ai_ci		No	*None*
3	**doctor_id** 🔑	varchar(50)	utf8mb4_0900_ai_ci		No	*None*
4	**prescription_details**	varchar(1000)	utf8mb4_0900_ai_ci		No	*None*
5	**is_owned**	tinyint(1)			No	*None*

13. **Appointment:** This table contains all appointments scheduled between doctors and patients. It contains doctor id, center id, timestamp etc. appointment_id is the primary key of this table. The metadata of this table is shown below:

#	Name	Type	Collation	Attributes	Null	Default
1	**appointment_id** 🔑	varchar(200)	utf8mb4_0900_ai_ci		No	*None*
2	**profile_id**	varchar(200)	utf8mb4_0900_ai_ci		No	*None*
3	**doctor_id**	varchar(200)	utf8mb4_0900_ai_ci		No	*None*
4	**centre_id**	varchar(200)	utf8mb4_0900_ai_ci		No	*None*
5	**appointment_timestamp**	varchar(100)	utf8mb4_0900_ai_ci		No	*None*
6	**status**	varchar(50)	utf8mb4_0900_ai_ci		No	*None*

14. **Email:** This table contains all emails sent and received between doctors and patients. It contains sender,receiver, email body, subjects etc. email_id is the primary key of this table. Metadata of these table is shown below:

#	Name	Type	Collation	Attributes	Null	Default
1	**email_id** 🔑	varchar(50)	utf8mb4_0900_ai_ci		No	*None*
2	**email_sender**	varchar(50)	utf8mb4_0900_ai_ci		No	*None*
3	**email_receiver**	varchar(50)	utf8mb4_0900_ai_ci		No	*None*
4	**email_details**	varchar(1000)	utf8mb4_0900_ai_ci		No	*None*
5	**email_isNew**	tinyint(1)			No	*None*

Chapter 4

Security and Attacks

4.1 Introduction

Security is a critical component of every online application. Before developing any system, it is critical to understand the nature of its security and how it currently functions. The comprehensive inspection offers the exact data needed during the design process to verify that all of the client's needs are met.

4.2 Login System

The login system is the most important component of any program. This is a barrier that mostly filters out illegal users. Users may generally view their own data after logging in. However, if an unauthorized person gains access to the system, they can view unauthorized data and jeopardize its security.

To login to this application, users must provide their registration id and password. These two records are saved in the database. As a result, anyone with Database View can login unauthorizedly and access other people's data. As a result, passwords are encrypted with MD5 hashing.

Let us look at some fundamental definitions.

What is MD5?

MD5 (message-digest algorithm) is a cryptographic mechanism that is used for message authentication, content verification, and digital signatures. MD5 is a hash algorithm that confirms that a file you transmit matches the file received by the person to whom you sent it. Previously used for data encryption, MD5 is now mostly used for authentication.

How does MD5 work?

MD5 uses a mathematical hashing process to create a signature that can be compared to the original file. As a result, a received file may be validated as matching the original file that was transmitted, guaranteeing that the correct files reach their destination.

The MD5 hashing technique transforms data into a 32-character string. The word "frog," for example, always yields this hash: 938c2cc0dcc05f2b68c4287040cfcf71. Similarly, a 1.2 GB file produces a hash with the same number of characters. When you give that file to someone else, their computer verifies the hash to guarantee it matches the one you sent.

If you modify only one bit in a file, regardless of its size, the hash result will be entirely and irrevocably modified. The MD5 test requires an exact duplicate to pass.

How is an MD5 hash calculated?

To generate a hash, the MD5 hashing technique employs a sophisticated mathematical formula. It divides data into specific-size pieces and manipulates it many times. During this time, the algorithm inserts a one-of-a-kind value into the calculation and turns the result into a tiny signature or hash.

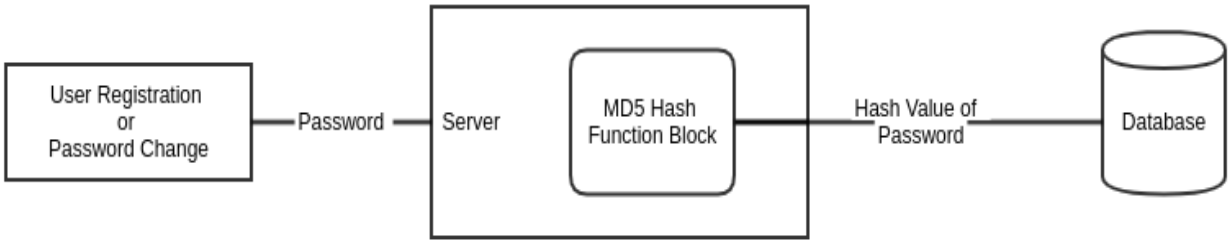
The stages of the MD5 method are quite difficult for a reason: you cannot reverse this process and reconstruct the original file from the hash. The same input, however, will always provide the same result, also known as the MD5 sum, hash, or checksum. That is why they are so valuable for data validation. An MD5 hash is as follows: 0cc175b9c0f1b6a831c399e269772661. That's the letter "a" hashed.

Now to our main programme; when it stores a password, it turns it to an encrypted version using the MD5 hashing process and puts it in the database.

Consider the following example:

Step 1: Storing a password:

Assume the user wishes to change their password to 'somend,' thus the programme sends an API request. The application now receives the password as'somend' and transforms it to its hash form, yielding "687ffe9cfbfcfe8d6e8b34d29a475129." This will now be saved in the database along with its accompanying registration id, like "reg12."



Step 2 : unauthorized user trying to Login:

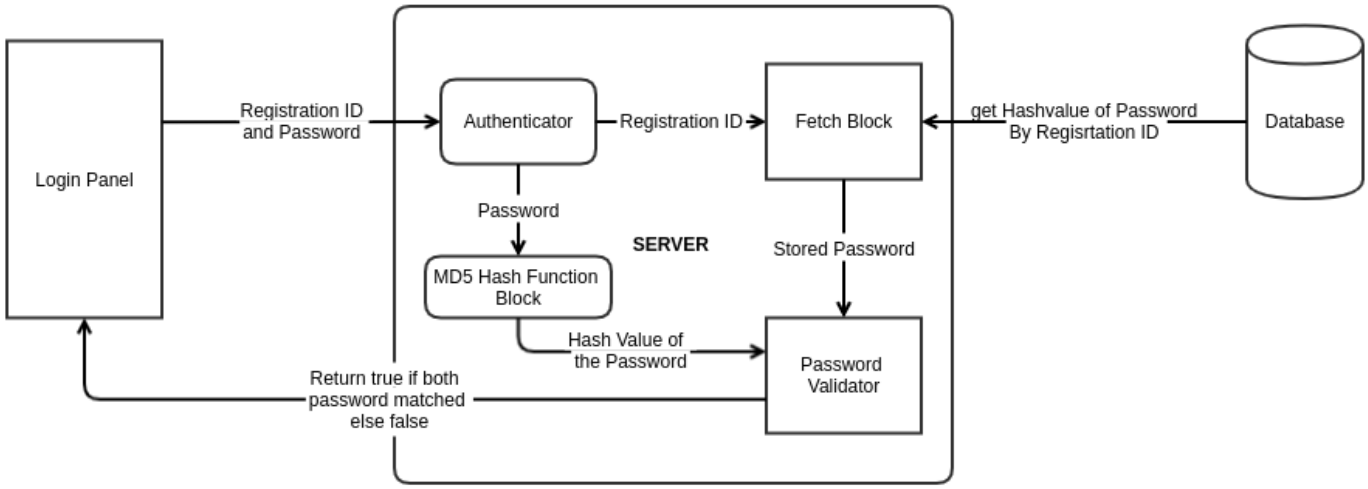
Now, a person attempts to log in using the registration ID "reg12" and the password "somen." The programme will now convert it to its hash form, i.e. "27e994c5020f253f4c34cd075489473e."

The programme will now get the password from the database where the registration id is'reg12' and compare it to the current one. Because "687ffe9cfbfcfe8d6e8b34d29a475129" is recorded in the database and a request for "27e994c5020f253f4c34cd075489473e" is received, the application will detect a mismatch. The user will no longer be able to log in.

Step 3 : authentic user trying to Login:

Now a person attempts to get in with the registration ID "reg12" and password "somend." Now the application transforms it to its hash form, yielding "687ffe9cfbfcfe8d6e8b34d29a475129," which it compares to the ones in the database to identify a match.

Users may now login and view their data.



4.3 Sensible Medical Records

Now we'll look at its primary security elements that pertain to the user's sensitive data such as patient prescriptions, emails, appointment details, and so on.

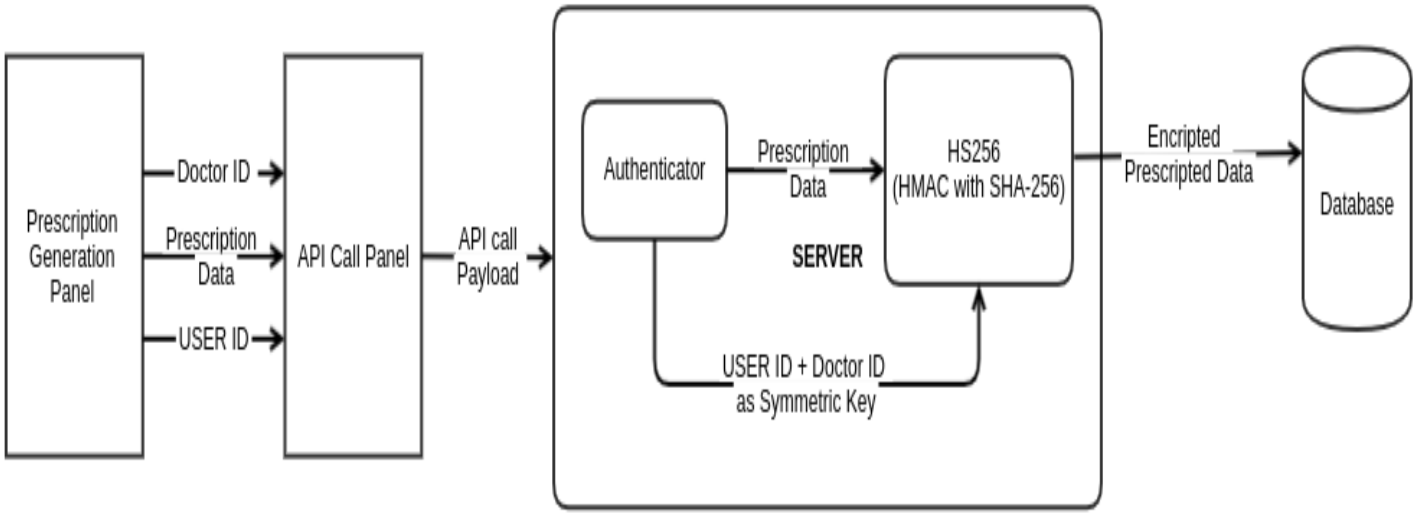
This sort of data is only available between two users, or to put it another way, only two users have authority to view a single prescription or email. Let us go into a prescription.

Let's consider some scenarios.

1. Assume a doctor, 'doctor 1,' prepares a prescription for a patient, 'patient 1.'

2. This 'prescription 1' is now saved in the database and is only accessible by these two individuals, a. doctor 1 and b. patient 1.

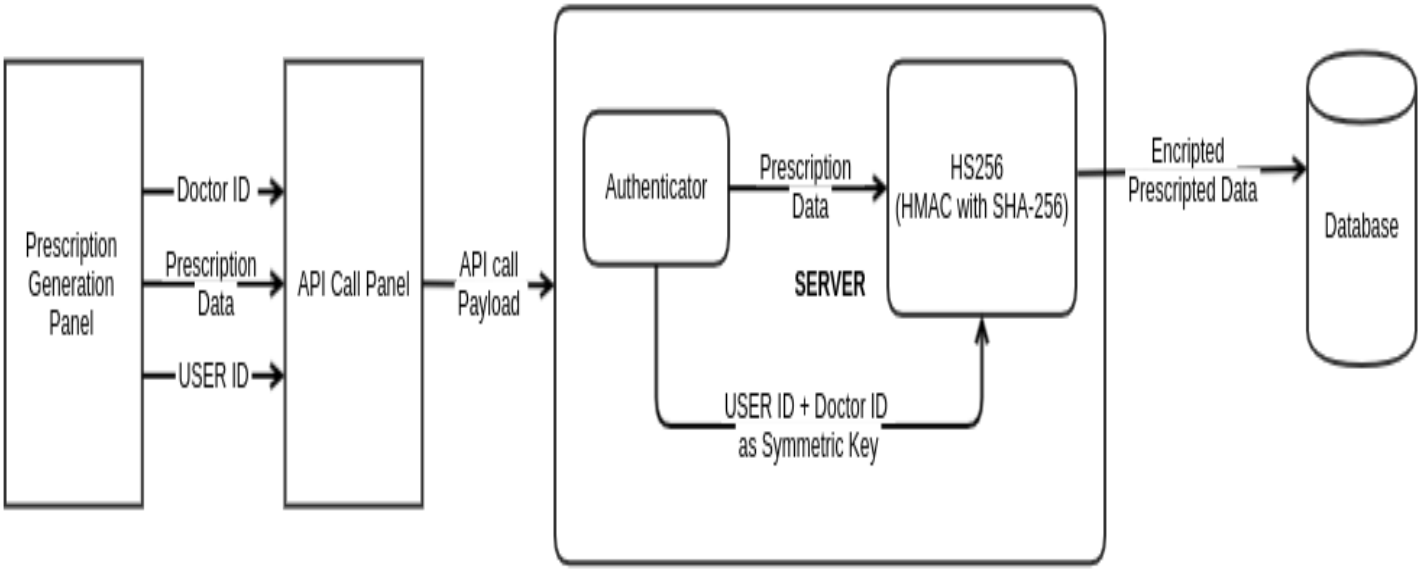
3. No other user may or will access this prescription in order to ensure data confidentiality and integrity. The HS256 Signing Algorithm is used to accomplish this operation.



HS256 (HMAC with SHA-256) is a one-secret-key symmetric key hashing technique. Symmetric indicates that the secret key is shared by two parties. The key is used to both generate and validate the signature.

Now, assume that doctor 'doc1' generates a prescription 'pres1' for patient 'p01'. To encrypt this 'pres1', we'll use a secret key produced by the MD5 hashing technique, which uses the user ids of both 'p01' and 'doc01' as input parameters.

To decode 'pres1', a special hash key is required, which may be produced by solely utilizing the user ids of 'p01' and 'doc01' as input parameters.



Chapter 5

Analysis of the LifeLine

5.1 Features Summary

Let's have a look at the features that will be included in this application. When building these features, I always kept in mind all of the security concerns and issues that are currently present in practically every hospital management system.

1. Governing Body Administration

This application must be managed by or under the administration of any governing organization. This program shares a single database, and all information, including physicians' data, patients' details, appointment details, and prescriptions, is kept in this database. As a result, it contains a great deal of sensitive information from all medical institutes.

Patients and medical centers will require a trustworthy person to serve as an administrator in this application. *A governing body, in my opinion, is far more equipped for this*.

2. One software for all healthcare facilities

To function, no medical establishment is required to deploy this software system or create its own database. This application will be deployed with its own database and used by all centers, patients, and intended users.

Each medical facility will set up their own account on this application and utilize it as needed. Patients will also be allowed their own accounts, which will allow them to work at any medical facility registered in this program throughout the world.

3. Keep your personal information confidential

To have a conversation with their physicians, users do not need to enter their personal contact number, and when booking an appointment, they do not need to provide their residential address. To send you an email, the physicians and medical centers you visited do not need to know your email address either.

Every user in this application is only a number, an ID, and they can easily communicate with one another using these. To communicate with these ids, the application has an inbuilt email feature

4. Compare the services and amenities of two different medical centers

Patients will be able to compare all medical facilities at one location. They may view their needed department and act accordingly if their physicians are available. The user may quickly select out their chosen centers based on the departments they require. They may compare their services, the number of physicians or doctors in each department, and any ratings they may have.

5. quickly check the availability of doctors at various medical institutes

Patients can easily check the availability of their physicians and make appointments. They may simply locate their physicians' schedules, as well as their timeliness in various locations if available and registered by their respective centers.

They may quickly schedule an appointment with just a single click. To make this appointment, the customer does not need to fill out any forms or disclose any personal information to the facility. They may quickly check the status of their appointment schedule, whether approved or refused, on their own account.

6. Prescription sharing across two different medical centers

Patients may easily examine and share their prescriptions with any doctor they like. They can share their prescription with doctors in the same or various medical facilities with one click. Patients can even share a portion of their prescription rather than the entire prescription with their doctors as needed.

7. Prescriptions and test results are easily accessible

With a single click, patients may obtain their prescriptions and test results. They are not required to visit the facility each time they want a copy of their test results. They also don't have to print out their prescriptions or test results to discuss with their doctors. They may exchange their records with their doctors in a simple and secure manner.

8. Speaking with physicians easily and discreetly

They are not compelled to come to the facility every time they wish to consult with their doctor. With the aid of this program, they can effortlessly communicate with them.

With the aid of this program, doctors may simply check their reports, amend their prescriptions, or communicate with them at any time while sitting at home.

9. quickly and simply declare an emergency

Patients do not need to panic every time there is an emergency since they will be able to conquer the problem. With a simple click, they may simply raise an emergency. They can then contact their preferred medical institution to inform them of their emergency.

10. quickly reserve an ambulance

Patients do not need to know their phone numbers to contact an ambulance. They may simply summon an ambulance with a single click using this app, just like they do with an uber these days.

They can simply examine the options and compare them to select the one with the least distance between them. *It relieves the user's headache by providing all of the ambulance information in their location.*

5.2 Analysis of the System

Now comes the analysis. This may be divided into two groups, which are shown below.

1) **Benefits of Doctors:** With one simple step, the doctor-patient relationship as we know it will shift radically. People will not be able to communicate with a doctor in the same way that they do with friends through numerous web applications and platforms, but the distance between them will undoubtedly be considerably less. Medical ethics will be a critical aspect. The doctor–patient connection is fundamental to health care practice and is required for the delivery of high-quality health care in illness diagnosis and treatment. One of the pillars of modern medical ethics is doctor–patient interaction. Most colleges teach students from the start, even before they step foot in a hospital, to establish professional contact with patients, to respect their dignity, and to protect their privacy.
    a) They will be able to check appointments and work accordingly at any moment.
    b) They will have a lengthy relationship with their patients..
    c) After the initial visit, doctors will not rely on the patient for any information.
    d) Reduce paperwork and labor hours.

2) **Benefits of Patients:** A patient must have faith in their doctor's abilities and feel comfortable confiding in him or her. Most physicians value the development of a positive connection with their patients. Some medical disciplines, including psychiatry and family medicine, place a greater emphasis on physician–patient interaction than others, like pathology or radiology.
    a) There is no waiting or queuing.
    b) will be able to carry out tasks from home.
    c) They may access their information, medicines, and test results at any time.

Both sides value the quality of the patient–physician relationship. The better the relationship in terms of mutual respect, knowledge, trust, shared values and perspectives about disease and life, and time available, the more and better information about the patient's disease will be transferred in both directions, improving diagnosis accuracy and increasing the patient's knowledge about the disease. When such a connection is strained, the physician's ability to conduct a thorough examination is jeopardized, and the patient is more likely to doubt the diagnosis and suggested therapy, resulting in lower compliance with medical advice.

In such scenarios, as well as where there is a real difference in medical opinions, a second opinion from another physician may be sought, or the patient may opt to see another physician. Furthermore, the advantages of any placebo effect are predicated on the patient's subjective (conscious or unconscious) appraisal of the physician's reliability.

5.3 Aspects of the relationship

Commentary and debate are provided on the following facets of doctor-patient interaction.

1. **Informed consent:** The standard medical procedure for treating patients with respect is to tell them honestly of their condition and to seek them directly for permission before administering any treatments. The concept that patients should have a choice in the manner in which their treatment is provided and the right to give informed consent to medical procedures has historically undergone a transition in many cultures away from paternalism, the belief that the "doctor always knows best." Informed consent can cause problems in the doctor-patient relationship, such as when the patient refuses to learn the truth about their illness. The use of placebos is also fraught with ethical issues.

2. **Shared decision-making:** Health advocacy ads like this one urge individuals to discuss their medical needs with their doctors. According to the concept of shared decision making, a patient who grants informed consent to treatment is also given the chance to select a course of care that best suits their needs and preferences. An alternative to this is for the patient's health decisions to be made by the doctor without taking into account the patient's treatment objectives or getting their feedback.

   Ulrich Beck's World at Risk is a good example of the range of patient involvement in medical decision-making. Beck's Negotiated Approach to Risk Communication, which involves maintaining an open line of communication with the patient and coming to a compromise that is acceptable to both the patient and the doctor, is at one extreme of this spectrum. Since only using this method can a doctor sustain the patient's open collaboration, the majority of doctors use a variant of this communication model to some extent.

   The Technocratic Approach to Risk Communication, which places the doctor's authoritarian control over the patient's treatment and pressures them to accept the treatment plan they are provided with, is at the other extreme of this spectrum. The patient has minimal opportunity to contribute to a treatment plan under this communication paradigm, which gives the doctor omniscience and power over the patient.

3. **Physician superiority:** Simply because the doctor is more qualified, knowledgeable, and frequently on familiar territory than the patient, the doctor may be seen as superior.

   To build a strong connection and improve communication with the patient, a doctor should at the very least be aware of these differences. A sort of shared care where the patient is empowered to assume a significant amount of responsibility for their own treatment may also be advantageous for the doctor-patient relationship.

4. **Benefiting or pleasing:** A dilemma may emerge in instances when choosing the most efficient therapy, or facing avoidance of treatment, produces a dispute between the physician and the patient, for any variety of reasons. In such circumstances, the physician requires ways for communicating unpleasant treatment alternatives or disagreeable information in a way that minimizes pressure on the doctor–patient relationship while enhancing the patient's overall physical health and best interests.

5. **Formal or casual:** The doctor and patient may have different ideas about how professional or informal the doctor-patient interaction should be.

   For instance, a Scottish research found that patients would want to be called by their first names more frequently than they already are. Most of the participants in this research either preferred (223) or did not object (175) to being referred to by their first names. Only 77 people, the most of whom were over 65, disapproved. However, the majority of patients prefer not to use the doctor's first name.

   Patients who have some level of familiarity with the doctor often find it easier to discuss sensitive matters like sexuality, but for certain patients, a very high level of familiarity may make the patient unwilling to share such intimate matters.

6. **Transitional care:** Patients who are moved from one healthcare provider to another may receive less effective treatment while good doctor-patient connections are being restored. Generally speaking, continuity of treatment in terms of attending personnel helps to facilitate the doctor-patient connection.

7. **Other people present:** One or more parents being there during a child's visit to the doctor is an example of how the presence of other people might affect how the doctor and child communicate. These may offer the patient psychological support, but in certain situations they may jeopardize the doctor-patient relationship's confidentiality and prevent the patient from discussing sensitive or personal matters. Having both parties of a partnership present while seeing a health professional regarding sexual concerns is frequently essential, which is generally a good thing, but it may also limit the disclosure of some topics and, according to one report, raise the stress level.

Future Work

Due to some restrictions, all registration for the medical facility will be handled by the administration. ***Administration will soon include automatic authentication and certificate validation.***

Multiple account creation is prohibited for centers. But going forward, they will be able to give their center account more than one admin access. To do this, upon registering, create admin roles with the correct email address. After that, it will be confirmed with the email address, making it apparent whether or not it belongs to him. A registration failure will occur if the email is not verified. This will assist in easing the unneeded burden on the server and database.

People who sign up will be subject to rigorous restrictions. Their national identity number must be given. By doing this, it will ensure that no strange accounts are created. These accounts will then be enabled when each national identity number has been properly verified. An OTP will be sent to their registered mobile phone each time they attempt to log in. Multiple accounts are therefore not at all conceivable. No one else will be able to login. Security will be maintained strictly.

Although it is highly essential, a doctor may not always have access to a patient's family history of illnesses and disorders. The physicians will adore it when something similar becomes accessible to them. Everyone from all fields of employment recognises the usefulness of data. Every day, they make our lives simpler.

An emergency raising service to center and rapid ambulance booking quality are designed into the plan. There will be a service for determining OT/OR availability, and they may quickly dispatch an ambulance in accordance. Everyone acknowledges the value of data. They make our lives easier every day.

For the 6 month-old patient prescription or clinical records for doctors, there is a plan for cloud storage. Everybody is allowed some standard storage in a database. However, a cloud store will be necessary for lengthy histories. Although implementing the cloud is labor-intensive, its benefits cannot be quantified.

There is a premium user plan available with some small charges. Priority treatment and other exceptional services, such as ***live webcam sessions with requested physicians in an emergency***, will be made possible by this function. At the end of the day, people will find this quite advantageous.

Conclusion

This was a truly amazing project to work on, and I learnt a lot while doing it. A number of fresh ideas and potential difficulties with a system like this have become evident to me. I'm not going to pretend that this software is completely functioning. It has amazing functionality, but while working, I discovered how we can make it even better for us. I've liked working on this project and want to continue working on it to improve it. I feel I can make something unique in such a way that people will enjoy the end result. Our inventiveness distinguishes us from every other creature in the world. We create equipment and technologies to make our lives easier and more comfortable. This began at a very young age, and we have never ceased building or designing new items since. Because of this inventiveness, our world has evolved into something far different from what our forefathers knew.

Artificial intelligence (AI) is an ancient concept, but our present methodology has elevated it to a new level. We have been able to construct objects that have altered the entire thought process of human civilization. Medical technology, like other branches of science, has advanced. People used to perish from many ailments, but we have overcome them via innovation in several industries. We can now execute surgeries that people could not even imagine a decade ago.

Automation in the medical field is still relatively young, but the issue is how long it will remain so. Researchers are working to diagnose and treat patients who do not have access to a doctor. Of course, there are doctors on hand to provide oversight. We are developing clever tools to propel things forward. This research is a small step toward the enormous contributions that science and technology may make to the medical field. We take diverse approaches to new experiences. Some individuals rush into new experiences, while others take their time.

This has been and will continue to be the case for humans. However, new tools are released on a regular basis. Science, like our human society, will continue on its path. I am really glad to be a part of this endeavor and hope that one day this will be your hospital experience.

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