

A MAJOR PROJECT REPORT ON

E-DIAGNOSIS: ONE STOP WELLNESS

SUBMITTED IN PARTIAL FULFILLMENT FOR THE AWARD OF DEGREE OF

BACHELOR OF TECHNOLOGY

IN

COMPUTER SCIENCE AND ENGINEERING



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WAKNAGHAT (H.P.) MAY 2019

CERTIFICATE

This is to certify that the major project report entitled, **E-DIAGNOSIS: ONE STOP WELLNESS** submitted by **VIPUL (151241)** in partial fulfillment of the requirements for the award of Bachelor of Technology Degree in **Computer Science and Engineering** of the Jaypee University of Information Technology, Wagnaghat is an authentic work carried out by them under our supervision and guidance. The matter embodied in this report is original and has not been submitted for the award of any other degree.

Signature of Supervisor:

Dated:

DECLARATION

I hereby declare that this written submission represents my own ideas in our own words and where others' ideas or words have been, included, have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission.

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Vipul Singh (151241)

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ABSTRACT

With rapid transformation in the healthcare system and a growing need for quality healthcare, the hospital managers are now combining business expertise with an understanding of the healthcare system to increase efficiency and effectiveness of healthcare delivery and patient satisfaction.

The solution developed will mainly help the hospital managers & nurses. It will provide the ability to automate patient registration, schedule & search appointments. Nurses will do the initial diagnosis and they will check patient's history, finally they will prescribe medicine and refer the patient to appropriate doctor. Nurses can also manage the medicine requirement of patients in this system & they can send prescription to stores.

CHAPTER 1: INTRODUCTION

With rapid transformation in the healthcare system and a growing need for quality healthcare, the hospital managers are now combining business expertise with an understanding of the healthcare system to increase efficiency and effectiveness of healthcare delivery and patient satisfaction.

The solution developed will mainly help the hospital managers & nurses. It will provide the ability to automate patient registration, schedule & search appointments. Nurses will do the initial diagnosis and they will check patient's history, finally they will prescribe medicine and refer the patient to appropriate doctor. Nurses can also manage the medicine requirement of patients in this system & they can send prescription to stores. Fig 1.1

Our Services uses an integrated approach, working with health care professionals across the industry to fill the current gap in health. Services uses technological advances to bring health care provision into the twenty-first century. Telemedicine is the use of medical information exchanged from one site to another via electronic communications to improve a patient's clinical health status.



1.1. AGILE METHODOLOGY

Agile software development is an approach of software development in which requirements and solutions are a result of cumulative effort of self-organizing and cross-functional teams and their end-users[1]. The agile [2] methodology is a practice or a method in which the whole project is divided into small continuous iterations. Each iteration comprises of simultaneous development and testing of the project. It is unlike the waterfall methodology [3] where whole project is done all at once and the testing part is done at last. The Manifesto for Agile Software Development is built upon twelve basic principles: [4]

1. Providing customer satisfaction by timely delivery of product.
2. Always welcome changes, even in the end stages of project.
3. Frequent delivery of working software (weekly).
4. Daily standup meet between developer and business associates.
5. Projects are built around motivated and trusted individuals.
6. Face-to-face conversation.
7. The primary measure of progress is the working software.
8. Constant pace is to be maintained
9. Technical excellence and good design is paid continuous attention.
10. It is essential to maintain simplicity.
11. Self-organizing teams leads to best designs and architectures.
12. On a regular basis, team checks how to become more effective and makes the adjustments accordingly.

Although there are many differences between agile and waterfall model but one of them is the approach which they both use for quality and testing purposes. Waterfall methodology uses separate testing and build phase where build phase is followed by the testing phase. Agile methodology is famous for its simultaneous development and testing because here in each iteration testing is done. So if even a small error is found it is corrected simultaneously. Thus, it reduces the time and increases the efficiency at the same time.

1.2. AGILE PROJECT MANAGEMENT ROLES:

There is a team of many people which lend their hand for the successful completion of a project. Under agile methodology, the team comprises of following bunch of people in each team which play a prominent role in the team:

1. **Product owner:** The person who is the link between customer, business stakeholders and the development team. The product owner is the main person who knows about the product and the customer's needs and priorities. He daily checks and clarifies the developer team about the requirements from the customer's end.
2. **Development team members:** Product is created by these people. It includes a software developer, designer, writer, data engineer, tester, etc. whosoever is required for that particular project and has expertise in the field of project.
3. **Scrum master:** He is the main support system of the developing team who ensures that the agile process remains consistent. He is responsible for clearing the roadblocks from the organization's side.
4. **Stakeholders:** These people provide valuable feedbacks that are important but are not ultimately responsible for the product and also get affected by the project's outcome.
5. **Agile mentor:** An experienced person who is good at implementing agile methodology into project and share his experience with the project team. He is a guide who gives his valuable knowledge and shares his experience about the project he has worked in past and advices the team for different approaches and techniques.

1.3. AGILE PROJECT MANAGEMENT EVENTS

Although there are many stages in the project development but when we follow agile methodology mainly seven events are included in project development as shown in fig1.2. These can be explained as follows:

1. **Project planning:** It is the initial planning of the project where roadmap of the project, product vision is done.
2. **Release of planning:** Planning for the next bunch of product features to be released and only one release date is planned at a time.

3. **Sprint:** Also known as the iterations, is a time duration in which team creates a functional product. This time duration generally lasts from one to four weeks, but cannot be larger than four weeks. All the sprints must be of the same duration.
4. **Sprint planning:** Before the start of eachscrum a meeting is done so that all the work to be done in that scrum can be planned and the team can commit to its goals.
5. **Daily scrum:** Each day in the morning a 15 minutes meetup is held by the development team members to know each other's work to be done in that particular day, the work that is lagging and the work to be done in the future. Daily scrum enables the team to know whether they are having any hindrances in their path or not and how to improve their efficiency in any particular area.
6. **Sprint review:** After each sprint is completed a meeting is held by the product owner where the development team shows how much part of the planned work is done and how much is left so that it must be included in the next sprint i.e. by updating the product backlog.
7. **Sprint retrospective:** At the end of each sprint the scrum team will evaluate their methods and procedures and look forward to the changes they can implement for clearing the roadblocks so that the functionality of the project can be implemented.

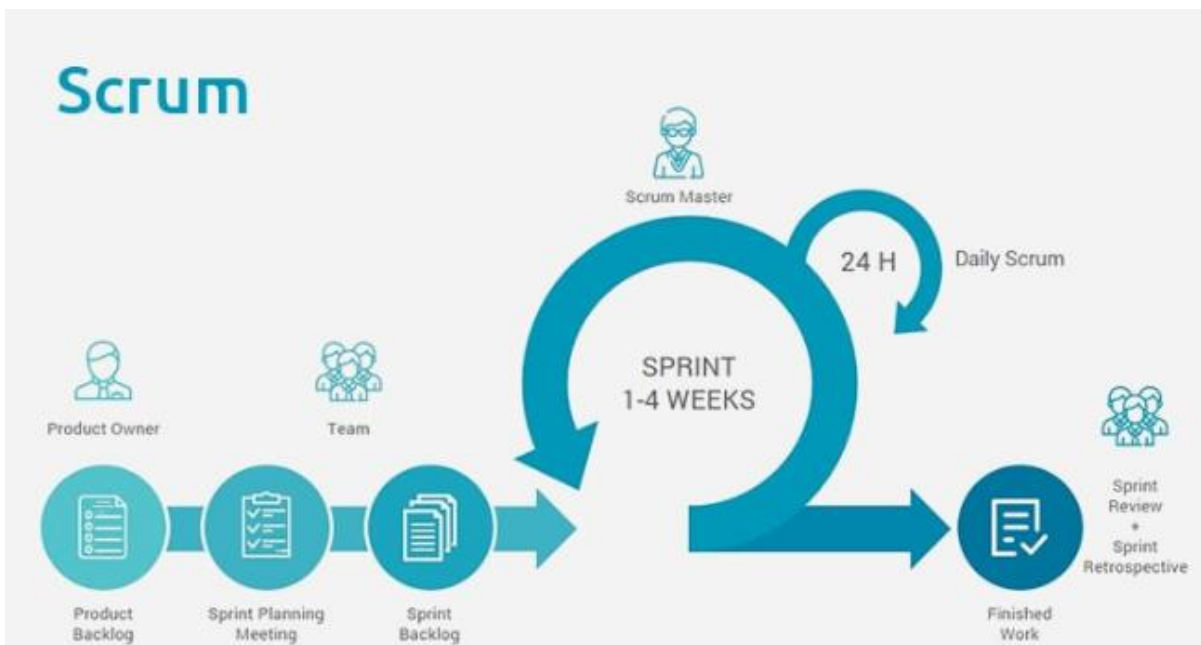


Fig 1.2 Scrum Process

CHAPTER 2:

BUSINESS REQUIREMENT SPECIFICATION

Technologies Used to accomplish the project

Front End	HTML5, CSS3, JavaScript
Middleware	Java (Servlet, JSP, WEB, MVC)
Backend	Oracle

Table 2.1: Technologies used

Requirements for projected to be executed

Technology	Hardware	Software
Java	Desktop PC with 8GB RAM	<ol style="list-style-type: none"> 1. Eclipse IDE for Java EE Developers (Oxygen) 2. Tomcat 9 3. MySQL Community Server 8.0 4. Oracle 11g express version

Table 2.2: Hardware and Software required

Servlet

Servlets are the Java programs that keeps running on the Java-empowered web server or application server. They are utilized to deal with the solicitation got from the web server, process the solicitation, produce the reaction, at that point send reaction back to the web server.[5]

A Java servlet is a Java programming segment that expands the capacities of a server. In spite of the fact that servlets can react to any kinds of solicitations, they most normally execute web compartments for facilitating web applications on web servers and along these lines qualify as a server-side servlet web API. Such web servlets are the Java partner to other unique web content innovations, for example, PHP and ASP.NET.[6]

JSP (Java Server Pages)

JSP's are Java Server Pages, a technology that is useful in making dynamic web pages' are converted into servlets at runtime, thus JSP is a Servlet; each JSP servlet is stored and re-utilized until the first JSP is altered.

Oracle database

My SQL is the most popular open source database which is easy to use, reliable and has better performance. It is used for storing huge data and most of the leading web-based applications are using this for data storage.[7]

2.1. High Level Business Requirement

Primary focus is to complete developing the critical requirements and then to proceed with the remaining requirements.

S.No.	Business Requirement ID	Short Description	Description in detail
1	Req_1	Hospital and users Registration	Ability of the system to procure the fundamental details of the Hospital and users.
2	Req_2	Hospital and users Authentication	Ability of the system to authenticate the credentials of the registered Hospital and users
3	Req_3	View Hospitals	Ability of the system to display hospitals
4	Req_4	View Doctors	Ability of the system to display the details of the doctors of a selected hospital
5	Req_5	Book appointment	Ability of the system, which allows the user to book an appointment of the selected doctor.
6	Req_6	View Patient details	Ability of the System, which allows a particular hospital to view the details of the patients who booked appointment of its doctors.

Table 2.3: High Level requirements

2.2. Process Architecture

Below is the overall functional flow of the project including the components of interaction as shown in fig2.1

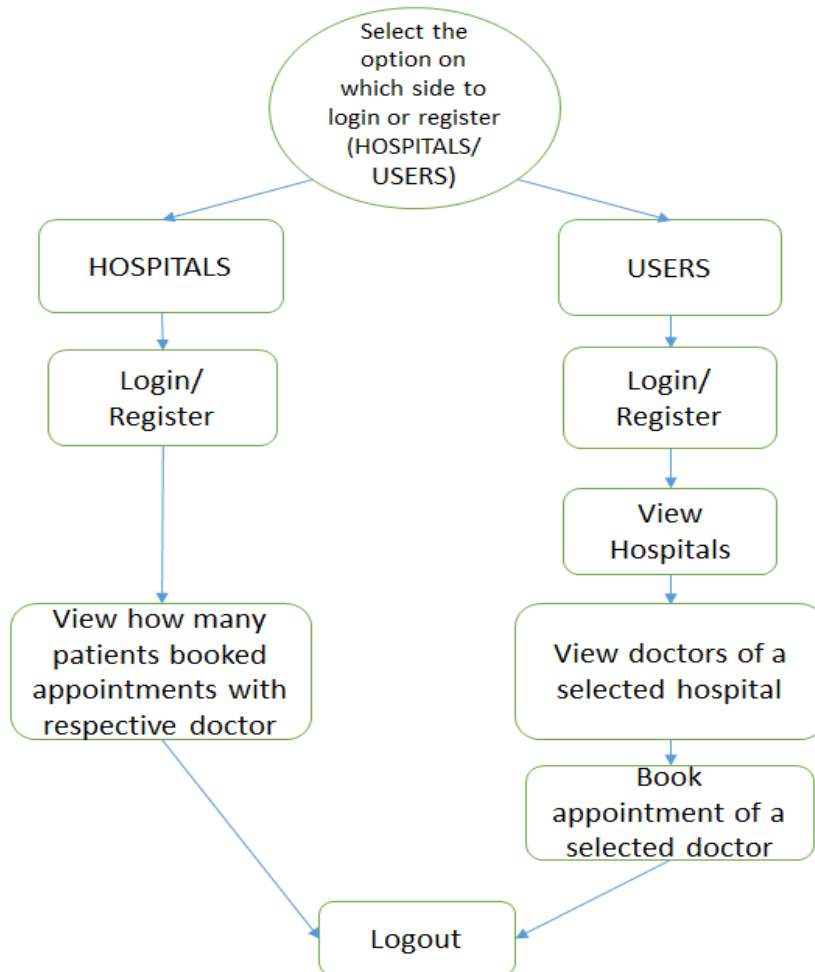


Fig 2.1: Functional Flow of Project

2.3. Detailed Business Requirement

The functional requirements are charted for each of the high-level requirements.

The following elements are captured for each business requirement in the table provided below:

1. Requirement Type

F Core Functionality

E Exception

UI User Interface

R Reporting

2. Priority of Requirement

1=Base Functionality

2=Advanced Functionality

3=Additional Opportunities

3. Originator

Name of the business process of the system/ department or function name in the customer organization

The Requirements in this document are prioritized as shown in table 2.4

Value	Rating	Description
1	Critical	The requirement is critical to the success of the project. The project will not be considered complete without this requirement.
2	High	This requirement is high in priority, but the project can be implemented at a bare minimum without this requirement.
3	Medium	This requirement is somewhat important, as it provides some value but the project can proceed without it.
4	Low	This is a low priority requirement or a “nice to have” feature if time and cost allow it.
5	Future	If any future work is to be included

Table 2.4: Prioritized List of the Requirements

Req. #	Rationale Categorization	Business Requirement	Req. Type	Priority
Req_1.1	User Registration	When the User clicks on the registration link, it should re-direct to volunteer registration form.	UI	Critical
Req_1.2	Hospital Registration	When the Hospital clicks on the registration link, it should re-direct to organization registration form.	UI	Critical
Req_1.3	User Registration	User needs to fill some of the basic attributes/fields as mentioned below in requirement: First Name, Last Name, Age, Gender, Contact Number, E-mail, Password, Volunteer Id (auto generated and hidden from UI)	UI	Critical
Req_1.4	User Registration	Clicking 'Submit' should validate the datatype constraints for each field	F	Critical
Req_1.5	Volunteer Registration	Volunteer failing to provide information on the mandatory fields be provided with an alert message – 'Please update the highlighted mandatory field(s).' Also, highlight the missed out field in red	E	Medium
Req_1.6	User Registration	Post-successful field level validation, save the information in the database	F	Critical
Req_1.6	User Registration	Upon saving the information in the database, display the message 'Your details are submitted successfully'.	E	Medium
Req_1.7	Hospital Registration	Hospital needs to fill some of the basic attributes/fields as mentioned below in requirement: Name of the organization, Contact Number, E-mail, Password, organization Id (auto generated and hidden from UI)	UI	Critical
Req_1.8	Hospital Registration	Clicking 'Submit' should validate the datatype constraints for each field	F	Critical
Req_1.9	Hospital Registration	Provide organizer failing to provide information on the mandatory fields with an alert message – 'Please update the highlighted mandatory field(s).' Also, highlight the missed out field in red	E	Medium

Req_1.10	Hospital Registration	Post-successful field level validation, save the information in the database	F	Critical
Req_1.11	Hospital Registration	Upon saving the information in the database, display the message, 'Your details are submitted successfully'.	E	Medium
Req_2.1	User Credential Authentication	A registered volunteer – is able click 'Login' link, after keying in 'contact number' & 'Password' field and get his credentials authenticated with the existing database entry.	F	Critical
Req_2.2	Hospital Credential Authentication	A registered Hospital – is able click 'Login' link, after keying in 'contact number' & 'Password' field and get his credentials authenticated with the existing database entry.	F	Critical
Req_3.1	Patient Details	When a hospital is signed in they can see the patients who booked an appointment of its doctors.	UI	Critical
Req_3.1	Hospital Details	When a user is signed in he should be shown the list of hospitals	UI	Critical
Req_4.1	Doctor details	When a user is selecting a hospital he can see list of doctors of that hospital with a book appointment option.	UI	Critical
Req_5.1	Book Appointment	When user clicks appointment his details along with the doctor details should be stored in data base.	F	Critical
Req_6.1	Patient Details	When a hospital is signed in they can see the patients who booked an appointment of its doctors.	UI	Critical

Table 2.5:Detailed Business Requirement

Validation field type

Field Name	Field Type	Data Type	Mandatory	Possible Values
First Name	Text(50)	Alphabetic	Yes	
Last Name	Text(50)	Alphabetic	Yes	
Age	Numeric(2)	Numeric	Yes	
Gender	Drop Down	NA	Yes	Male, Female
Contact Number	Text(10)	Numeric	Yes	
E-mail	Text(50)	Alphanumeric	No	
Password	Text(15)	Alphanumeric	Yes	
Volunteer Id	Auto-generated(5)	Numeric	Yes	Non-editable system generated text
Name of the Hospital	Text(50)	Alphabetic	Yes	
Contact Number	Text(10)	Numeric	Yes	
E-mail	Text(50)	Alphanumeric	No	
Password	Text(15)	Alphanumeric	Yes	
Hospital Id	Auto-generated(5)	Numeric	Yes	Non-editable system generated text
Name of the Doctor	Text(50)	Alphabetic	Yes	
Doctor specialization	Text Area(rows-5,cols-10)	Alphanumeric	Yes	

Table 2.6: Data Types of the field required

CHAPTER 3:

USER INTERFACE SPECIFICATION

Use case document is to systematically capture requirements for the project and the system to be developed in terms of use cases. Functional use cases are captured in this document.

It also serves as the input for the project scoping.

The scope of this document is limited to addressing the use cases from a user, quality, and non-functional perspective.

3.1. Home Page

User interface deals with the capture of user details. The user here shall be the operator of the system and will be keying in the patient or doctor information into the system.

User being able to access the homepage & get redirected to the 'Patient Registration' or 'Hospital Registration' page upon click of 'Patient/Hospital' link.

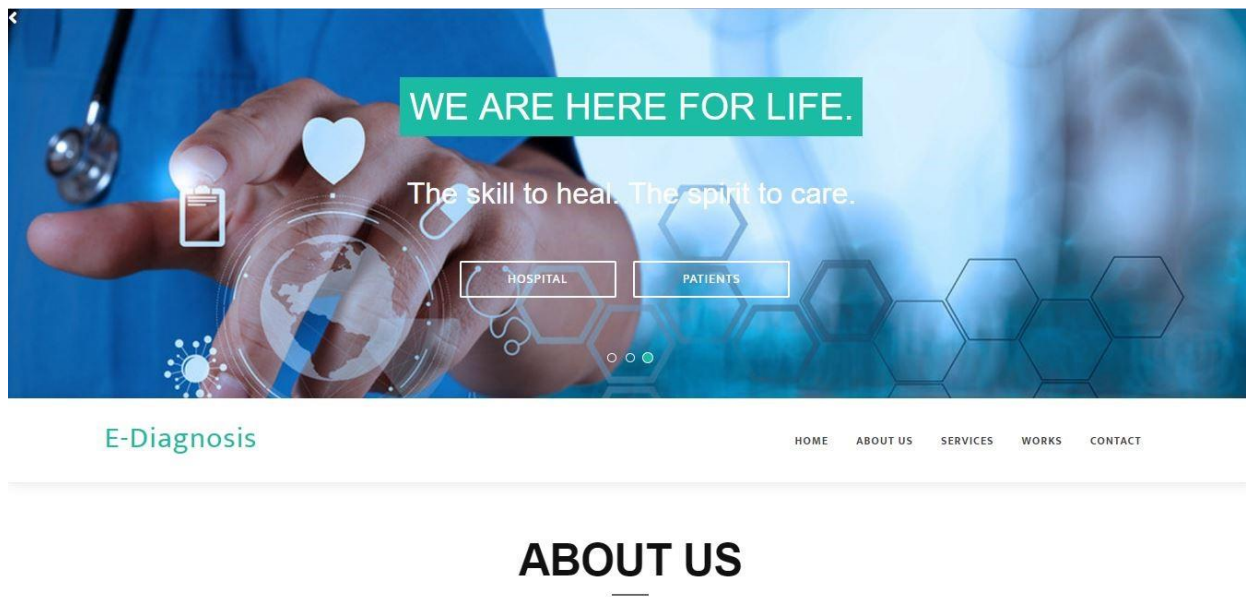


Fig 3.1 (a) Homepage

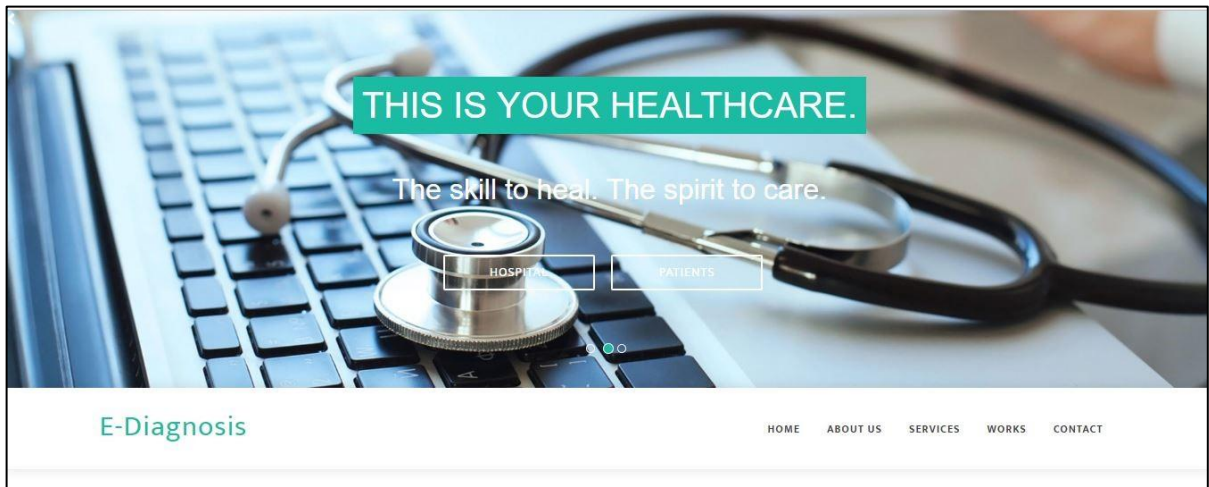


Fig 3.1(b): Homepage

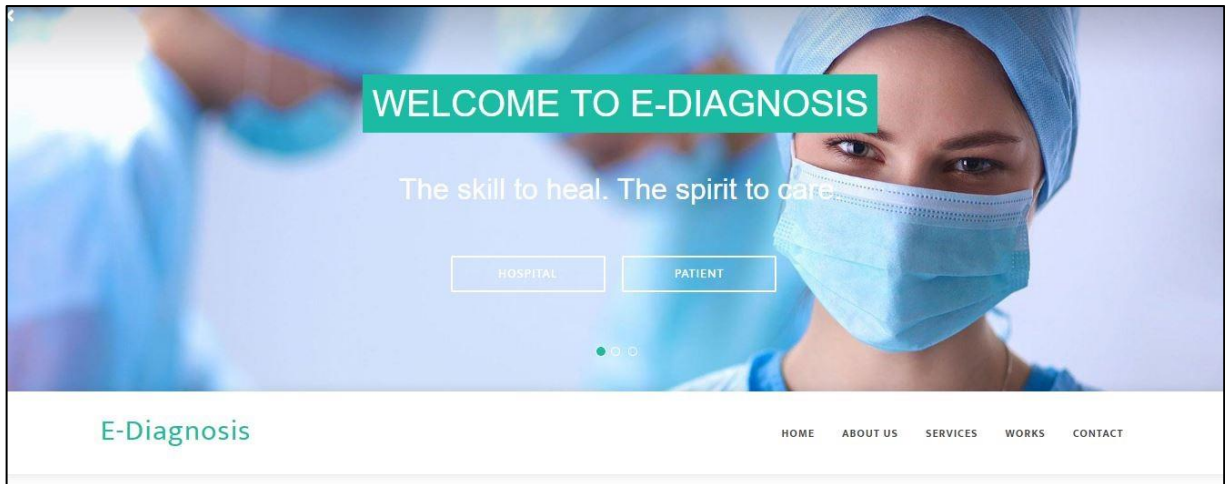


Fig 3.1(c): Homepage



Fig 3.2 About us – Homepage

3.1.1. Services - Homepage

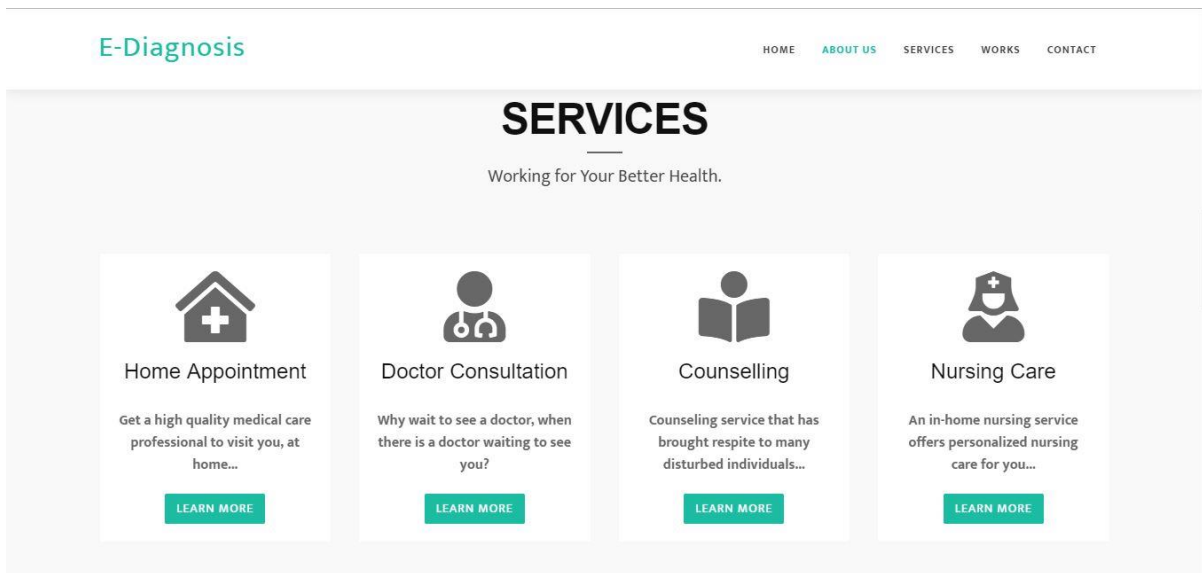


Fig 3.3(a) Services – Homepage

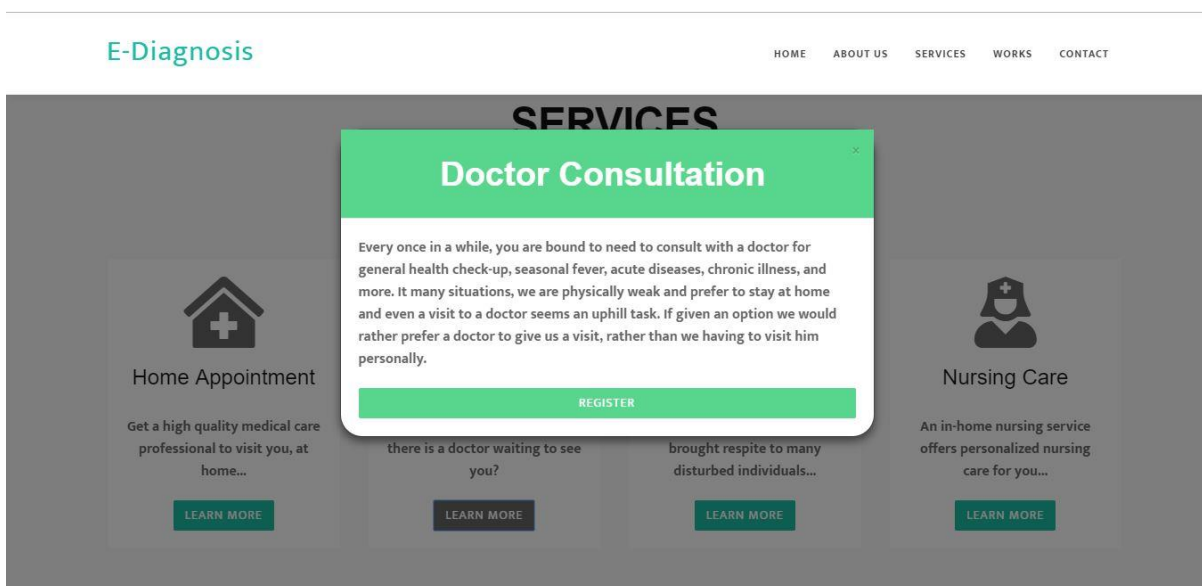


Fig 3.3 (b) Services - popup

3.1.2. Portfolio

This section focuses to earn the trust of the users by displaying the how the online platform of Doctor and Patients works and how well we connect the both side of users as shown in fig 3.4(a) and 3.4(b)

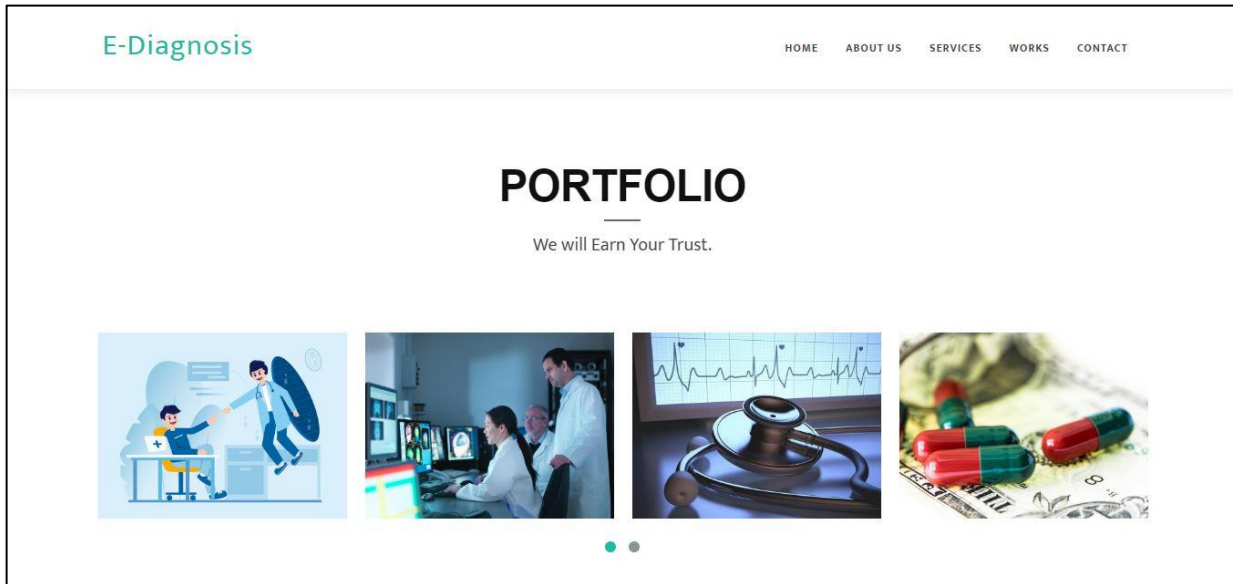


Fig 3.4 (a) Portfolio

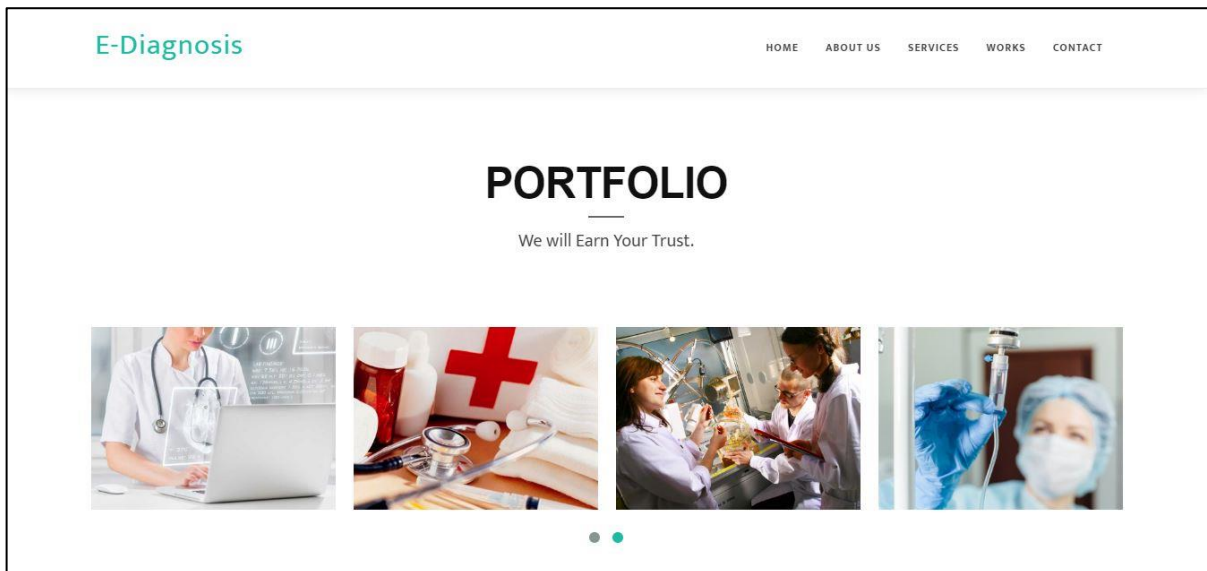


Fig 3.4 (b) Portfolio

3.1.3. Contact Us

This section is the suggestion box of the site, E-diagnosis works for the people, by the people as shown in fig 3.5

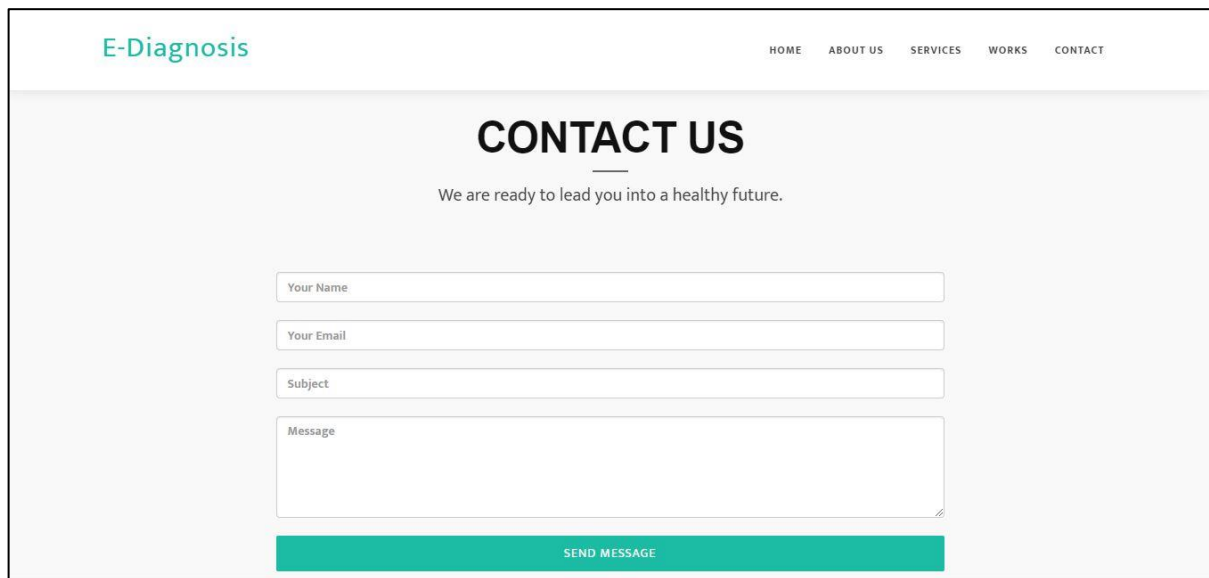


Fig 3.5 Contact us – homepage

3.2. Login Page

User being able to access the homepage & get redirected to the ‘Login page’ upon click of ‘Hospital’ or ‘Patient’ link

A new user should be able to Register itself and be able to provide his details and get enrolled in the system as shown in fig 3.6

3.2.1. Business Rules

Business rules are defined using the following attributes

- When the user clicks on the registration link, it should re-direct to registration form as in fig 3.7
- User needs to fill some of the basic attributes/fields, First Name, Last Name, Age, Gender, Contact Number, User Id, Password as in fig 3.8
- Clicking ‘Submit’ should validate the datatype constraints for each field
- Post-successful field level validation, save the information in the database
- Upon saving the information in the database, display the message, “Your details are submitted successfully”.

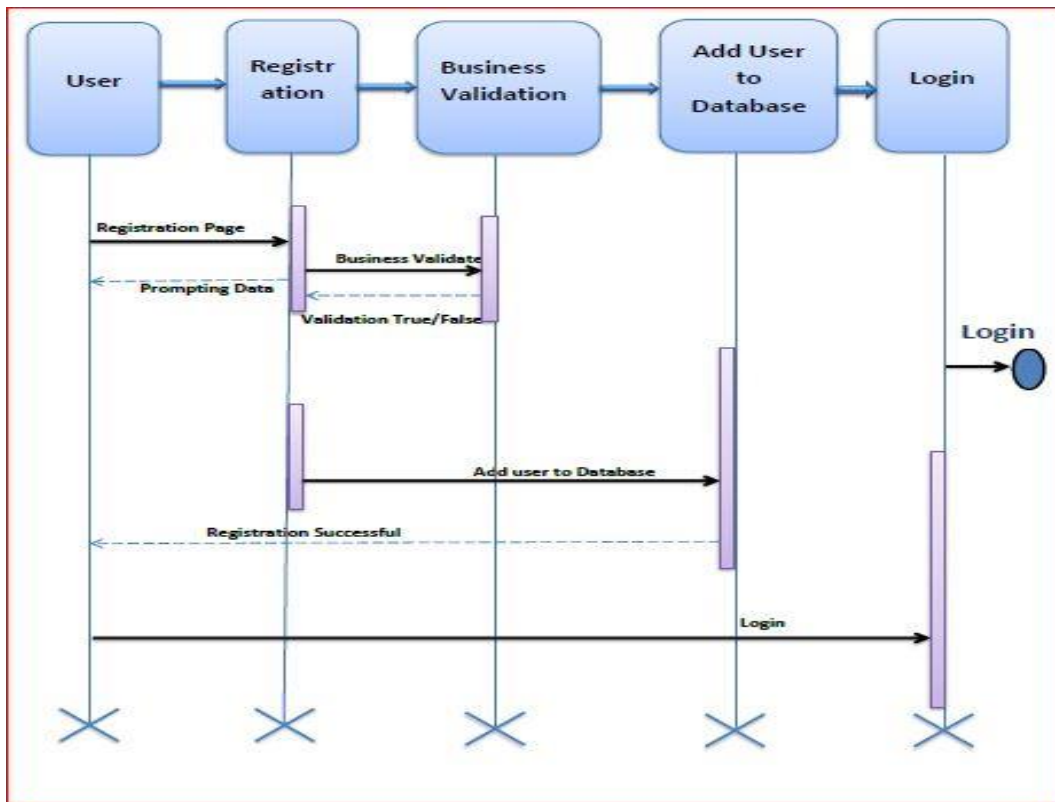


Fig 3.6 Use Case Model

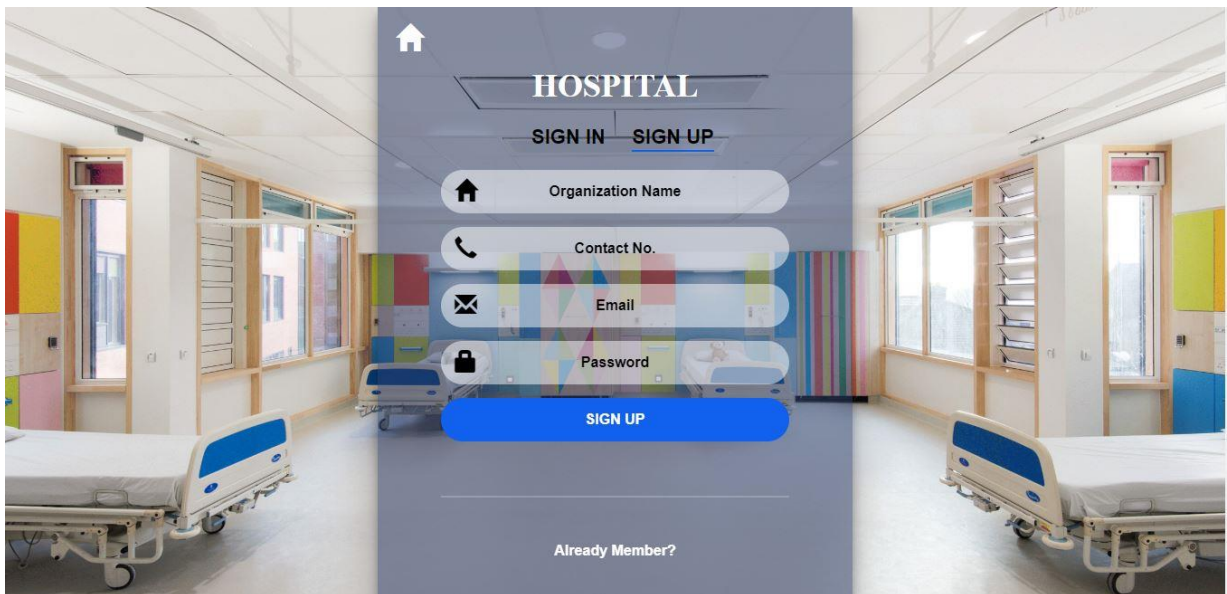


Fig 3.7 Hospital Sign Up

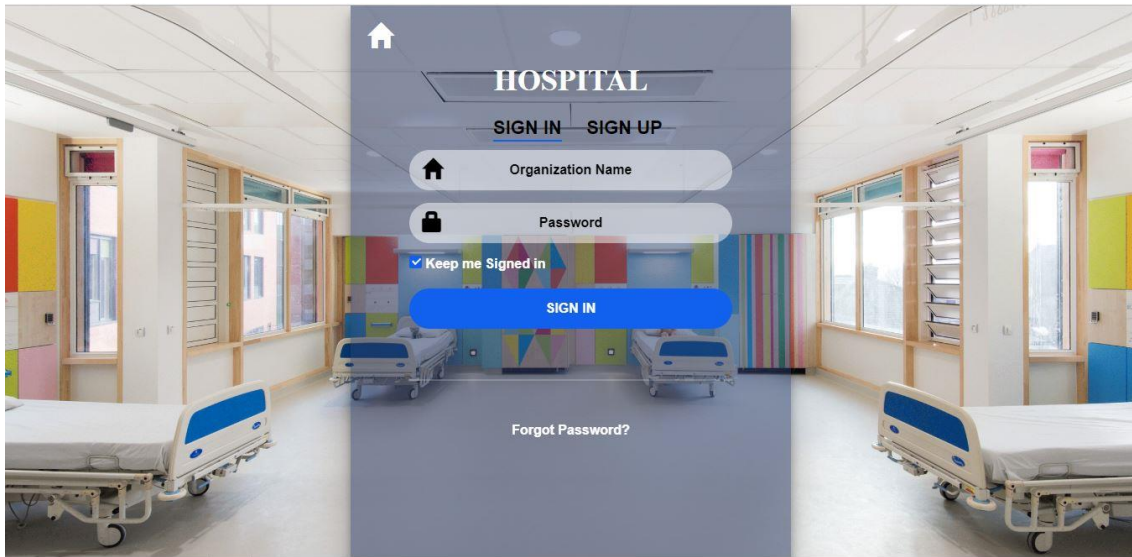


Fig 3.8 Hospital Sign In

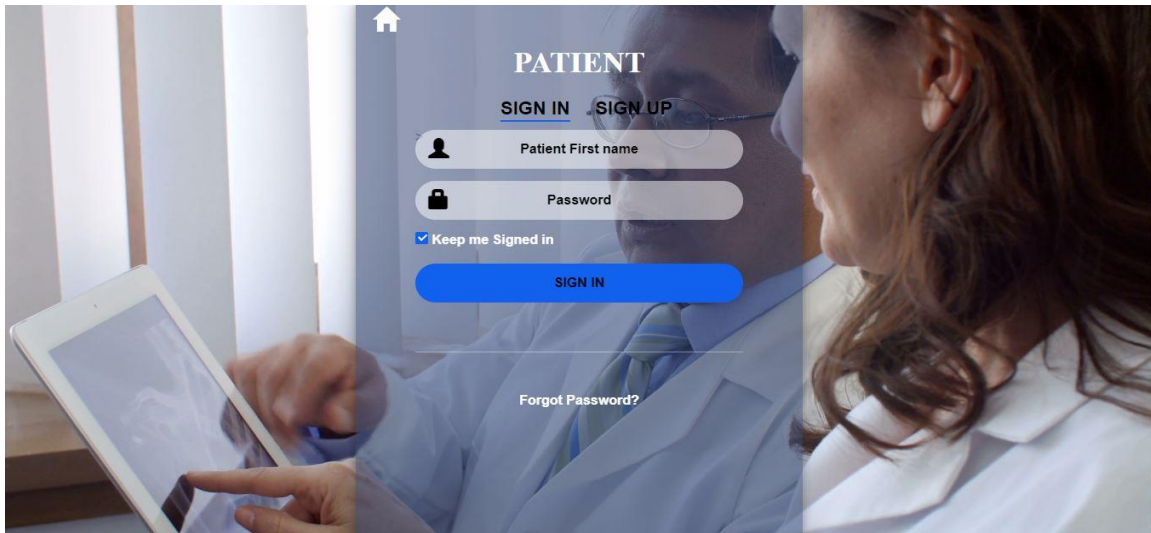


Fig 3.9 Patient Sign In

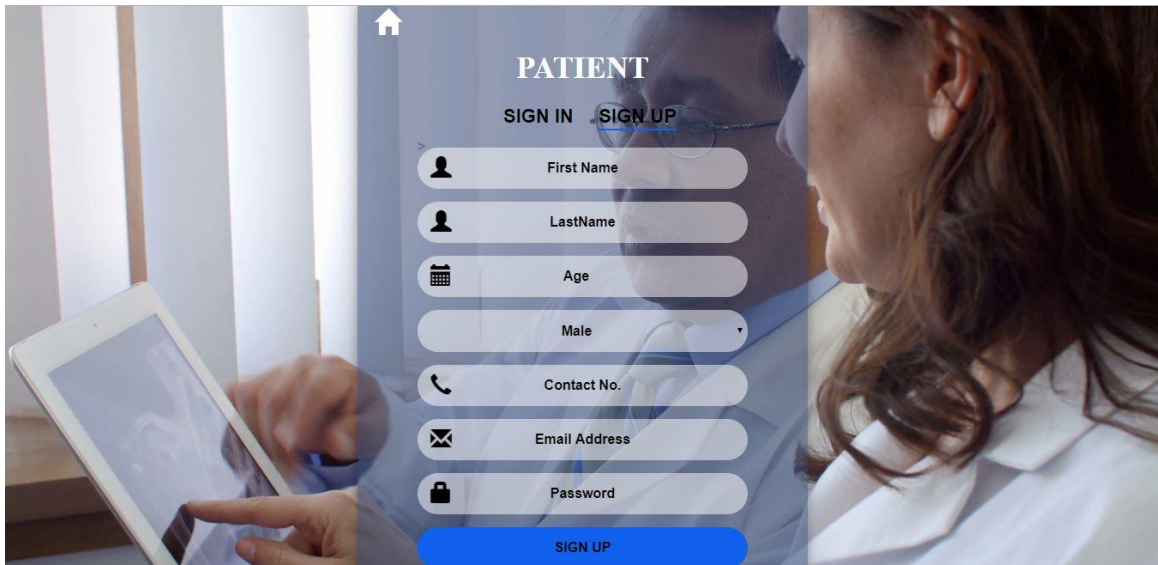


Fig 3.10 Patient Sign Up

3.3. Patient Portal

- User being able to access the homepage of the Patient portal & get redirected to the List of Hospitals by clicking on 'Hospital List' or be able to Book Appointment for himself upon click of 'Book Appointment' tab on the navbar as in fig 3.11
- User interface deals with the capture of user details. The user here shall be the operator of the system and will be keying in information into the system for booking an appointment for the desired specialized doctor of the registered Hospitals as in fig 3.12



Fig 3.11 Home Patient Portal

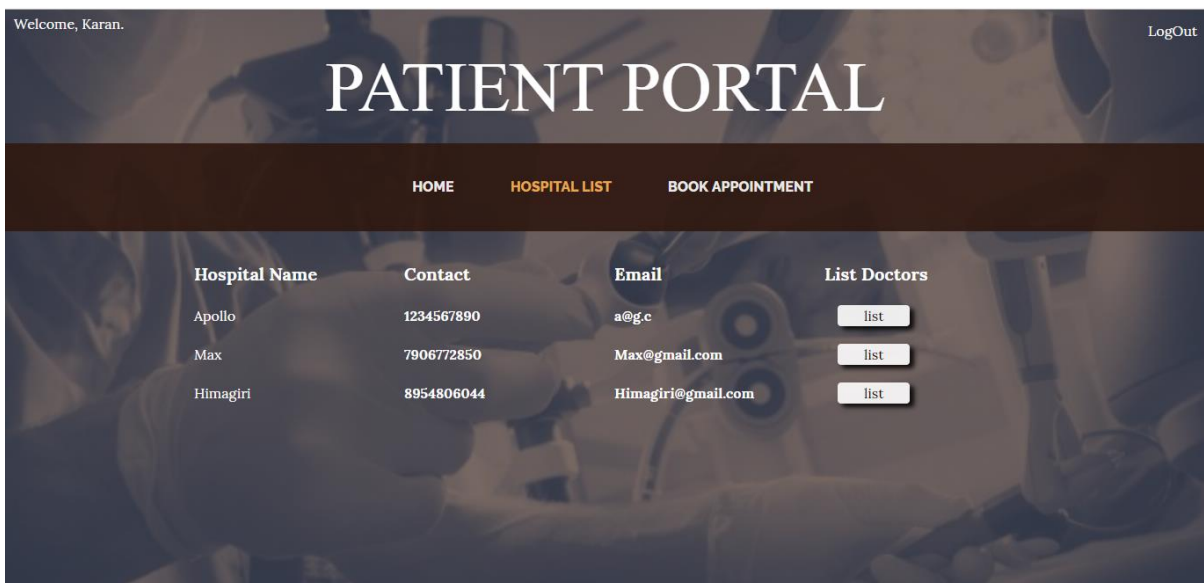
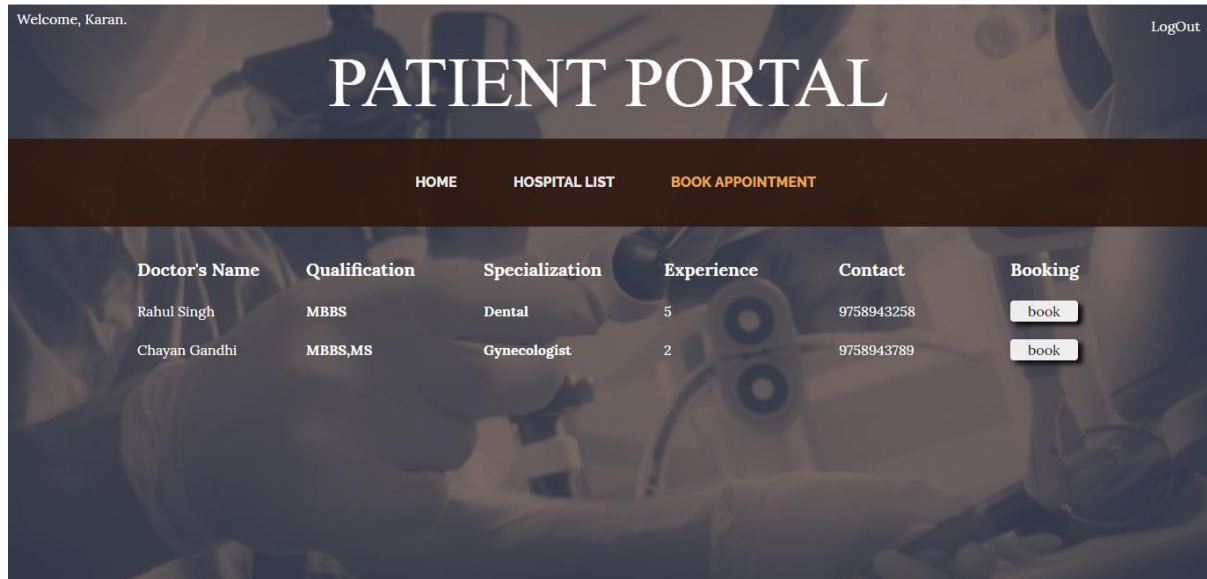


Fig 3.12 List of Hospital

After successful login to the patient portal, the patient can access the list of doctors in two different ways.

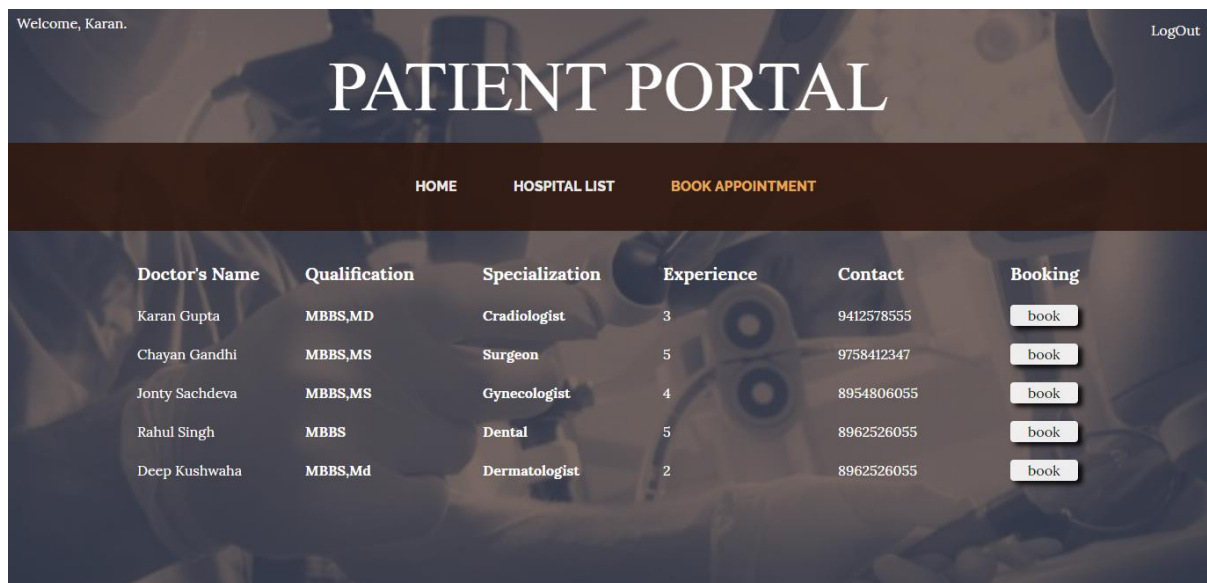
- The patient can go through the list of hospitals registered to the site to choose for his desired hospital he wants to book appointment to as shown in fig 3.13
- The patients not having any specific hospitals to register into, can easily access the list of all the doctors connected with E-diagnosis irrespective of the hospital they are working for, as shown in fig3.14



The screenshot shows a patient portal interface. At the top, it says "Welcome, Karan." and "LogOut". The main heading is "PATIENT PORTAL". Below the heading are navigation links: "HOME", "HOSPITAL LIST", and "BOOK APPOINTMENT". The main content area displays a table of doctors with columns for Doctor's Name, Qualification, Specialization, Experience, Contact, and Booking. Two doctors are listed: Rahul Singh (Dental, 5 years experience, contact 9758943258) and Chayan Gandhi (Gynecologist, 2 years experience, contact 9758943789). Each doctor has a "book" button next to their contact information.

Doctor's Name	Qualification	Specialization	Experience	Contact	Booking
Rahul Singh	MBBS	Dental	5	9758943258	book
Chayan Gandhi	MBBS,MS	Gynecologist	2	9758943789	book

Fig 3.13 List of Doctors in a specific Hospital



The screenshot shows a patient portal interface. At the top, it says "Welcome, Karan." and "LogOut". The main heading is "PATIENT PORTAL". Below the heading are navigation links: "HOME", "HOSPITAL LIST", and "BOOK APPOINTMENT". The main content area displays a table of all doctors registered to E-Diagnosis with columns for Doctor's Name, Qualification, Specialization, Experience, Contact, and Booking. Five doctors are listed: Karan Gupta (Cradiologist, 3 years experience, contact 9412578555), Chayan Gandhi (Surgeon, 5 years experience, contact 9758412347), Jonty Sachdeva (Gynecologist, 4 years experience, contact 8954806055), Rahul Singh (Dental, 5 years experience, contact 8962526055), and Deep Kushwaha (Dermatologist, 2 years experience, contact 8962526055). Each doctor has a "book" button next to their contact information.

Doctor's Name	Qualification	Specialization	Experience	Contact	Booking
Karan Gupta	MBBS,MD	Cradiologist	3	9412578555	book
Chayan Gandhi	MBBS,MS	Surgeon	5	9758412347	book
Jonty Sachdeva	MBBS,MS	Gynecologist	4	8954806055	book
Rahul Singh	MBBS	Dental	5	8962526055	book
Deep Kushwaha	MBBS,Md	Dermatologist	2	8962526055	book

Fig 3.14 List of all the doctors registered to E-Diagnosis

A registered patient is able book an appointment, after keying in ‘Name/Contact’ & ‘Password’ field and get his credentials authenticated with the existing database entry. After successful booking of an appointment the patient is redirected to page displaying confirmation to his booking as shown in fig 3.15



Fig 3.15 Confirmation of appointment

3.4. Hospital Portal

- A registered hospital is able login, after keying in ‘Name/Contact’ & ‘Password’ field and get his credentials authenticated with the existing database entry. It gets redirected to the Home Page of the Hospital Portal as shown in the fig 3.16



Fig 3.16 Hospital portal homepage

- Hospital being able to access the homepage of the hospital portal & get redirected to the Schedule of each doctor by clicking on ‘Doctors Schedule’ or be able to register a new doctor for itself upon click of ‘Register Doctor’ tab on the navbar.



Fig 3.17 Doctors Schedule

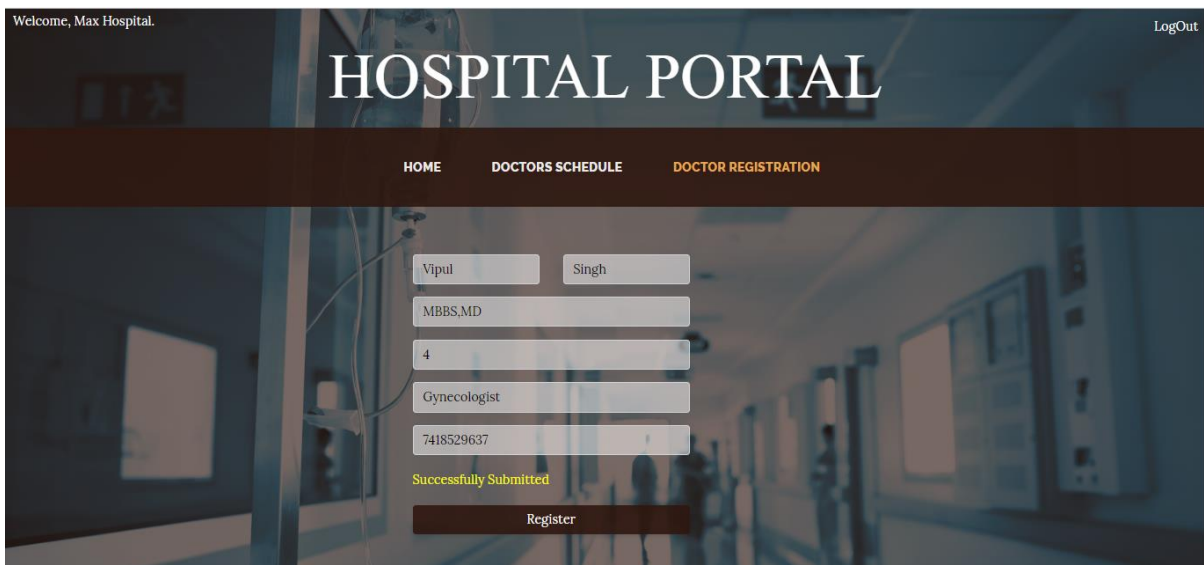


Fig 3.18 Doctor Registration

- A Hospital already existing in the database can register a new doctor to its hospital under the ‘Doctor registration’ tab as shown in fig 3.18
- All the fields must be correctly filled in according with the field level validation.
- Post successful field level validation the information will be saved in the database displaying a message “Successfully Submitted” as shown in fig 3.18

CHAPTER 4:

CONCLUSION AND FUTURE SCOPE

4.1. Conclusion

- The portal is an interactive portal between hospitals and patients. From a patient's perspective it includes his/her login portal, allowing search for hospitals or doctors along with their specialization.
- It also provides facilities such as taking appointments as well as seeing the doctor's timings of availability and his profile. It allows the patient to choose their choice of doctor and hospital in accordance to their budget and nearest available facility.
- Whereas from a hospital's perspective, the portal facilitates the administration to maintain a record of all of its doctors and patients. It allows them to book appointments and register new employee viz. Doctors along with their complete profiling e.g. their area of specialization, education history, no. of years of experience etc.
- Thus, the portal provides transparency and ease to both the hospital, patients and their doctors. It improves hospital management and appointment scheduling process and gives access to information to all in a much easier and systemized manner.

4.2. Future Scope

The portal enables communication and information access to everyone in a much systemized and easy to use, user friendly manner but a few more features can be incorporated in it.

Counselling

Sometimes it is better to take Doctors' opinions before starting a new diet or following a new exercise routine or even applying any new healthcare products or simply wanting a second opinion. Our Web application has future scope for providing a fast and easy method of doctors' counselling on the go to our users and also an easy way for doctors to communicate with patients.

Nursing Care:

Nowadays every home has an elderly or a young one which needs to be taken care of or someone which needs to be nursed back to health and it becomes a tiresome job to find a nurse best suitable for the job quickly. Our web application has future scope for listing qualified nurses so that it becomes easy for people to find them and our web application also works as a platform to post jobs for the nurses.

Home Appointment

Apart from booking appointments for the patient with doctors of registered hospitals to avoid time wastage and provide a systematic approach to patient clinical checkups. Our web application holds future scope for home appointments so that it becomes easy for users to avoid hustle free consultation especially for people who are not able to move around so much.

Doctors' Consultation

It is not easy to consult to your doctor every time you have a problem. People procrastinate going to a hospital and calling every time becomes a nuisance for the doctor hence, we made this web application with a future scope in mind to provide with an easy way for patients to consult their doctors without leaving the house or disturbing the doctor.

Emergency

Our web application is also built to incorporate emergency contacts and services in the future as every second counts in life and death situations. And few seconds early notification for hospitals might save some lives.

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