A PROJECT REPORT
ON

HEALTH CARE CONNECT WITH AI

SUBMITTED TO THE SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE

IN THE PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE AWARD OF THE DEGREE

OF

BACHELOR OF ENGINEERING
(COMPUTER ENGINEERING)

SUBMITTEDBY

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2018 -2019

CERTIFICATE

This is to certify that the project report entitles

HEALTH CARE CONNECT WITH AI
Submitted By

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are bonafide student of this institute and the work has been carried out by him/her under the supervision of **Prof. Bangar P.H.** and it is approved for the partial fulfilment of the requirement of Savitribai Phule Pune University Pune, for the award of the degree of **Bachelor of Engineering** (Computer Engineering).

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Place : Ahmednagar

Date:

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Hajare Navnath
Kulat Parikshiti

ABSTRACT

The importance of health care is immense in a society and over the past years, this sector has been evolving to produce a more efficient and computerized system. This paper presents the development of a web and mobile application for the general public. The main objective of this project is to develop a web or mobile based application for search for best doctors, hospitals and clinics in your locality and sort by distance to find out the nearest doctor or hospital filter the list of doctors by specialty, consulting fees, experience and consulting time see the availability of a doctor for different dates and time slots the general public where they can store their own medical data and access it anytime, from anywhere and get the proper information about health service provider. In the health care connect with ai system, users can register as patients and health service provider to store their data in the database. The system also consists of registered health service provider. The health service provider can view their patient's data and issue prescriptions. The system has been developed using angulor6, html5 and ionic framework. The database has been designed using mongodb , sqlite and server side language nodejs and typescript . The system has been tested, verified and implemented. It provides an efficient way of storing information electronically, a faster communication mechanism between patients and health service provider, and also ensures better security for the users.

TABLE OF CONTENTS

LIST OF ABBREVATIONS

ABBREVATION	ILLUSTRATION
AI	Artificial Intelligence
HDD	Hard Disk Drive
IDE	Integrated Development Environment
RAM	Random Access Memory

LIST OF FIGURES

1.Introduction

1.1 OVERVIEW

In today's world everything is becoming computerized and web based. Different organizations have already moved towards computerized systems which made lives easier and faster. One of the most important sectors of any nation is their health care sector. The organization of people, institutions and resources that deliver services related to health to meet the medical needs of the general public or any individual is referred to as Health Care System. The importance of health care is immense in a society and over the past years, this sector has been evolving to produce a more efficient and computerized

The main objective of this paper is to develop a web based application for the general public and health service provider where they can store their data and access it anytime, from anywhere. Health Care connect with AI system is the application of computer, mobile phones, internet , which aims to provide services electronically to improve patient's medical needs. In our Health Care connect with AI system, users can register as patients to store their medical data in the database and also health care service provider store their data in database to find best data for patients to get best service provider appointment. There is also an android and IOS mobile application associated with the Health Care connect with AI system web application.

The current Existing systems are as shown below:

Fig2.1: Existing Apollo Hospital System

In health care system is also moving towards computerized based system like other industries. Many health organizations already use digital hospital management system. For example, hospitals like Apollo and United hospitals have their own customized software to carry out the daily activities of the hospital such as - patient registration, scheduling appointments or diagnostic tests, medicine department, billing system and many others. But these operations are only handled by the hospital employees and are specific to their own hospitals. There are no scopes for the patients to use it personally and cannot access it from anywhere else. This is just a hospital management software designed for a specific hospital.

The authors in have discussed about the current status, challenges and future developments of eHealth . In the paper , the authors discussed about the possible scopes of health care services in the country, the concept of eHospital, how government is contributing to move towards digitalized health care sector, the challenges it might face and future areas to work on. From their research analysis, they concluded that the condition and scope of eHospital is good but it is not sufficient. One of the major problems encountered was that the most of the general public in not well informed of the services of electronic health care.

1.2 MOTIVATION :

1.2 Advantages of Working System:

1. Hospital management create profile for every patient
2. Data about patient can save in database.
3. Complete billing system at one desk.

.

2. Saves time

There is an increased overall awareness and a higher level of comfort demonstrated specifically by millennial consumers. In this ever-evolving digital world where speed, efficiency, and convenience are constantly being optimized.

4.Helps to plan your whole day

This proposed system helps user to plan his/her whole day according to the environment condition, market availability, weather change.

1.3 PROBLEM DEFINATION

1.3.1 Problem Statement :

HEALTH CARE CONNECT WITH AI

1.3.2 Objective

The main objective of our project is to create a web and mobile application on Health Care, where the users, registered as patients and Health service provider, can upload their own data in the system. This information is saved and updated in the database and the user can access these data anytime, from anywhere. The users can easily view their past records, both in tabular and graphical form. There is also few registered doctors, who can give best health service, when requested by a patient

1.3.3Limitations :

1.3.1 Limitations of Working System:

- This system is only for hospital management.
- Patient can not use this system.

  .

2. LITERATURE SURVEY

Sr. No.	Name of Paper	Published	Content
1	Electronic medical records and their impact on residents and medical student education	2006-IEEE	The primary goal of this study is to develop an android-based healthcare application, which can assist the users to monitor their health-related conditions for improving their health.
2	E-health in rural areas: Case of developing countries.	2008-International Journal of Biological and Life Sciences	The Application of e-health solutions has brought superb advancements in the health care industry. E-health solutions have already been embraced in the industrialized countries
3	Health System in Bangladesh: Challenges and Opportunities.	2014-American Journal of Health Research.	The health system of Bangladesh relies heavily on the government or the public sector for financing and setting overall policies and service delivery mechanisms
4	e-Health in Bangladesh: Current Status, Challenges, and Future Direction.	2014- The International Technology Management Review	The Application of e-health solutions has brought superb advancements in the health care industry. E-health solutions have already been embraced in the industrialized countries
5	Online Health Care	2018-IEEE	The importance of health care is immense in a society and over the past years, this sector has been evolving to produce a more efficient and computerized system.

3.SOFTWARE REQUIREMENTS SPECIFICATION

3.3 EXTERNAL INTERFACE REQUIREMENTS:

3.3.1 Hardware Interfaces:

a) Laptop

3.3.2 Communication Interface

a) Internet

3.4.4 Software Quality Attributes:

- **Availability:** Since there are no external requirements , the system will be available all the time.
- **Correctness:** The system will generate an appropriate report about different activities by learning process and will keep track of all the records.
- **Maintainability:** The system will be easy to repair in case of any fault in minimum cost.
- **Usability:** The system will satisfy maximum number of users.

3.5 SYSTEM REQUIREMENTS:

3.5.2 Software

a) WINDOWS 7 and above or Linux
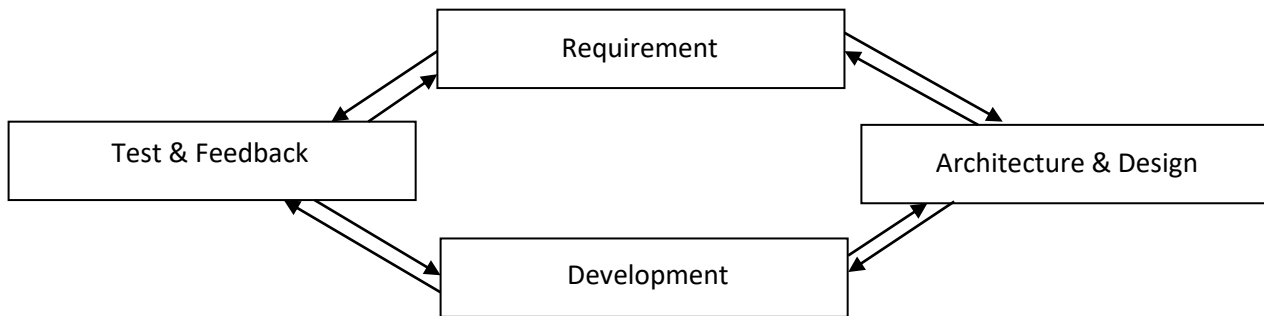
b) VSCode IDE.

c) Any Browser

3.5.3 Hardware

a) Intel i5 Processor (Machine)

 b)   RAM 8GB and Above.

c) HDD 512 GB Hard Disk Space and Above
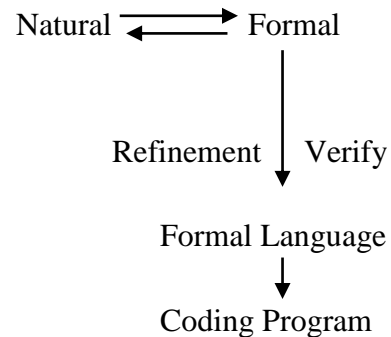
3.6 ANALYSIS MODELS:SDLC MODEL

Agile model:

Use Cases:

1) User's need change dynamically.

2) Unlike the waterfall model, it requires only initial planning to start the project.

```
                    ┌──────────────────┐
              ┌────→ │   Requirement    │ ←────┐
              │      └──────────────────┘      │
              │                                ↓
┌──────────────────┐                  ┌──────────────────────┐
│  Test & Feedback │                  │ Architecture & Design│
└──────────────────┘                  └──────────────────────┘
              ↑      ┌──────────────────┐      │
              └───── │   Development    │ ←────┘
                     └──────────────────┘
```

Development Phase:
- Describe Specification

- Description Language

$$\text{Natural} \rightleftarrows \text{Formal}$$

- Verify Specification

$$\text{Refinement} \downarrow \text{Verify}$$

- Design

$$\text{Formal Language}$$
$$\downarrow$$

- Implementation   Coding Program

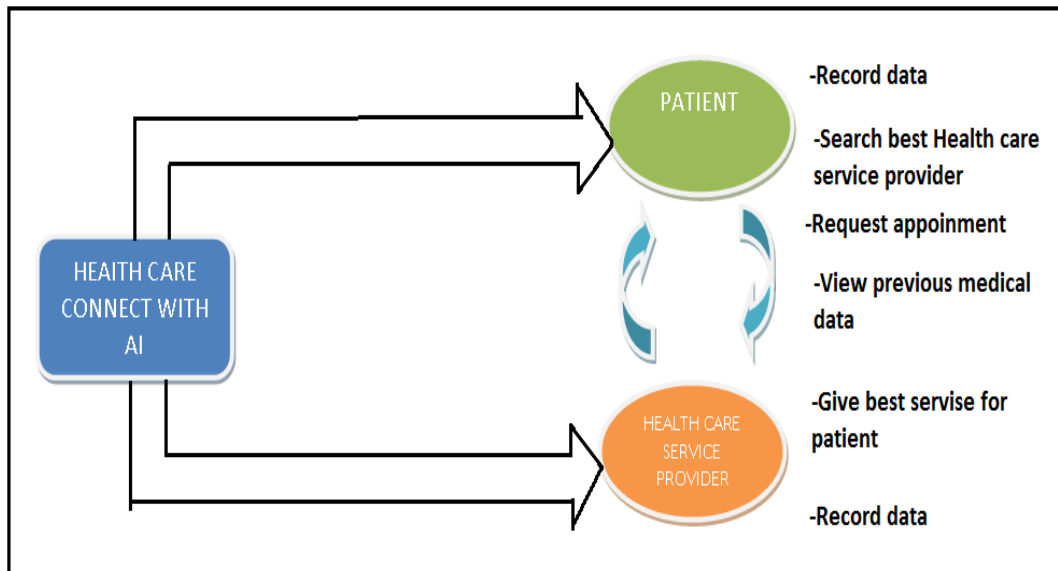# 4. SYSTEM DESIGN

4.1 System Architecture:

Fig. (4.1) System Architecture

4.2 Different Models

HEALTH CARE CONNECT WITH AI is a web application for providing health related services to the general public.The system has been developed using Angulor6, HTML5 in IONIC framework. The database has been designed using MongoDB ,SQLite and server side language is NodeJS and Typescript. There are two aspects of Health Care Connect with AI. One is about how the patients can be benefited from the proposed system and another is how the Health service provider module works.

Patient's Module:

> The users who want to receive the facility of this
> Health Care Connect service, first needs register as   patients in our web and mobile application of Health Care Connect.

> Patient will be able to register on the application by entering name, email ID, phone number, government ID, country, city, location, etc. A verification link on registered email ID and OTP will be sent to the mobile. Once confirmed patient registration will be confirmed.
> Note: If any third party verification needs to be done, client will be required to provide the API for the same.

> Patients will be able to sign in using registered email ID and password. On successful sign in, patient will be redirected to the list of service providers in the area.

> Patients will be able to view their own medical history. Medical history will only be viewable and it will be entered by the health service provider. History will be sorted as latest encounter being at the top. Clicking on any listed encounter will redirect the patient to the details screen.
> Note: Client will be required to provide list of data points to be shown on listing screen and details screen.

- Patients will be able to search for health service providers using location, specialty, name, hospital, working hours, etc. Based on search criteria list of service providers will be shown to the patient. Clicking on any of the listed health service providers will redirect the patient to the details screen.

- Patient will be able to view the data access requests received from health service providers. They will be able to approve or reject the request. Same will be notified to the health service provider.

Modules for Health Service Provider:

- The Health Care Service Provider of the Health Care Connect application are registered by the admin of the enlisted in the system.
- Health service providers will be able to register on the application by entering name, email ID, phone number, government ID, country, city, location, hospital, specialty, etc. A verification link on registered email ID and OTP will be sent to the mobile. Once confirmed health service provider's registration will be confirmed.
  Note: If any third party verification needs to be done, client will be required to provide the API for the same.

- Health service providers will be able to sign in using registered email ID and password.
- Provider will be able to enter encounter details against the patient after the visit. The details will be added in the patient's medical history and will be available for other providers (with valid access) to view. Post encounter raising insurance claim will be mandatory.

- Provider will have to raise the insurance claim against the patient after the visit. The details will include the insurance details shared by patient, patient's unique ID, encounter details, billing details.
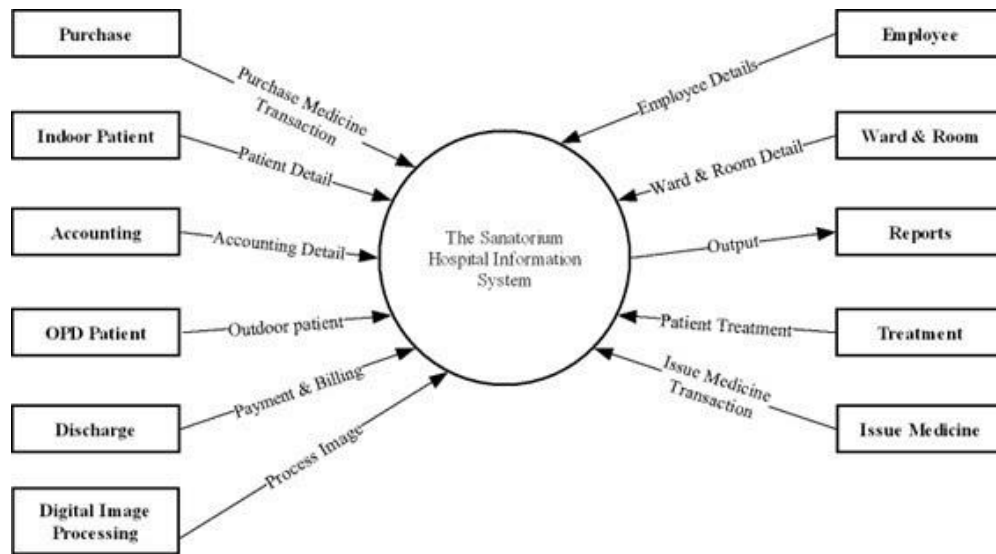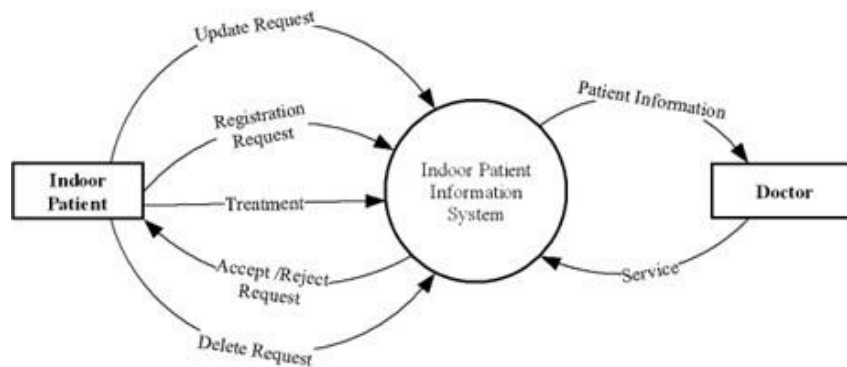
4.3 Data Flow Diagrams

Fig:-Context Level Diagram

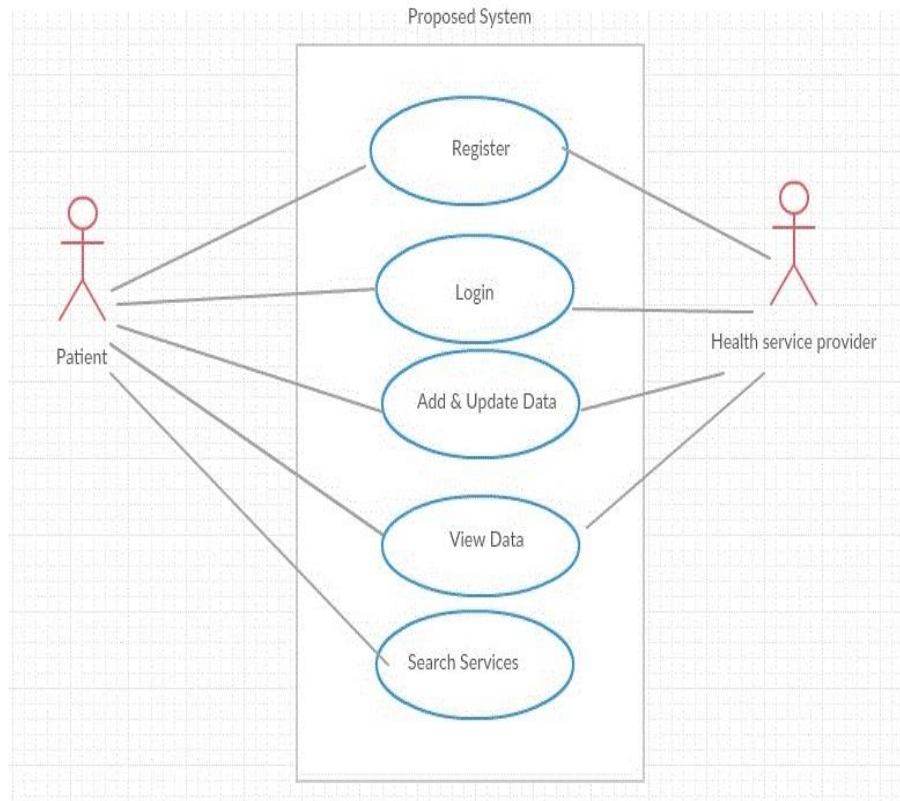0 Level Indoor Patient Information System

4.4 UML Diagrams

4.3UML Diagram
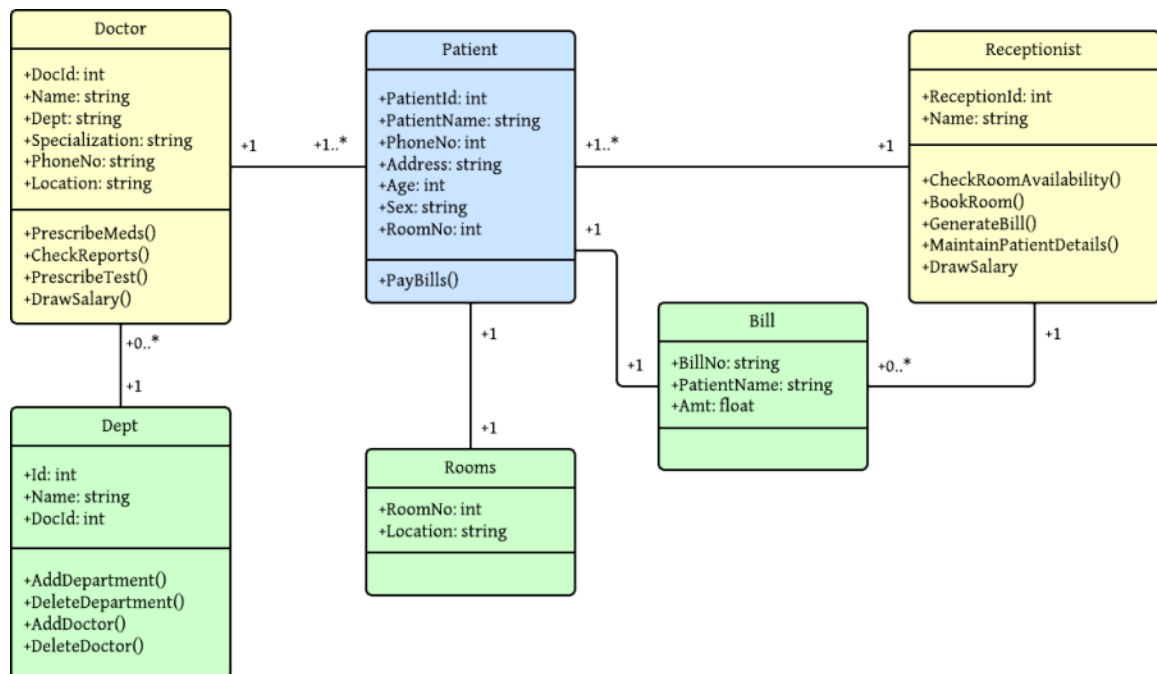

Fig:Use Case Diagram

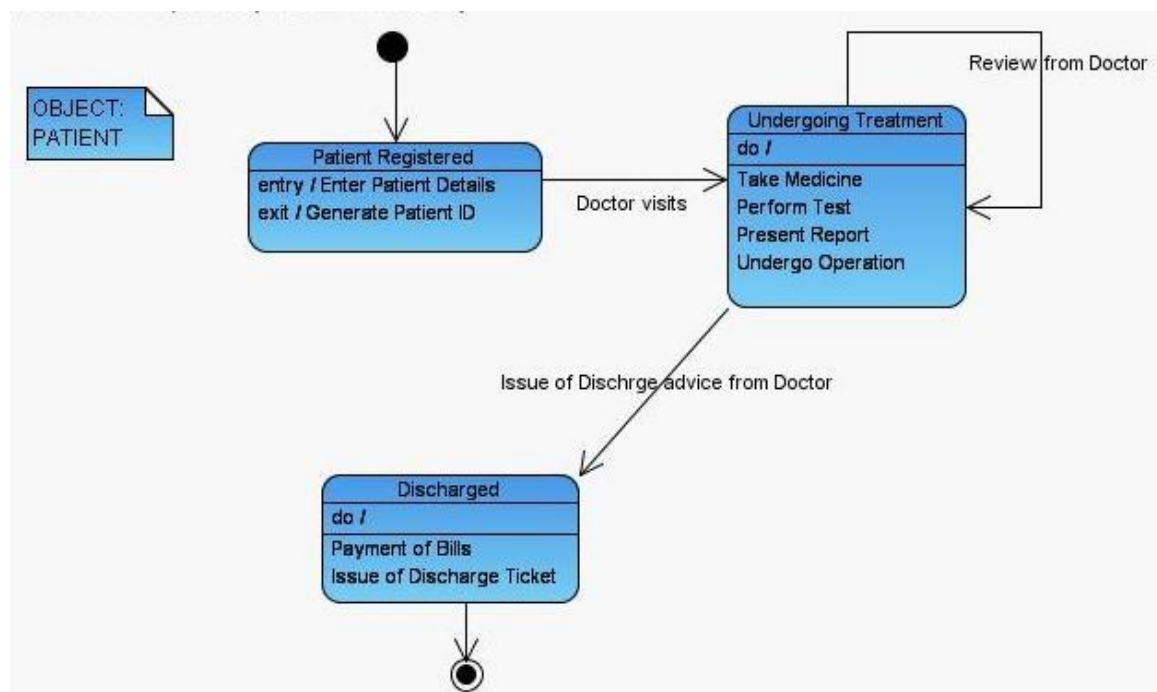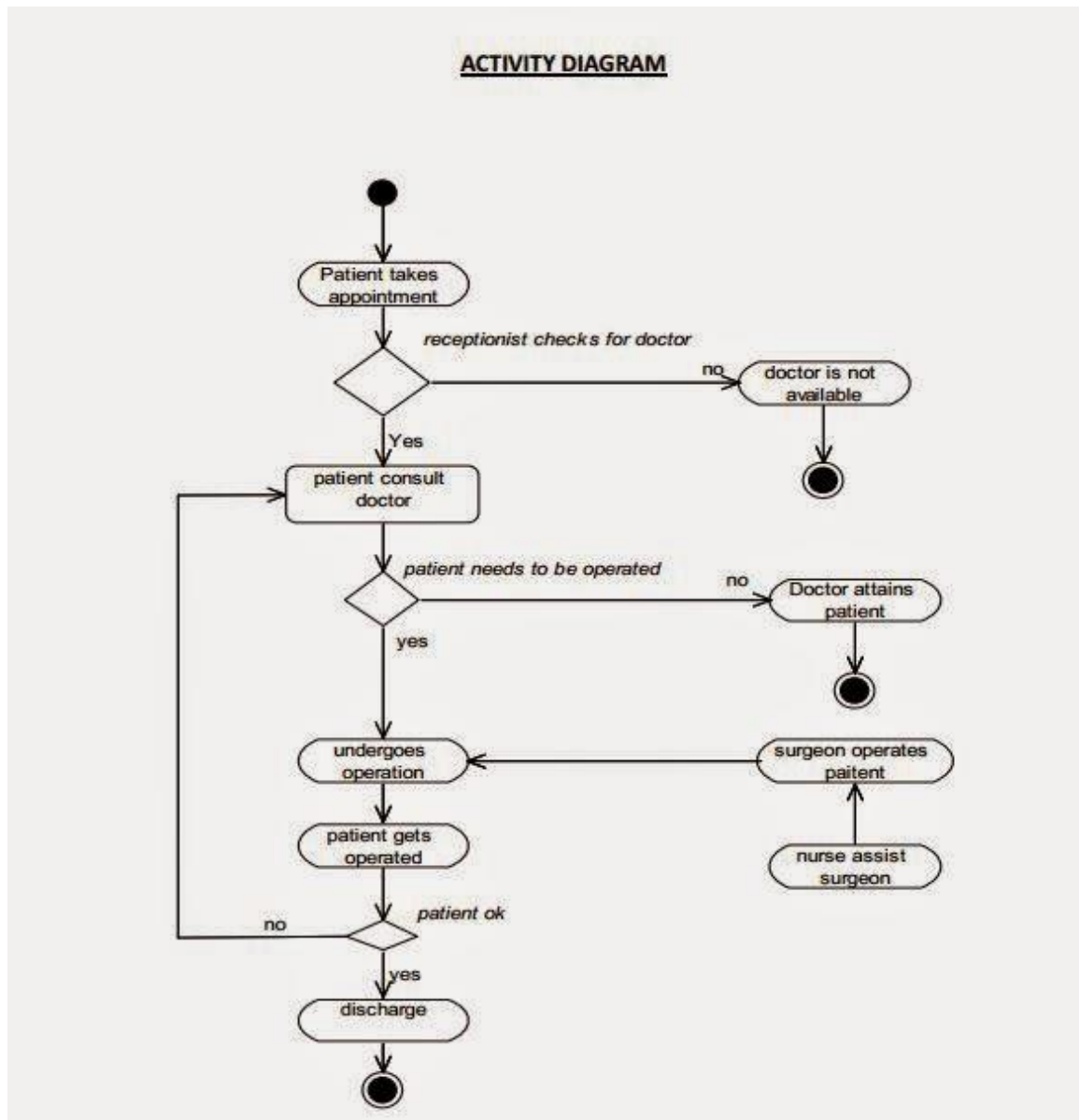**Fig.(4.4.1) Use Case Diagram**

Fig.(4.4.2) Class Diagram

Fig.(4.4.3) Object Diagram

Fig.(4.4.4) Activity Diagram
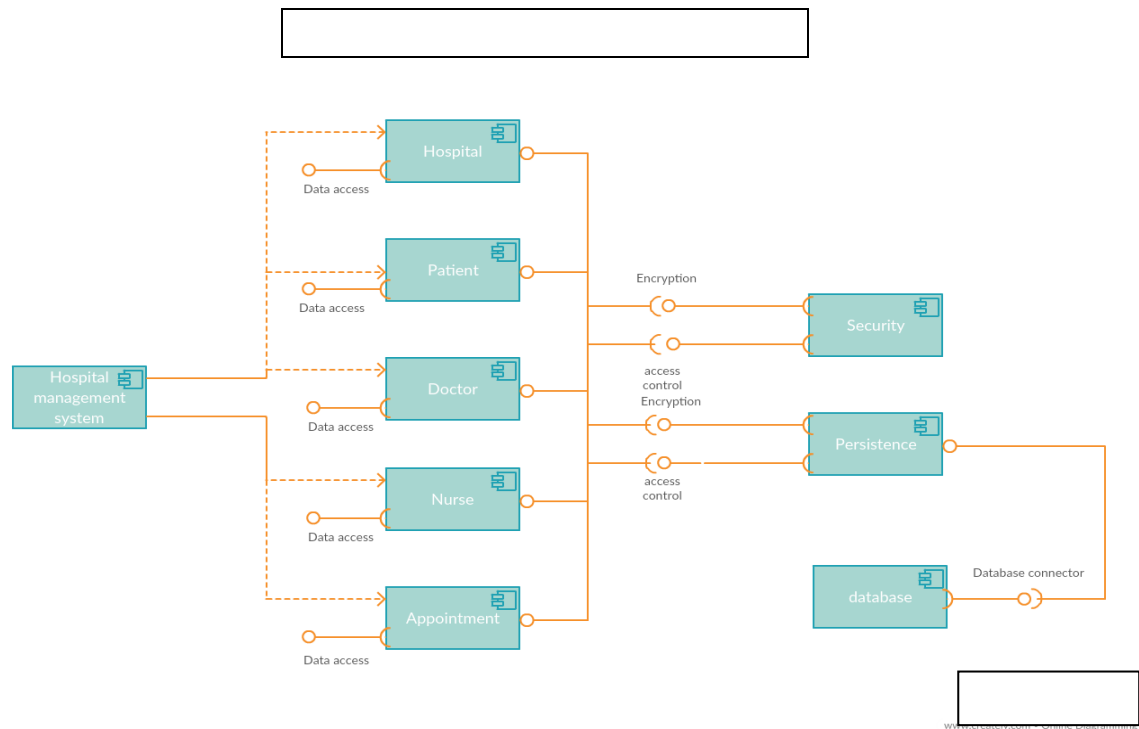

ACTIVITY DIAGRAM

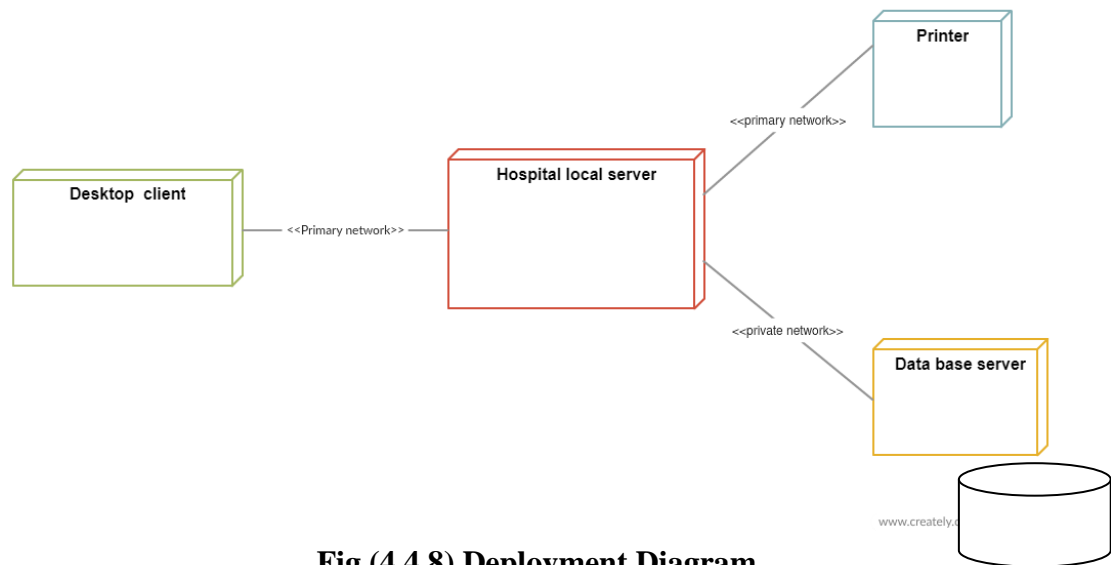**Fig.(4.4.7) Component Diagram**

Fig.(4.4.8) Deployment Diagram

05. PROJECT PLAN

5.2.3 Overview of Risk Mitigation, Monitoring, Management:

The proactive management of risks throughout the software development life-cycle is important for project success. The risk management practice, which involves risk identification, analysis, prioritization, planning,mitigation and communication. A risk driven process for selecting a software development model. Risk in itself is not bad; risk is essential to progress, and failure is often a key part of learning. But we must learn to balance the possible negative consequences of risk against the potential benefits of its associated opportunity.

Risk Mitigation:

Related to risk planning, through risk mitigation the team develops strategies to reduce the possibility or the loss impact of a risk.

Risk Avoidance : The team can opt to eliminate the feature which seems risky enough to implement. Here , if the Holographic assistant wouldn't be able to compute more than two input modules then we will skip the tedious inputs.

Risk Protection: A team can employ fault tolerance strategies or can buy an insurance to cover the financial loss in case the risk becomes a reality.

Risk Monitoring:

After the risks are identified , analyzed , and prioritized , and actions are established , it is essential that the team regularly monitor the progress of the product and the resolution of the risk items, taking corrective action when necessary. This monitoring can be done as part of the team project management activities or via explicit risk management activites.

Risks need to be revisited at regular intervals for the team to reevaluate each risk to determine when new circumstances caused its probability and/or impact to change. At each interval, some risks may be added to the list and others taken away. Risks need to be reprioritized to see which are moved "above the line" and need to have action plans and which move "below the line" and no longer need action plans. A key to successful risk management is that proactive actions are owned by individuals and are monitored.

Risk Management

The risk management process can be broken down into two interrelated phases, risk assessment and risk control. These phases are further broken down. Risk assessment involves risk identification, risk analysis and risk prioritization. Risk control involves risk planning, risk mitigation and risk monitoring. It is essential that risk management be done iteratively, throughout the project as a part of the team's project management routine.

5.3 PROJECT SCHEDULE

5.3.1 Project Task Set:

Tasks	Activities
Task 1	Project Design
Task 2	Requirement Analysis
Task 3	Develop System Architecture
Task 4	Develop detail design specification
Task 5	Install Systems
Task 6	Project development
Task 7	Perform Tests
Task 8	Perform Project Review
Task 9	Fix Bugs
Task 10	Quality Assurance

5.3.3 Timeline Chart:

Months	Jun-Jul	Aug-Sept	Oct-Nov	Dec-Jan	Feb-Mar	Apr
Planning	███					
Design		███				
Coding			███			
Testing				███		
Report					███	
Final						███

5.4 TEAM ORGANIZATION

5.4.1 Team Structure:

Team Member 1	Content strategy, Change management, Project Management, Technical Development
Team Member 1	Accessibility, Business Analysis, Metric Analysis
Team Member 2	Quality Assurance, Usability testing, User Research
Team Member 2	User Interface Design, Visual Design, Interaction Design

5.4.2 Management Reporting and Communication:

Details

Sr. No.	Title	Report Time	Last Reported	Status
1.	Research and Synopsis	September	October	Completed
2.	General Overview	October	October	Completed
3.	Basic Implementation	November	December	Completed
4.	Further Design and Animation	December	February	Completed
5.	Coding	February	March	In Process
6.	Integration	March	March	In Process

06. PROJECT IMPLEMENTATION

6.1 OVERVIEW OF PROJECT MODULES:

HEALTH CARE CONNECT WITH AI is a web application for providing health related services to the general public.The system has been developed using Angulor6, HTML5 in IONIC framework. The database has been designed using MongoDB ,SQLite and server side language is NodeJS and Typescript. There are two aspects of Health Care Connect with AI. One is about how the patients can be benefited from the proposed system and another is how the Health service provider module works.

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➢ The users who want to receive the facility of this
   Health Care Connect service, first needs register as   patients in our web and
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➢ Patients will be able to view their own medical history. Medical history will only be viewable and it will be entered by the health service provider. History will be sorted as latest encounter being at the top. Clicking on any listed encounter will redirect the patient to the details screen.

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➢ Health service providers will be able to sign in using registered email ID and password.
➢ Provider will be able to enter encounter details against the patient after the visit. The details will be added in the patient's medical history and will be available for

other providers (with valid access) to view. Post encounter raising insurance claim will be mandatory.

➢ Provider will have to raise the insurance claim against the patient after the visit. The details will include the insurance details shared by patient, patient's unique ID, encounter details, billing details.

6.2 TOOLS AND TECHNOLOGIES USED

6.2.3 Software

  c) WINDOWS 7 and Above Compatible Versions.

  d) VSCode IDE.

  e) MongoDB

6.2.2 Hardware

  b) I3 2.3 GHz Processor and Above.

  c) RAM 8GB and Above.

  d) HDD 512 GB Hard Disk Space and Above.

  .

07. SOFTWARE TESTING

7.1 TYPE OF TESTING

7.1.1 Unit Testing:

Unit testing was done after the coding phase. The purpose of the unit testing was to locate errors in the current module, independent of the other modules. Some changes in the coding were done during the testing phase. Finally ,all the modules were individually tested following bottom to top approach, starting with the smallest modules and then testing one at a time.

7.1.2 Black Box Testing:

This method of software testing tests the functionality of an application as opposed of an application as opposed to its internal structures or working. Specific knowledge of the application's code/internal structure and programming knowledge, is not required. Test cases are built to specifications and requirements, i.e., what the application is supposed to do. It uses external descriptions of the software, including specifications, requirements, and to design to derive test cases. These tests can be functional or non functional , though usually functional. The test designer selects valid and invalid inputs and determines the correct output. There is no knowledge of the test object's internal structure.

7.1.3 White Box Testing:

This method of software testing tests internal structures or workings of an application, as opposed to its functionality. In white-box testing, an internal perspective of the system, as well as programming skills, are required and used to desugn test cases. The tester chooses inputs to exercise paths through the code and determine the appropriate outputs.

7.1.4 Integration Testing:

At the culmination of integration testing, the software is said to be completely assembled as a package; interfacing errors have been uncovered and corrected. Then as a final series of software test, validation tests were carried out.

7.1.5 Acceptance Testing:

This is the final stage in the testing process before the system is accepted for operational use. Any requirement problem or requirement definition problem revealed from acceptance testing are considered and made error free.

7.2 TEST CASES AND TEST RESULTS

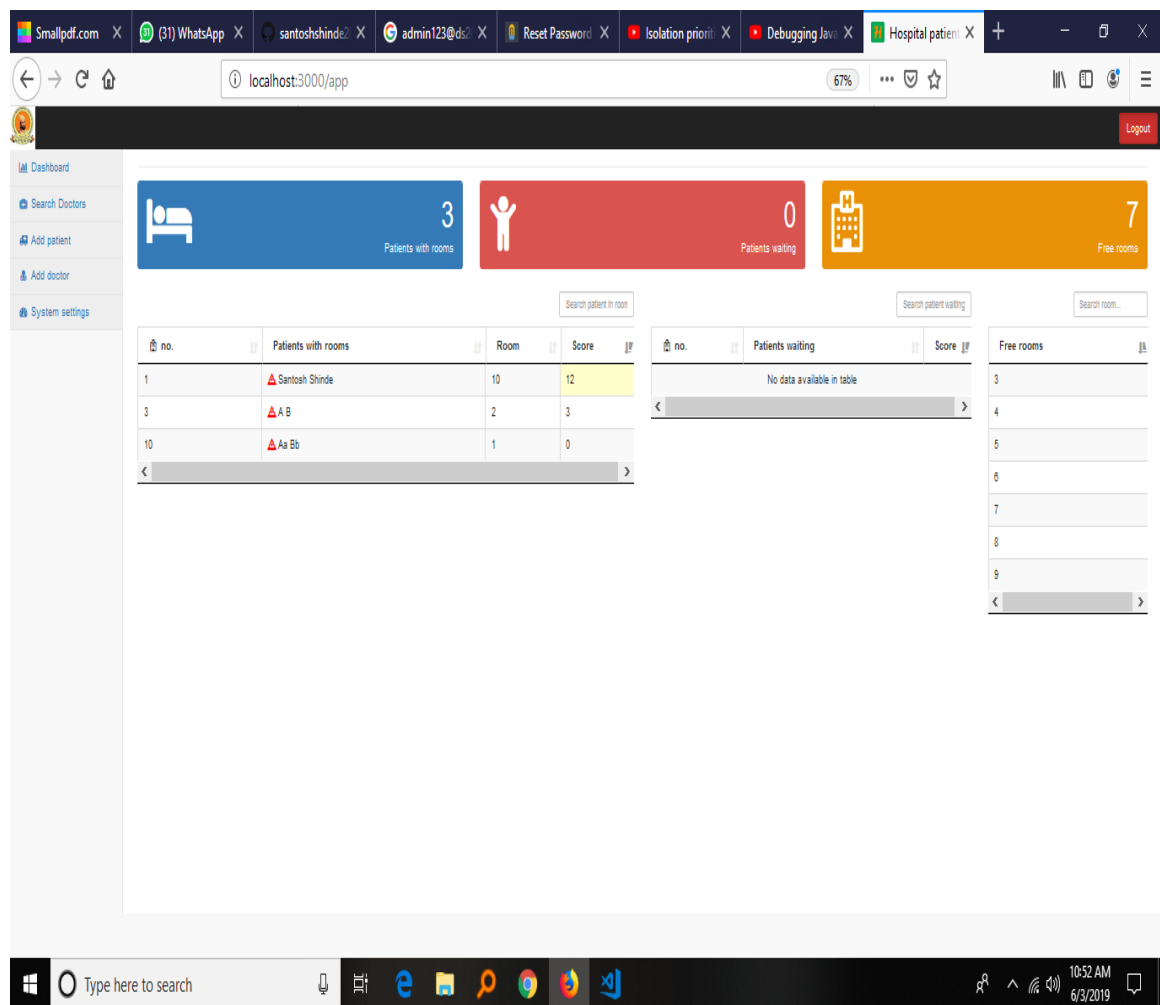| No.	Test Case	User Input	Expected Result	Actual Result	Status
1.	Register Patient	User gives all the credentials asked by the system	Registration successful	Registration successful	Pass
2.	Register Patient	If User miss any infor- mation to enter	Registration Failed	Registration Unsuccessful please Try again	Pass
3.	Login Patient	System takes the username and password	Login success-ful	Successful	Pass
4.	Login Patient	If incorrect information is entered	Login failed	Login failed, please give correct pass-word or username	Pass

No.	Test Case	User Input	Expected Result	Actual Result	Status
5	Register Doctor	User gives all the credentials asked by the system	Registration successful	Registration successful	Pass
6	Register Doctor	If User miss any infor- mation to enter	Registration Failed	Registration Unsuccessful please Try again	Pass
7	Login Doctor	System takes the username and password	Login success-ful	Successful	Pass
8.	Login Doctor	If incorrect information is entered	Login failed	Login failed, please give correct pass-word or username	Pass

08. RESULTS

8.1 OUTCOMES:

HEALTH CARE CONNECT WITH AI is a web application for providing health related services to the general public and Find Best Doctor

8.2 SCREENSHOTS

Fig.

8.2.1DashBoard
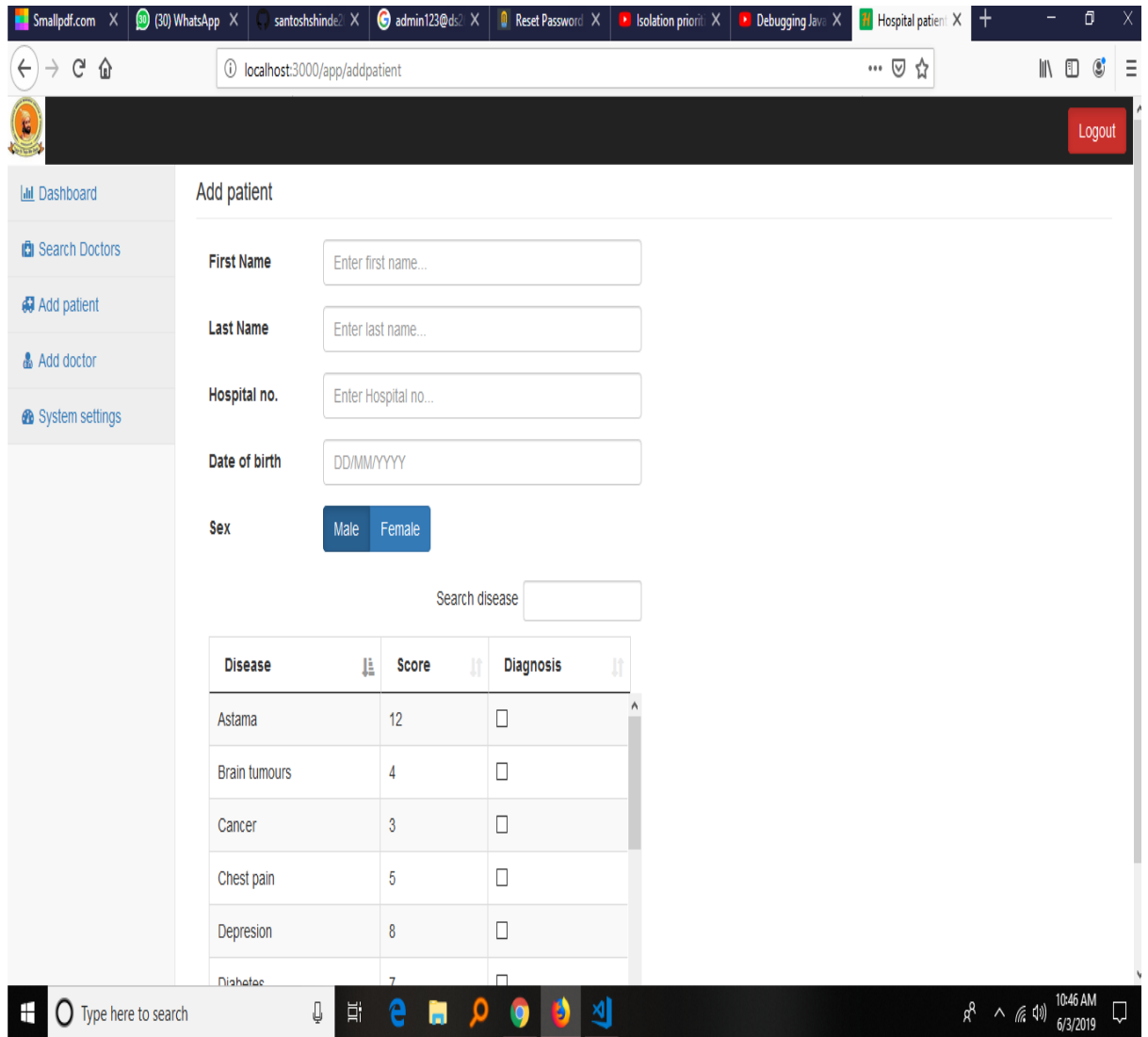
Fig. 8.2.3Patient

Fig. 8.2.5System Settings

Fig.Doctor Find

9. CONCLUSIONS

Health Care Sector is a very important sector in every society. It is the basic rights of every individual to get access to proper health care. This sector has been evolving to produce a more efficient and computerized system. Bangladesh has also made a significant improvement in the health care system over the years and Bangladesh government (ICT division) has taken different projects to make health care sector digitalized like other industries. In this research, we could develop a web application which can be used for the general public of Bangladesh, where they can store their own medical data and access it anytime, from anywhere. The system will also consists of registered doctors under the enlisted hospitals, who can give free medical advice and prescribe necessary medications to the patients when requested for an appointment. Online Health Care is an efficient and cost effective way of virtual communication between patients and doctors. The main challenge of this project was the time constraint and access to limited resources

9.2 FUTURE WORK

In the future, we plan to upgrade the system and incorporate other functionalities related to health care. There is big scope to make this project into a complete health care solution, if we could incorporate this existing web application to hardware device. Then the users could directly take input from the device such as blood sugar machine, and record it in the database via the mobile application. There would also be a information directory about different kinds of medicines. Since health care is a huge sector, there are scopes for possible research in future.

APPENDIX A

In Computer Science, many problems are solved where the objective is to maximize or minimize some values, whereas in other problems we try to find whether there is a solution or not.Hence, the problems can be categorized as follows -

I. Optimization Problem   **II. Decision Problem**

There are many problems for which the answer is a Yes or No.These types of problems are known as **decision problems**.A decision problem solved with the help of algorithms.In this context, we can categorize the problem as follows –

1. P-Class :

It consists of all those decision problems that can be solved on a deterministic sequential machine in an amount of time that is polynomial in the size of the input.These problems are called tractable problems.

2. NP-Class :

It consists of those problems that are verifiable in polynomial time.NP is the class of decision problems for which it is easy to check the correctness of claimed answer, with aid of a little extra information.Hence, we aren't asing for a way to find a solution,but only to verify that an alleged solution really is correct.

NP-Hard :

A problem is NP-Hard if an algorithm for solving it can be translated into one for solving any NP-Problem.NP-Hard therefore means "at least as hard as any NP-Problem".

NP-Complete :

An NP-Complete decision problem is a problem which belongs to both NP and NP-Hard complexity classes.

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