ELECTRONIC PATIENT RECORD SYSTEM

BY

NAHIAN AHMED
ID: 151-15-5137

MONSUR AHMED SHAFIQ
ID: 151-15-5439

AND

SAJIBUL HASAN
ID: 151-15-4986

This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Computer Science and Engineering

Supervised By

Md Zahid Hasan
Assistant Professor
Department of CSE
Daffodil International University

Co-Supervised By

Most. Hasna Hena
Senior Lecturer
Department of CSE
Daffodil International University

DAFFODIL INTERNATIONAL UNIVERSITY

DHAKA, BANGLADESH

NOVEMBER 2018

APPROVAL

This Project titled **"Electronic Patient Record System**", submitted by Nahian Ahmed, Monsur Ahmed Shafiq and Sajibul Hasan to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering (BSc) and approved as to its style and contents. The presentation has been held on 07 November , 2018.

BOARD OF EXAMINERS

_____

Dr. Syed Akhter Hossain — **Chairman**
Professor and Head
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University

_____

Dr. Sheak Rashed Haider Noori — **Internal Examiner**
Associate Professor & Associate Head
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University

_____

Md. Zahid Hasan — **Internal Examiner**
Assistant Professor
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University

_____

Dr. Mohammad Shorif Uddin — **External Examiner**
Professor
Department of Computer Science and Engineering
Jahangirnagar University

DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Md. Zahid Hasan , Assistant Professor, Department of CSE,** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

Supervised by:

_____

Md. Zahid Hasan
Assistant Professor
Department of CSE
Daffodil International University

Submitted by:

_____

Nahian Ahmed
ID: 151-15-5137
Department of CSE
Daffodil International University

_____

Monsur Ahmed Shafiq
ID: 151-15-5439
Department of CSE
Daffodil International University

_____

Sajibul Hasan
ID: 151-15-4986
Department of CSE
Daffodil International University

ACKNOWLEDGEMENT

First, we express our heartiest thanks and gratefulness to almighty God for divine blessing makes us possible to complete the final year project successfully.

We really grateful and wish our profound our indebtedness to **Md. Zahid Hasan**, **Assistant Professor**, Department of CSE, Daffodil International University, Dhaka. Deep Knowledge & keen interest of our supervisor in the field of "*Web Development*" to carry out this project. His endless patience, scholarly guidance, continual encouragement, constant and energetic supervision, constructive criticism, valuable advice, reading many inferior draft and correcting them at all stage have made it possible to complete this project.

We would like to express our heartiest gratitude to **Dr. Syed Akter Hossain, Professor and Head,** Department of CSE, for his kind help to finish our project and also to other faculty member and the staff of CSE department of Daffodil International University.

We would like to thank our entire course mate in Daffodil International University, who took part in this discuss while completing the course work.

Finally, we must acknowledge with due respect the constant support and patients of our parents.

ABSTRACT

This project is on Electronic Patient Record System which improve our current medical system. This project use a central database system where doctor, patient and pharmacy can retrieve their information. Doctor will checkup his patient and prescript the patient through our project. The record of patient will be entered according to patient id card. When the patient want to buy medicine, the pharmacist will check patient record using his/her id number. If the information is present in database patient can buy medicine. That's how our project can stop misuse of medicine. If the patient goes to other doctor, that doctor can check his previous record. As all data are in database, patient record will never lost. Patient can always see their prescription on our system. When pharmacist sell their medicine it will also store in system and they can also check their sell history in the project. As the doctor and pharmacists are authorized by the admin of the project, unauthorized doctor and pharmacist cannot enter our system. Through the project the problem of village doctor or unauthorized doctor can be solved as well as unauthorized pharmacy .This project can make our medical system paperless and digital.

TABLE OF CONTENTS

LIST OF TABLE

PAGE NO

LIST OF FIGURES **PAGE NO**

CHAPTER 1

Introduction

1.1 Introduction

This project is on Electronic Patient Record System which improve our current medical system. This project use a central database system where doctor, patient and pharmacy can retrieve their information. Doctor will checkup his patient and prescript the patient through our project. The record of patient will be entered according to patient id card. When the patient want to buy medicine, the pharmacist will check patient record using his/her id number. If the information is present in database patient can buy medicine. That's how our project can stop misuse of medicine. If the patient goes to other doctor, that doctor can check his previous record. [1]

As all data are in database, patient record will never lost. Patient can always see their prescription on our system. When pharmacist sell their medicine it will also store in system and they can also check their sell history in the project. As the doctor and pharmacists are authorized by the admin of the project, unauthorized doctor and pharmacist cannot enter our system. Through the project the problem of village doctor or unauthorized doctor can be solved as well as unauthorized pharmacy .This project can make our medical system paperless and digital.

1.2 Motivation

In our country doctor prescribe a patient in paper .Patient information doesn't store in any electronic system.so it can be lost. Other doctors of the same patient can not have the previous record. Sometimes prescription are hard to understand. Patient sometimes lost their prescription or test / medical report for this can not find proper medical services.

Doctor many times suggest to checkup in private medical service provider for his own interest. There are many village doctor or fake doctor present in our country and they are harmful. Illegal dispensary shop common in our country. Even misuse of medicine happens using fake prescription. Our country has163 million people but we don't single data warehouse for store medical information which can be useful in medical research .

1.3 Objective

We are developing a system which will use nation wide and will under a governing body(such as our Ministry of Health).He has authorized doctors , hospital and medicine dispensary. If a patient wants get treatment from a hospital under a doctor, the doctor will prescribe him(using his d-id) and store his info in this system (using n-id). And after this the patient wants to buy medicine so he goes to dispensary. Dispensary owner check patient information (using his p-id) by accessing the system.

Medicine without prescription can not buy. On the other side unauthorized dispensary can not sell medicine as the prescription is in the system because they are not authorized. Same time unauthorized doctor cannot prescribe patient . After storing all data the system will provide data to other doctor or hospital in our country. There will also a management system for dispensary owner to gain their attention. Patient who hasn't any n-id they will use their birth certificate and new born baby will provide temporary id by hospital

1.4 Expected Outcome

Yes we have some expected outcome from this project. We want to make this project for future.

- Since all information of patient doctor, pharmacy store in a system. It can be used country wide.
- Patient information can visible by other doctors and they can prescribe the patient.
- Misuse of medicine can be stopped.
- Fake doctor or village doctors cannot prescribe the patient. So we can stop the problem of village doctor.
- Unauthorized dispensary cannot use the system. So they cannot sell the medicine.
- With all the information of patient we can know which disease is it threat now.
- According to the number of patient the distribution of doctor can be assume.
- All the medical record of our country can be use for medical research.
- To see the medical record of a patient doctors can know the cause the disease .
- It can also help forensic department. It can be help the cause of death of patient.

1.5 Report Layout

In this report we are trying to describe how we made our project and how this report going to help anyone to understand the project.

In Chapter 1 we discussed about introduction, outcome, motivation ,objective and why we are doing this project.

In Chapter 2, we have given about the background details of our project and also focus on related works. We also describe comparative studies.

In chapter 3, we discussed about business idea and analysis. We also have represented all the specification in chapter 3.Discuse use case diagram of our Project.

In chapter 4, we have discussed about our development process and working. We also shown some screenshot of our project.

Chapter 5, is about implementation of our project database. We are testing our project in this chapter.

In Chapter 6, we discussed about our future scope to make this project more effective. We also discussed about future possibility of development our "Electronic Patient Record System" project.

CHAPTER 2

Background

2.1 Introduction

Now we are living in the modern world where everything is going digitally but our country's medical system is not digital. So we want to digital our medical system. For this we are working Electronic Patient Record System where Doctor, Patient and Pharmacy can retrieve their information. Village doctor or fake doctor are main problem in developing country like Bangladesh. Some medicine can prescribe by village doctor which medicine cannot permitted to prescribe by unauthorized or unregister doctor. For this patient can suffer. In addition, there are also unqualified 'doctors' who do not own a pharmacy shop but provide written prescriptions. However, the treatments provided by these village 'doctors' remain open to question, with instances of maltreatment or inadequate treatment. The treatments are mostly symptomatic and poly pharmacy is common, with antibiotics and vitamins prescribed widely. For misuse of medicine patient can die. And patent record cannot preserve in our country. If doctor want to show patient previous medical record, sometime it cannot possible. Sometime pharmacy sell illegal medicine or unauthorized medicine. Unauthorized pharmacy shop cannot access our system, so they cannot sell their medicine. It will solve the unauthorized medicine shop problem in Bangladesh. Overall this system help us to make a proper modern medical record system.[2]

2.2 Related Works

There are no actual Electronic Patient Record System in our country. We get some idea from various modern hospital and develop country like Mount Elizabeth, Oxford University Hospital, e-health Switzerland but we convert the system to solve our own problem like record patient information, village doctor problem, unauthorized medicine shop and selling. We also add some ERP system from Bangladeshi modern hospital like Square , Lab aid, Ibne sina, NINS Hosptial etc.

2.2.1: Mount Elizabeth Hospital

By this website Patient just can Find the doctor and take online appointment . Patient can also show cost of treatments.

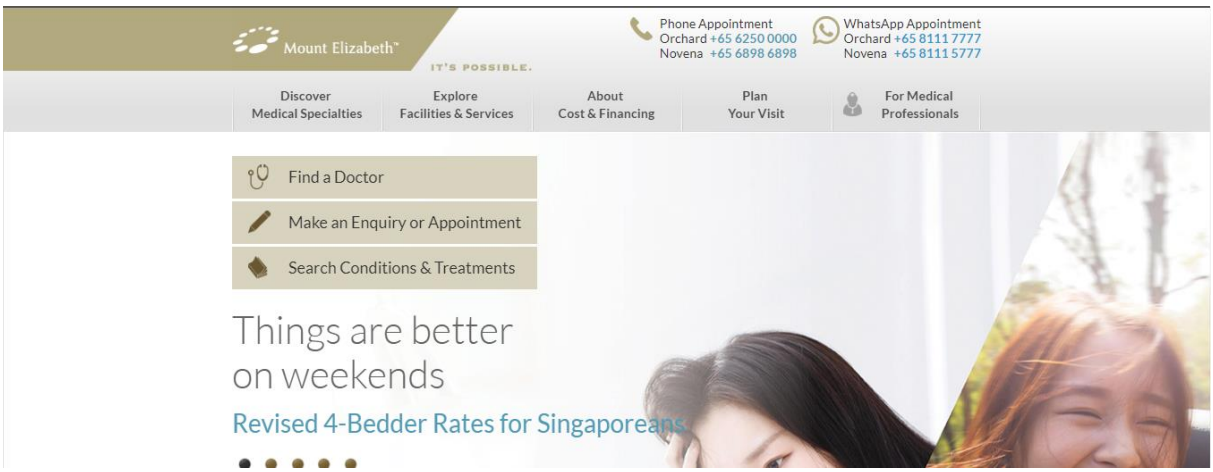

Figure 2.1: mount Elizabeth

2.2.2: Oxford University Hospital

Hear also a example of another hospital. This hospital also can appointment online. But this hospital have a charity. They working Electronic Patient Record by smart card, and research department also.

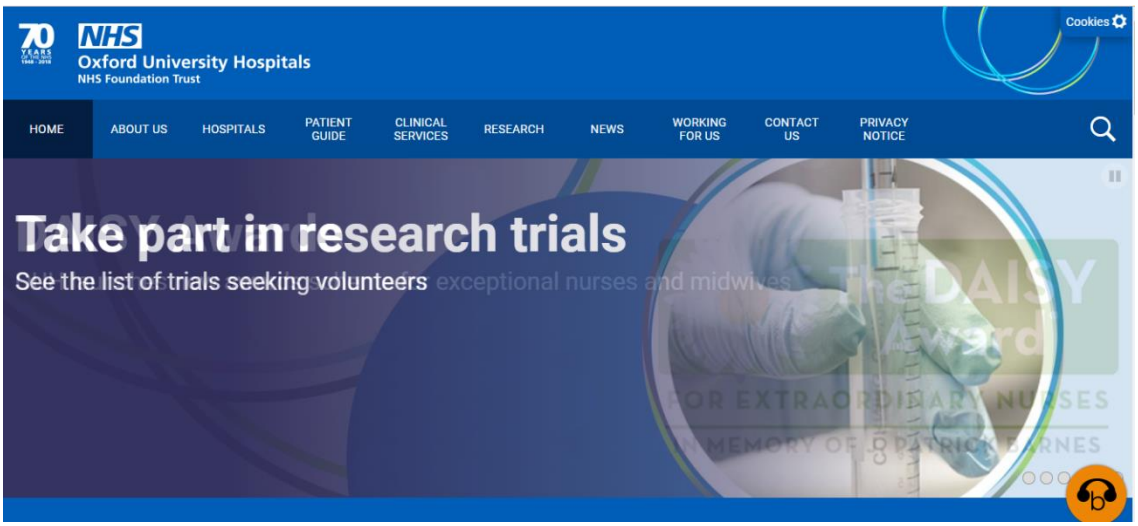

Figure 2.2: OUH uk

2.2.3: Square Hospital

This Hospital have on patient record system.They just recorded patient medical test record and financial recorded.

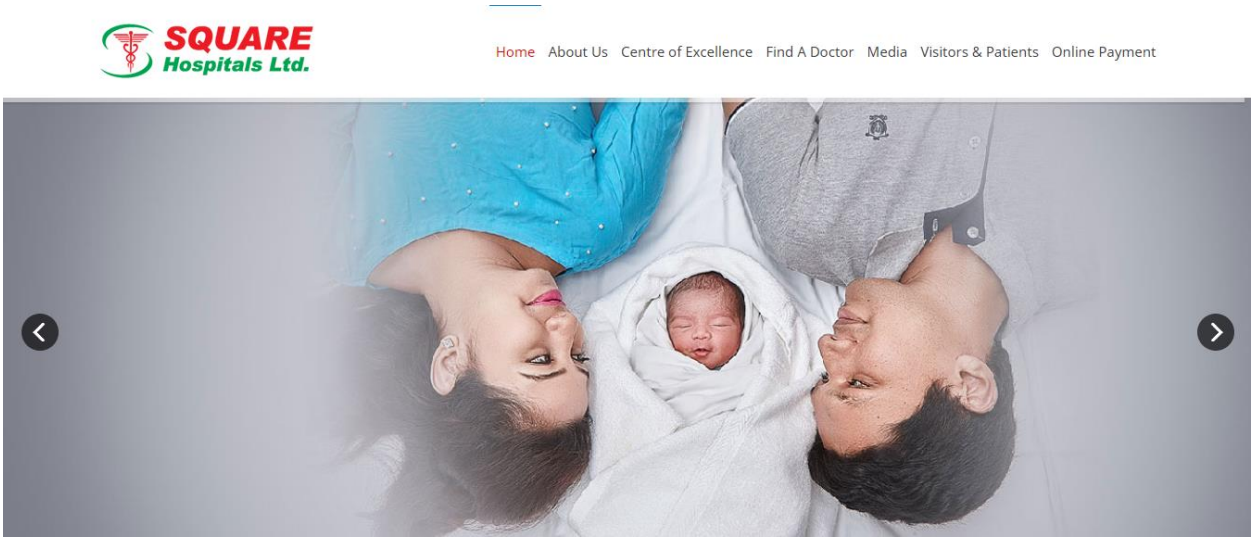

Figure 2.3: squarehospital

2.2.4: http://www.bdhealth.com

By this site Doctor can open account and they prescribe patient.[4]

Figure 2.4: bdhealth

2.3 Comparative Studies

Our project is totally different from all the previous project we studied. In our system Doctor, Patient and Pharmacy retrieve their information but in other system cannot provide this. We make this project to solve our country's problem which other project don't offer . Some differences of Related work about Electronic Patient Record System application and our application is given bellow:

Table 2.1: Compassion between related works.

Case	mountelizaeth	ouh.nhs.uk	square	bdhealth	Lab aid	Our Project
Patient Registration	**Yes**	**No**	**No**	**Yes**	**No**	**Yes**
Login	**Yes**	**No**	**No**	**No**	**No**	**Yes**
Doctor Registration	**Yes**	**No**	**No**	**Yes**	**No**	**Yes**
Doctor Login	**Yes**	**No**	**No**	**Yes**	**No**	**Yes**
Store Prescription	**No**	**No**	**No**	**Yes**	**No**	**Yes**
Patient History	**No**	**No**	**No**	**No**	**No**	**Yes**
Pharmacy login	**No**	**No**	**No**	**No**	**No**	**Yes**
Pharmacy Sells Record	**No**	**No**	**No**	**No**	**No**	**Yes**
Prescription Print	**No**	**No**	**No**	**No**	**No**	**Yes**
Notice	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Doctor Check Previous History	**No**	**No**	**No**	**No**	**No**	**Yes**
Asking Query	**Yes**	**No**	**No**	**No**	**No**	**Yes**

2.4 Scope of Problem

So far the main concern is to help people and we do our best to make this system secure and take care of private data of patient. Our project can handle SQL-injection and the system will not damage. In laravel every form has a csrf token so the Post method is more secure and it cannot be hacked. User password is encrypted using bcrypt which is impossible to decrypt. We use two step authentication when user forget password.

2.5 Challenges

Obviously we have some challenges to make our project. Really challenges are common things in our life when we make something.

- To convince our government to use this system
- We should have to give user best support.
- To make good relationship with doctor, patient and pharmacy.
- Uploading the total project in online server and successfully run them
- User data protection
- Activity of admin
- Pharmacy activity and sells record
- Provide a management system to pharmacy
- We should make this apps very user friendly.

CHAPTER 3

Requirement Analysis And Design

3.1 Business Process Modeling

Business process modeling is a technique to represent the workflow of a system. The main characteristic of the methodology are diagram base as “Flow Diagram”. Here, figure 3.1 shows the business process modeling of our project.

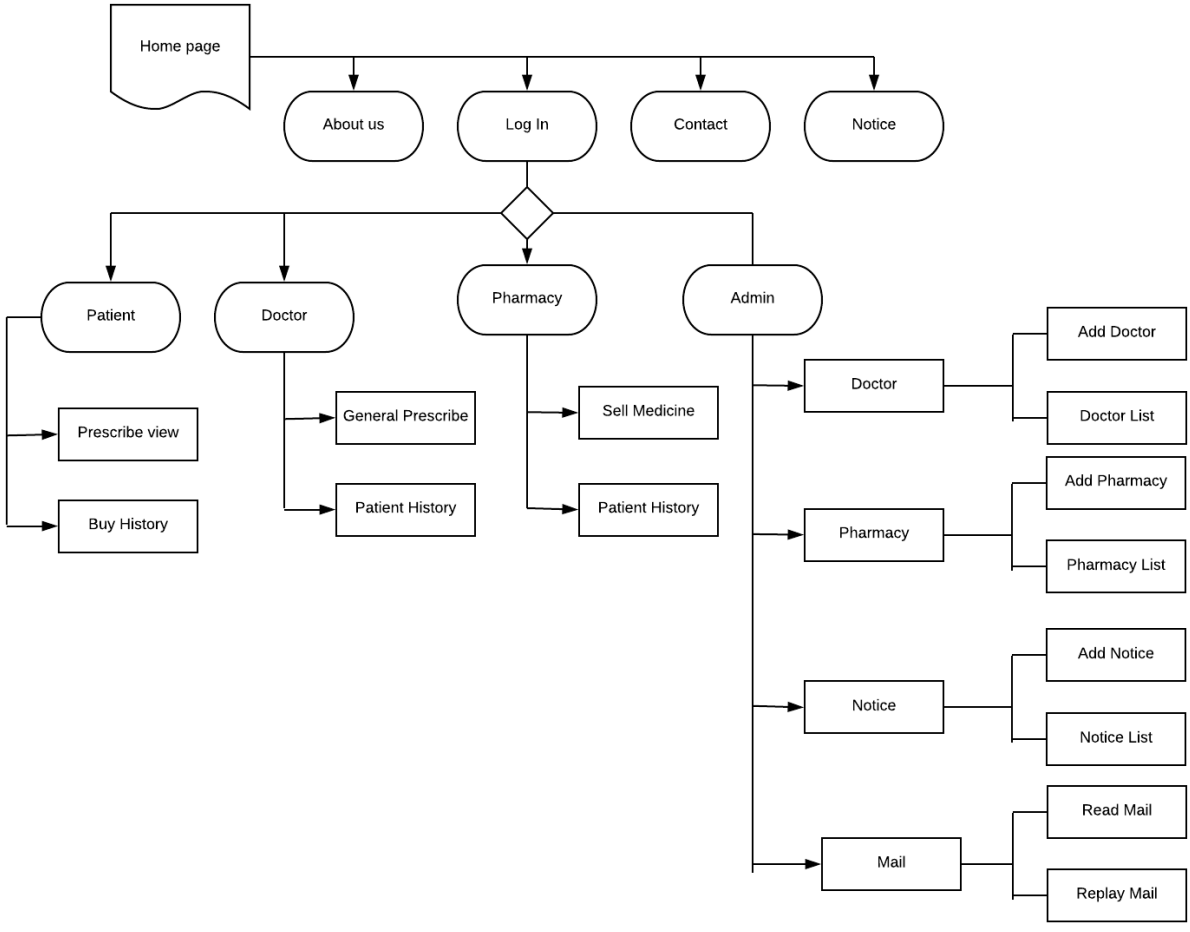

Figure 3.1: Business Process Model

3.2 Requirement Collection and Analysis

Any project have some requirement. In our Electronic Patient Record System we try to create paperless database which can help patient properly. There have two type of requirement. Functional and non-functional requirement.

At first we collect information from doctor which is help us to invited doctor open an account in our system. Pharmacy can also entry our system like these. Which can insure authorized doctor and pharmacy. Patient can also login by their National Id card which is authorized. In admin site, when user or visitor need any information query, visitor can contact by message and admin can replay these message. These are functional requirement.

On the other hand some non-functional requirement which is help us to make our system user friendly, optimize performance, memory consuming, smoother operation and load on quickly as possible on our system. User friendly User Interface. Easy way to understand into visitor.

3.3 Use case diagram

Figure 3.2 shows the use case diagram of the project

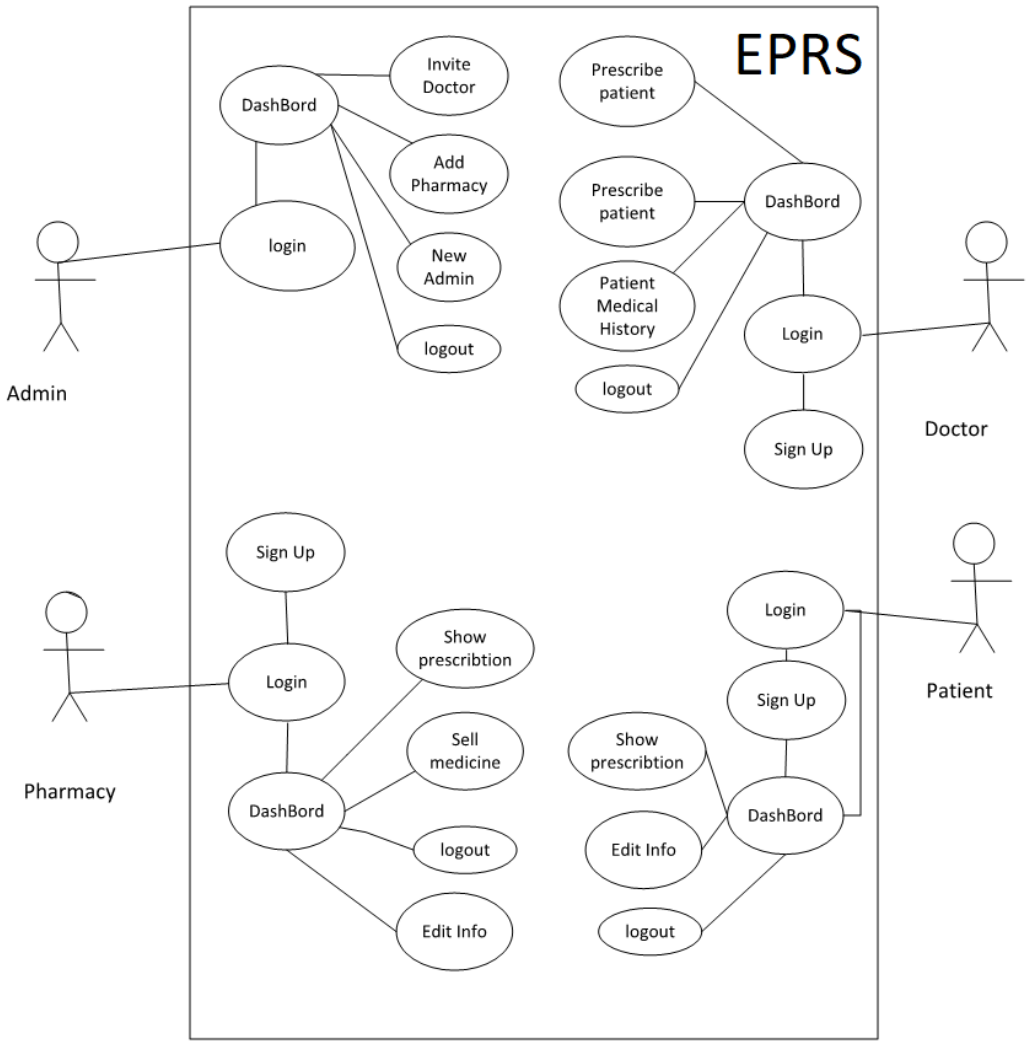

Figure 3.2: Use Case Diagram

3.3.1 Use case diagram description

In our project there are three user and admin. Admin have the most authority in our Project. If any doctor want entry on our system his valid information collect admin then admin can invited doctor by email. When admin invited doctor, his Govt. registration will be recorded in database. Then by invited mail doctor can open account by gives important information.

Doctor can easily check patient history and also can view another doctor prescribe who can prescribe that patient. Doctor can easily general prescribe by only national ID card number. Doctor can view patient all history and also check another doctor prescription which given against the patient NID.

Like that Pharmacy can also open account by invited email. Every pharmacy have drag license , by this Registration number which first in our database admin invited every pharmacy. Pharmacy can sell medicine easily by view patient prescribe.

Patient can open their account by using their NID number and valuable information. If any patient cant open account, doctor can prescribe easily by patient NID number.

Admin can replay visitor mail who need any inquiry. Admin can view doctor, pharmacy details and their list also.

3.4 Logical data model

Logical data model of our project has been shown through the figure 3.3 given below:

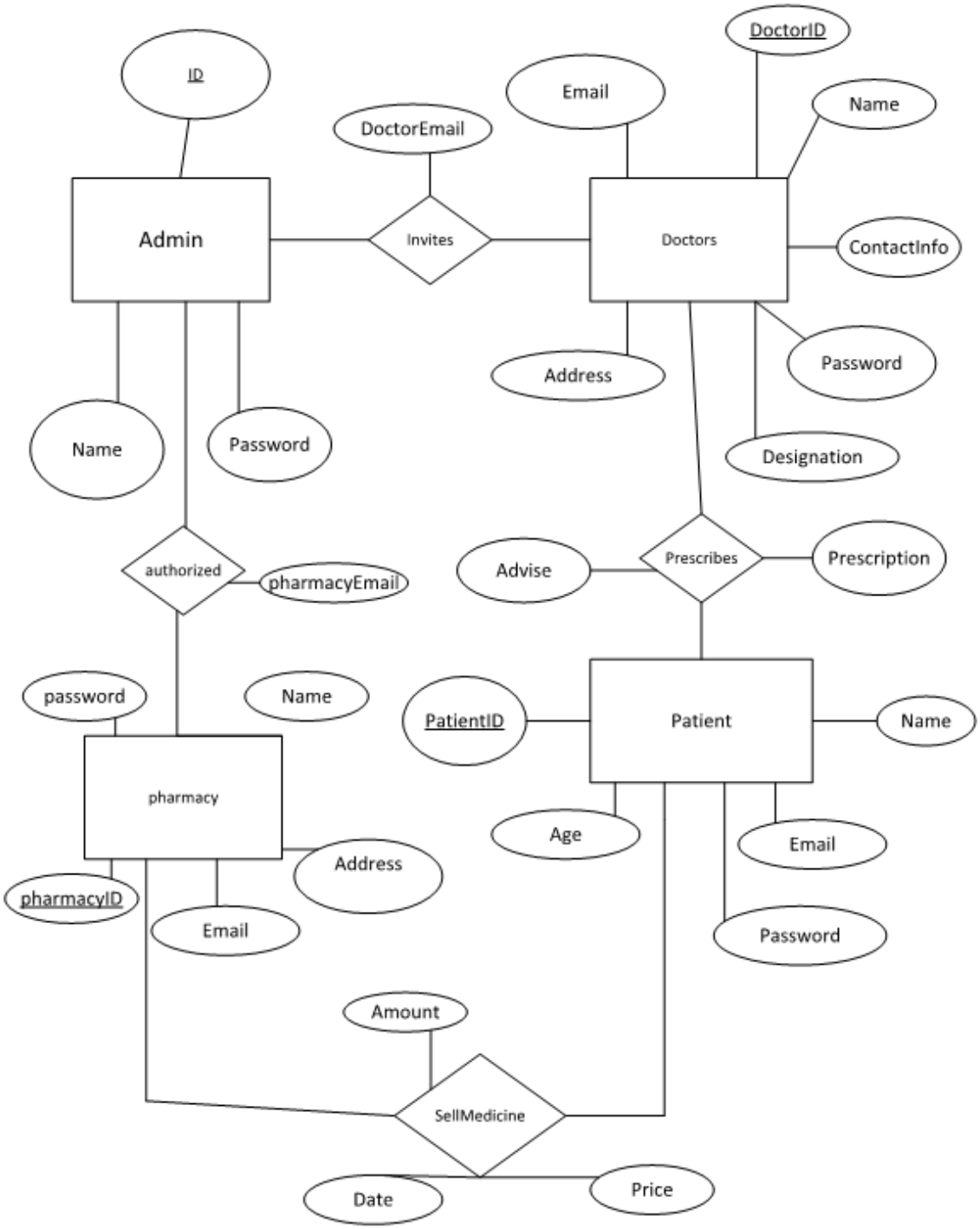

Figure 3.3: Logical Data Model

3.5 Design Requirements

The design requirements for our project will different from other project because we working hues database system. Which digitalization our medical system. As for this our project design and working process carefully created user friendly and secure. On the below we describe our design requirement .

- At first we use our project MVC which secure our project.
- Responsible user interface use for user friendly.
- Doctor and Pharmacy user can register in our system by invitation mail because authorized provident.
- Two step verification in forget password.
- Patient can easily check prescription by login.
- Patent can also print their prescription hard copy.
- For private information secure we sue bcrypt .
- Pharmacy cannot harassment patient by medicine price also.
- On notice board notice can easily update by admin .
- Pharmacy can easily check their sell history which can help their account management.
- Fake or village doctor cannot enter this system.

CHAPTER 4

Design Specification

4.1 Front-End Design

The front of the website is designed keeping in mind that user should be satisfied with the interface and its specification. We have used standard color combination that conductive to users with all eye sight. We used simple and light colors for fonts and backgrounds so that readers feel comfortable reading news.

- Every user can visit this web application, here they can see home page .

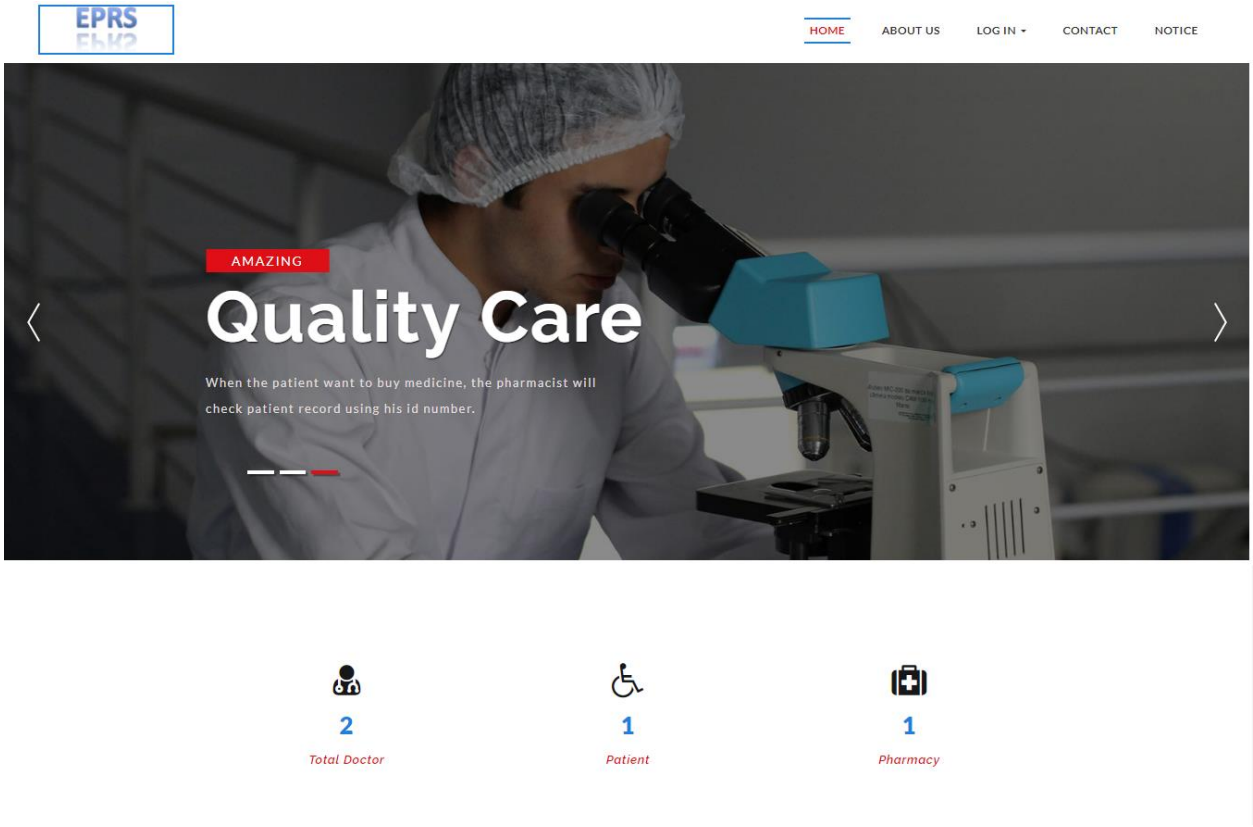

Figure 4.1: Home Page

- Admin can login here by using simple login form, where admin have to input his/her user name and password.

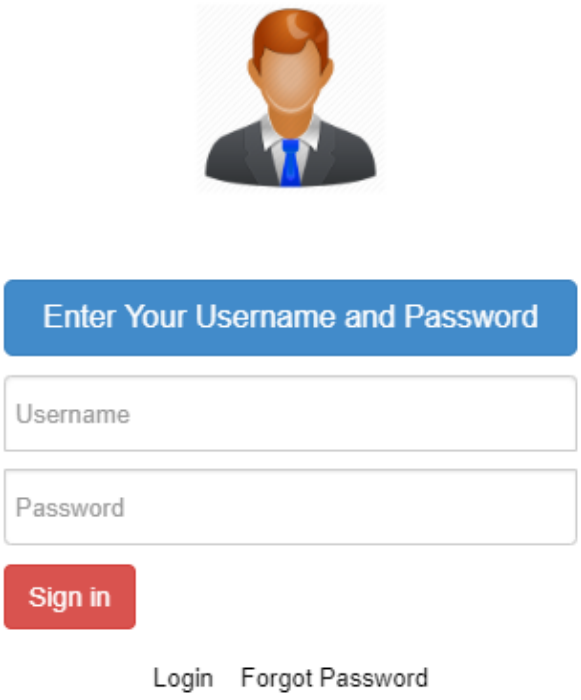

Figure 4.2: Admin Login page

- Admin invited doctor by email id, then doctor can open account and login as a doctor.

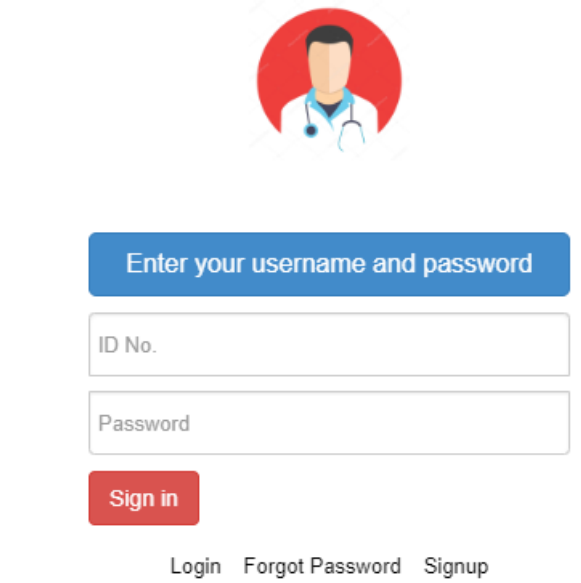

Figure 4.3: Doctor login page

- Admin invited pharmacy by email id, then pharmacy can open account and login as a pharmacy

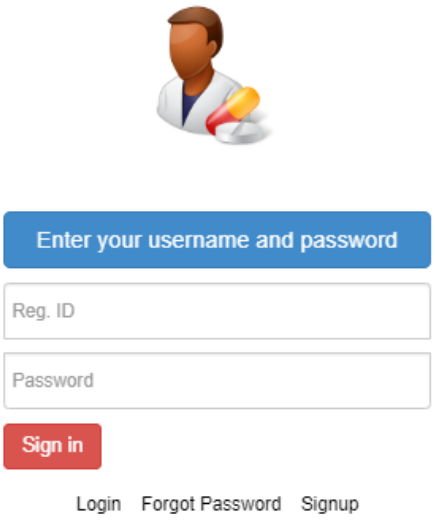

Figure 4.4: Pharmacy login page

- Admin can all user, show doctor list, pharmacy list, edit, update, delete notice board and mail replay.

Figure 4.5: Admin dashboard page

- Doctor can prescribe patient by patient NID number. Can check patient history also.

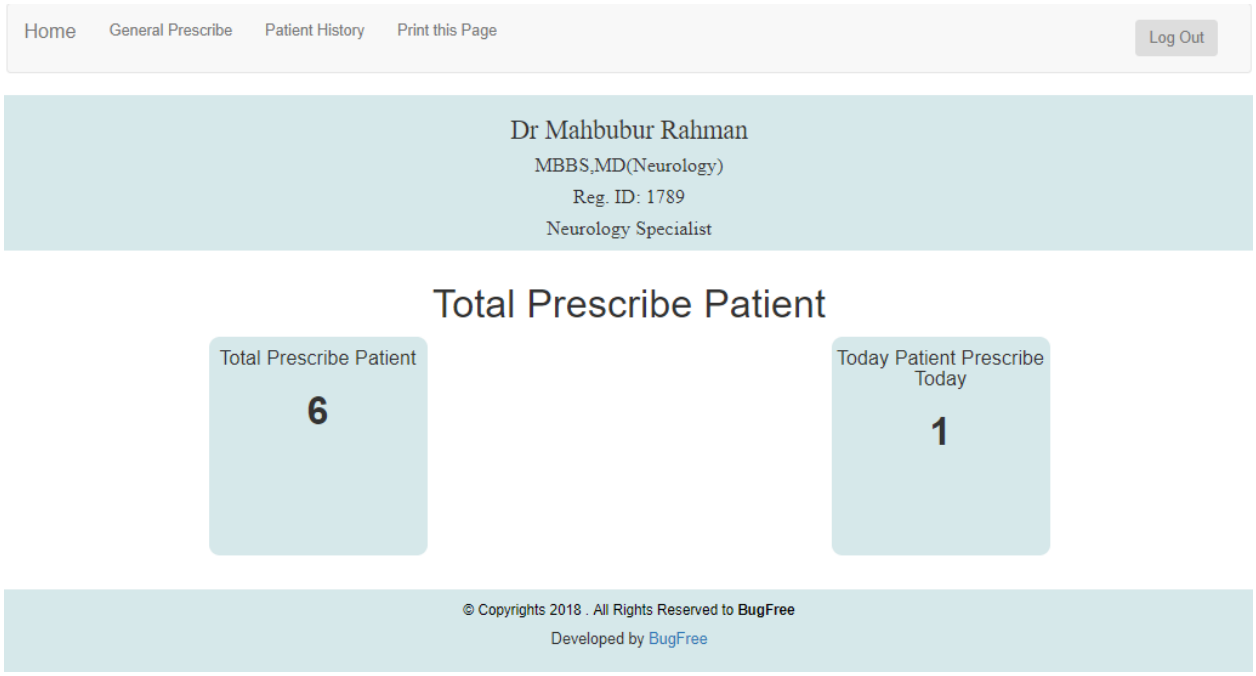

Figure 4.6: Doctor dashboard page

- Pharmacy can sell medicine by patient NID number. Can check patient prescription also.

Figure 4.7: Pharmacy dashboard page

4.2 Back-End Design

- In our project we use php as a programing language and laravel MVC framework.
- We use apache for server.
- For database we use MySQL.
- In MVC we use full model ,control and view.
- To interact with data to view use blade syntax.
- Two step verification use for forget password.
- We use mail server for sent mail.

4.3 Interaction Design and UX

Interaction Design is very important to make system easy. As our website means to make for government purpose that's why we make the UX a formal look. Here we use various kind of button, doctor ,patient, pharmacy icons, text area, link, table ,pictures and beautiful url generate to make out site user friendly. We use input text option manually what user need.

4.4 Implementation Requirements

To develop and design our project , we should follow requirement specification. Because it plays various device. Most popular technology like Google chrome engine v8 and Firefox are common are in every device for that we use most recent font end technology. Like HTML5, CSS3, JavaScript, jQuery, Laravel MVC framework are used. For database interaction we use eloquent ORM with MySQL to retrieve data.

CHAPTER 5

Implementation And Testing

5.1 Implementation of Database

- We connect the database through .env file in laravel.
- As we use MVC, every database table is connect to a model.
- Model maintain the script of eloquent ORM to retrieve data.
- Every data table has a timestamp.
- Data table are made following ERD diagram.
- We use joining query to collect data multiple table.
- Joining query script written in query builder.
- Aggregate function and general query written in eloquent ORM.

5.2 Implementation of Front-End Design

We have used Bootstrap framework for making our project responsive. Every HTML page in laravel consider as view. Every view in laravel store in view folder. And the view contain store in public folder. When the page is called from route the pages comes from view and page contain comes from public folder. And the pages has extension of dot blade .

- When admin login to the dashboard he will see total number of doctors, patient and pharmacy.
- When admin click doctor button he will see to option- add doctor and doctor list.
- Admin can add doctor by sending email and also can see the doctor list.
- Doctor can see the dashboard after login into doctor profile.
- Doctor can search patient history by Patient NID number.
- Doctor can prescribe patient by NID number.
- Pharmacy can sell medicine by using patient NID number after verifying patient prescription.
- Pharmacy can search patient history by using Patient NID number.

5.3 Implementation of Interaction

User interaction is the main things of any system. Without interactive design of any system no one will be interested. We just implement interactive design of UI for better user experience. Here we use some colorful icons, buttons, and texts for user interaction. This system is designed with sequence of step to help people. We just try to make it very user friendly because if it is user friendly then everybody will like it.

- Most of user interaction between user and view happened using button.
- Most of login and user authentication handle by using JavaScript and Jquery.
- Dynamic live searching made by using Jquery.
- User validation maintain by using PHP.
- Data send from model to view and visualize user is handle by blade syntax.

5.4 Testing Implementation

After completing the project most important thing is to test it every possible way. In testing phase we use three kind of user. They are novice user, mid-level user and professional user. Then we find minor problem and fix them.

- In every post request has a specific url if we call the url of post request without sending data it will generate error. We handle it to returning a get request url.
- In every input filed there is minimum and maximum requirement. We handle it using validation .
- In some other case or invalid date purpose , we use exception handling to avoid the problem.
- We use several warning and massage to user for avoid unrequired activity.
- There are many option to test a software like a software can be test by executing codes, design, and finally execution of the whole system combining codes & design.

5.5 Testing Results and Reports

Test Case	Test case step	Test Case Description	Expected Result	Actual Result	Status	Date
1.Admin login	Enter username and password	Username: admin Password: admin	Successful login and enter admin dashboard	Successfully login	pass	30/10/18
2. Invite doctor	Enter email and government registration number	Email:ahmed15-5439@diu.edu.bd Registration no:: 1234	Invitation mail send successfully	mail send successfully	pass	30/10/18
3. Invite pharmacy	Enter email and drug License number	Email:nahian15-5137@diu.edu.bd Registration no:: 4567	Invitation mail send successfully	mail send successfully	pass	30/10/18
4. Add Notice	Select subject and write notice	Subject: Polio day Message: write something	Save successfully notice board	Show on notice board	pass	30/10/18
5. Replay Query	Mail notification	Replay the message.	Message send successfully	Massage send	pass	30/10/18
6. Edit Notice	Click edit option of notice	Write new notice which want edit	Notice update successfully	Notice Update	pass	30/10/18
7. Delete Notice	Click delete button	Delete Notice if validation end	Notice delete successfully	Notice Delete	pass	30/10/18
8.Doctor registration	Dr Name,Dr ID, qualification, email, password.	Dr Name: abcd, Dr ID:1234, qualification: MBBS,MD, Email: ahmed15-5439@diu.edu.bd, password:1234578	Create account successfully	Account create	pass	30/10/18
9.Doctor login	Dr ID, Password	Dr ID:1234 Password:12345678	Login Dashboard	Login successfully	pass	30/10/18

Test Case	Test case step	Test Case Description	Expected Result	Actual Result	Status	Date
10.Doctor assigned medicine	Patient ID, Disease Name, Medicine info	ID:12345678 Disease: fever Medicine: napa 2p per day	Save successfully	Save medicine	pass	30/10/18
11.Print Prescription	Click to print	Doctor can print from here or save as	Print successfully	Print prescription	pass	30/10/18
12.Pharmacy Registration	Pharmacy owner Name, License No:, email, password.	Pharmacy owner Name: abul, License No:7896, Email: a@gmail.com,password:12345678.	Pharmacy account create successfully	Pharmacy account create	pass	30/10/18
13.Pharmacy Login	Drug License No:, Password.	Drug License No:7896, Password:12345678.	Login Dashboard	Login successfully	pass	30/10/18
14.Pharmacy sell medicne	PID, Medicine name, quantity, price	PID:12345678,Medicine name:tab napa,quantity:10,price:20	Sell medicine	Sell medicine successfully	pass	30/10/18
15.Pharmacy view prescription	Search PID	PID:12345678	View patient prescription	View successfully	pass	30/10/18
16. Pharmacy view sell history	Click history	Show all sell history	Show all history	Successfully can show history	pass	30/10/18
17.User registration	NID,Pname, Email, Password	NID:12345678 ,Pname:SPharma,Email:s@gmail.com, Password:12345678	Account create	Account create	pass	30/10/18
18.User Login	NID, Password	NID:12345678, Passswrod:12345678	Login in dashboard	Login in dashboard	pass	30/10/18

Table 5.1: Testing table

CHAPTER 6

Conclusion And Future Scope

6.1 Discussion and conclusion

The main focus of this project is to digitalization of Our medical system. Where data of patient can store and doctor and pharmacy retrieve data. Where patient can easy access to his medical profile and doctor can see patient medical history. Pharmacy can sell medicine after checking patients prescription through online. Our whole system also able to make our medical system paperless. If our government established our project properly it can remove many problem of country like village doctor , misuse of medicine, unauthorized medicine shop and many more.

6.2 Scope for Further Development

- Since all information of patient doctor, pharmacy store in a system. It can be used country wide.
- Patient information can visible by other doctors and they can prescribe the patient.
- Misuse of medicine can be stopped.
- Fake doctor or village doctors cannot prescribe the patient. So we can stop the problem of village doctor.
- Unauthorized dispensary cannot use the system. So they cannot sell the medicine.
- With all the information of patient we can know which disease is it threat now.
- According to the number of patient the distribution of doctor can be assume.
- All the medical record of our country can be use for medical research.
- To see the medical record of a patient doctors can know the cause the disease .
- It can also help forensic department. It can be help the cause of death of patient.

References

[1] Learn about Eprs System, available at https://www.mountelizabeth.com.sg , last accessed on 11-10-2018 at 10:00 pm.

[2] *Clare Cape, "Electronic Patient Record (EPR) Benefits realization case study", Journal, Vol.2, pp.35-39, February and 2016*.

[3] Learn about Eprs System , available at http://www.bdhealth.com , last accessed on 31-10-2018 at 7:00 pm.

[4] *DR. THOMAS KOSTERA, DR. CINTHIA BRISEÑO, "Electronic patient records in Switzerland: A hurdle race on a tight schedule", Journal, Vol.1, pp.1-27, 22. AUGUST 2018*.

[5] The Electronic Medical Record system, available at https://www.rch.org.au/emr/, last accessed on 31-10-2018 at 7:00 pm.

[6] Elizabeth C. Murphy, Frederick L. Ferris, III, and William R. O'Donnell, "An Electronic Medical Records System for Clinical Research and the EMR–EDC Interface", final edition, Invest Ophthalmol Vis Sci. 2007 Oct.