Home Tele-Health System

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Approval Certificate

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Declaration

This is to certify that the work entitled "**Home Tele-Health System**" is the outcome of the research carried out by us under the supervision of Professor Dr. Mohammad Nurul Huda, Professor and MSCSE Coordinator, Department of Computer Science and Engineering, United International University.

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Abstract

Information And Communication Technology (ICT) is grown up rapidly in many sectors in Bangladesh. But healthcare system is not so developed in our country using ICT. In this thesis, we have designed a model named Home Tele-Health System which is basically designed with the help of using ICT that will help all the people of Bangladesh to get initial medical services using this system.

Acknowledgement

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Table of Contents

LIST OF TABLES

LIST OF FIGURES

Chapter 1

Introduction

Home Tele-Health System is such a kind of system that provides clinical health care using ICT from a distance. It has been used to overcome distance barriers and to improve access to medical services that would often not be consistently available in distant rural areas. In Bangladesh, basically in rural areas would often not be consistently available medical services. So, we can use Home Tele-Health System to overcome distance barriers and to improve access to medical services. In this system a doctor can give treatment a patient without visiting patient or a patient can get treatment from a doctor without visiting doctor's chamber.

Chapter 2

Background and Related Works

"e-Health" can interact between patients and doctors through the use of ICT for health related purpose[1].

In our country health sector is not so develop. But ICT sector is growing so fast. There is a lot of chance to develop health sector using ICT infrastructure. So we proposed a model named "**Home Tele-Health System**" that can change our health sector and people can get medical services easily using this system.

Table 2.1: Tele-Health records in all world (2013-2018)

Years	**Patients (in millions)**
2013	0.35
2014	0.64
2015	1.16
2016	2.11
2017	3.84
2018	7

2.1 Developed Country

In this section we are trying to show some scenario about Tele-Health services in developed country.

U.S.

In U.S. a huge number (about 74%) of patients use Tele-Health services. In U.S. 50% hospitals have Tele-Health program. The value of global Tele-Health services was at $17.8 billion in 2014. In U.S. about 75% people trust & rely on Tele-Health services. A huge number of doctors are involved this services and this amount was about 8 lakh [2] in 2015.

Table 2.2: U.S. telecommunication current status

Total population	323.1 million (2016)
Phone users	237.72 million(2017)
Internet users	78.2% of the population
Fixed broadband users	28.0% (2012)
Wireless broadband users	89.8% (2012)

2.2 Developing Country

In this section we are trying to show some scenario about Tele-Health services in developing country.

India

India is our (Bangladesh) neighboring country and has 1.3 billion people and has 29 states [5].India has only 938,861 registered doctors [6]. India will try to establish 3000 clinic for the rural peoples. India already has been established 25 regional Tele-Medicine centers and another 47 in various stages of implementation.

Table 2.3: India telecommunication current status

Total population	1.324 billion (2016)
Phone users	433 million people
Internet users	323 million people(2016)
Fixed broadband users	1.44 million people
Wireless broadband users	2.11 million people

2.3 Undeveloped Country

Nigeria

Nigeria is a West African country and has 186 million people. Most of them are poor and has 500 ethnic groups[3]. Most of them live in rural areas. So, they cannot get proper medical services because of undeveloped communications and scarcity of doctors. They have 45,000 doctors beside 186 million people[4]. Tele-Health service is not so developed in Nigeria. So, they are trying to develop it for their people especially for the poor and rural area's peoples.

Table 2.4: Nigeria telecommunication current status

Total population	186 million (2016)
Phone users	70 million people
Internet users	55 million people

2.4 Current Status of Bangladesh

In rural area, people are not getting proper treatment from doctors or specialized persons as they are not willingly to go there. So people are from these areas suffering a lot of problems and sometimes they even die for silly diseases .So for the betterment of these poor and illiterate people some organizations have taken some steps. But it's not possible in every time to go these areas for serving treatment. In order to solve this problem, remote treatment has taken.

There are going several treatment programs in Bangladeshi TV channels for not only the rural people but also for the city people too. Here, different TV channels organize different programs of treatment on in live .In here people of the remote areas or cities can communicate the doctors and specialized persons through phones or in video conferencing. It becomes possible by the improvement of mobile networks. Generally these kinds of programs are hosted by a doctor or a journalist and there are one or more doctors or specialized persons have sited to give answer of the general people. As these kinds of programs are hosted in live, so people can communicate with the doctors through their telephones.

Figure2.1: Providing Health Services using TV program

Another popular way of communicating with the doctors is video conferencing. Recently a program telecasted in ATN NEWS named "Connecting Bangladesh" hosted by journalist Munni Shaha. This program was for the treatment of rural women. Here, one representative was in rural area for gathering rural women those who needed treatment and make video conferencing with this TV program.

Figure2.2: Connecting Bangladesh program in ATN News

There is also a way to communicate any times through mobile networks organized by the mobile operators (Grameen phone, Robi, Banglalinketc) dialing 789 to any time though it is highly expensive for the rural people.

Figure2.3: Health services using mobile operators

2.5 Tables

It's a telecommunication status in Bangladesh tables. In this table we see all the number of land-lines, mobile phone user and all other user record in Bangladesh.

Table 2.5: Telecommunication Current status in Bangladesh

Number of Telephones (land-lines)	134 million
Number of mobile phone subscribers	44.8 million
Digitized districts	100%
VSAT Providers	31
VSAT users	64
Number of ISPs	185
Internet users	450,000 (2006)
PSTN Phone Subscribers has reached	1,186.919
Internet penetration	0.3% 0.5
Telephone density	1 per 100 persons

Chapter 3

Proposed Method

3.1 Introduction

We want to design a system which is basically online based for communicating patients and doctors. Here, patients can communicate with doctors easily through voice messages or plain text and give sample picture of the disease (if possible) and after reviewing the problems of the specific patient, doctor will prescribe and give suggestions to that patient. The rural people will be benefited much on using this system as they can communicate doctors easily whenever they want.

3.1.1 Diagram Our Model

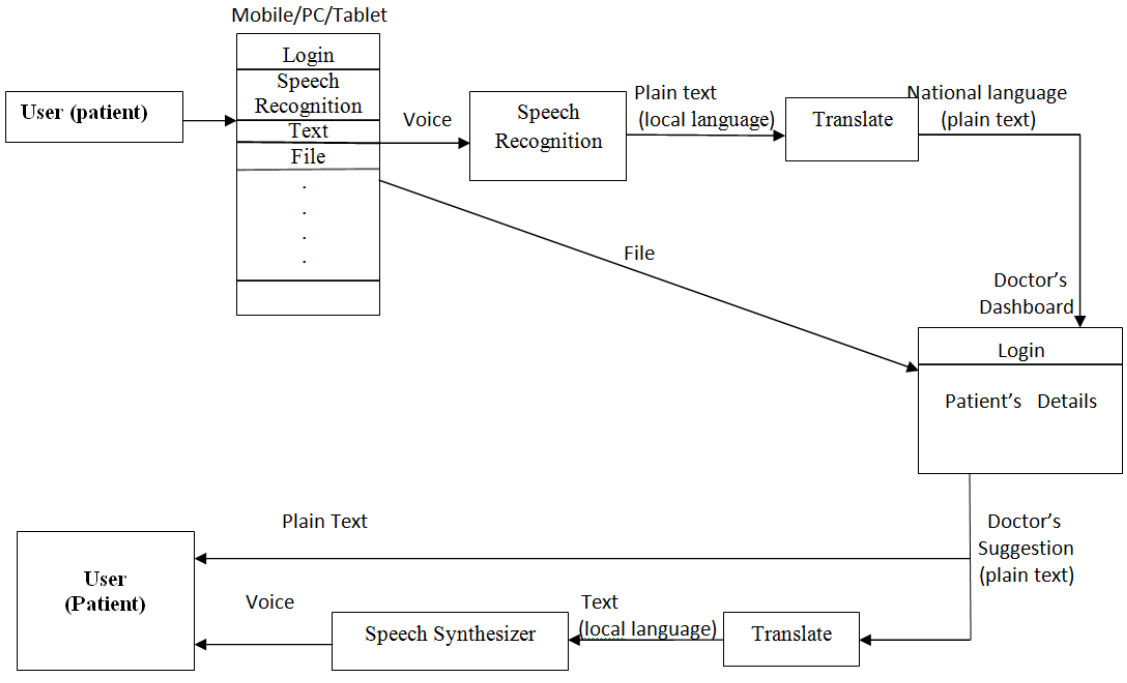

Figure 3.1: Diagram of our system model

3.2 Our System Model

3.2.1 Architectural Design of smart card

Our **Home Tele-Health** system is web based. But it can show records/history even in offline. So, people can get services from this system through computer and smart phones (such as in android, Microsoft, ios, linux etc). But users must need internet connection while they will interact with the doctors.

Every people of our country will receive a health card which is basically virtual. In order to reduce cost, we have designed this virtual health card. Only people of Bangladesh are allowed to access this card and get services.

3.2.2 Creating Virtual Health Card

As every Bangladeshi has birth certificate or NID card, so we can uniquely identify every people of our country through these service. So, using Birth certificate or NID card API of Bangladesh, we can generate every people's virtual health card.

On the other hand, every doctor in our country has a registration number and license number. So, we can generate Doctor's virtual health card by which they can provide services to the patients.

3.2.3 Login panel

The interface of the login panel for health card (both patient & doctor) is:

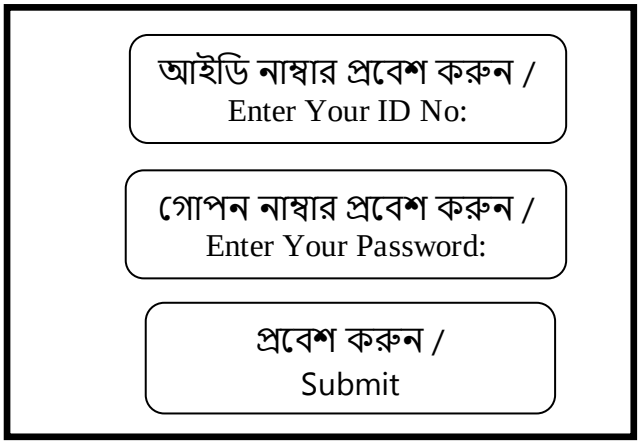

Figure 3.2: Diagram of our system login panel

People of our country can use this health system through inputting their health ID No. and password. Initially we will generate their password using their Date of Birth which we can get from the Birth certificate or NID card. Doctors can also provide `services by login our health system. Their license number can be their ID No. and password can be their Date of Birth (initially). But patients and doctors have to change their password after their 1st login.

3.2.4 Dash Board

After login, patient and doctor can see an interface which provides some functions such as their picture, name and personal information will show on their individual dashboard.

There will be four main functionalities for a patient. Those are:

- History of the patient
- Voice Recording
- Text Messaging
- File Uploading
- Payment

On the other hand, there will be three functions for a doctor. Those are:

- History of Patients
- Text Messaging
- Upload File

3.2.5 Functional Activities of a Patient

In history section, there will be necessary data like prescription, reports of different list of treatment of a patient.

In voice recording section, patient can make voice messages about his/her health problems using his/her own language (local Language) to the doctor.

In text messaging section, patient can write his/her problems of health and send to the doctor.

In file uploading section, patient can add necessary files, scanned copy or even he/she can take images of his/her health problems (Such as skin disease, or other physical problem) and upload them.

Figure 3.3: Sample picture of skin disease for uploading to doctor

3.2.6 Functional Activities of Doctor

When a patient knocked a doctor about his/her problem, then first of all,the doctor will check that patient's health history which is already described in patient section.

A doctor will receive only written messages and no voice text from a patient which will be described in speech recognition process and voice synchronization process and can defines messages for that patient.

A doctor can also add some prescription, suggesting different fest document and other text format based .Files and upload than for the patients.

3.2.7 Speech Recognition

In our country most of people live in villages or rural areas. So, basically most of the people use local language for expressing their thoughts. If these people want to communicate with doctor using their local languages then most of the time, the doctors won't understand the patient's language.

In order to solve this problem we can use speech synchronization. It will help us by conveying patient's voice text to plain text. Then we have to convert these messages to national language based message and sent to doctor. If the patients write message using their language then we don't need to use speech recognition process. We just been to convert these local language based message to national language based message and send to doctor.

3.2.8 Speech Synthesizer

After receiving the text messages from patient, the doctor will generate messages and suggestion for their patient. Their message will convert in local languages of that patient and store in patients text message box. On the other hand, doctor's text message will convert in voices messages using voice Synchronization and send to the patients in their local language.

So, patient will receive both voice message as well as text message.

As Bangladesh is a developing country, so government can't bear the huge cost of paying the doctors. So people have to pay to get these treatment services. But the fee is not so high. People have to pay 20% where government will pay 80% of the doctor's fees. One need to pay his/her fees in the end of the month. If anyone did not pay his/her fees then he/she can't communicate the doctors and can't get the treatment services. One can also pay in advance for the treatment. Then the amount of the money will be shown advance payment in his dash board. In order to pay their fees, they have to follow a very simple payment method.

3.2.9 Payment policy

People have to use their mobile phone to pay their fees. They can pay through their health id number.

First of all, they need to press *1971# (example). Then, one has to type his/her HEALTH ID number and send it.

After that, he will receive some information for the corresponding health ID number such as his/her name, age, address. Thus he/she will sure that he/she will pay his/her own health account.

After showing the information there will be an input box for inputting amount of money. After the completion of giving amount of money he/she will need to input his/her bank account or other payment service number and also need to input his transaction pin number. Finally when he/she will send the amount of money then he/she will get a confirmation message of that transaction and the desired amount of money will be deducted from his bank account.

Government will also pay the doctor's bill after collecting the money from the people who getting services from this Home Tele Health System.

3.2.10 Use case in Payment Method

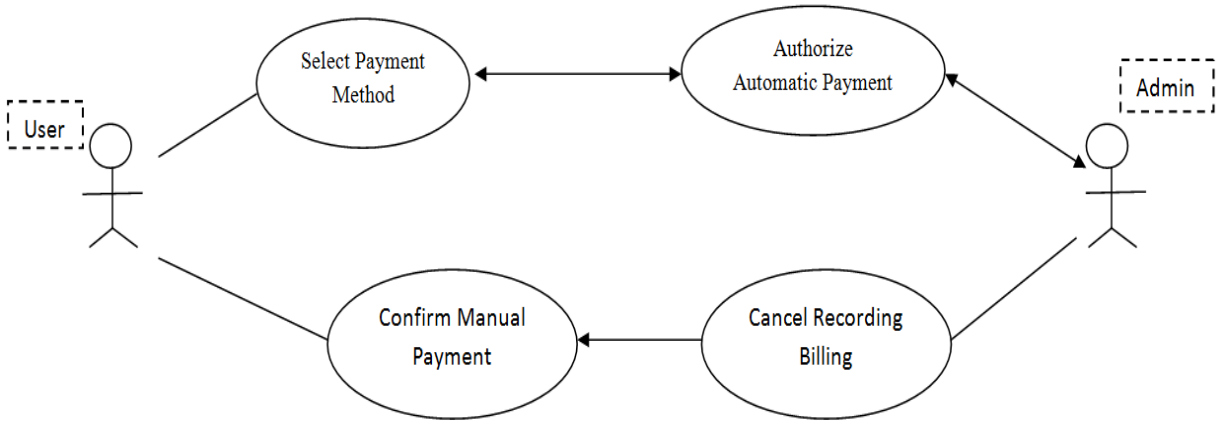

Figure 3.4: Use case diagram for payment method

Here, an authorized user has to input his/her Bank Account such as Dutch Bangla Bank, Brack bank, Islami Bank etc or he/she can use Mobile Banking such as bkash, Rocket, Ucash etc.

3.2.11 Bill payment follows the steps below

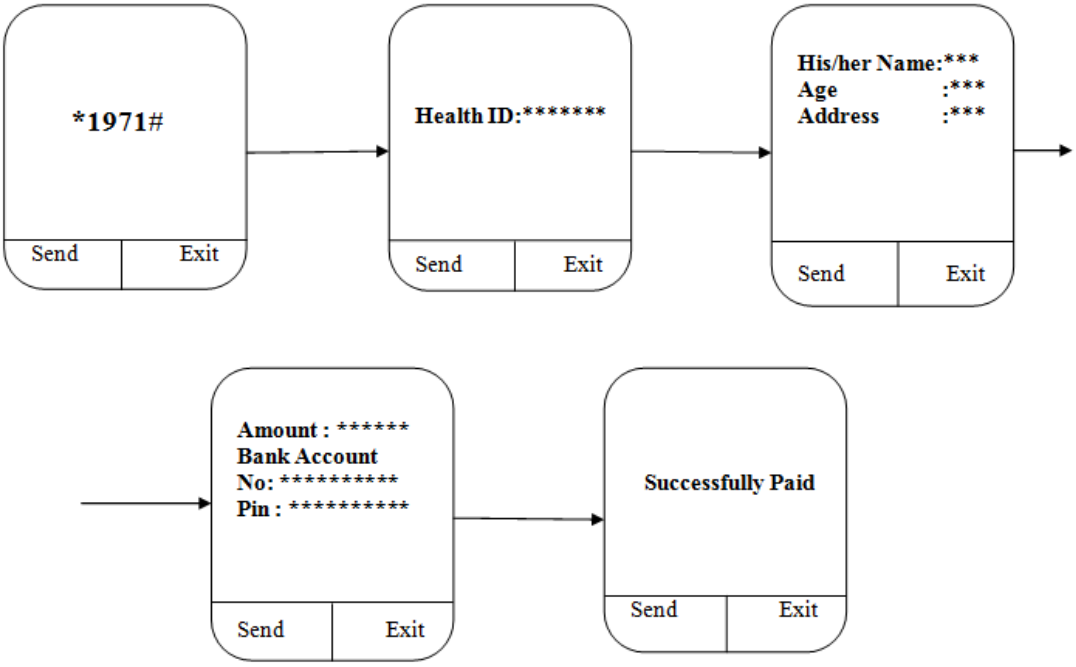

Figure 3.5: Diagram for payment method

Here, user first dial *1972# then next step give user health ID number when user give their health ID number then feedback conform user name, age and address. When user conform this ID is his/her then go to next step in payment method. User can pay his/her payments in bank account and other option. When user take their account pin number then successfully paid.

3.2.12 Use case model diagram

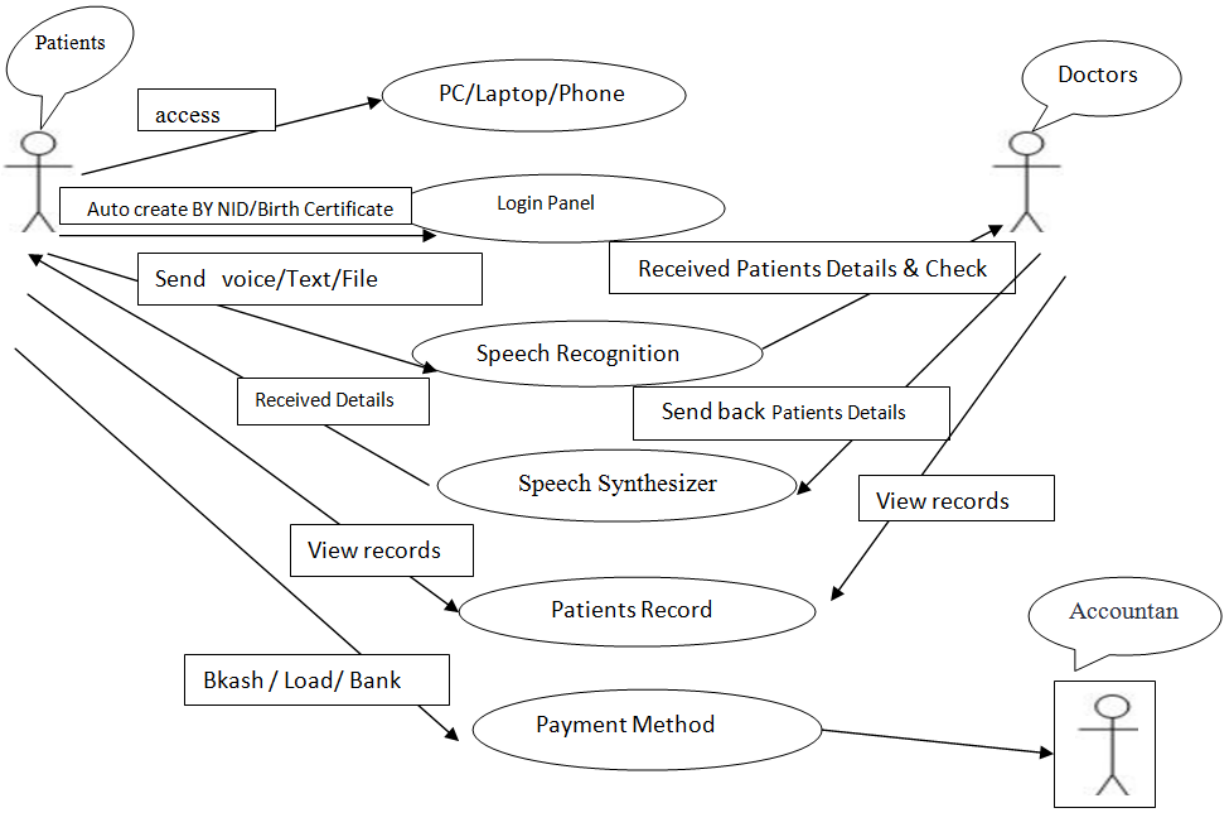

Figure 3.6: Model diagram in Usecase

Chapter 4

Challenges

4.1 Introduction

- The main challenge is to connect all peoples specially the poor peoples in rural area.
- Internet coverage and Mobile phone.
- Communication system.
- Internet cost must be low.
- To create user satisfaction &acceptance.
- Privacy & keep secure the system.
- To build network among doctors & patients.
- Need wide range of infrastructural (ICT) coverage.
- Rapidly growing ICT coverage.
- Financial Problems.
- Resistance of Change.
- Lack of Policy and Regulation.
- Dial up internet connection to all BTCL phone connection at10-15 paisa/minute rate.

Chapter 5

Conclusion & Future Work

5.1 Conclusion

Home-Tele-Health system in Bangladesh is not so developed yet. So there are a lot of opportunities to implement this system in Bangladesh. The main goal in our thesis to develop a Home-Tele-Health system in Bangladesh in a way so that all people take or have an easy treatment facilities specially poor peoples of rural area to easily & low cost.

If government deploys this system in Bangladesh it may revolution in our treatment sector.

5.2 Future work in our system

In our System we can added directly call and video call system, for this reason people can directly call and video call to doctors and share their problems.

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