

# Digital Medicine: An android based application for health care system

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**Abstract**—An hectic lifestyles to cope with fast pace more and more people are facing health problems irrespective of the age group. Healthcare system has thus become an inevitable part of every family. Getting efficient and quick healthcare becomes a necessity; therefore along with the generic approach there comes a need to adopt a parallel efficient and speedy approach known as Digital Medicine. It is an approach which can be adopted by hospitals to provide quick access to healthcare services provided by them. Such as online video conferencing, emergency alarm with critical form of medical condition or accidents; uploading of medical reports with security measures necessary while consultation, online medical prescription, scheduling appointment, information about nearest hospital and medicos, life remainder system to remind medicine intake timely. It is designed with an aim to facilitate faster and efficient communication between doctors and patients giving transparency to locations or distance where they are based while using the application. The proposed application is deployed on android based mobile phones connecting to the server managed by hospitals and uses GPS and GSM network for communication.

**Keywords:** GSM, GPS, Digital Medicine, Healthcare System, Video Conferencing, Report Transfer.

## 1. INTRODUCTION

The main intension of introducing the system is to achieve location transparency for patients and doctors in the existing traditional health care system. At the same time it helps to reduce the manual paper work at the healthcare counters. As we deal with sensitive domain, there was also a need to handle the data in a secured way hence different levels of security measures were adopted. User friendly interface and quick data processing and transmission were also the demand of application.

### 1.1 Existing System

In the existing health care system, the primary requirement and disadvantage is physical presence of patient and doctor for every consultation. Also there is a high chance of misinterpretation of data as well as

occurrence of errors. Moreover, it is cumbersome and time consuming. With the increase in volume of patients in the health care institutes, traditional method of management has gone out of phase. As a result of this, an advanced Health Care Management System has been the demand of time.

Disadvantages of Existing System:

- No location transparency for patients and doctors.
- Unable to forward urgent notification or emergency alarm to doctors or hospitals.
- Unable to get exact location of accident.
- Unable to get information on nearest hospital and clinic.
- Unable to notify in urgency to hospital and clinic.
- Unable to get online medical prescription.
- Unable to get immediate services such as scheduling an appointment, booking an ambulance etc.
- Time consuming and high volume of paper work.

### 1.2 Proposed System

Our system consists of two parts: the client and the server. The client is deployed on an android-based cell phone (android 2.2 onwards). There are two parts:

- The emergency alarm.
- Healthcare management system.

Both the two are android applications. The server is deployed on a computer, which may be located in a hospital, and be operated by a doctor.

It also contains two subsystems:

- The emergency alarm
- The healthcare management system.

With the help of the GPS and GSM network, the system can make sure the location of the users when they are in medical trouble. It triggers the emergency alarm and can also display all nearest hospitals to user. When the doctor or family receives the alarm message, they can immediately take medical measures to rescue the user. The system is using GPS and GSM technology for communication. The Global Positioning System (GPS) is a space-based global navigation satellite system (GNSS) that

provides location and time information in all weather, anywhere on or near the Earth. GSM (Global System for Mobile Communications, originally *Groupe Spécial Mobile*), Messages are sent to a Short message service center(SMSC) which provides a "store and forward" mechanism

Physical presence of patients and doctors are not needed in most cases during follow up consultation. Follow up consultation can be achieved very efficiently through video conferencing module in our system. Also when doctor in rural areas refer their patients to doctor in city hospitals they can use video conferencing module to exchange information about the patient in loop. Our System has adopted Sinch open source for video conferencing module. Sinch offers software development kits for video Calling – the Sinch SDKs – that you integrate with your mobile or web application for easily adding video calling based features.

The system support secure management of health record both in storage and during transmission. This is achieved by using AES algorithm encryption/ decryption of medical reports. The Advanced Data Encryption Standard (AES) is a symmetric-key method of data encryption. AES works by using the same key to encrypt and decrypt a message, so both the sender and the receiver must know and use the same private key.

Other health services supported by the system are providing online medical prescription, viewing the nearest hospitals and doctors or diagnostic centers, scheduling an appointment, and booking ambulance. These services are provided using GPS and GSM communication network.

Advantages of Proposed System

- Video conference call between patient-doctor and doctor-doctor.
- Emergency alarm on critical medical conditions or accidents.
- Online medical prescription
- Secured medical report transfer from patient to doctor or doctor to doctor
- Availing health service facilities such as scheduling an appointment and booking an ambulance
- Finding the nearest hospitals and medicals
- Low cost and time saving system
- Different levels of security measures in each module.

## 2. WORKFLOW OF SYSTEM

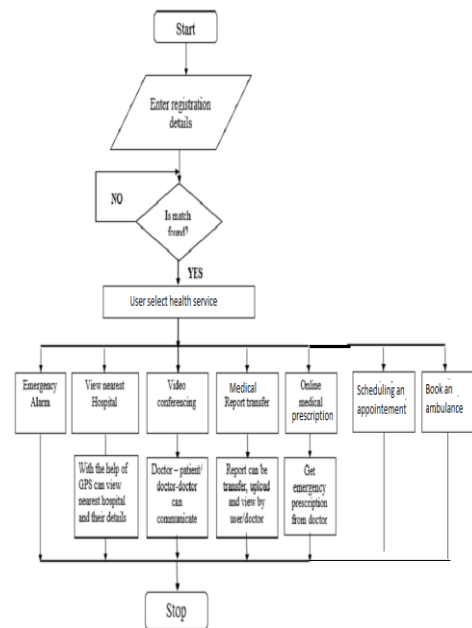


Fig-1: Flowchart

## 3. IMPLEMENTATION

### 3.1 Video Conference Call

For follow up consultancy the patient can use this module to consult with the doctor. The same module can be used for doctor to doctor medical information and history exchange about a patient in loop. Video conferencing is provided by the open source application “sinch”

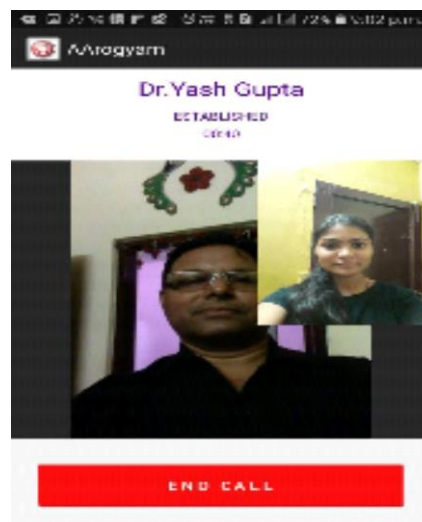


Fig-2: Video Calling

### 3.2 Emergency Alarm

Emergency alarm system can be triggered on critical medical condition such as cardiac arrest or an accident. The alarm action will send emergency messages and calls to the user's family and the doctors. The emergency message can include the location information, in order for the rescue staff to locate the user.

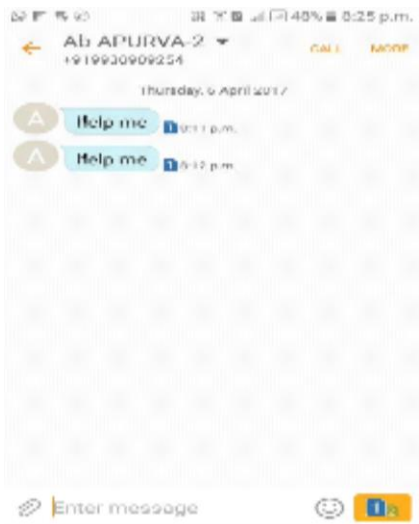


Fig-3: Emergency Alarm

### 3.3 View Nearest Hospital

With the help of the GPS and GSM network, the system can track the location of the user and thereby display information about all nearest hospitals to user by clicking on a particular hospital all information about that hospital will be provided to the user.

### 3.4 Medical Report Transfer

Patients can upload their various medical reports during consultancy with doctors. Also doctors can analyze those reports during the follow up with the patient. These medical reports will be transferred from one system to other in encrypted form. For the encryption of the medical reports AES algorithm is used which will protect the confidentiality of the user and only the authorized person can access it. The history of such uploaded medical reports can be viewed by the doctor for further treatment.



Fig-4: Report Transfer

### 3.5 Online Medical Prescription

After the follow up consultancy through video conferencing doctor can send the online prescription to the user which will provide the information about the medicines, the frequency and the time of intake.

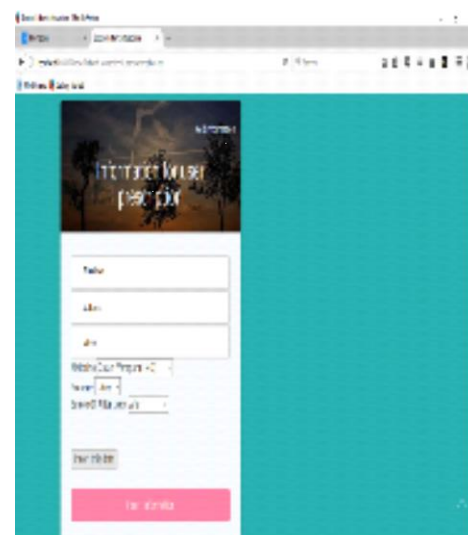


Fig-5: View Prescription

#### 4. CONCLUSION

We have developed a healthcare App which is very user friendly and efficient in communication and reporting. The application developed has met all the objectives that were delineated as the advantages of the proposed system. By deploying the application on mobile phones we have been able to bring the healthcare App on the palm of every individual.

The application can be deployed on the cloud by integrating different hospitals and linking their servers through the cloud. Though sufficient security measures have been adopted still there could be a scope to increase the security parameters.

With respect to the feedback of the App users further improvements can be incorporated within the system to make it more users friendly.

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