

# Development of Smart Healthcare System

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## Abstract

The proposed healthcare system provides a smart bridge between the doctors and patients. The application software helps in collecting the patient information of rural area. The details of the patient will be stored in the backend even it is in offline mode. Since the patient information are highly confidential and as a security measure two way authentication is used. Along with the login/password, fingerprint authentication is also incorporated. This provides a team-based approach with information-sharing across different healthcare sectors, and offers maximum continuity of care for the patient.

## Keywords

Login/Password, Authentication, Database, E-Health, Statistics.

## I. Introduction

Nowadays, digitalized is likely the single most important demographic shift worldwide in urban health care. They face a problem in maintaining and identifying the patient profile. It is very difficult to maintain the records of the patients as physical assets. Hence, this system planned to make it computerized according to the needs in single software to easily access the patient's profile. The system will create register screens of different age-group patients according to taking treatments from the centers, camps, and school. The details of the patient will be stored offline even if there is no network. Later, the details will be updated dynamically in the server database when they are back to online. The patient's observed data is entered based on which the physician can suggest the patient for further treatments.

## II. Literature Survey

Wireless Smart Health Monitoring System proposed one of the approaches is to monitor the health state of the patient and screen it to doctors or paramedical staff through the IoT, as it is hard to screen the patient for 24 hours. So here the patient health condition or status i.e. Pulse rate, Respiratory rate, Body Temperature, Position of the body, Blood glucose, ECG and so on can be measured by utilizing the Non-invasive sensors.

Smart Human Health Monitoring System By Using Iot proposed model enables users to improve health related risks and reduce healthcare costs by collecting, recording, analyzing and sharing large data streams in real time and efficiently.

IOT Based Smart Healthcare Monitoring System for Rural/Isolated Area sit deals with the ways in which the biomedical system can be monitored using IOT. It mainly works as a connectivity as a method of E-Health Care. The system can also reduce the stress of a rural people to reach for a medical care and doctor. It works on to check the purity of water by applying a sensor. This can result in the source of easy availability of a medical facility.

Design and implementation of smart HealthCare system using IoT proposed a paper which depicts the idea of solving health issues using the latest technology, Internet of Things (IoT). It presents the architectural review of smart healthcare system

using Internet of Things (IoT) which is aimed to provide a Better HealthCare to everyone. Using this system architecture, patient's body parameters can be measured in real time.

A design approach to smart health monitoring using android mobile devices This project deals with monitoring of the patient through wireless technology. The monitoring signals are finally obtained in Pc and Android mobile devices. A visualization module of the server program graphically displays the recorded biomedical signals on Android mobile devices used by patients and doctors at the end of the networks in real-time.

## III. Challenges in the existing system

Most of the healthcare system provides bridge between the doctors and the patient but the major challenge is in the storage part. It is very difficult to store the patient record in the rural area wherever network is not available. Hence it is again a tedious process to redo the same work. Moreover, time consumption is very high completing the entire process.

## IV. Proposed System Architecture

The proposed system architecture comprises local PC, hand held device, application server, database and to interconnect all those devices network is required. The major issue of the existing system is in maintaining the patient records in manual pattern. To provide a solution for the existing system, we propose a system wherein entire system is digitized. This system is developed to minimize the work of the data collectors. Data collectors are the intermediators carry the handheld device with them who visit the camp and collect the patient details. The details will be feed into the app in offline mode itself later they can be stored in the database via application server once they enter into the internet zone. The local pc in the architecture is connected to network which is used for the hospital reference and directly connected to application server through database.

The mobile app comprises five features named community enumeration, school health screening, statistics of the patient, outpatient sheets and patients past treatments. The application is connected with the backend which is used to store the entire details. Whenever require, the data can be retrieved.

## V. System Development

The proposed system is developed with five modules. The first module is family details enumeration wherein the fields of the frontend is developed based on the details of the family. The second module is developed to incorporate the community enumeration. This module is added with the features to maintain the records of the patient. The third module is developed to add community health screening. This module is developed to get the data from the students school-wise. Additional features were also added in this module, where the student who needs follow-up treatment can also be updated. The fourth module is created to get the statistics report about the patient health. Finally, the fifth module developed is out-patient face sheet which helps to incorporate the out-patient records in easy and fast manner.

The data collectors visit rural area, schools and collect their patient profiles through their hand held devices and store them offline temporarily. Since the data collectors visit rural areas the network of the handheld devices will not be stable. The temporarily collected data then uploaded online whenever network is available.

To obtain much more information about the lead without any Personally Identifiable Information (PII) attached both online and offline data are combined. The doctors also visit rural area for camps and they visit schools, colleges to collect the patients profile through hand held devices it temporarily stores the data of the patient in community database relationship management system. So it could be easy to note that this data is usually personally identifiable. Combining online and offline data in one central platform provides with a complete 360 degree view of patient.

**A. Family Enumeration**

The existing system involves enumeration of the family details individually using manual methods of pen and paper which is to be computerized. In this proposed system, it reduces the time involved in reentering the data in computer again. A separate module is provided for this family details enumeration. The features are incorporated in this module are Patient name, religion, community, annual income, members of the family, address, house type and details, water supply, latrine facilities, electricity, fuel for cooking, refusal disposal, health insurance, marital status, educational status, occupation, member details, chronic illness. The enumeration module as shown in fig. 1.

An enumeration is a complete ordered list in a collection of data. The list is allowed to contain repetitions depend on the content of the given problem. It is a concept that is used to attribute a quality to another concept, as qualifier a collection of items or a listing of all the elements of a set in medicine practice for producing the further treatment to the patient.

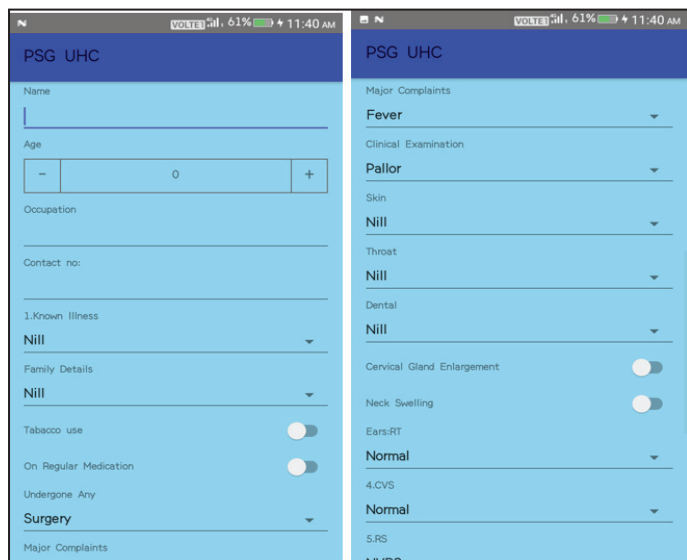


Fig. 1: Enumeratio

**B. Community Enumeration**

The existing form includes eight sections to which the patient’s observed data is entered based on which the physician can suggest the patient for further treatments. It gathers the following data from the patient the patient’s existing medical record, Anthropometric details, Clinical Examination details, CVS, RS, Abdomen, CNS, Other findings. The above said features are developed as a software

module. Based on the findings from the above data the physician will suggest the patient appropriate diagnosis, medication and if needed a referral to a specialist or evaluation (Blood/X-ray/Scan). It simplifies the patients centric approach including informational and physiological domains that serves cumulatively capture and then process all critical information. This module provides effective and efficient value-driven healthcare operations.the Community Enumeration module as shown in fig. 2.

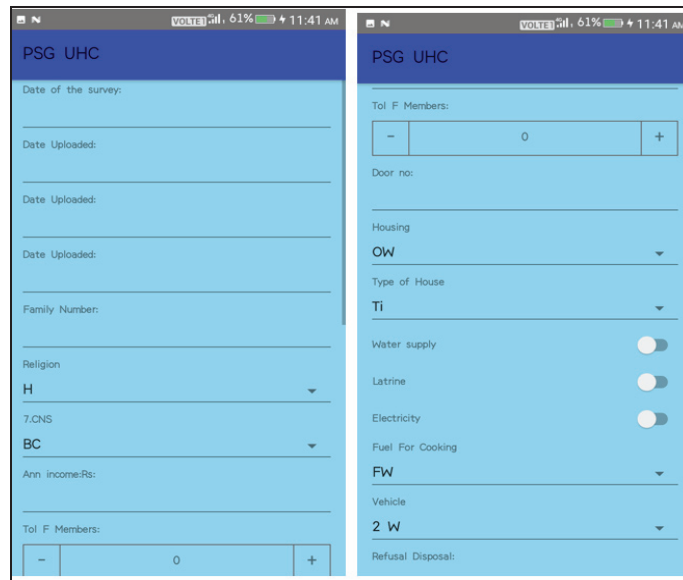


Fig. 2: Community Enumeration

**C. School Health Screening**

As per requirements gathered from the doctors, separate software is to be developed for the entry of student checkup records. Hence the various fields like BMI, Vision, Dental caries, Skin Lesions, Pallor, Nek Swelling, ENT, RS, CVS, Referral follow up details are included in the application. In some states or districts these screening tests are mandated by law and may also include dental checks, scoliosis evaluations, blood pressure readings, and height and weight measurements. In school districts in which nurses are available for more thorough assessments, testing for tuberculosis and even physical checkup are conducted as camp. Hence additionally stated features are also added in this module. The school health screening module is as shown in fig. 3.

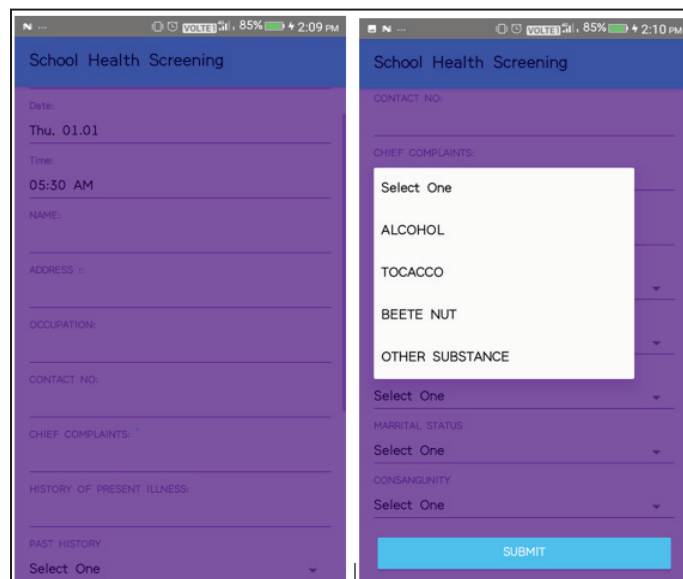


Fig. 3: School Health Screening

**D. Statistics of the Patient**

Statistics covers the patient’s activity such as the population’s use of general hospitals, diagnoses, treatment level as in-patient, outpatient consultation and day to day treatment are distributed graphically for easy finding of patient’s medical report. Patients are increasingly presented with medical report and its statistical information is invaluable in the way of determining that what combination of the goods and services to produce to which populations to offer them. Health care statistics are critical to allocative and production efficiency. Reliable statistical information minimizes the risks of healthcare systems. Statistics are important to healthcare center in measuring performance success or failure, where it provides improvisation for the measurement of healthcare system. The statistics module as shown in fig. 4.

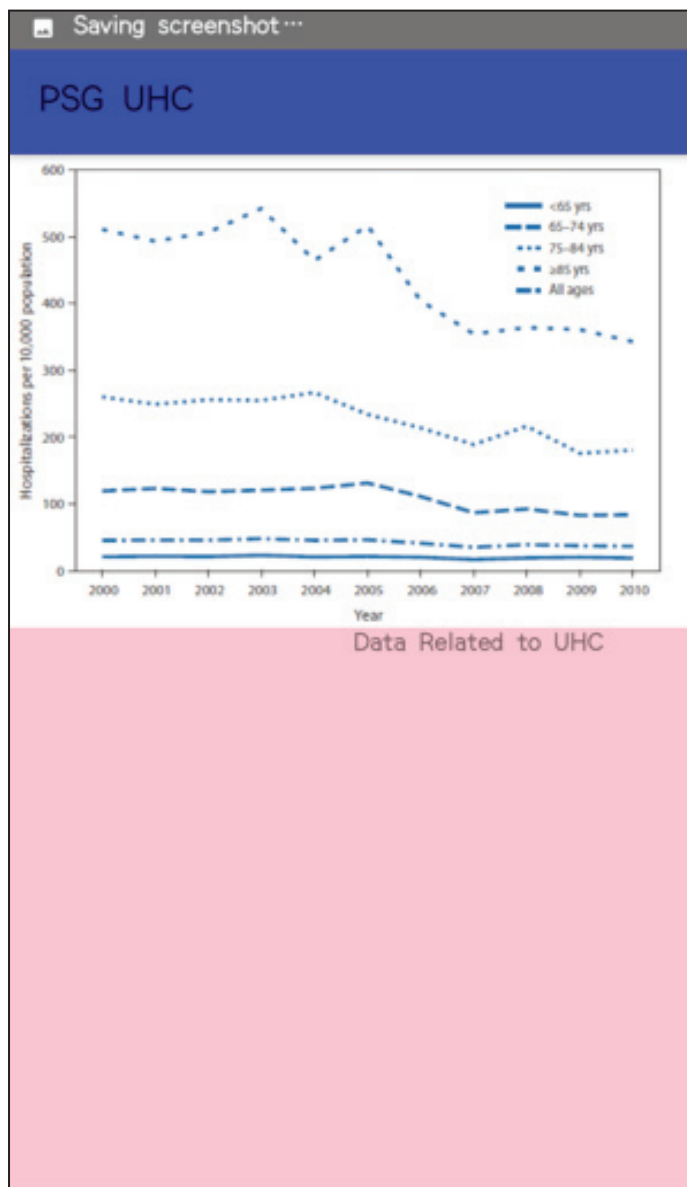


Fig. 4: Statistics

**E. Out-Patient Record**

The out-face sheet module is to be taken as priority to face the current need of the system in hospitals. The fields to be covered in the module are address, occupation, phone number, chief complaints, and history of patient illness, family history, personal history, menstrual history, general examinations, and ENT details. Face sheet is a document that gives patient’s information that increase their involvement in patient care activates, their ability

to navigate and become even more crucial. Locating vital pieces of information is critical to developing in appropriate assessment and plan for the individual patient. It is important that physician and other prescribers may document pharmacists for their record. Hospitals and clinics are utilized by the physician group of treating out-patients. The Out patient record module is as shown in fig. 5. Clinical information system of the patient is utilized for managing patient health record. Scheduling patient’s visits is also managed.

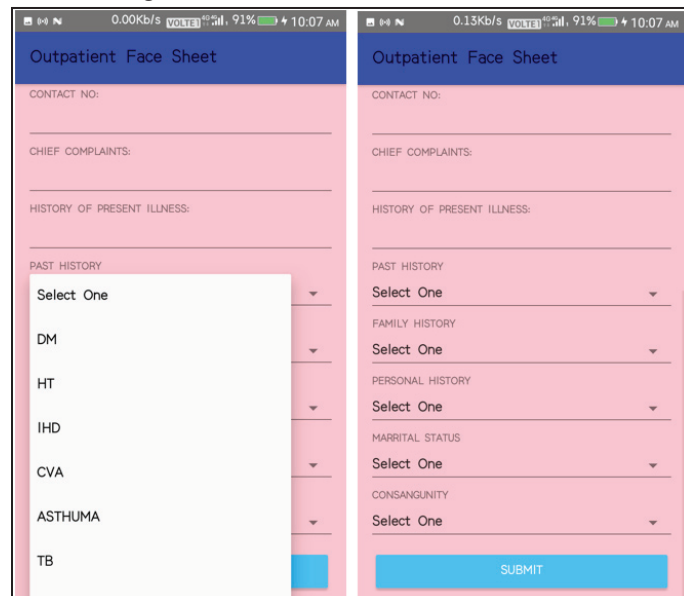


Fig. 5: Out-Patient Record

**VI. Technology**

Smart health care have been introduced to the urban healthcare data collectors to reduce their hand written works into smart healthcare system has also recognized the advantages using information technology and communication technology to develop the healthcare into smart healthcare system that Global Observatory of eHealth (GOe) has determined mHealth as “medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices.” Mobile phones and other devices are used to support patients and improve healthcare. Besides using mobile phones to make calls and sent text messages, mHealth also includes more complex features and applications such as General Packet Radio Service (GPRS), third and fourth generation mobile telecommunications 3G and 4G systems. Where in rural areas there limit of internet in high speed so the technology implemented is so useful to store the data in offline mode for temporarily. Add offline sync to the database server, since the adesso uses MySQL server as it data store server database applications without rebuilding the schema the sync data can be manual or automatic. When app is in offline mode data entered in forms id stored in local database in the method of bi-directional sync and it accessed through multiplatform communication, it is made available to and on request.

**VII. Result Analysis**

As the reports of the patients are digitalized, easy to maintain, without the misconception of the hand written records the concept of healthcare systems making digitalized and storing the data in local database and retrieving the data to the database through application server for slow internet connection. The complex nature of the healthcare operation is designed with the ideas of

network centric. Until data are better integrated across entities, some redundancy will remain in the collection of race, ethnicity, and language data from patients and enrollees, and equivalently stratified data will remain unavailable for comparison purposes unless entities adopt a nationally standardized approach. Methods should be considered for incorporating these data into currently operational data flows, with careful attention to concerns regarding efficiency and patient privacy.

### VIII. Conclusions

Thus this system made the documents as digitalized, which is easy to maintain the patients records and available in both online and offline mode. Since this system is itself maintaining the details of the patient which is should be highly confidential hence additional fingerprint authentication is also provided for security measurement.

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