

# Smart and Secure Healthcare

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**Abstract:** The smart and secure healthcare system provides a smart bridge between the doctors and patients. The software application helps data collection easier in rural areas. The details of the patient will be stored in the server. Patient information are highly confidential and as a security measure authentication is used. Along with the login/password of Gmail, fingerprint authentication and face authentication is also incorporated. This provides a digitalized view of healthcare system which is different in sharing information.

**Keywords:** Authentication, Database, Healthcare.

## 1. Introduction

Prolonged life expectancy along with the increasing complexity of medicine and health services raises health costs worldwide dramatically. The smart health concept has much potential to support the concept of preventive, participatory, predictive, and personalized, such as high-capability, multi-function monitors are typically used in hospitals and clinics to ensure a high-level of quality patient care. As a view this can be used in healthcare camps which provide efficient manhandling, weakly-structured data sets and digitalized health care camp. The graph in fig. 1 describes the challenges.

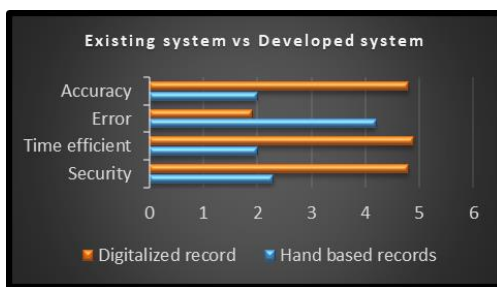


Fig. 1. Graphical representation

Hence this system planned to make it computerized information in a single software for easy access 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.

## A. Challenges in the existing system

The medical field provides survey and healthcare camps conducted freely for the patients in the rural areas by social sectors and government plans and other sectors like financing, pharmaceuticals, health human resources, and public health. Major challenge is data storage. It is very difficult to store the patient record collected from rural areas and survey data as there is no availability of network. Hence it is again a tedious process to redo the work if data are lost. Moreover, time consumption is very high in completing the entire process of the patients.

## B. Proposed System Architecture

The proposed system architecture used in remote areas, which enables monitoring and transmitting data to health care camp providers in other locations. Register screens will also be available for different age-group of patients according to taking treatments from the camps.

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 where entire system is digitized. Data collectors who visit the camp and rural areas 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 mobile app comprises four features named family enumeration, community health screening, school health screening and outpatient sheets. Along with the login/password of Gmail, fingerprint authentication and face authentication is also incorporated. The application is connected with the backend which is used to store the entire details. The figure below describes the development system fig. 2.

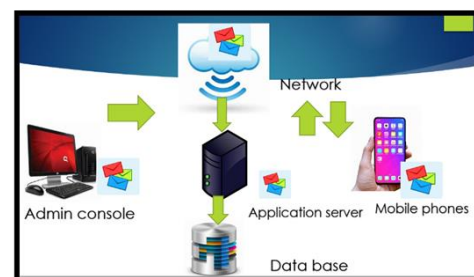


Fig. 2. Proposed system architecture

**C. System Development**

The proposed system is developed with four modules. The first module is family enumeration where the fields are developed based on the details of the family. The second module is developed on the community health screening where the patient’s community details are entered. The third module is developed to add school health screening. This module is developed to get the data from the students on healthcare camp. Additional features were also added in this module, where the student who needs follow-up treatment can also be updated. Finally, the fourth module developed is out-patient or general examination face sheet which helps to incorporate the out-patient records in easy and fast manner. The figure shown below gives the option of selecting modules fig. 3.and fig. 4.

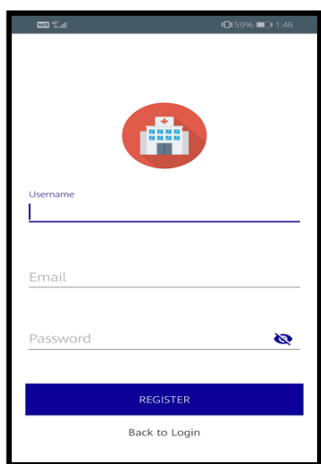


Fig. 3. Login registration

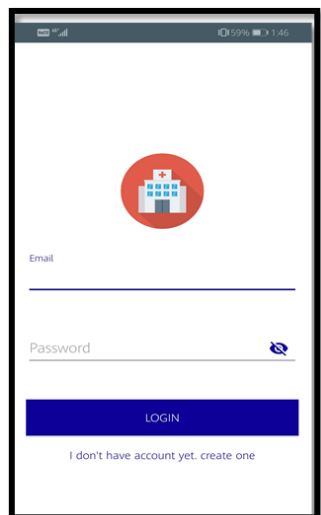


Fig. 4. Sign up in healthcare app

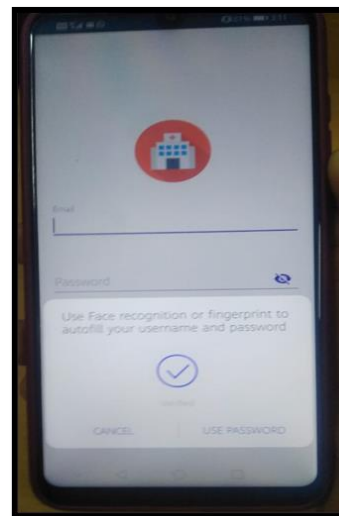


Fig. 5. Face or fingerprint verification

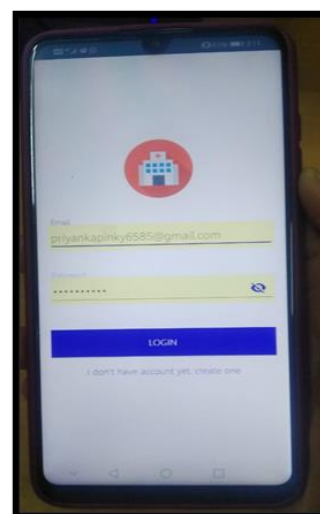


Fig. 6. Login to the healthcare app

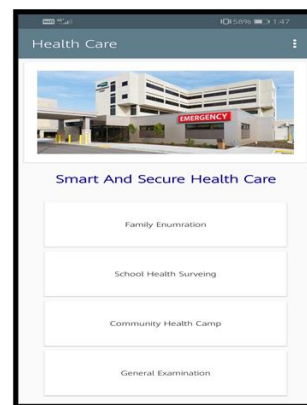


Fig. 7. Smart and secure healthcare app

Fingerprint or face verification have been adapted from biometrics and additional to that password verification is also used in the android mobile application. Authentication is shown in fig. 5. and fig. 6.

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

and the network of the handheld devices will not be stable. The temporarily data collected by the data collector will be uploaded online whenever network is available or take a backup of the information where the network is not provided in the specific hospital. Healthcare app is shown in fig. 7.

To obtain much more information about the lead without any Personally Identifiable Information (PII) updated in database. The doctors also visit schools, colleges to collect the patients profile through hand held devices that also stores the data in a managed system. So it could be easy to note that this data is usually personally identifiable.

**1) 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. 8.

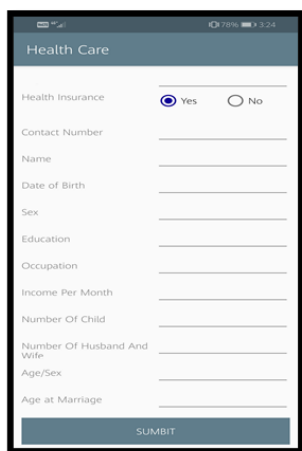


Fig. 8. Family enumeration

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 is also managed.

**2) Community Health Screening**

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 patient’s centric approach including informational that serves cumulatively capture and then process all critical information. This module provides effective and efficient value-driven healthcare operations. The enumeration module as shown in fig. 9.

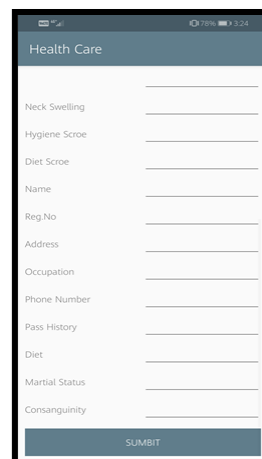


Fig. 9. Community health screening

**3) School Health Screening**

As per requirements gathered from the doctors, separate entry of student checkup is designed. 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 school districts in which nurses are available for more thorough assessments, testing for tuberculosis and even physical checkup are conducted as camp. Hence the required additional features are added in this module. The school health screening module is as shown in fig. 10.

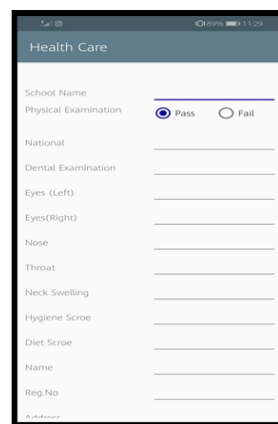


Fig. 10. School health screening

**4) Out-Patient Record**

The out-face sheet module provides their clients with more freedom, it allows clients to maintain other commitments to work, family, school, or other important activities. Out-face

sheet may provide a higher level of privacy. 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. The out-patient sheet is shown in fig. 11.

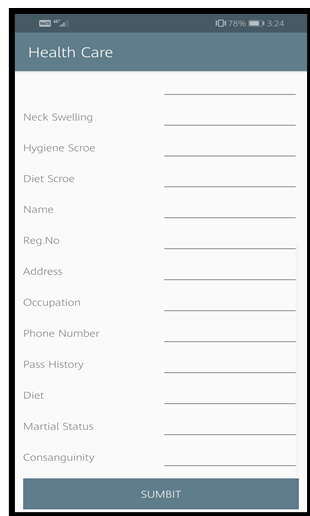


Fig. 11. Out-Patient record

## 2. Conclusion

Thus this system made the documents as digitalized, which is easy to maintain the patients records and available in both

database and may have a backup in hospitals where there is no server. Since this system is itself maintain the details of the patient which is should be confidential. Hence additional authentication features are also provided for security measurement. Patients are digitalized, without the misconception of the hand written records the concept of healthcare making digitalized and storing the data in database. Methods should be discovered in all flies which gives a better way for digitalization.

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