Android based Remote Health Monitoring System

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Abstract **— The aim of the project was to provide a health monitoring facility to the patients during this pandemic. To cope with modern technology and modern problems, we developed this android application and the whole system to ensure the health of every citizen of our nation. Especially in this situation it is not possible to regularly check the critical case of patients, using this system they can easily contact the health care facility and the healthcare centers can provide proper facility to the patient. The location of the patient can be traced in critical situations. The Android application can be easily used by the patient and the doctors can easily diagnose the patient's current health status and easily send the reports using the website in this system.**

Keywords— Remote Healthcare, Website, Android Application, Location Tracking

I. INTRODUCTION

Technology is developing day by day in every field of the world. Now everyone in the world got smart phones and their impact on humans has increased a lot. We thought why not having the health sectors be included in the part of this new technology. In the olden days, there are no smart phones, internet facility& now it's changed. The Android-based health monitoring system is a healthcare management application that helps the doctor to diagnose the patient anywhere at any time. A Registered user can have the facility anywhere. Whenever he/she in need of an ambulance, consultancy etc. The user can easily contact the healthcare center. Especially during the situations when the patient is unable to visit the hospitals. The states of the patients are checked regularly by the healthcare system. The Personal health Information (PHI) is sent by the user using the android application. The Provided data is sent to the Trusted Authority(TA) for further diagnose. The reports are checked and diagnosed by the doctors using the website provided with the system. The patient's location is traced by the system which helps the Trusted Authority(TA) to send the ambulance facility to the user in need. The Email alert for the user and Alarm alert for the Trusted Authority(TA) makes it more reliable.

The Efficient working and monitoring of the system make it more desirable. The portability of the system is an impressing factor. From the user's perspective going to a hospital, having an appointment with the doctor and consultation are critical tasks especially for the critical patients who were in need of regular checkups. So we trust in this system and will do make a difference.

II. RELATED WORK

The regular checking of various health reports is not possible in real time. The system handles the situation more conveniently. The fast and efficient way of communication between the healthcare and patient helps to attain maximum advantage from the system.

Gowthami.P [1] proposed a system which promotes the telemedicine. It shows the various methodologies and various design concepts to be considered for the effective monitoring of patients. Various vital signs like heart rate, blood pressure, Angle displacement measurement, Object reflection measurements are collected and entered into the database. The system uses the android technology, web server facility for the implementation. The hardware in this system consist of 3 blocks-sensors, microcontroller and display system. To make the analyzing of the data more efficient they introduce a bio- amplifier in the system. Amplifier will amplify the signal and display it on the screen. It benefits not only the customers but also the doctors who were in need of seamless communication for the better consultation.

Yunzhou Zhang [2]proposed system with mobile phone and web server capabilities. Physiological parameters are measured by the wearable sensors. It shows the pictorial representation of health status for the patients. They have user- friendly operation process and also provides light weight on- body monitoring sensor for users. It supports a real-time alarming and positioning service in crucial situations. In the indoor environment, they developed a Wi-Fi based localization method to meet the critical situations. System consists of three functional parts which includes a portable terminal, a smart phone and remote server. Zephyr BioHarness™ sensor is used as the portable terminal. The user can view his/her health status, surrounding environment and the past data according to their needs using smart phones.

Remote server software consists of two parts Client/Server(C/S) and Browser/Server (B/S).The whole system is designed for the patients with chronic diseases, especially the elder peoples.

Fayezah anjum [3] proposed the system which facilitates the health monitoring services for general public of Bangladesh where they can store and access their own medical data. In this paper the digitalization of health care sector in Bangladesh is discussed.[4] Chen C M. presented a friendly web-based interface for monitoring the pulse signals and heart rate for remote health treatment. The system consists of physiological sensor, PDA, wireless communication and world-wide web for the remote health care facility. The authors in [5] have described the various challenges and opportunities of health system. The paper focuses on the measurement and continuous monitoring of biological parameters of patients.

III. PROPOSED SYSTEM

The proposed system of our paper is about patient monitoring system. The system designed to provide online health care services to the public that can be accessed from anywhere at any time. The system will be monitoring the Personal Healthcare Information (PHI) of users. PHI report includes body temperature, blood sugar level, blood pressure pulse rate. At the time of registration, the user will undergo e-mail verification. Here the registered users can submit their data which is stored in the database for future reference. The users will have their own profiles. Users can view the PHI reports and can send reports to Trusted Authority (TA).TA can view medical user's PHI data and send the diagnosed report to users via mail. Our project includes an emergency alert system in which the TA can alert the ambulance driver with the patient details and location.

A. Architecture

In Fig.1, the android part for sending data and viewing the result analyzed by TA network part for connecting the user and healthcare center, the healthcare center part used to analyze, diagnosis and return the report to the user, database part processing the collected data and stored into the memory. Our system offers features such as data management of patients, email messaging, patient location tracking and sending the ambulance for a user in a critical situation. The network between the smart phone and the TA makes them communicate with each other during the overall process. Health care can retrieve and store data in the database. The access to the database is limited to TA. Android phone in the system architecture makes the system portable for the registered users. The database offers vast storage for the data management process.

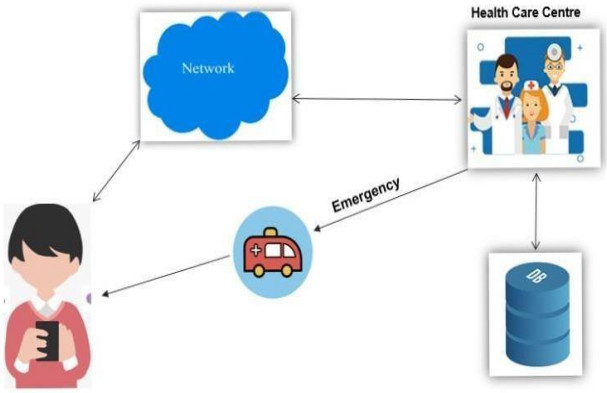


Fig.1.System Design

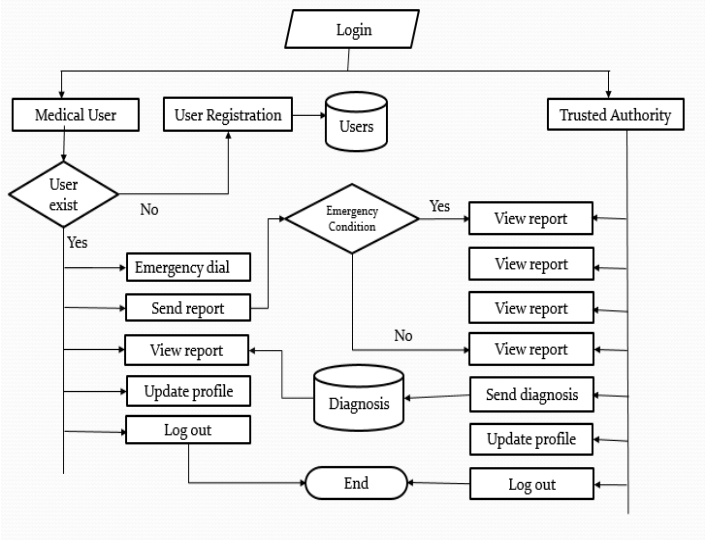


Fig.2.work flow diagram

In Fig.2 plot the workflow of the system .The login option provided to the medical users and the trusted authority. The medical user has to register in the system for using the healthcare services and after the registration, the user's details are stored in the database. Emergency dial option can be used by the user according to the situation. By using this facility users can contact their dear ones in a critical situation for help. Medical users can submit PHI report and view their own diagnosed report after analysis by TA. The TA can analyze the PHI report submitted by the users, the alert mechanism provided by the system enables the TA to assure better health services to the patients. Ambulance service can be used by TA for patients during a critical situation. After diagnosis TA can easily send the report to user.

B. User Module

The facilities of the system can be accessed by the user only when they are registered through the websites. On the registration time, new users have to give their personal information and undergo email verification, as shown in fig.3.

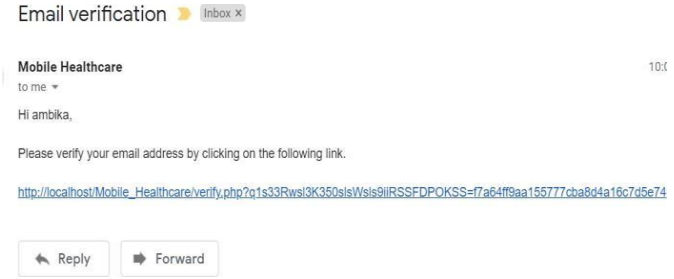


Fig.3.Email verification

After registration, medical users can log in and log out with their preferred username and password through the android application SPOC-Client. In fg.4 and fig.7 user interface is shown.

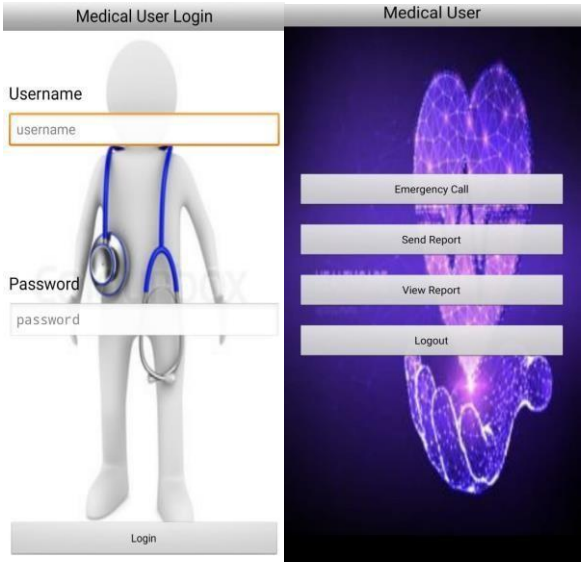


Fig.4.Android App Interfaces

After login, the home page will be displayed which includes view report, emergency call, send report and logout options.

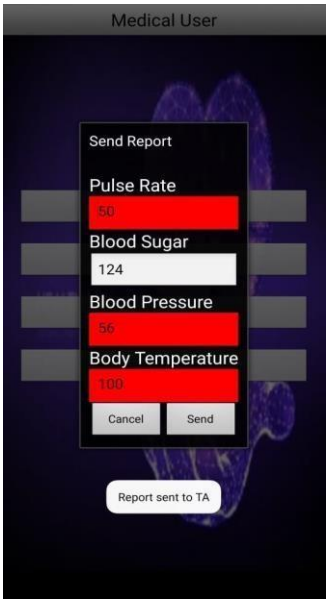
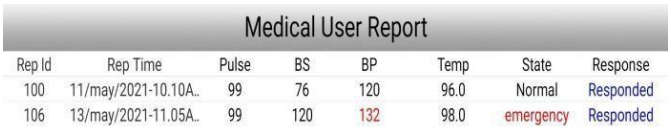


Fig.5.Dialog box of send report

In the fig.5, the option 'send report', PHI report will be sent to the healthcare sector continuously. Perfect and timely analysis and monitoring of the patient is possible through this method. The 'Emergency call' option will provide a special feature that the user can contact their relatives in an emergency situations. These contact details are also provided by the users.



Rep Id	Rep Time	Pulse	BS	BP	Temp	State	Response
100	11/may/2021-10.10A..	99	76	120	96.0	Normal	Responded
106	13/may/2021-11.05A..	99	120	132	98.0	emergency	Responded

Fig.6. Medical report of user

As shown in fig.6, medical users can view their past and recent reports analyzed by healthcare center.

C. Admin Module

There will be a website for health care to monitor and analyze the health conditions of users. The PHI reports of users are analyzed and marked condition as 'emergency or normal'. The emergency reports are given high priority and displayed on the home page.

Fig.7.User Update Interface

The function of the bell icon is to alert the admin with a notification sound when new emergency conditions are arrived and keep a count on the emergency conditions. Admin can view and search the user's details. In fig.8, the option PHI report, admin can view and search the reports provided by the medical users.

Fig.8.PHI Report Table

Admin can send the diagnosed report to the medical users via email in the normal and emergency condition.

Fig.9.Diagnosis Dialog box

In critical situations, patient location as shown in fig.10 and user's name is shared with the ambulance driver.

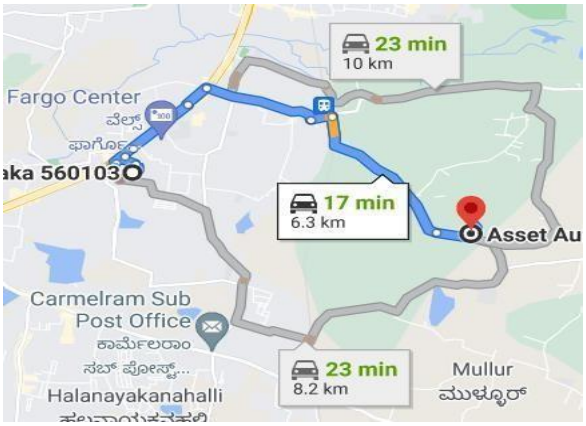


Fig.10.Location Tracking

IV. FUTURE SCOPE

In the future we would like to enhance the project and implement features that benefit the users. Introducing a digital signature provides a layer of validation and security to messages send through a non-secure channel. Providing equipment with sensors that detect physical, chemical and biological signals provides a way for those signals to be measured, recorded and sent to the TA. Bringing features such as AI based offline/online ChatBot in the system can ensure all the users get proper communication. Implementing patient- doctor interaction through a video/audio calls. An effective public health system is essential for furnishing upcoming generations and development in science and technology is the key step to it.

V. CONCLUSION

In this paper, we have proposed a new remote mobile health monitoring system that can provide simple and continuous health monitoring of users. Here we designed android based application and website that can be accessed by the public even in remote areas, where they can store and retrieve their medical data that can access it from anywhere at any time. The main challenges of this project are security issues, time constraints and data storage .Data management is more efficient when compared to data management in hospitals. Regular monitoring of various biological parameters of patients makes the system more alert in nature. The main limitation of our project is that, we can only monitor patient's real-time condition. In future, we can develop sensor equipment that can monitor user's condition regularly.

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