# MOBILE APPLICATION THAT KEEPS MEDICAL RECORD

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## *Abstract*

*Modern medical field is purseuing to reach its peak and storing of health records of patients as a paper documentation has several limitations and drawbacks. We are much familiar with the paper documentation of our medical records / health reports which we receive formally in hospitals and laboratories. It consists bundles of papers filled with the patient's diagnosis and other health related details, Hospitals charges for updating the details in the medical record. It's a big disadvantage with paper documentation, sometimes, they got lost or damaged easily and it had been a hard thing to update you're your report. Let us consider you were in a hurry to buy a medicine but you left your prescription at home. One couldn't carry their health report all the time. Now a days, everyone carries their mobile with them wherever they go. The research we performed regarding storing health records in the form of softcopy had lead us to create an Electronic Personal Health Record (E - PHR) application that stores, manages and provide access to the user's medical information prescribed by their personal physician.*

***Keywords*---*Mobile Applications; Emergency Medicine; Personal Health Records***

# 1. INTRODUCTION

The Health record system was followed traditionally in the form of paper documentary that has some advantage till now, like ease to use in a familiar format, reduced upfront costs, physical form factor and ease to customize. it also includes several drawbacks such as non - scalable storage, consuming and error prone, limited security and lack of backups. In order to eliminate such limitations in health record system, Electronic based PHR system and EHR (Electronic Health Record) system came into existence. Normally, a PHR enables the patients to store and keep track of their health records under their own supervision. PHR includes both paper based system and Electronic based system. There is a difference between PHR and EHR in terms of data ownership. In PHR, the data once entered by the doctor was managed only by automatically until new record is added whereas, in EHR, the data ownership had been shared between the Doctor and the patient. (The brief explanation about PHR is provided in the upcoming paragraph of this paper). the modern world is much familiar with web applications, an EHR in the form of web application is an effective solution.

In this following research, an electronic personal health record application was built using Android Studio Environment with inbuilt Android Software Developer Kit (SDK), Java Developer Kit (JDK), Universal Synchronous Data bus ( USB ) cable wire and an android mobile phone. The languages supported includes Java and Kotlin. The user's data was stored safely in Google Firebase and can be accessed by user without any technical knowledge. Hence, this application would be a modernized solution to carry medical records in your pocket instead of carrying in your hands as a documentation. In this paper, Questions such as how the research is done, how the electronic PHR application was built, what is the outcome of the research, limitations of the application were to be discussed.

**Case study about PHR:**

As mentioned in the introduction, this passage gives a view over additional information about personal health record and also the types, features, the need to switch PHR. Though the evolution of PHR has begun from 1990, it became popular and considered to be an effective solution when Google and Microsoft released their own PHR software products in 2007. (Note : PHR products of Google LLC is not available in present day) . In 2008, Consortium of American companies including AT&T and Walmart introduced a web based framework for personal health record .

PHR can be broadly classified into four types namely tethered, untethered, stand alone and networked. A tethered PHR, which is also known as 'patients portal', is one which is connected with electronic health record, which means patient can access their health record which is placed into the PHR by the provider This type is of more secure than other types of PHR. A untethered PHR is one which is not connected with any EHR meaning that the patient have independent access over his record. This enables the patients to collect, store and retrieve their data. A Stand-alone PHR differs from untethered PHR by allowing the user to share or connect his PHR with external providers and laboratories. This type of PHR enables the users to store their record in their own desktop or mobile phones. The Networked PHR is nothing but an

interconnected PHR of different records of multiple patients. The introduction of "Dossia" framework has lead to a debate that which should be called as a true PHR, whether stand alone Or tethered. Many people consider Stand alone PHR as be the true PHR. Benefits of PHR are mentioned below:

* **Efficient patient engagement**:

PHR enables the patients to have a clear track over their health. Furthermore, much of what patients do for their health happens outside the walls of the doctor's cabin.

* **Reduction in administrative costs**:

PHR eliminates the labour work to manage and update the documentations of patients health record. Other expenses including papers, charts, graphs are also eliminated.

* **Improved patient and provider communication**:

PHR improves communication regarding health record between patient and user in a secured and direct way.

* **Space is minimized**:

Though a single paper documentation requires small space, multiple or bunch of records may occupy a huge space, especially in hospitals and health care centers. Since, PHR is a web based software, the data is stored in phone / desktop memory or in cloud. Especially storing the data using efficient algorithm can reduce the required memory space enormously.

Since 2007, when Microsoft and Google LLC introduced their personal health record software products, other competitors also introduced their own personal health record applications built with efficient algorithms and effective tools / frame works. We also would like to mention that the PHR application we designed is not the first PHR application ever but one among the thousands designed every day in the software world. Some of the pioneer / existing personal health record options are mentioned below:

• **Dossia:**

A web based framework created by a nonprofit consortium called the Dossia founders group. It was released at the same time when Google introduced one of it's PHR product ,"Google health". Dossia provides an untethered PHR that is drawn from multiple sources in which patients store their records themselves without connecting with EHR. At present, Dossia records are offered only to the employees of Walmart, Intel , AT&T, BP America etc.

• **My PHR**:

This PHR is offered by American Health Information Management Association (AHIMA) to parents, care givers and chronically ill patients.

• **Health Vault:**

This application is provided by Microsoft corporation to store health record of common people.

• **Google Health:**

Introduced into the market by Google LLC in May 20, 2008 and discontinued in 2012. It was restarted in 2018 as a separate new division and reorganized back into Google LLC in 2021

**Softwares & Development kits used in the research:**

* Android Studio 3.6- windows version
* Android Software Development Kit
* Java Development Kit
* 64 bit PC
* USB cable
* Google Firebase
* Android mobile (latest version is preferred)

**Android Studio:**

Android studio was developed by Google LLC on May 16,2013 as a replacement for Eclipse Android Development Tools (E-ADT). It is an Integrated Development Environment (IDE) for Android operating systems. It can be installed and operated in Linux based OS, Windows, Mac OS and as a subscription based service. It is built on JetBrains' IntelliJ IDEA software. The size of this software varies from 812 to 950 MB and supports only on 32 bit PCs. This software supports only two programing languages namely, Java and Kotlin. In order to use, other programing languages, the installation of Android Native Development Kit is required.

Some of the features & reasons to choose Android studio are mentioned below:

* It has in built emulator (Virtual Emulator) to debug and run applications but comparatively slower than other emulators and compilers.
* Built in support for Google Cloud and robust testing mechanisms.
* Improved application indexing
* Simple Application acceptance process
* Hardware independence
* Faster deployment
* Compatibility issues are rare with updated operating system versions.

**Android SDK:**

It is a software development kit developed by Google LLC that supports Linux, Windows and Mac OS X 10.5.8 or later versions and Windows 7 or later versions. This kit includes tools such as debugger, handset emulator, libraries and tutorials. Android SDK comes bundled with Android Studio and also can be installed separately if required.

**Java Development Kit (JDK):**

It was owned by Oracle corporation that is used to create run time environment for java source code. Unlike Android SDK, JDK do not come bundled with Android studio. The system requirements include:

* 258 MB or above space on ROM
* 258 MB or above space on RAM
* Linux OS or Windows 7 or later versions

**Architecture of JDK:**

The Java Virtual Machine (JVM) stays on top of OS and convert Java source codes into Bytecode and executes the program. The JRE integrates software plugins , libraries and jar files required to run the program.

**64 bit PC:**

Google has announced that it will stop supporting 32 bit Android studio & 32 bit Android virtual machine and can be operated only in more efficient 64 bit versions of IDE in 2020. Hence, 64 bit PC is preferred.

**USB Cable:**

Utilizing Android virtual emulator often may lead to reduction in efficiency of PC. Hence, the application can be installed into an android mobile via USB and tested.

**Google Firebase:**

Acquired by Google LLC on October 21, 2014, this software enables the developer to store large amount of data on the cloud. Some of the advantages include improved security, cost efficient, scalability and efficient authentication options. It also provide tools for tracking analytics, fixing and reporting application crashes.

**Android Mobile:**

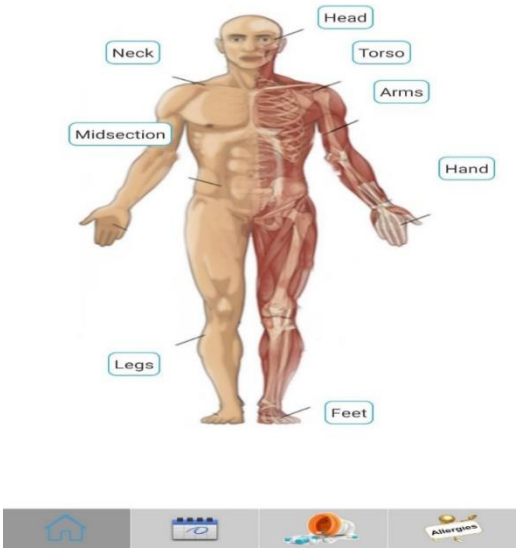
Though Android studio provides wide range of options to choose the Android version to be supported, it is preferable to choose the latest Android version due to following reasons:

* Less number of previous version users.
* High processing speed.
* Choosing latest version enables the application to run in some previous versions too.

## 2.PROCEDURE OF IMPLEMENTATION:

**Diagnosis history page:**

This page resembles an image which is a human body with button texts in it. On clicking the button text, the user can enter the diagnosis details such as injury date, injury name. The user can also edit or delete it whenever he wishes.




(**fig.1.0**) We can have a observation over the diagnosis interface

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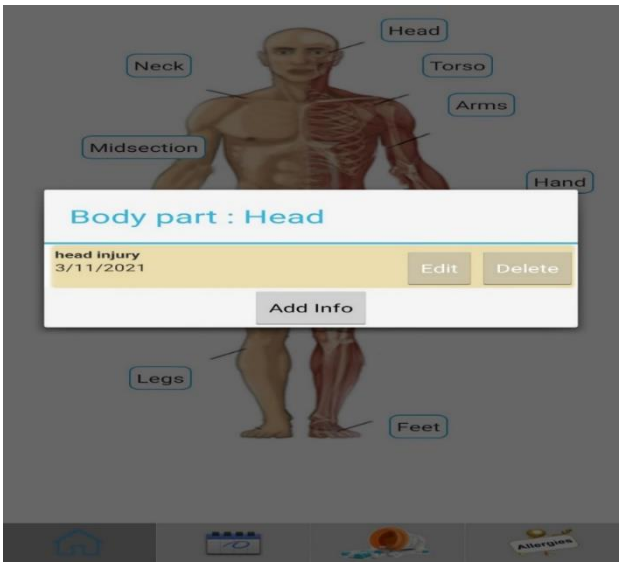


(**fig1.1**) Resembles the data/ information saved along with edit/delete option

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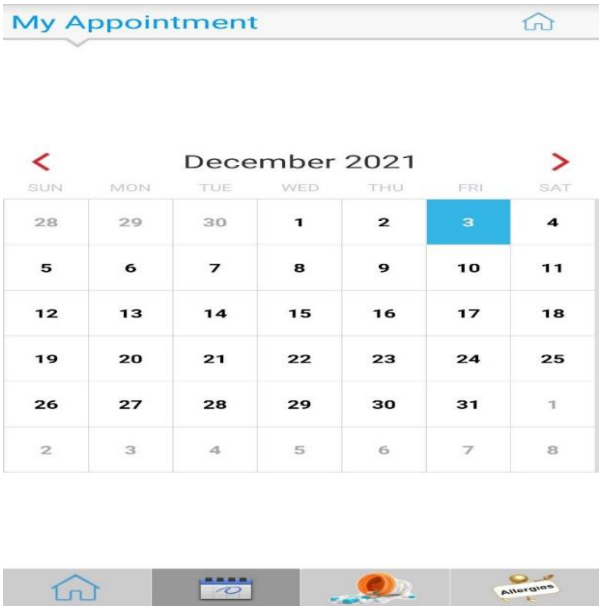
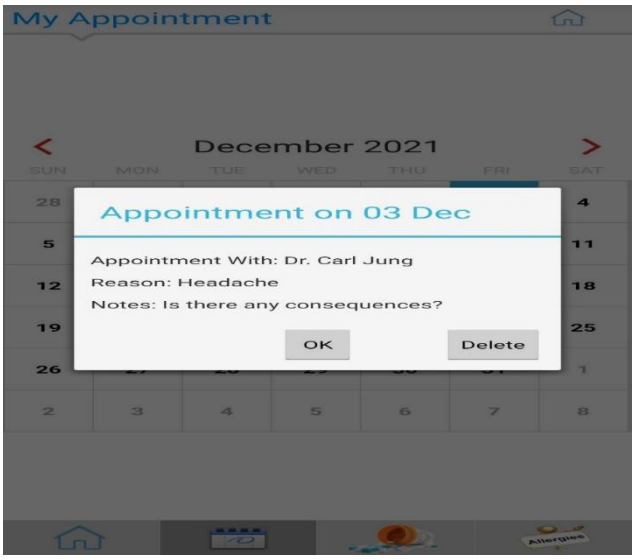
## APPOINTMENT PAGE:

On Clicking appointment button below the main page, the user can enter the appointment page. The page resembles a Calendar, on long pressing the data, user can store various details like appointment date, queries and doctor name. User can also edit or delete the data whenever he wish. The image below resembles the appointment page interface.



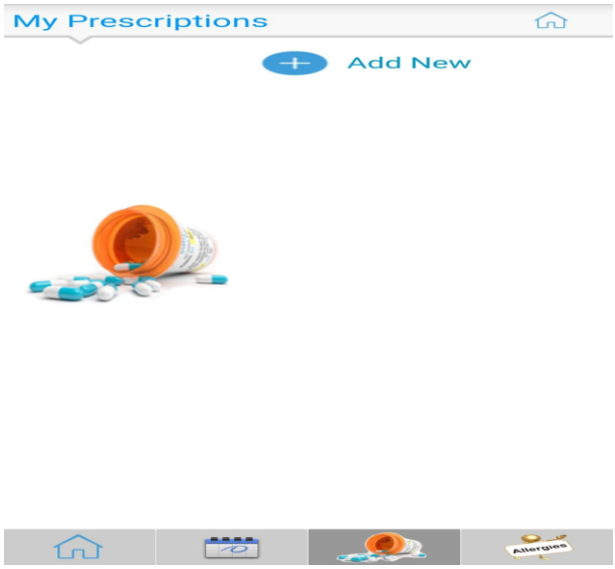

(**fig1.2**) Appointment for the check-up in a calendar form




(**fig1.3**) Name of doctor and questions with edit/delete option provided.

**PRESCRIPTION PAGE:**

On clicking the prescription icon below, the user can enter the prescription page. This prescription page resembles a simple interface. On clicking the add icon, the user can add as much prescriptions he wants user can also add extra details like suggested doctor, prescription he wants User can also add extra details like suggested doctor, prescription filed and he can update the data too.

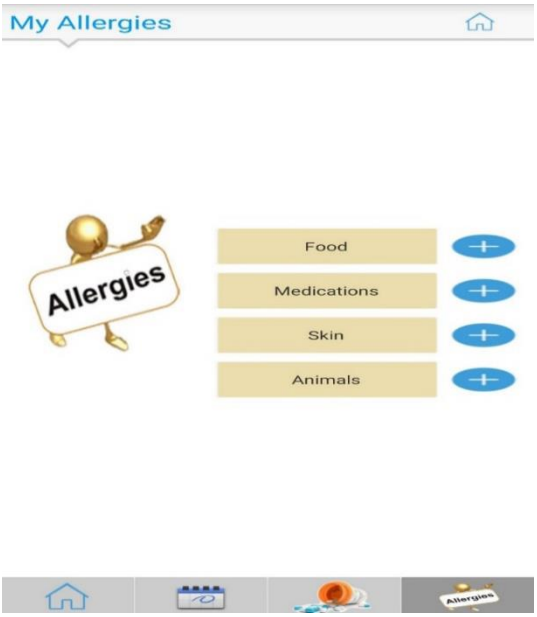



(**fig1.4**) Resembles the prescription page interface.


(**fig1.5**) page resembles the data / information entered by the user. On clicking the cross icon, the user can delete his / her data

**ALLERGY DATA PAGE:**

On clicking the allergy icon below the page, the user can visit the allergy data page. The page consists of an image and four boxes list one below one carrying the texts food, medications, skin, animals




(**fig1.6**) The user can choose his allergy category and enter his reason / name of the allergy. The options for editing and deleting are also provided.

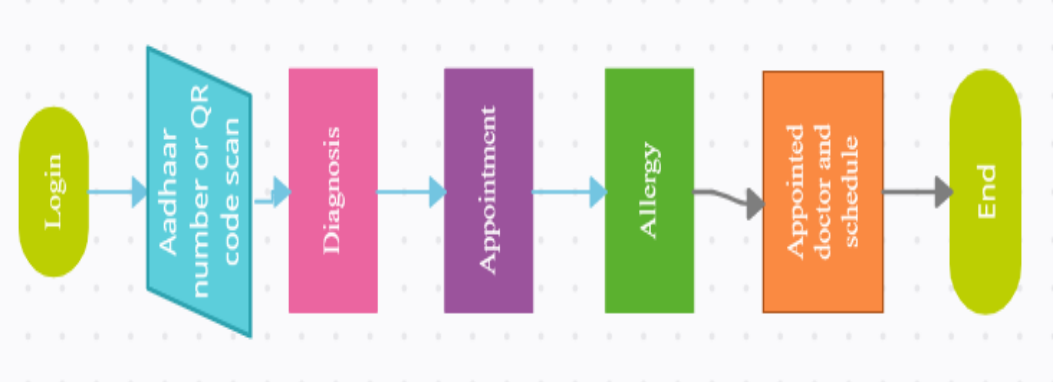
## 3. METHODOLOGY:

### INSTALLATION OF SOFTWARES:

The Software include Android studio which is offered for free by Google LLC and JDK ( Java Developer Kit ) which is offered by Oracle Corporation. Make sure that the PC / Laptop is a 64 bit system, since, Android studio does not support 32 bit systems.

It is necessary to check the versions of the software that suits your operating system. The JDK must be installed and located first before the installation of Android studio. The official logos of Android studio & JDK is attached for reference.

### FLOW CHART



## 4.CONCLUSION:

Thus, our application will help to reach a new height for medical safety and error reduction by monitoring the diagnosis methods of doctors and additionally reduces unlicensed medical practitioners and illegal medicines by connecting their medical license with aadhaar. This, app will also allow doctors to store their patients records and a new law should be made to use this app compulsorily. Thus, a proper maintenance of server and new features will lead to revolution in medical history.

**REFERENCES**

[1] S.Gupta , N.Kaur and D.K.Jain, "mSwasthya: A mobile-enabled personal health record management system," International Conference on Computing, Communication&Automation, 2015, pp. 374-379,doi:10.1109/CCAA.2015.7148404.

[2] Electronic health records: then, now, and in the future R Scott Evans Yearbook of medical informatics 25 (S 01), S48-S61, 2016.

[3] Going mobile: how mobile personal health records can improve health care during emergencies Nidhi Bouri et al. JMIR M health U health. 2014 https://pubmed.ncbi.nlm.nih.gov/25098942/

[4] Foundations for an electronic medical record AL Rector, WA Nowlan, Shazia Kay Methods of information in medicine 30 (03), 179-186, 1991

[5] The barriers to electronic medical record systems and how to overcome them Clement J McDonald Journal of the American Medical Informatics Association 4 (3), 213-221, 1997

[6] Mobile personal health records: an evaluation of features and functionality Hadi Kharrazi etal. Int J Med Inform. 2012Sep https://pubmed.ncbi.nlm.nih.gov/22809779/

[7] Development of a Mobile Application for Patient's Medical Record and History Md Talat Mahmud, Faria Soroni, Mohammad Monirujjaman Khan2021 IEEE World AI IOT Congress (AIIoT), 0081-0085, 2021

[8] Electronic patient records and the impact of the Internet Charles Safran, Howard Goldberg International journal of medical informatics 60 (2), 77-83, 2000

[9] A distributed framework for health information exchange using smartphone technologies Mohamed Abdulnabi et al. J Biomed Inform. 2017 May. https://pubmed.ncbi.nlm.nih.gov/28433825/

[10] Online medical records: a decade of experience Charles Safran, Daniel Z Sands, David M Rind Methods of information in medicine 38 (04/05), 308-312, 1999

[11] The electronic health record and its contribution to healthcare information systems interoperability Sandra VB Jardim Procedia technology 9, 940-948, 2013.

[12] eHealth: past and future perspectives Tibor van Rooij, Sharon Marsh Personalized Medicine 13 (1), 57-70, 2016.