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Pill Alert App - An Insulin level Tracker and Dosage Reminder

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Abstract

Diabetes is a dangerous disease that affects a great number of people causing many to depend on insulin shots and medication for survival. Even though it is a life threatening disease, a lot of patients, particularly the aged, may find it difficult to remember their dosage and time to take it.

This can sometimes be intentional or a result of old age and dementia, as most patients of such ages are often prone to other illnesses like this.

My system – **The Pill Alert Application** aims to reduce this problem by serving as a constant reminder to the patients, checks that the right dosage is taken and the prescription by the doctor is followed accordingly.

Index Terms: medication, old age, diabetes, patient, reminder

Introduction

Our lives are full of chores and duties and most of the times in doing some of these duties, we tend to forget about ourselves and our health. Sometimes we as adults get too busy to the extent we forget to eat or remember to take our medication for an ailment we may be suffering from.

Some of us can consider ourselves as young people with good memories and great health, but there comes a time when you are so tired down by the stress and schedules of this world that you forget completely what is most important for you and your body(thus; taking your medication to get well or sustain your health.

If we can easily forget about these very important things for our health, how much more cant our aged folks, our grandmas and dads, our Aunties and Uncles with chronic diseases like Diabetes, stroke, hypertension and a host of diseases that require them to be on constant medication and taking a range of medicines of varying and confusing dosage.

This can be a very herculean task to taking into consideration that most of our aged relatives at those points of their lives barely remember simple details like where they leave their car keys(memory lost), what color their socks are(sight/vision lost), how a food taste (taste lost) and a lot of malfunctioning senses due to old-age.

It is therefore important to have a system that caters and take our aged's misfortunes into consideration and better helps them to manage their medication intake and dosages in other that they do not over dose or under dose which can be detrimental to their health and can cost them their lives [1].

We introduce a Python web/mobile based system - **Pill Alert App** that offers a digital reminder to individuals living with diabetes of all stages on when they are to take their insulin medications, and how much they should take. In addition, it prompts them on their next appointments with the doctor and also sends a **short message service (sms)** to the Doctor taking care of them and to a relative of the patient, which should permit better monitoring of their dosage intake.

2. Related Works

There have been numerous prior works and research in this field of medicine where smart devices and technology have been used to aid patients in taking their daily dosages and medication. Some noticeable works include:

i. Medisafe

Medisafe Medication Management is an Android application that stores medical medications, sets reminder, allows for customization of the reminder tone (thus the user can select any music or audio of his/her choice). It also keeps track of your medication supply and when a refill is need in case the patient runs out of the medication. However this system does not include functionality for keeping doctor's appointments. [1]

Furthermore, it also does not have a way for doctors to keep track of their patients' dosage intake.

ii. My MediHealth

This application is primarily targeted at children and runs on most smartphones and tablets. It provides user interface for scheduling prescription. This system also made use of RFID (Radio – Frequency Identification) and motion detection technologies that further ensures that the patient has taken in their medication. [2]

Park et al [4] proposed a medication reminder sync system based on how best to synchronize of data by transmitting Open Mobile Alliance data synchronization (DS) [11] Message which provides patient prescription and device data to a remote medical staff elsewhere and any changes made by this medical staff is synced and updated in the system server.

i. Wedjat

A smart phone application called Wedjat which tries to reduce or avoid human errors on the part of medical administration was developed by Zao at el. [3] [5]

Wedjat sends out prescription intake reminder to patients, helps in identifying medication authenticity and directions on its intake. [3][11]

3. Analysis

As I went through most of these notable software that mostly run on Android devices, I noticed some loopholes in their operations which makes their use unpopular

A. Findings in existing systems:

I. Most of these applications do not have a way to automate certain tasks and as such require manual input, which may be daunting to those that are not as technologically inclined. It also may result in more errors in data entry. [7]

II. The users have to enter the reminders more than once which can be tedious. As a result some users may be discouraged to using the application

III. Most of them do not have means where the contacts and information of the doctor taking care of the patient is stored. As a result if the particular doctor in question travels and a new doctor comes in or if the patient wants to contact him, it might not be possible.

IV. Most of the other applications leave the taking of the drugs in the hands of the patient, and some of them are adamant and as a result willingly or unintentionally forget theirs.

B. Setbacks of Existing System :

I. Most of the data entry has to be done manually. And as such makes its use herculean for our not so technologically advanced or enthused clients.

II. There is no part to keep doctor's information in the event that they are unavailable to attend to the patient

III. Patient's health history which can be vital in the event that the designated doctor is unavailable is mostly not stored by these applications.

IV. Due to the too many manually nature of some of the existing systems, human errors and fatigue can set in.

4. Proposed System

Our Pill Alert Application seeks to address some of the above stated problems.

By having a desktop and web version, we ensure that it is possible for the doctor to monitor the patient's vitals and dosage intake. We include a section that allows the patient to send email or chat directly with the doctor by syncing the doctors. Also a step tracker will be included to help track the walks the user takes, keeping him or her abreast with his heart rate and heart beat details.

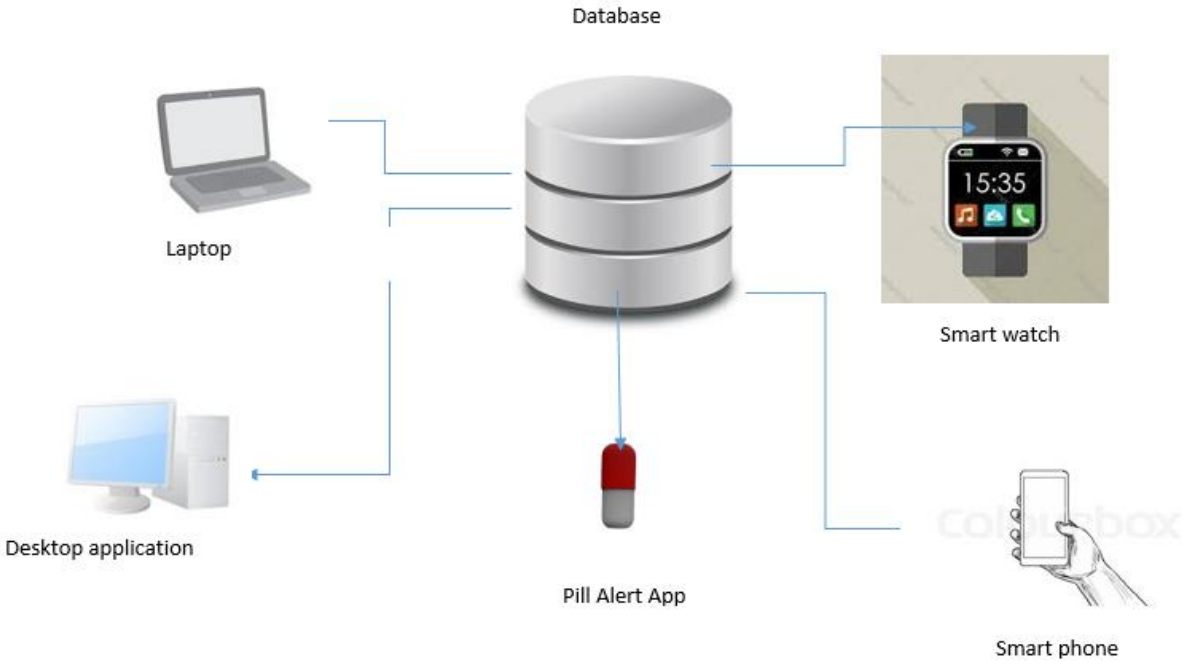

Fig1. architecture of pill alert application

Our system will be able to work on all platforms, be it android, IOS or hopefully smart watches.
This will reduce the likelihood that the user to misses their pill or dosage again.
In addition, there is a section for location tracking where by using Google map, the user can be spotted and in the event that they get lost or have a sudden health problem, they can be tracked and attended to.
With the desktop and web versions for the doctor, there will be a database section where all important patient information will be kept in the event that is needed.
A separate database will be made for the patient's side but data there may be limited since most of the original data would be fed to doctors.
When the time comes for the patient to take his medication, the system will alert him or her via an audio notification that can be customized based on the patient's preference. This application is specifically made for but not limited to people loving with all stages of diabetes Choosing a song they love too can help them cognitively as they can associate that particular song to their medication taking which helps boost memory too. [8]

5. System Overview

The **Pill Alert Application** has numerous sections, starting with the webpage, users are asked to enter certain crucial information into the system which is further saved into a database using Django DB.

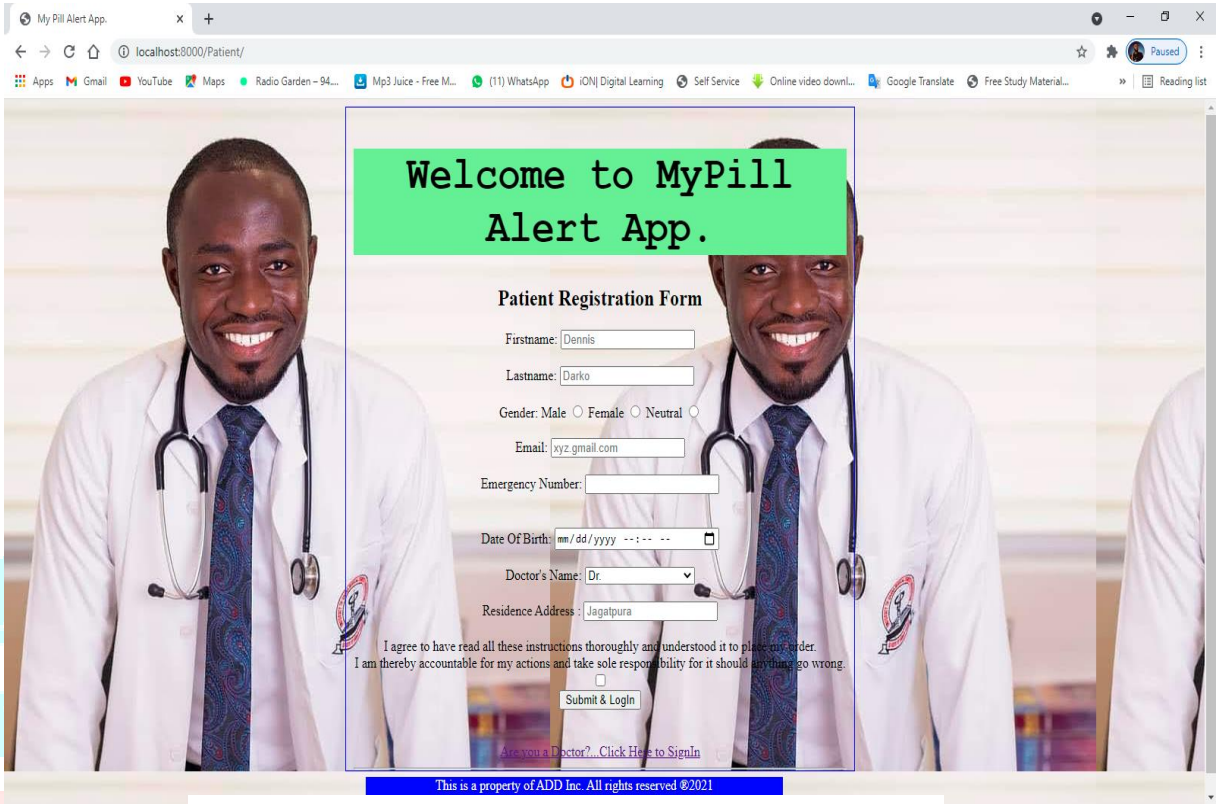

Fig2. patient's registration form on pill alert application

i. Patient Form

The Patient is asked to enter their first name, last name, gender, and email which can be useful as an immediate relative can provide theirs where the doctor can reach out to them in the event of any emergency

Furthermore, an emergency number is to be provided in a textbox for a situation where the doctor has to contact a relative or someone other than the patient.

Place of Residence is also crucial for doctors to do the necessary follow ups if the patient has any complications.

It also helps the doctor to build good relations with the patients' family and he can drop by sometimes to ask questions about how patient is faring.

The time for the dosage taking, the amount to be taken and the name of the prescription will be there for the user to enter and this will help set a reminder that will prompt him or her to take their insulin shot or drug should the time come.

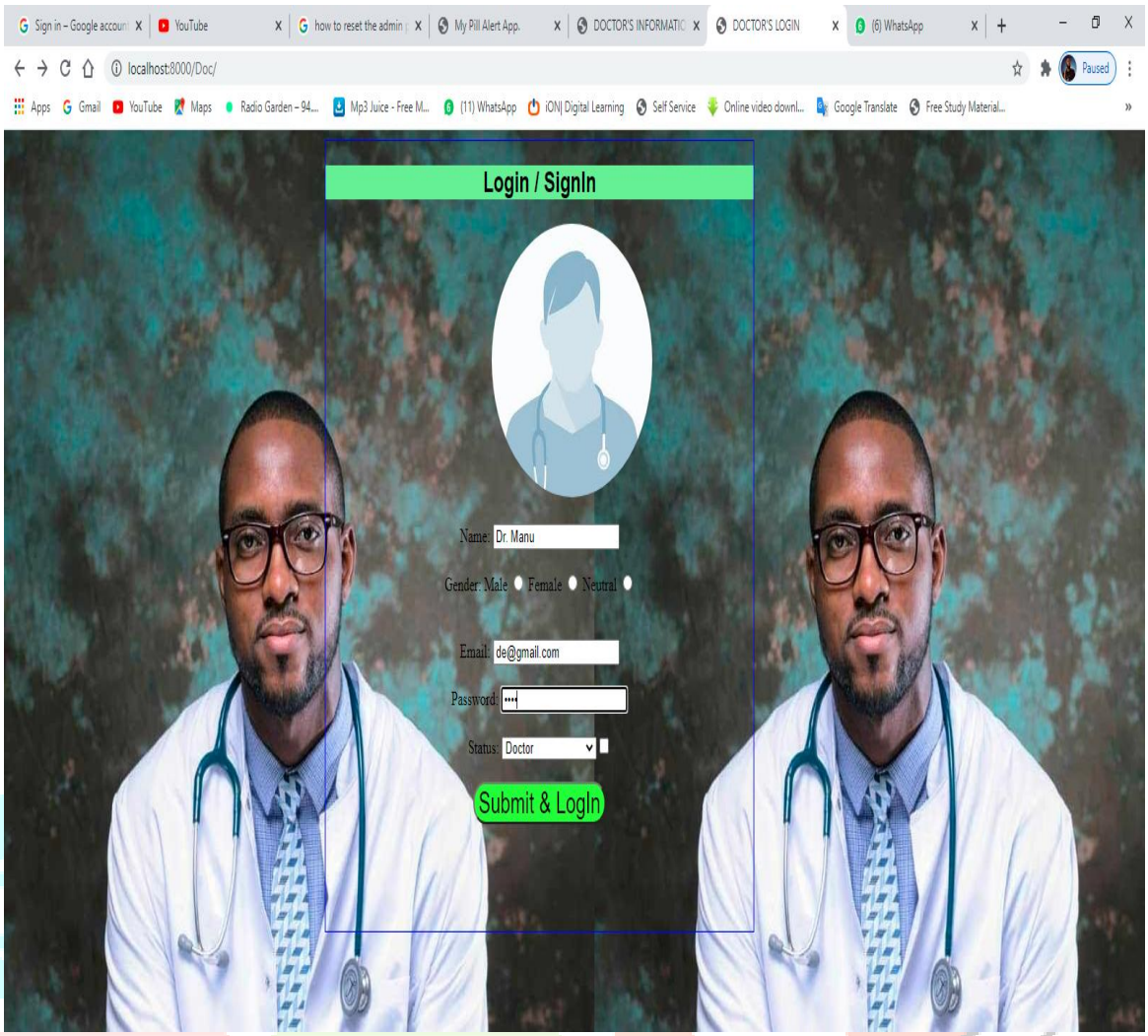

Fig 3. doctor's login page on pill alert application

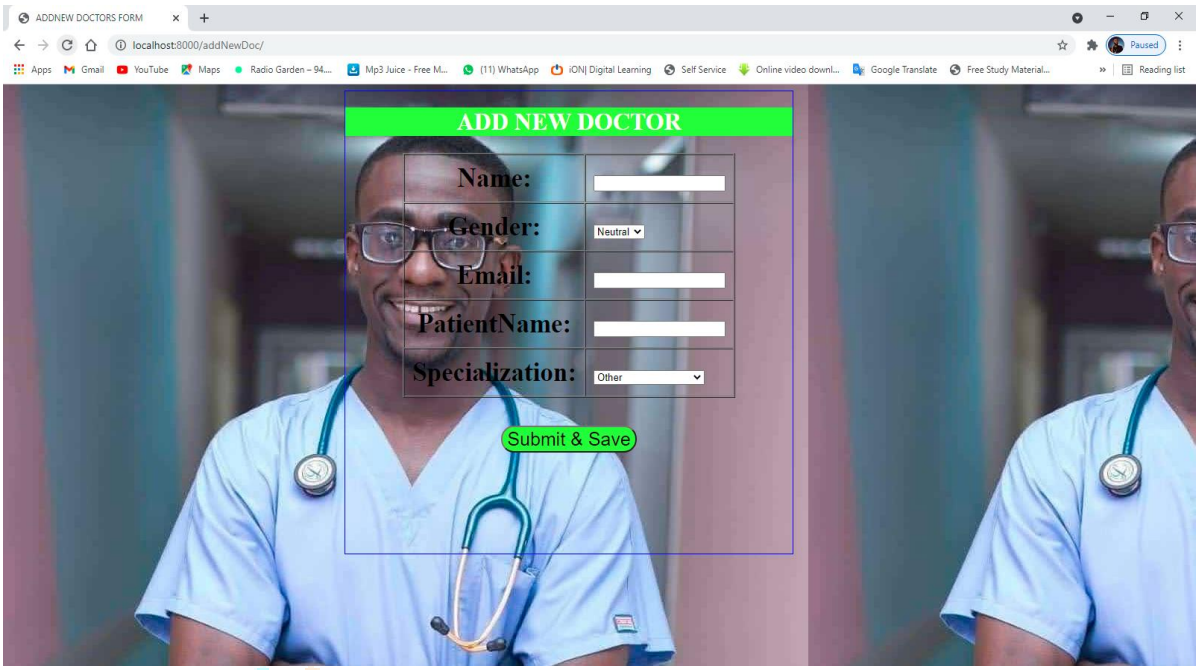

Fig 4. add new doctor's login page on pill alert application

ii. Doctor's Form

The Doctor or medical personnel - also has a form to fill where he will input some data into is Android / IOS / Desktop version of the app to prove some relevant information about himself. He provides his basics of name, gender, email, designated patient name and his specialization. All these are important as they are recorded in the database to also keep track of the doctor administrating the insulin to our patient.

The Doctor can send a message via email or sms to the patient directly as he monitors the activities of the patient to make sure he / she takes the insulin medications.

He also send a reminder for the next appointment which can be helpful in case the patient forgets.

A new Doctor can also be added should the patient have to visit multiple doctors. This information is crucial in better understanding the history of the patient and should the designated doctor be unavailable, any new doctor around can handle the patients' case.

All the collected information will be stored on Django Database system where their authentication, confidentiality and privacy will be assured.

Fig 5. doctor's bio information on pill alert application

Editing, updating and deletions can be done at any time when the need arises and will take effect in the systems, thereby making it always current and authentic

6. Some Major Dependencies:

Google map API will be employed as there will be tracking of patients sometimes when they ask for it.

Django DB will be used for all the database activities and storage of information.

Android Studio and Visual Studio will be the Integrated Developer Environments used to make these programs. Also React Native and JavaScript XML can be used as alternatives

7. Results

The Pill Alert application is an easy to use, user friendly application. Judging from its user friendly and easily recognizable icons, users should be able to navigate their way through the system with minimal assistance.

The data only needs to be entered once making it less tiring and saving the user the cumbersome tasks of re-entering data always

The feedback and reviews on the system are mostly positive and it does well to address most of the short comings of the existing system.

Despite all this success, it still takes the effort of the diabetes patient to help us help him. For stubborn patients who refuse to take their medication, we cannot force them. And tracking such individuals proved difficult.

I conducted a survey of 50 people and I asked them to download and use the application for their own medical needs.

According to the records gathered, 75% of them have come to love the app and are still using it as their medication assistant and reminder.

25% suggested some upgrades to the system to make it customized and personalized to their needs.

I therefore intend to develop the application to the best I can to make it more user friendly and popular with my audience.

8. Conclusion

The Pill Alert application is a technologically advanced way to aid diabetes patients of all status to remember to take their medication on time and in the right dosage.

I take the health of my targeted audience seriously and would like to see to it that their health is resorted to the best of their abilities as possible by developing this user friendly application.

Some patients are genuinely busy consequently require a constant reminder to take their dosage. This is what Pill Alert does best and future updates to this app will check for confirmation of the taken drug and the authenticity of the drug to be taken.

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