Medi Minder: A Blood Sugar Monitoring Application Using Android

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Abstract: Diabetes is a chronic disease that needs to be consistently monitored to maintain the blood sugar levels within normal ranges. Here is an android application to reduce the time and travelling expense, which is easy to use by any user and for immediate response as to what has to be done when you get to know your blood sugar level, using a smartphone and android compatible glucometer. The application records the sugar level of the patient, confirms it whether it is high, low or normal and tells what immediate steps needs to be taken in a critical situation and also informs the same to the doctor and the caretakers, who have been registered, through a notification.

Keywords: Android Smart Phone, Glucomete, Diabetes, Blood Glucose, Patient Care.

I. INTRODUCTION

Diabetes is divided into two types type 1 and type 2. A type 1 patient has no insulin production and has to inject insulin during the day. A patient with type 2 diabetes is usually not treated with insulin and doesn't have to take measurements as frequently. They are instead recommended to have a healthier life-style Patients have difficulties in controlling their blood glucose level because of problems with either producing or absorbing insulin. To be able to measure the glucose level during the day, most of the patients carry a blood glucose meter to avoid acute and chronic complications.

A. Overview

Both type-1 and type-2 diabetes has to be treated through a combination of anti-diabetic drugs, regular exercise, watching your weight and eating right. All these aspects affect the condition differently, so to be able to track cause and effect patients are advised to use a log-book for their daily routines. Together with a blood-glucose meter, blood-measurement-sticks and medicines this is a lot to carry around and so many patients don't use their books regularly. By providing a better platform for keeping track of the above mentioned categories, this application hopes to raise the life quality of people with diabetes.

B. Objective of the project

The main objective of this project is to ease the diabetic patients to check their blood glucose levels and monitor their own health more closely and to aid them in taking their medication on time. The application also helps the doctor and relative of the patient to get to know about the health status of the patient. With the help of pill reminder function in the application the patients can even set reminders for their medications.

C. Scope of the project

The MediMinder application has many functions and is available for free. Other applications which are free, lack in many functionalities when compared to MediMinder application such as syncing with the glucometer device, graphing the tests, sending reports to doctors and relatives without any extra cost. This application allows for diabetic patients to use their Android phone application, log information, calculate their blood sugars, set pill reminders and send information out to a doctor or a relative.

D. Motivation

The motivation of the project is to help Diabetic patients to help themselves. By use of Medi Minder application, the patient can check his/her blood glucose level and get to know instantly what immediate step has to be taken the levels are critical. The application also helps to send the recorded test result to the concerned doctor and relative who can take care of the patient in person.

E. Literature Survey

There are many works related to maintenance of blood glucose level by patients themselves. Some of the works related to this project are discussed here.

An Integrated Monitoring System for Managing Diabetes Patients Using Mobile Computing Technology by Mashael S. Bin-Sabbar and Mznah A. Al-Rodhaan : Stated that Diabetes is a chronic disease that needs to be monitored regularly. It can be very useful if mobiles come into picture to record the test reading and save in a centralized database.

Patient Monitoring System Using Android Technology by Prema Sundaram: Stated that Telemedicine is a developing application in which the medical information is transferred through networks for consulting remote medical examinations. In this method, the patient's ECG, pulse rate are entered into the database and uploaded into web server to send to doctor using android technology.

Smartphone-Based Glucose Monitors and Applications in the Management of Diabetes: An Overview of Salient "Apps" and a Novel Smartphone-Connected

Blood Glucose Monitor by Joseph Tran, Rosanna Tran and John R.White: Stated that self monitoring of blood glucose is very essential and usage of smart phones for monitoring provides better and accurate results. There are many applications over the Smartphone which provide help in self monitoring of blood glucose levels. They are:

Diabetes Buddy: This application allows users to log diabetes related data like recording glucose values, physical activity time, and carbohydrate intake and water consumption. The drawbacks are there is no alarm reminder or no communication with outside world.

Diabetes Pilot: This application contains log features along with database on nutritional information on many food items. There are drawbacks such as additional costs for the purchase of software to transfer the logged data to a computer and the insulin calculator does not consider essential factors such as previous dose, which could affect the needed insulin amount.

II. REQUIREMENT ANALYSIS

A. Existing System

The free solutions come in electronic form that you print-out and fill in. There are reports which are generated and got by the patients after at least 2 hours of the test. There have been some development in online journals in recent years and most of them provide an easy interface and good graphing capabilities. The problem is that the patient needs access to a computer and can't input the values at time of measurement.

Glucose-Buddy has solved this problem by having an Android application that interfaces with the user's online profile, but it just takes manual entries and just records it. The question to be answered will be if it's possible to build an application on Android which is both easy to use and with enough features that it can replace other logging alternatives for patients. Another important sub-question is if the proposed application can help the patient understand how different aspects of their life-style affect their condition.

Although there has been application like these developed, none has all the features proposed. This thesis will try to create new functionality that can help patients. Android is still a fairly new operating system and developers are still learning to work with Android. There are a lot of questions about best practices, and what can and can't be done. This thesis will also serve as an evaluation on what challenges still face developers wanting to start working with Android.
The goal is to help patients with diabetes by providing a tool for better understanding of their condition. The purpose of this thesis is to first investigate the needs of diabetics and diabetic care, and then create an application-platform with functionality based on that research. Focus will be put on log book functionality with the strive to automate data upload from the wide range of medical devices diabetics use.

B. Proposed System

The main objective of MediMinder Application is to allow patients to monitor their own health more closely and to aid them in taking their medication on time. Having all the annual health record in one single application helps medical staff in finding the required information and in better aiding and treating the patients as well. The Document is intended for three types of users:

- **Patients:** Patients will use this application to register their medical records including their medications, dosage and timings.
- **Patient relatives**: In case the patients forget to take their medication, their relatives will be informed by a notification message, in order to ensure the patients adhere.
- **Medical Staff:** Medical staff can use the application to view the patient monthly or annual health record, which will aid them in better treating them.

Weight will also be put on finding new ways to help doctor-patient communication.

III. SYSTEM DESIGN

A. System Architecture

The architecture design process is concerned with establishing a basic structural framework for a system. It involves identifying the major components of the system and communications between those components. Large systems are always decomposed into sub-systems that provide some related set of services. The initial design process of identifying these sub-systems and establishing a framework for sub-system control and communication is called architecture design and the output of this design process is a description of the software architecture.
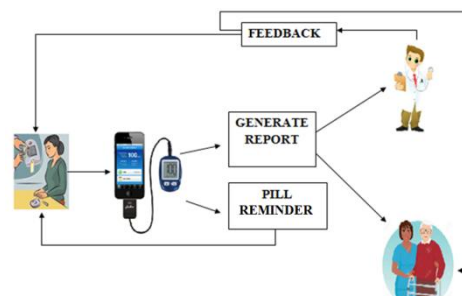

The main goal of the framework shown above is to provide an ease access to the patients to monitor their own blood glucose themselves. Patient checks the blood glucose using the glucometer which is compatible with android phone. The mediminder application records the test reading and generates a report out of it. The report is sent to the registered doctor and concerned relatives of the patient. Doctors can send feedback to the patients which can also be viewed by relatives. The application also generates pill reminder to help patients to take their pills on time.

B.Data Flow Diagram

Data Flow Diagrams help system designers during initial analysis stages visualize the system to meet the requirements. Data Flow Diagrams give a clear

understanding of the boundary between existing systems and postulated systems.DFDs represent the following:

- External devices sending and receiving data.
- Processes that change that data.
- Data flows.
- Data storage locations.
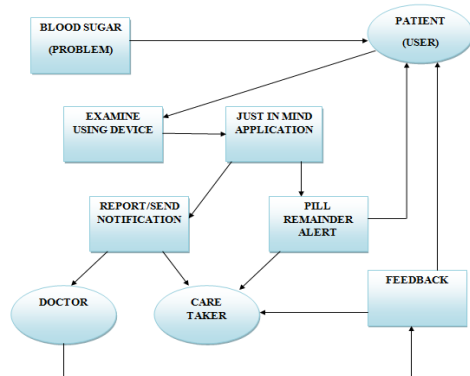
IV. CONCLUSION

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