

Mobile Applications for Supporting People with Schizophrenia

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Student's Declaration

I hereby declare that the work presented in the report entitled Harmony-Saksham submitted by me for the partial fulfillment of the requirements for the degree of Bachelor of Technology in Computer Science & Engineering at Indraprastha Institute of Information Technology, Delhi, is an authentic record of my work carried out under guidance of Dr. Pushpendra Singh . Due acknowledgements have been given in the report to all material used. This work has not been submitted anywhere else for the reward of any other degree.

Signature (Shreya Sharma | Ashutosh Batabyal)

Place & Date:

Certificate

This is to certify that the above statement made by the candidate is correct to the best of my knowledge.

Signature (Dr. Pushpendra Singh)

Place & Date:

Abstract

Medical illnesses such as bipolar disorder, schizophrenia, depression are of great concern in today's time. Mental patients require long term treatment and a caregiver who is there to adhere to their needs. Medical conditions may affect someone's ability to relate to others and function each day. The challenges are not limited to only the patients but also their caregivers. Existing studies show the potential of mobile technologies to build healthcare systems for mental illnesses which can help ease out the process of medical treatment for patients, caregivers and doctors. Our solution is to build - An android app for patients, an android app for the caregivers and a web interface for the clinical usage by the doctors.

Keywords: Mobile computing, mental health, mHealth, HCI, development, android

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Work Distribution

Ashutosh Batabyal :

- Notification and alarm management/ offline mode
- Diet module
- Progress chart
- Data retrieval

Shreya Sharma:

- Saksham Web portal
- IADL Module
- User Profile

- Database, Firestore
- User Activity Monitoring

Contents

1. Introduction	...6-7
2. Previous Work	...8
3. Current Progress	...9-11
Appendix	...

Chapter 1

Introduction

Mental illness is a condition which affects a person's capability to think/react or function. It is an invisible disability which can make severe impact on a person's day to day life and can hamper not only his or her life but also the lives of their family members and loved ones. According to studies 1 in 5 adult experiences mental health condition every year and 1 in 17 suffer from serious mental illnesses such as schizophrenia or bipolar disorder.

In such cases, families take the responsibility to procure the necessary psychological education and to initiate the medication for the patient. Therefore it is important that mHealth intervention should be given in case of low resources settings. The pressure for the caregiver in such severe conditions can be immense and can affect his/her health both physically and mentally.

To combat this problem we are working on a system consisting -

- a) an App for the caregivers
- b) an App for the patients
- c) a web dashboard for clinical usage by doctors

The mobile applications will not only educate the caregivers and the patients but will also give them an array of tools which will allow the caregivers to monitor the daily activities of the patients and generate useful data. The patient app also provides functionalities to help the patients carry out the daily routine and give them a positive feedback. The main aim of

the current prototype is to encourage patients to adopt an efficient daily routine, and reduce the efforts by caregiver by assisting the patient to become relatively independent.

The modules and the functionality of each module were described in detail in last BTP report.

The platform of choice is Android, as android smartphones are relatively cheaper and are easily accessible by majority of the people. The design of a mobile application for mentally-ill patients needs to be based on various psychological factors. Hence, project Saksham was designed and conceptualized by a team of computer researchers from IIT Delhi and psychiatrists from AIIMS. The AIIMS team interacts with Schizophrenic patients to conduct user studies. based on the user studies and the discussions carried out in the team meetings, a few modules were finalised for the mobile application for patients. Some examples of the modules are - Abiding to a daily routine, Medical Adherence and Psycho-Education etc. Later 2 modules namely, Diet and Self Reliance modules were added. The 8 modules keep getting revised from time to time based on patient's response and discussions carried out in the meetings.

Chapter 2

Previous work

Last semester we majorly worked on the following modules:

Injection Schedule: This was one of the major features implemented. This module allows the patient to select which injection he/she has to take from a list of injections, provided by the AIIMS team, as well as the interval between each injection appointment. The user can set the interval to weekly, monthly, fortnightly or once in 3 weeks. The user has to add the last date he/she had an injection appointment and the app automatically calculates the date of the next appointment and remind the user one day prior the appointment and also on the day of the appointment.

User profile: Important details about the patients could be viewed in this section of the app. Details like name, height, weight, alarm preferences and meals could be added/edited to this section. The patient can also the physical and leisure activities he/she performs daily.

Library module: This module is built to give the patient the links to important documents so he/she could do some external reading which might be useful in treatment or awareness regarding the disease. Storing every document in the app could rapidly increase the storage requirements of the app so, instead of keeping all the files in the app storage, we have used links and by clicking on a particular resource, a document is automatically downloaded and it gets opened in a pdf viewer present in the android mobile.

Chapter 3

Current work

Diet Module

This module will allow the patient to keep track of his daily diet habits and give him a summary at the end of the day of the food items he had for each meal. The module works in conjunction with daily routine. Depending on the number of meals the user chooses in daily routine, he/she will be reminded that many times of the day to have his meal. The number of meals he selects will be reflected in the diet module too. After the user clicks on the reminder (notification) or goes manually to the module, he will be presented with a screen to select the food items from a pre decided list food list (provided by aims). This data is then stored in the online database. The UI consists of a recycler view which picks the data from a list which is programmed in the code. This could later be changed to fetch data from a database.

Progress Graphs

The progress graph is designed for the medical adherence and injection module which show the medical and injection records of the patient. The user can easily get a glimpse of his daily medicine or injection schedule. He/she will be able to see if number of medicines/injections taken and

missed in a day. Green bar indicates the medicines taken and red indicates the number of medicines missed. Clicking on the bar of a particular day will give you the expanded view of the day. It'll give a list view, showing each medicine and it's status, i.e - was it taken or missed on that particular day. The same graph was also implemented for the injection module.

Notification handling and offline mode

To make the app function offline, we had to handle the way notifications were delivered so that it works without an internet connection. This was handled using pending intent in android and a broadcast receiver.

User profile

The user profile consists of basic information of the user and provides options to customise the app according to the user's need. The user can set his name, height, weight and other relevant details and can select a language - hindi or english which gets reflected in the entire application. The logout option is also present in the user profile as it is intuitive.

Self Reliance Module

The Self Reliance module is to educate the patient about Instrumental Activities of Daily Living (IADL). Instrumental Activities of Daily Living, often referred to as life skills, are actions that are important to being able to live independently. It is seen that people with schizophrenia are often unable to carry out these activities adequately because of their symptoms. This leads to disturbance in their day-to-day living. The instrumental activities are more advanced than basic day to day activities like bathing, brushing teeth etc. If one can carry them out, it will make them confident and independent. IADLs include: a) Public Transportation, Using telephone, meal preparation, laundry etc.

The IADL/Self Reliance module contains animated videos created by the Saksham team aimed to educate the patient about IADLs.

Saksham Web Portal

The Saksham web portal is designed to help the doctor visualise the records of all the patients who use the Saksham mobile app. It contains a dashboard which shows a list of cards of all patients. Each patient's record can be seen by clicking on his/her card. The patient info page contains the details of the patient which are provided by them during registration, the medical records, daily routine, injection schedule, diet etc which are filled by the patient via mobile app. The records are shown in a table format and can be downloaded in a excel sheet. It uses firestore as database and django as framework.

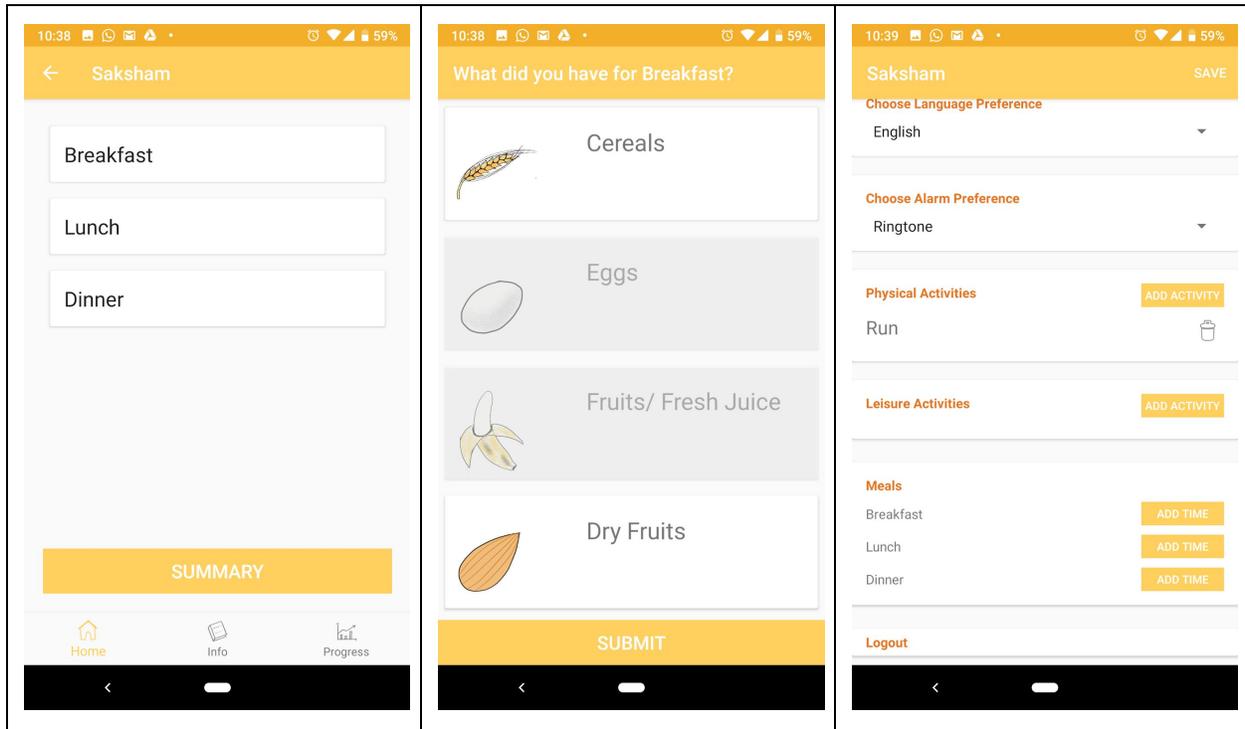
User Activity Monitoring

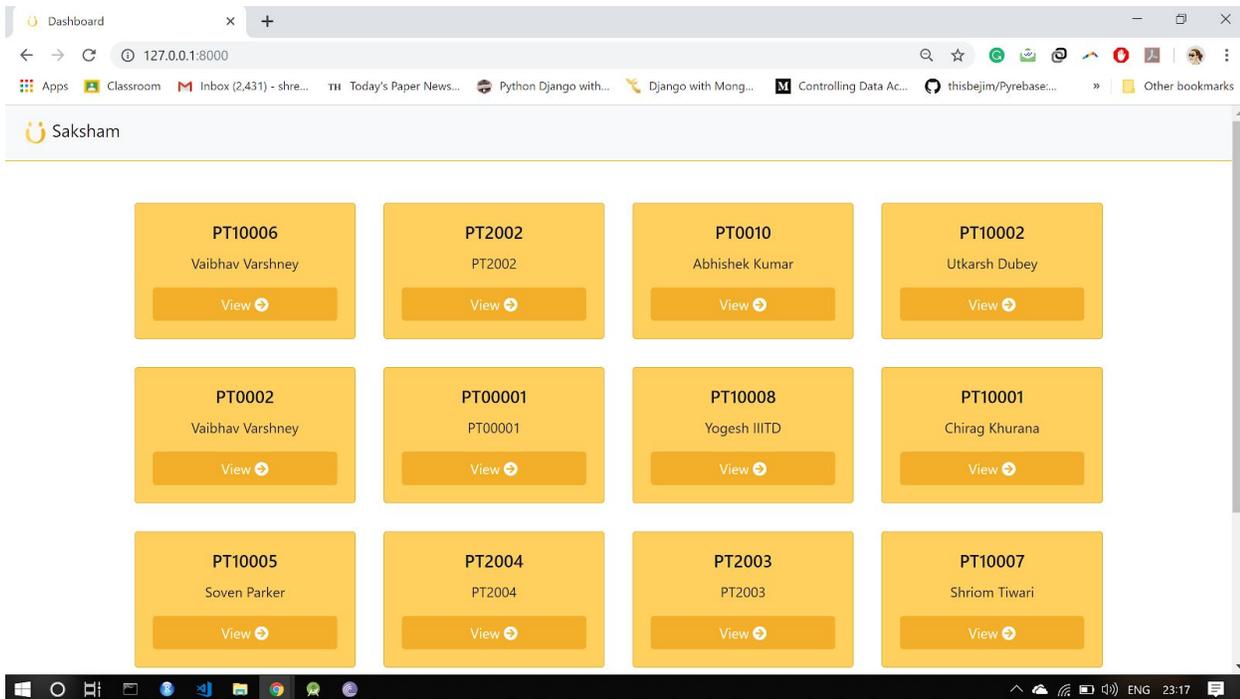
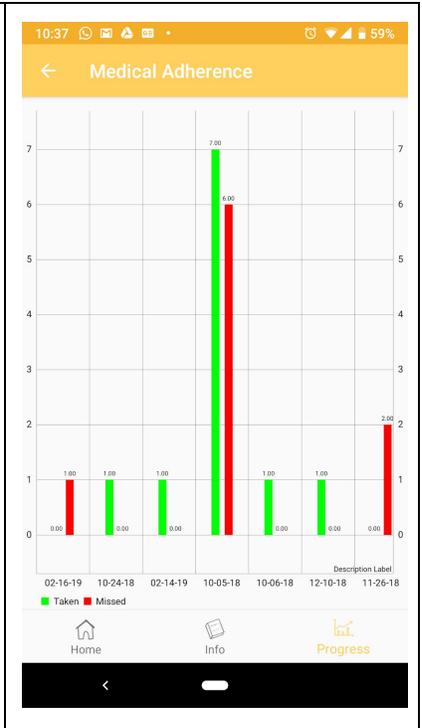
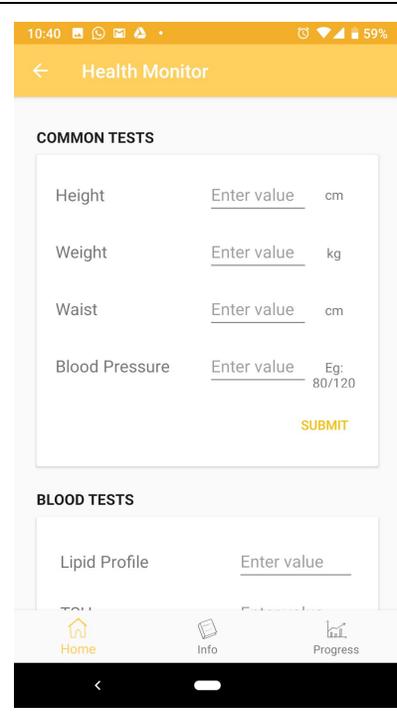
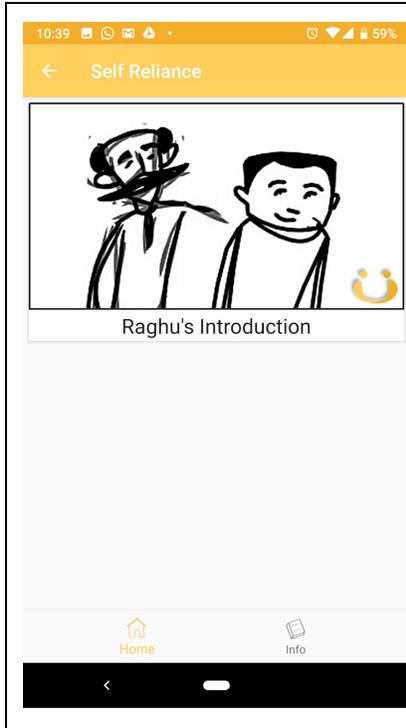
The goal of this functionality is to track user engagement with the app. The mobile app tracks how much time the user has spent on each functionality such as modules, Q&A's and fragments present in the app. The user engagement data is recorded in the firebase. This will help to analyse the effectiveness of the app's features once the app is deployed and help in relapse prediction.

Future Work

The goal is to deploy the app so the further work could be done on user study. The app is mainly designed to keep track of the patient activities and

user other tools to help figure out if technologies like this can bring some changes or help the patient or the caregiver.





Browser window showing a web application interface for "Saksham". The address bar displays "127.0.0.1:8000/PT2001". The page contains two main sections: "Medical Adherence Record" and "Daily Routine Record".

Medical Adherence Record

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index	Task Name	Time	Date	Status
22	Medicine1	05:02:58	2018-10-10	✔ Taken
23	RISPERIDONE	05:40:34	2018-10-10	✔ Taken
24	RISPERIDONE	18:17:55	2018-10-09	✔ Taken
25	OLANZAPINE	06:54:20	2019-02-16	✘ Not Taken
26	Medicine1	21:45:24	2018-10-06	✘ Not Taken
27	AMISULPRIDE	06:10:57	2018-12-04	✔ Taken

Daily Routine Record

Download

index	Task Name	Time	Date	Status
1	Walk	04:29:04	2019-04-05	✘ Not Done

Windows taskbar at the bottom shows the system tray with the date and time: ENG 23:19.