MediTrack

ECE 452/CS 446 Project Proposal

June 3rd, 2022

Presented by:

Maya Bishop	mvbisho
Aurchon Datta	a25datta
Ena Kohli	ekohli
Edmund Kong	emkong
Aditi Lohtia	alohtia
Parathan Vakeesan	prvakees

Github Repository: https://github.com/edmundkong1/meditrack

Project Description

Our project, MediTrack, is a medical tracking mobile application. This product will allow users to enter any symptoms they may have or incidents that have happened, which can be used as a reference for later use and for the app to analyze an individual's health. Data can include pain ratings, symptoms, allergies, and chronic health problems. Users can also input any medication and dosage they may take, and the app will set reminders for when to take the medication and when to renew the prescription. Given a doctor's consent, users can record medical appointments and write down notes directly in the app. Individuals can note down their insurance deductibles, and the app can keep track of different practitioners, such as through recommendations for having appointments while utilizing all of the coverage from their deductibles.

This application is extremely interesting as it can be used by a lot of different people, regardless of gender, ethnicity, and background. People can be in charge of their own health, understand their bodies more, and can prevent any future health problems. By monitoring your own health conditions, such as heart disease, diabetes, asthma, and pregnancy, people can keep track of their health. Some individuals also have trouble keeping track of their medication, and MediTrack will allow them to be more organized with their medicine intake. It would also be useful for those with health insurance especially when they are covered by multiple plans. The app would allow them to keep track of their remaining coverage for practitioners, which is not always easy to find on insurance providers' websites.

The reason that we selected to do this project is because it is extremely useful to a variety of people. It can make a strong impact and change people's lives by helping them keep track of their own health. We also selected this project because it has sufficient complexity and can fulfill the requirements for this course. We have complex features, such as scanning prescriptions to automatically get the medication name and dosage, a medical insurance organizer to help keep track of medical practitioners, statistics on changes in symptoms over time and correlations between symptoms, as well as a calendar to remind the user of when to take and renew their medication. We are essentially combining multiple aspects of health into a unified app, that will handle the complexities and make it easy for the user to handle their health conditions.

This project makes sense in a mobile form factor because it is portable and easy to access from anywhere. As an example, if someone is at a doctor's appointment, or at home, and needs to record information or store prescription documents, they can easily do so from their mobile devices. Most mobile devices nowadays have a camera, and so the user can take a picture of these documents or prescriptions. Some devices (eg. smart watches) also have a heart rate sensor that we can utilize in our app. Moving forward, another reason why this project makes sense with mobile devices is because it takes advantage of notifications that are directly sent to the user. For example, if the user needs to take their medication once a week, there will be a set reminder every week at the same time, to remind the user to take that medication, so that they do not forget.

Functional Properties

1. Remind users for health related activities through notifications and calendar *(Mockup - Tab 2: Calendar)*
    a. Remind users to take medication along with dosage and other information (eg. must take on empty stomach, medication interacts with alcohol, other warnings).
        i. Remind users to refill prescriptions before they run out, or get another prescription from their doctor if their refills run out
        ii. Allow users to use phone cameras to scan prescriptions and auto-input when to take medication and dosage
    b. Remind users to go to scheduled medical appointments
2. Record medical incidents and find trends in them *(Mockup - Tab 3: Incident Summary, Tab 5: About Me, Tab 6: Input)*
    a. Record severity of symptoms (i.e. fever, body aches, runny nose, cough) and if they are related to a diagnosed (or suspected) condition/illness that the user has
        i. Symptoms tracked over time through graphs for user to understand trends
        ii. Symptoms analyzed against other symptoms to see if there are correlations
    b. Interface with built-in heart rate sensor (if phone has one) to record heart rate in incident
    c. Store other medical metrics (ie. blood pressure, blood sugar)
    d. Allow users to use phone cameras to take pictures of injuries/symptoms
    e. Store user notes about incidents to show physician at later appointment
        i. Include metadata like date/time to help remind user when an incident occured
        ii. Export to PDF functionality to show physician during future appointment
        iii. Auto share to physician via email functionality
    f. Store user notes at medical appointments to record suggestions/advice given by physician.
3. Keep track of different practitioners that the user has *(Mockup - Tab 4: Practitioners)*
    a. Keeps track of practitioners and any procedures, notes and conversation recordings from each
    b. Separates practitioners by those which are covered by public insurance (if applicable) and those covered by the user's private insurance plans(s)
        i. For private insurance, keeps track of insurance deductibles and synchronization between multiple insurance plans
        ii. For private insurance, allow users to upload and track receipts and other practitioner information that their insurance company requires to get a reimbursement on services
        iii. For private insurance, suggest appointments throughout the calendar year so that the person uses all of their insurance deductible and can schedule their appointments in advance
        iv. Use Google Maps API to suggest providers within geographical reach of user

4. Include section on news articles on healthy lifestyle to be more aware on how to improve one's health *(Mockup - Tab 1: Home)*

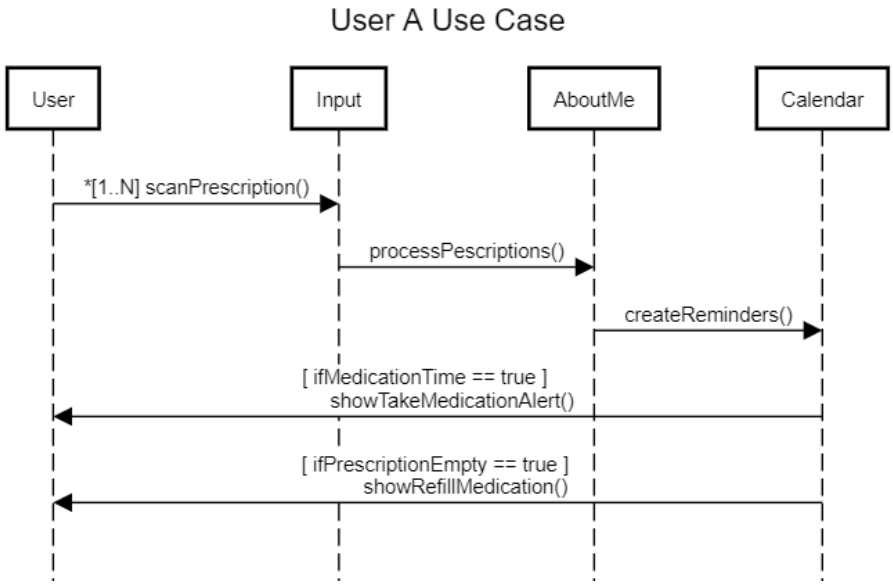
User Stories

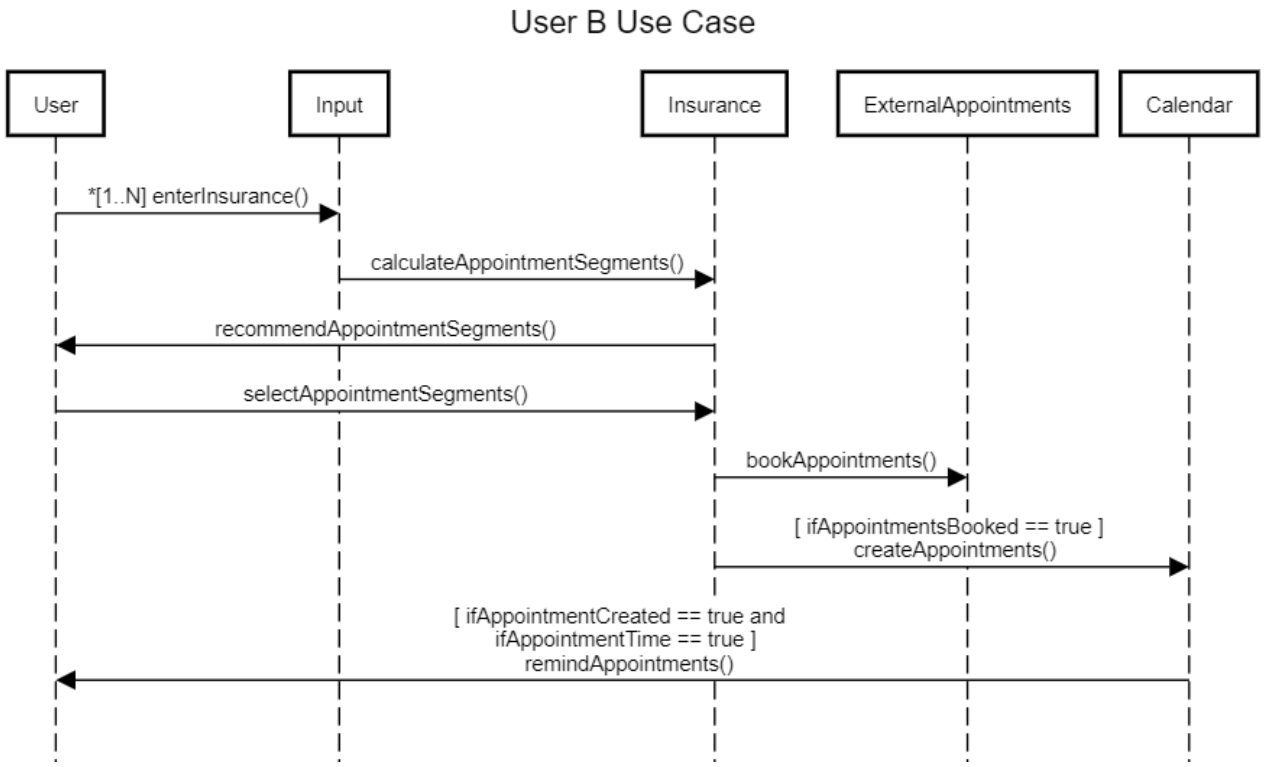
User A has a chronic health condition. User A takes several medications and finds it difficult to keep track of when to take which one, the dosage for each, and when to renew the prescriptions. User A uses the MediTrack medicine tracking feature by scanning their prescriptions which allows the app to give timely alerts on when to take which medication, as well as the dosage. MediTrack also reminds User A to renew their prescriptions when they are running low on medication.

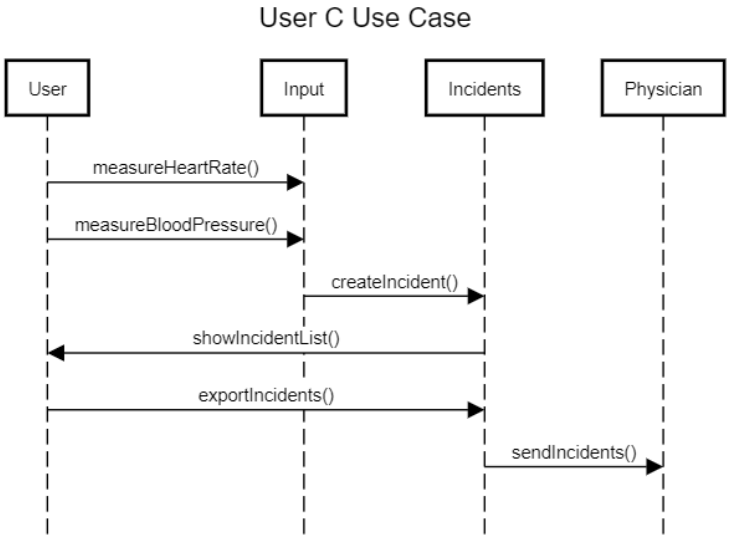
User B has an insurance plan through work as well as through their partner. The two plans cover different practitioners and procedures and are hard to keep track of. User B enters both plans into the app. The app provides options to split up potential amounts (ex: 45min massage every 3 weeks or 1.5h massage every 6 weeks) in a way that things are covered. The app reminds User B on a good time to book appointments which can then be entered in the app to get reminders.

User C's chronic heart condition acts up during an episode where they experience an abnormal heart rate. User C uses MediTrack heart rate sensor integration to record their heart rate. They also use their blood pressure cuff and record their blood pressure in MediTrack. A week later, during a checkup with their physician, User C forgets when their condition acted up. Luckily, User C can use the MediTrack app and send the information to their physician who can then give the appropriate medical advice.

User Stories - Architectural Views







Non-functional Properties

One non-functional property that MediTrack will need to support is the privacy and security of the user's data that they submit to the application. Specifically, this means that the data that a user inputs into the application will only be saved locally on the user's mobile device and will not be collected by MediTrack. This is crucial, as data privacy and security are very important to users when using any type of app, so by ensuring data is not saved can lead to a better

appreciation for the app by the users. Additionally, storing medical information itself can have legal ramifications, as it is data that the user would like to keep to themselves.

Another non-functional property that this app will need to support is being dependable. Since this app handles different types and severities of health conditions, it is important to users that the different features be reliable in terms of alerts for medication and appointments, as well as keeping track of medical incidents that occur. The reliability of these different features to handle a user's medical issues is the goal of this app, and a lack of it can cause users to lose faith in the app altogether. Our goal is to have MediTrack's notification system work more than 90% of the time, as missing an alert, and forgetting to take medication can have serious consequences.

Human Values

This application works to address human values in a few different ways. As an application that focuses on medical issues, MediTrack needs to accomodate people of different abilities. While creating the app, we will ensure the app is visually accessible by picking colours with good contrast and adjustable text size. To make the app motor accessible, we will create our tap targets as 44x44 pts, which is the size of an average fingertip. To allow for easy voiceovers of the app, we will use simple UI features that have accessibility built into them to ensure that users know what is on their screen. On top of ensuring a diverse set of people are able to use the app, the platform will work on creating self-respect in users by allowing them to manage their lives easier. Throughout the design and implementation processes, we will implement features to allow a person to have management of their own life and not infantilize them in the process.

Stakeholders

The primary stakeholders of MediTrack are everyday people that are looking to manage their health and their health care providers to make their lives easier. These people are looking for a simple application that lets them stay organized all in one device. They will use MediTrack for themselves, which should be our focus while creating a user centric application.

Some other potential stakeholders of the device are the medical care providers that work with the patients. These people constantly work with or need information about their patients and what their conditions are like. Having ways to share medical incidents by exporting as a PDF or emailing to the health care provider allows these stakeholders to get easier and accurate access to data on their clients current health conditions.

Additionally, any other carers of the patient whether family, friends or paid professionals might also be a stakeholder if they are helping the primary patient use the application. Although the app is meant to cater to different abilities and allow for a level of independence, it is also important to keep in mind that there is typically a support system of people that also might be involved in the patient's medical incidents based on their different abilities.

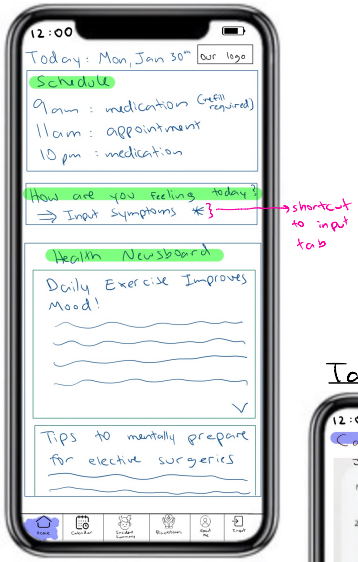
Population of Users

After conducting some research, we found a study from the Journal of Medical Internet Research that stated that older individuals, males, and individuals who have less than high school education were all associated with having a reduced likelihood of having access to such medical related applications. Similarly, age and education were factors taken into consideration when determining if individuals were likely to have a mobile device or not. Thus, looking at this study, the main users of MediTrack will be individuals who are younger (between the ages of about 13-40), more highly educated, have a higher income, and want to keep track of health patterns. To summarize, the population of users for this application will consist of high school and university students, new graduates, people in the fitness industry, or other individuals who need to monitor their changing health conditions.

Reference: Carroll, J. K., Moorhead, A., Bond, R., LeBlanc, W. G., Petrella, R. J., & Fiscella, K. (2017). Who Uses Mobile Phone Health Apps and Does Use Matter? A Secondary Data Analytics Approach. *Journal of medical Internet research*, *19*(4), e125. https://doi.org/10.2196/jmir.5604

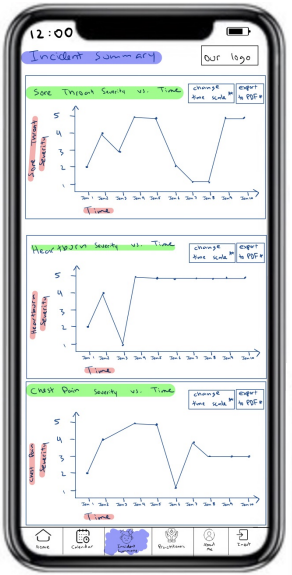
Low Fidelity Mockups : sorted by tab

Tab 1: Home

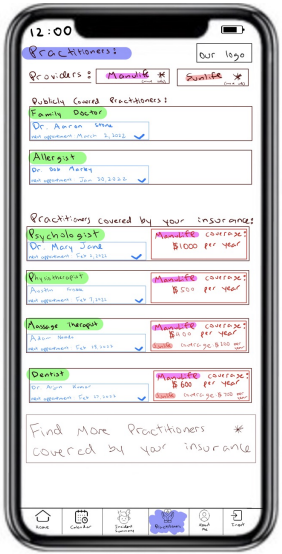


Tab 2: Calendar

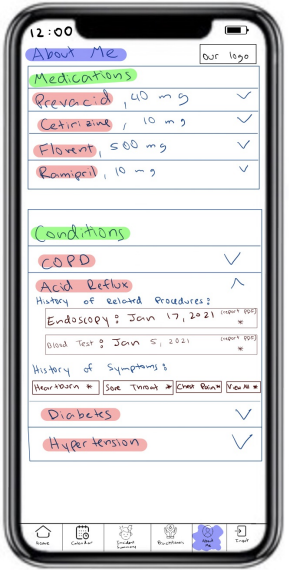
Tab 3: Incident Summary



Tab 4: Practitioners



Tab 5: About Me



Tab 6: Input

Legend:

- ⌄ : expand to show more info
- * : pressable button