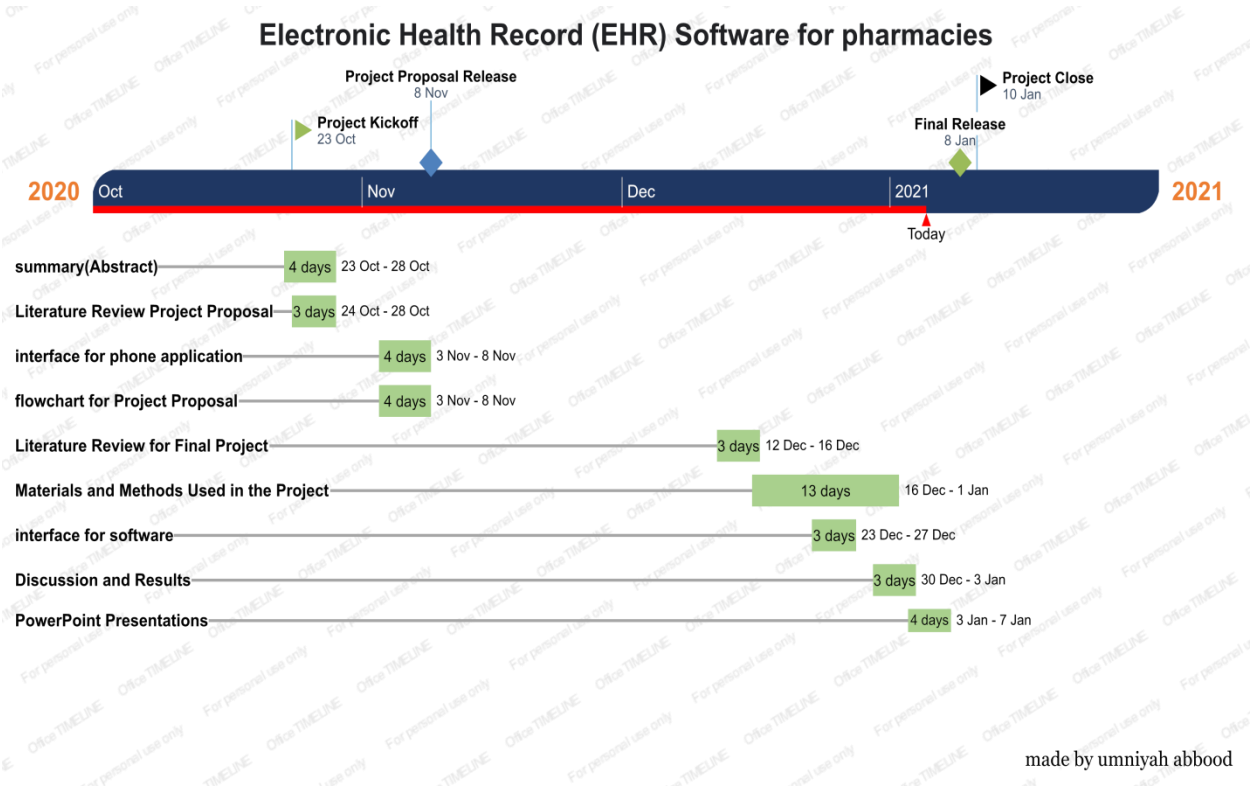
Patent Project Title:

Electronic Health Record (EHR) Software for pharmacies

Project Management:

Firstly, I got the inspiration from one of my siblings because she was complaining about the difficulties that she has been facing in her work.

Step1- I started by writing the summary and what ideas and features I wanted them to be included in the project.
Step 2- I searched for my project and wrote the literature review.
Step 3 - I designed the phone and software interfaces by using HTML and CSS. You can see some of them in the references part [11] [12].
Step 4- I drew the entire flowcharts, which I need.
Step 5- I reviewed the literature review and tried to mention what is the difference and similarity between them and my project.
Step 6- I started writing the materials and methods used in the project.
Step 7 - I wrote the discussion and results part.
Step 8 - I prepared the PowerPoint presentations.
Step 9 - I recorded the video when I present my PowerPoint.



Abstract

The 20th century has seen considerable advances in many technical fields and artificial intelligence, which have contributed to a rise in all fields. Our invention is related to the health field. It will advance the life standard for both patients and pharmacists. Our aim of the EHR is to allow people and health care organizations to be linked to the same database, which gives them fixable access to all data. Our project contains two parts, the first part is a software application for pharmacies and the second part is a phone application for the patients.

After investigation, I have noticed problems that pharmacists deal with daily; we aim to limit those hassles, so the pharmacist can make decisions more accurately and more effectively, in a shorter time, and without making fallacies.

Here are some problems faced by these pharmacists, which our software will solve:-

(i) Patients can forget their medicine name and which dose they should take.

(ii) Patients can give misleading information. They mostly do not give pharmacists all the information they need. If the patient does not know all the medicine that he is recently taking, that may cause an overlap between medicines, which puts the patient's life in danger.

(iii) Patients normally do not know if they are allergic to specific kinds of medicine, which can also put the patient’s life in danger.

(iv)Taking all this information every single time could be exhausting and time-consuming.

Hence, our invention is Electronic Health Record (EHR) Software for pharmacies to have a full record of the patients. In addition, this software will be distributed to all pharmacies. Moreover, the patient's records will be saved in the database such as their previous medicine, the date when they have started to take it, when they have stopped, and all the other details.

Secondly, the phone application will provide a life of comfort for patients. They will be notified of their medicine time, and if they run out of medicine, the app will notify the patient accordingly. This feature will be very helpful for patients, who have a chronic illness. They can keep a journal about their state if they have any side effects due to the use of medicine, and they have a list of medicines, which could give them allergic, and that will help in the emergency crisis. Patients also can share this list with their families. Moreover, the application will provide them with all the information for first aid as well.

Because of these two applications, the pharmacist can practice their work easier, service them more efficiently and reduce the stressful environment around them, and that will reflect positively on the patient's lives. And the patient's app will provide them detailed reports about their medical states which will make them more adaptable to their illness.

Literature Review:

As been mentioned by K.Englund,D.Carson[1], they invited The portable electronic device includes both a memory and a processor. Memory stores automated configuration instructions that are part of the medical mobile software application (MedMaster Mobility) and are invoked when the system attempts to connect with any present Health Information Technology (HIT) systems. The concept of this invention is similar to our in respect to saving the collected information in the memory.

Additionally, K .C. Frank and P.J. Karpen[2] developed a system that contains one or more processors for receiving a document from a client computer. A document containing one of the scanned documents. A fax document and an electronic document. A document form based on at least the representation of the document, indexing of the document using a classification and index-processing engine based on the document type. in this invention K .C. Frank and P.J. Karpen had used indexing serving and they use a matching algorithm to match between patients, in our software we do use the same methodology, however, we do use a matching algorithm to match patients illnesses with their symptoms and medication .

Moreover, D. S. McNair[3] adopted structural subject modeling (STM) to assess the probability of the existence or absence of one or more medical conditions based on unstructured text data from electronic health records. Then to evaluate the textual information as topical or concept-oriented expressions that are statistically comparable to those

associated with various clinical conditions or diagnostics. To classify and condition-or diagnostic-oriented clusters are the most closely similar to the current texts. We do not have this feature in our invitation; however, it is a good idea to improve our software

Additionally, [4]M. Yao established methods of delivering decision support systems (DSSs). It makes high-quality calculators and health-related decisions on patient care by executing some algorithms, which helps healthcare professionals within a short time and taking all the possibilities. In our software, we are trying to make suggestions to the pharmacists by mapping the symptoms with the disease and the disease with the medication

[5] In this article, J. A. Zlabek, J. W. Wickus, and M. A. Mathiason explained the effect of electronic health record (EHR). Healthcare systems have shown that by offering numerical facts of notable reductions in laboratory tests per week, radiology review, copies of paper ordered per month, and medication errors. On the other hand, death cases have shown unusual increases. Moreover, this is exactly the benefits of our software to reduce paperwork and wrong diagnose, however, as normal all inventions have side effects that need to be improved.

[6] This article discussed the advantages and the drawbacks that electronic medical records (EMR) would have by J. S. Alpert. There are many benefits from using (EMR), such as easy access to patient medical records, enter and store drug orders, examinations, minimize time, optimize service quality, reduce medical errors, and improve patient safety by removing errors arising from unreadable handwriting. However, it also poses some difficulties, such as not having medical staff trained in the use of the (EMR). This is mainly troublesome for older doctors who may not be very engaged with the new world technology, as well as maintaining the security for the system due to the hacker's attack.

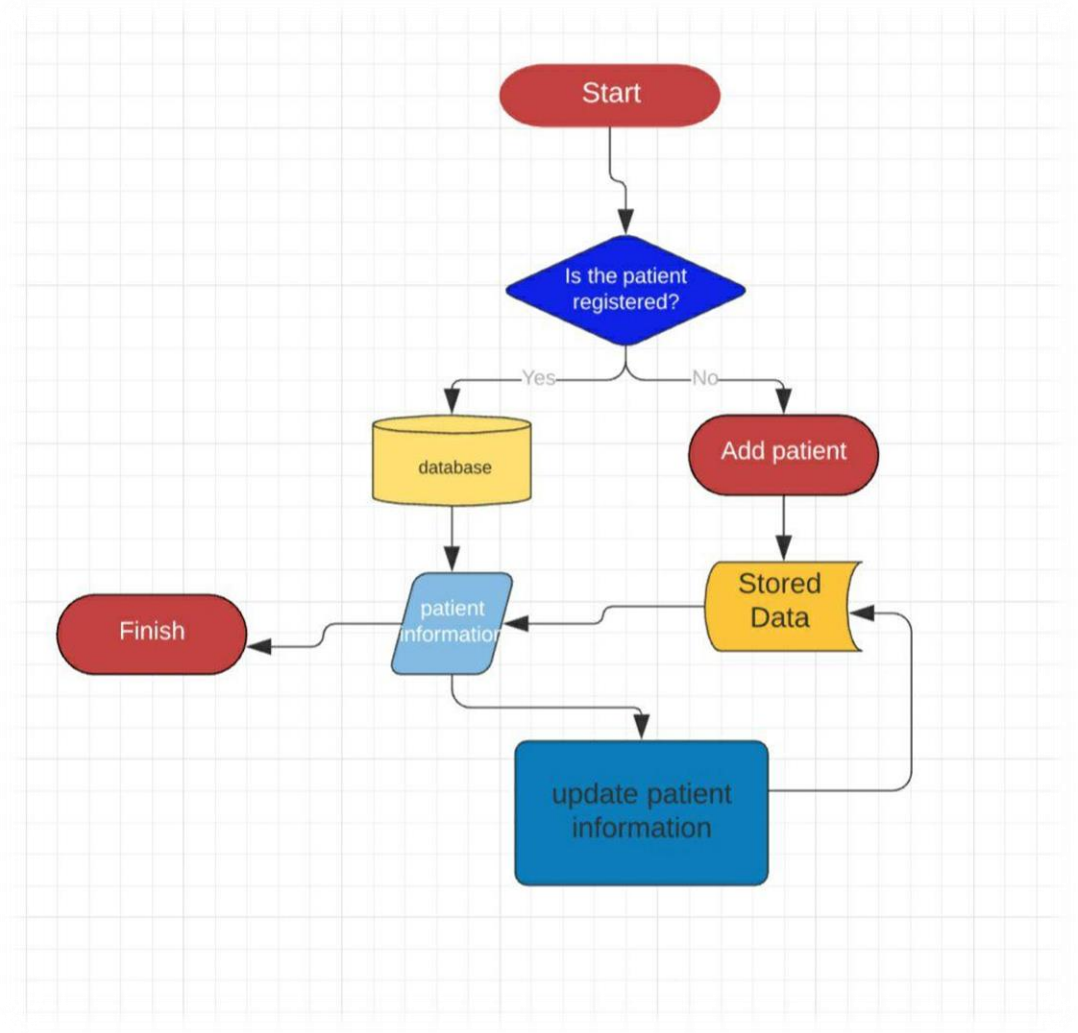
[7] C.Showell et al. mainly discussed the unnoticeable disadvantage of personal health records (PHRS) by saying " poor people have poor health" which means deprived people will not get any benefits from (PHRS) due to the high cost of the system. In another word, we advance healthcare for wealthy people without caring about the poverty people in our society and world.

However,[8] In this journal, B. J. Cherry, E. W. Ford, and L. T. Peterson had done interviews about the effect of Electronic health records (EHRs). The interviews were with supervisors, nurse managers, nurses, qualified nurse assistants, and other device users, the result was, users were satisfied with the system in terms of reasonable price, reducing working hours, and facilitating the nature of work.

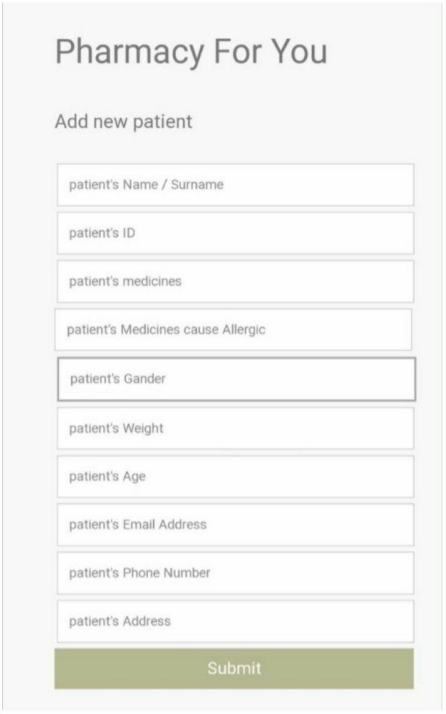
[9]In this article, J. Tsai and G. Bond made a comparison of electronic records to paper records in mental health centers. Electronic mental health records offered more accurate and faster medicine data than paper records; they were 40% fuller and 20% easier to retrieve on average.

[10] Additionally, this article discussed what if electronic health records affect the patient-psychiatrist relationship negatively, however, the result showed that there are no significant issues of disturbance in the relationship between patient and psychiatrist by using (EHR), even though (EHR) does not affect the relationship, it recommended to maintain a good communication style.

Materials and Methods Used in the Project:



Flowchart (1)

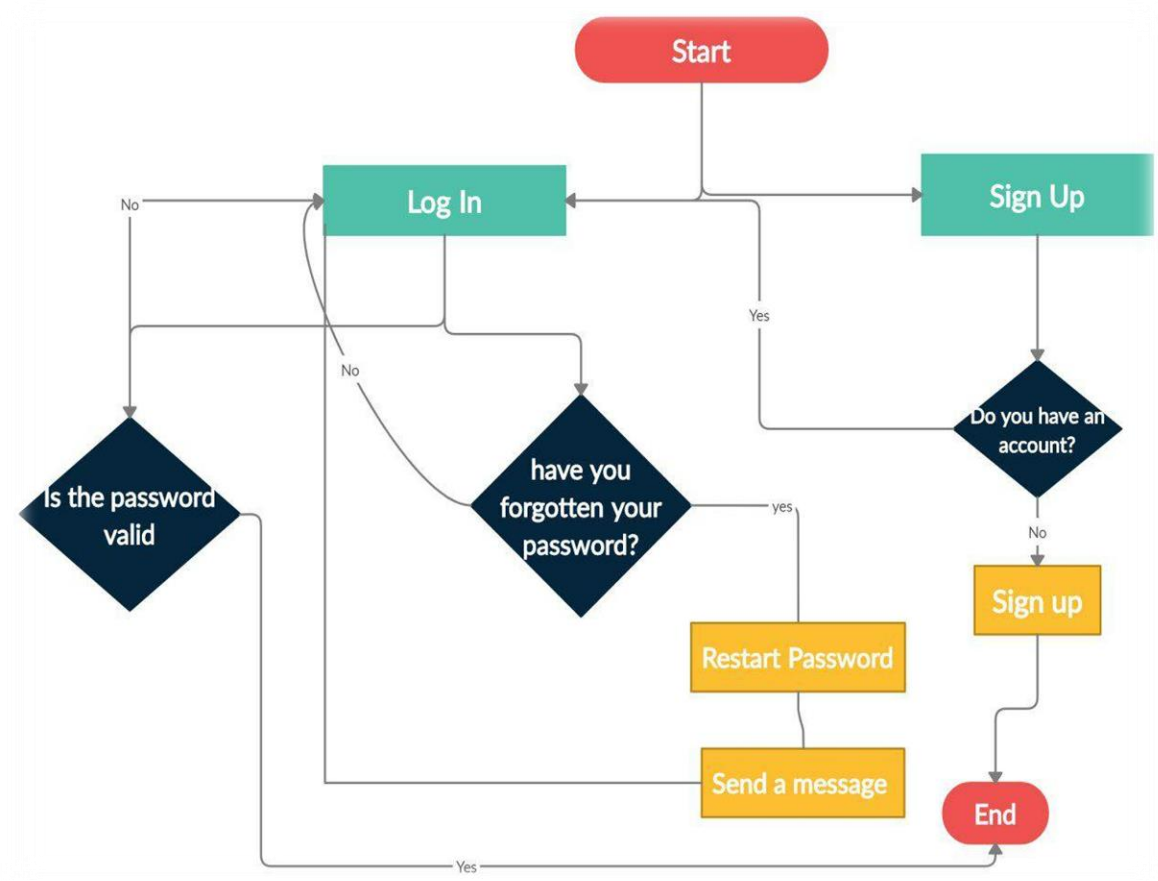


Pic(2)Update medicine **pic(1)Add new patient**

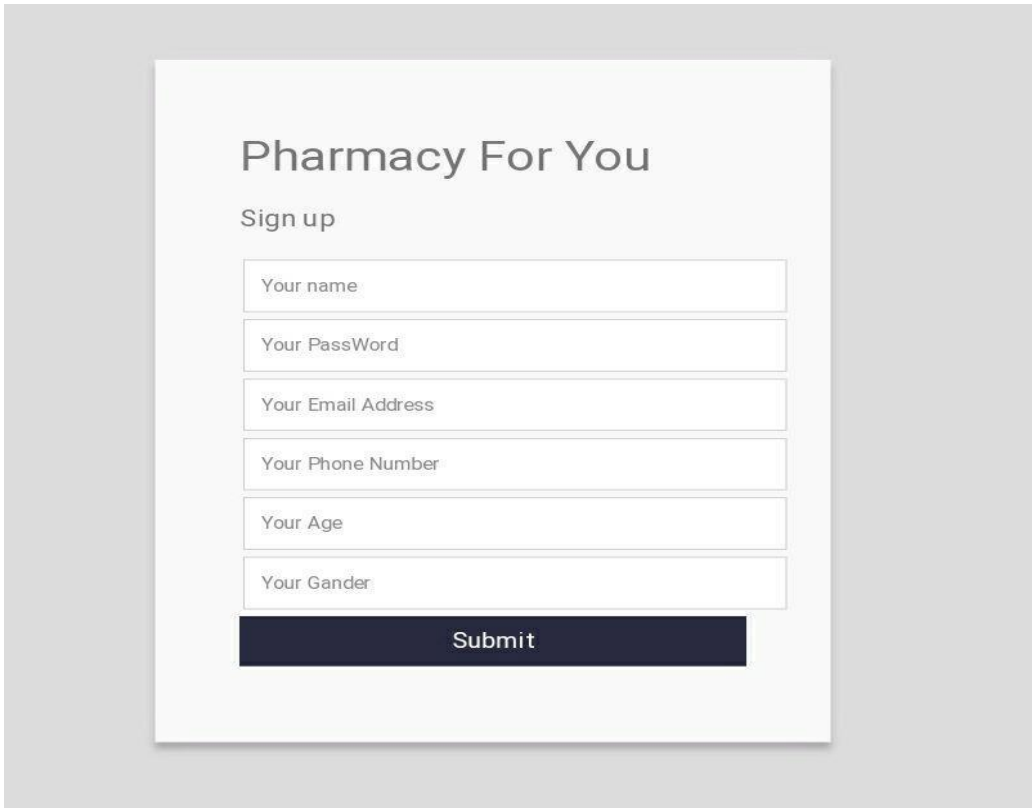
Pic(3) list of information

Flowchart (1) explains the software application for the pharmacy, if the patient id has been registered, his/her information will show up when the pharmacist will search for the patient name, Id, or phone number in the database. And the pharmacist can have a clear understanding of his/her

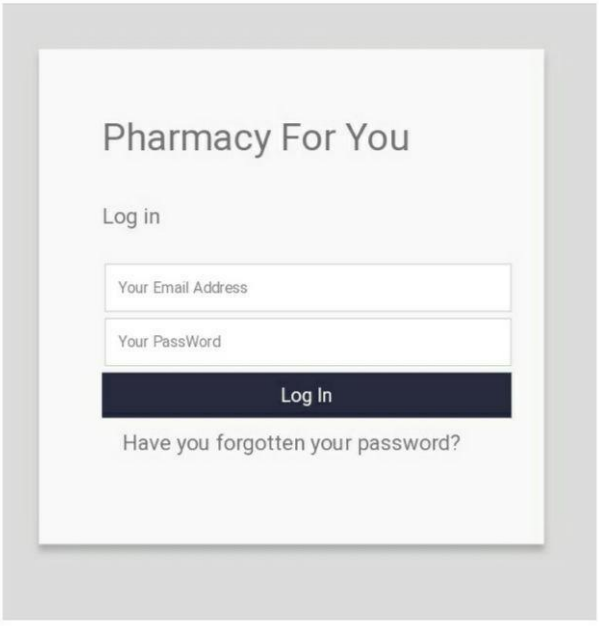
medical history, they will all the information such as (name/surname, medicines, medicines that cause allergic reactions, gender, weight, age, email address, phone number, address). The pharmacist can update **pic (2)** and add medicine to the patient and the information will be sent to the database. If the patient is not registered, he will be registered by the pharmacist **pic (1).** In the **pic (3),** the pharmacist can see all information of all patients and can search for specific info in the database of their pharmacy and they have access to the big database for all pharmacies.
Moreover, in the system the name of the pharmacy and the employee are also saved in the database, therefore when the patient gets his Prescription, he knows who is the person that given him the medicine ns the exact date.



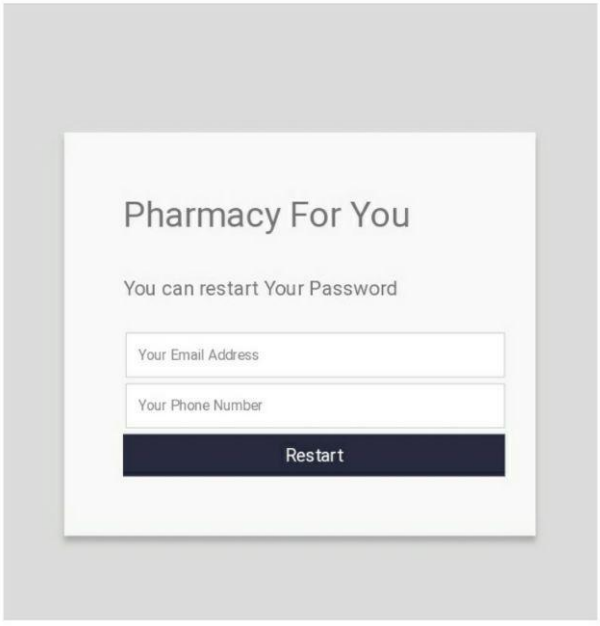
Flowchart (2)



Pic (4)

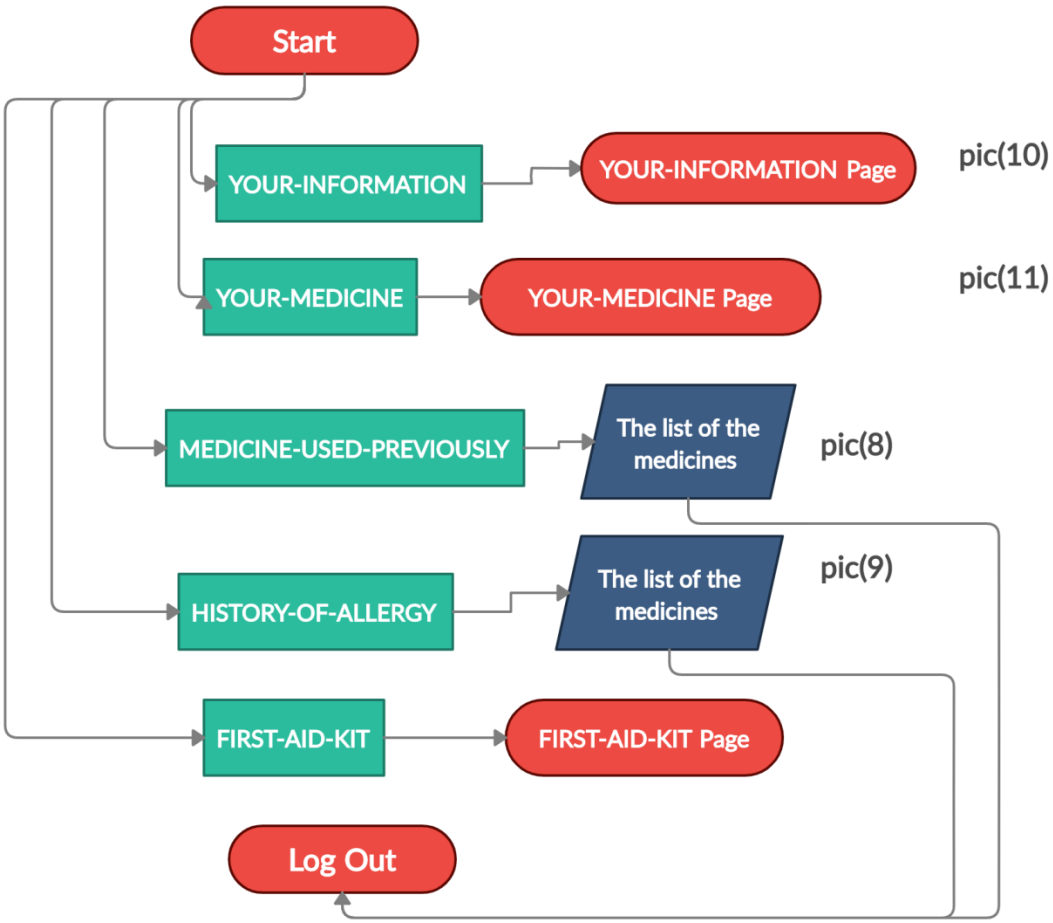


Pic (5)



Pic (6)

Flowchart (2) shows the phone application for the patient. If the patient had an account, he/she can log in **pic (5),** however, if he/she forgot his/her password, he/she can restate his/her password by choosing one of the two options, either entering their email address or entering their phone number as shown in **pic (6).** If he/she does not have an account, he/she can sign up **pic (4).**



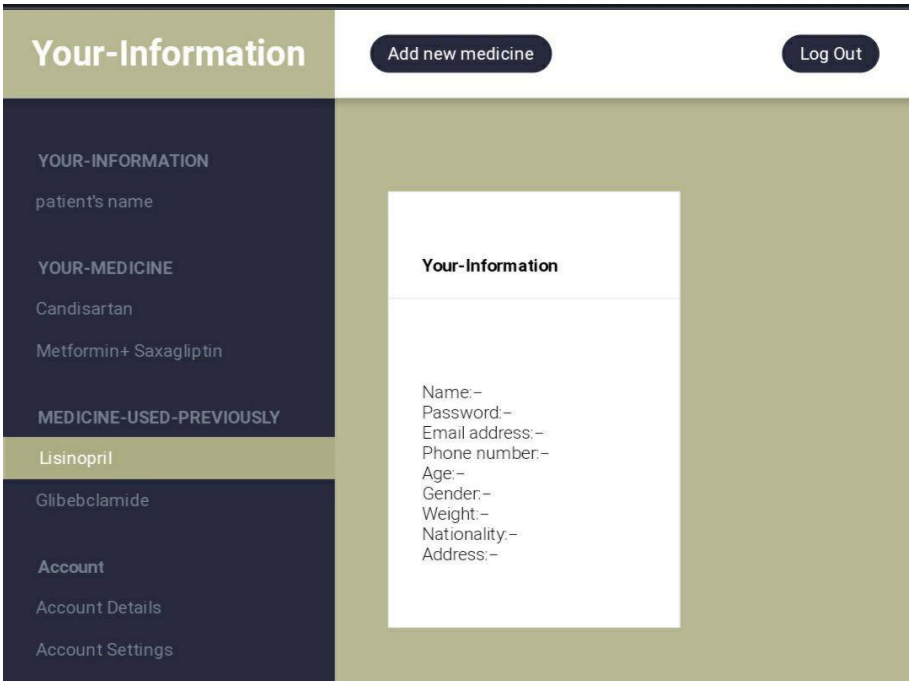
Flowchart (3)

Flowchart (3) shows the main page of the application, which has five components (YOUR-INFORMATION page, YOUR-MEDICINE page, on MEDICINE-USED-PREVIOUSLY, HISTORY-OF-ALLERGY, FIRST-AID-KIT page).

Pic (7)

Pic (8)

Pic (9)



Pic (10-part1)

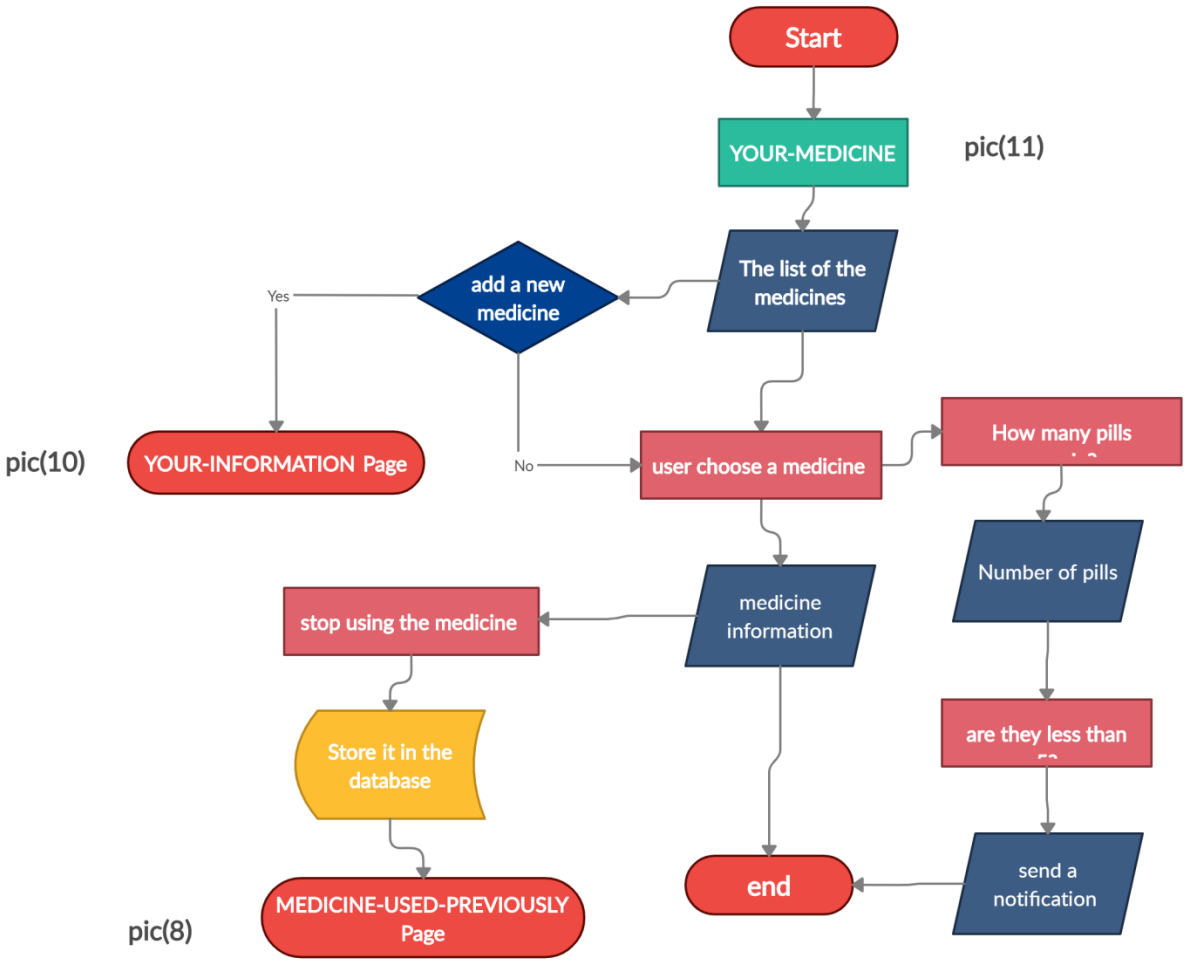
Pic (10-part2)

In pic(7), if the user clicks on YOUR-INFORMATION, it will take them to another page **pic(10-part1)** (YOUR-INFORMATION) and will show them information such as when they should take their medicine and the usage of their medication, their family medical record, and they can share their medicine schedule with any of their contacts and can the application will notify them about their medicine time, and they also can find the details about their account and the sittings.
From there, they can change their password, phone number, and email address. In addition, when the change occurs, the information will be automated changed in the software that pharmacy use, and by doing that we are trying to not lose any information related to our patients**. pic (10-part2).**

If the user clicks on YOUR-MEDICINE **Pic (11)**, it will take them to that page when they can see all information about their medicine.

If the user clicks on MEDICINE-USED-PREVIOUSLY **pic (8),** it will show them the list of medicines that they had used before, and if they click on a specific medicine, they can see when they started taking that medicine and when they stopped and from where pharmacy they purchased it.
Moreover, if the user clicks on HISTORY-OF-ALLERGY **pic (9)** the user can see the median and the chemical composition that the user may have an allergic reaction to it.

Finally, if they click on FIRST-AID-KIT, it will take them to that page where all information about first aid will be there. This page includes explanations of how someone can perform CPR, respond to heart attack, stroke, an allergic reaction, stop bleeding, etc.
They also can find the most important phone number such as Police – 155; Fire brigade – 110; etc.


Start
YOUR-MEDICINE
pic(11)
The list of the medicines
add a new medicine
Yes
No
pic(10)
YOUR-INFORMATION Page
user choose a medicine
How many pills
Number of pills
are they less than
medicine information
stop using the medicine
Store it in the database
MEDICINE-USED-PREVIOUSLY Page
pic(8)
end
send a notification

Flowchart (4)

Pic (11)

Flowchart(4)shows the YOUR-MEDICINE page when the users click on that page it will show them the list of their medicine which they have been using recently, they can click on one of them and see the side effects of their medicine and they also can now how many pills left.
İf the users choose to app a new medicine, the app will take them to **pic (10),** and when the change occurred, it will also be added to his database when the pharmacies can access them.
When the user chooses a medicine, the application will let them know how many pills left and if they are less than 5 it will send a notification to their phone if they have to keep continuing using that medicine and this will be extremely helpful for those patients who are suffering from choric illnesses.

Feature of the phone application:-
It is recommending the nearest pharmacy to your current location by using **the Global Positioning System** (**GPS**)and Breadth-First Search (BFS) algorithm to suggest the nearest way, and if the user knows what

is their medicine name, they can know where is the nearest pharmacy that has that medicine and this feature will save a lot of time for both the patient and the pharmacist, and that will happen easily because all medicine are entered to the software system by the pharmacist and because all the information are saved to the same database the user can reach the information by writing the name of their medicine and they can filter the result by the pharmacist that is open 24 or the one that is open now and they will found all the detailed related to the pharmacy (pharmacy name, phone number, address)

Some features of the software application, the pharmacist can search about the patient by whatever they want such as their name, phone number, ID, etc. We also offer to sort the medical information by index even though the information is sorted chronologically; the pharmacist can enter a list of keywords to accelerating the process, because the paten can go to many pharmacies in their life.

Discussion and Results:

In this invention, we have two main goals:-
Firstly, improve the quality of the medical service that will reduce human errors and facilitates the work of pharmacists and any other medical institution.

Secondly, offering a comfortable life to the patent, they do not need to know their medicine name anymore, they can find which pharmacy is selling their medicine, they will be reminded about their medicine time and how many pills had left, and all those features will make the patient life easier.

We will achieve that by providing accurate, updated, and detailed information about patients enabling faster access to patient records for more synchronized, effective care and sharing of electronic information with patients and other medical institutions.

Our invention could be applied to all medical services.
For example, we can merge the information of the patients with the hospital medical records, which will be extremely useful, especially in the emergency department because there they need two things: - accurate information and time. Moreover, this is what our invention is designed for. They can immediately have a reliable and accurate patient history, be alerts to patient allergies, and that will eliminate the need for patients to fill out the forms and repeat the details that already given which reduces the time that would be used to save the patient. Additionally, we can also apply it to the laboratories and merge it to the Lab Information Systems, and this would reduce the risk of missing or misplaced health records, including laboratory results, X-rays and imaging reports, and unnecessary medical tests. Overall, that will empower the cooperation between physician and patient because patients are presented with all appropriate information to make informed

and confident decisions about their health issues, treatment options, and overall well-being by offering a patient all information need

Like every invention, our invention has limitations such as high cost, it will be expensive to distribute this software to all pharmacies and keep maintaining it, also will take time for the medical staff to learn how to use it.
Additionally, it is challenging to keep the information safe from the intruders, and that always our number one concern because the user should feel safe enough to share their private information with us.

We can improve our invention by tracking the patients who having the same illness and taking different types of medicine that will lead to understanding which medicine is more effective considering the age and the gender of the patient and we can achieve that by using demographic methodology.
We also can merge the HES code to it by using the same QR code.
They can know all information about the patient, and that will be helpful because they can check all the medicine he had used before and they will have a clear understanding about his history because as we all know COVID-19 had affected each person differently according to on their immune system and they weakness.
As a result, we can gather all the health information under one database that can be used for all medical facilities.

References: Resources used in this section should be given.

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