Prototype Report

Cash Doctor 3.0 Mobile APP

Team 12

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Version History

Date	Author	Version	Changes made	Rationale
10/13/12	Ekasit	1.0	Original for CSCI577a; Tailored from ICSM PRO Template, separate prototype into screenshots section and core functionality section	To present overall workflow of the system and details about capability and limitation of core feature

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1. Introduction

1.1 Purpose of the Prototype Report

This prototype report is focusing on presenting design of proposed system. With navigation flow, screenshots, and descriptions of each screenshot, the report will serve development team as a medium to communicate with client about the product. This will expose capabilities that are missing, or discrepancy from client's expectation, in the design. Moreover, this visual representation will help us to obtain some requirements that may come up when client see the sample of actual product.

In addition, because Optical Character Recognition (OCR) functionality is very crucial for our project and it is too complex to develop from scratch, development team decide to employ open source named "Tesseract OCR" to develop this feature. Since our team has no experience with OCR technology, building this feature becomes the highest risk of the project. This prototype report will give client details about capability and limitation of this feature.

1.2 Status of the Prototype

This is an initial version of prototype report. Navigation flow, screenshots and their description are developed based on team's current understanding in the win conditions. Details about capability and limitation of OCR feature are described in the last section.

2. Navigation Flow
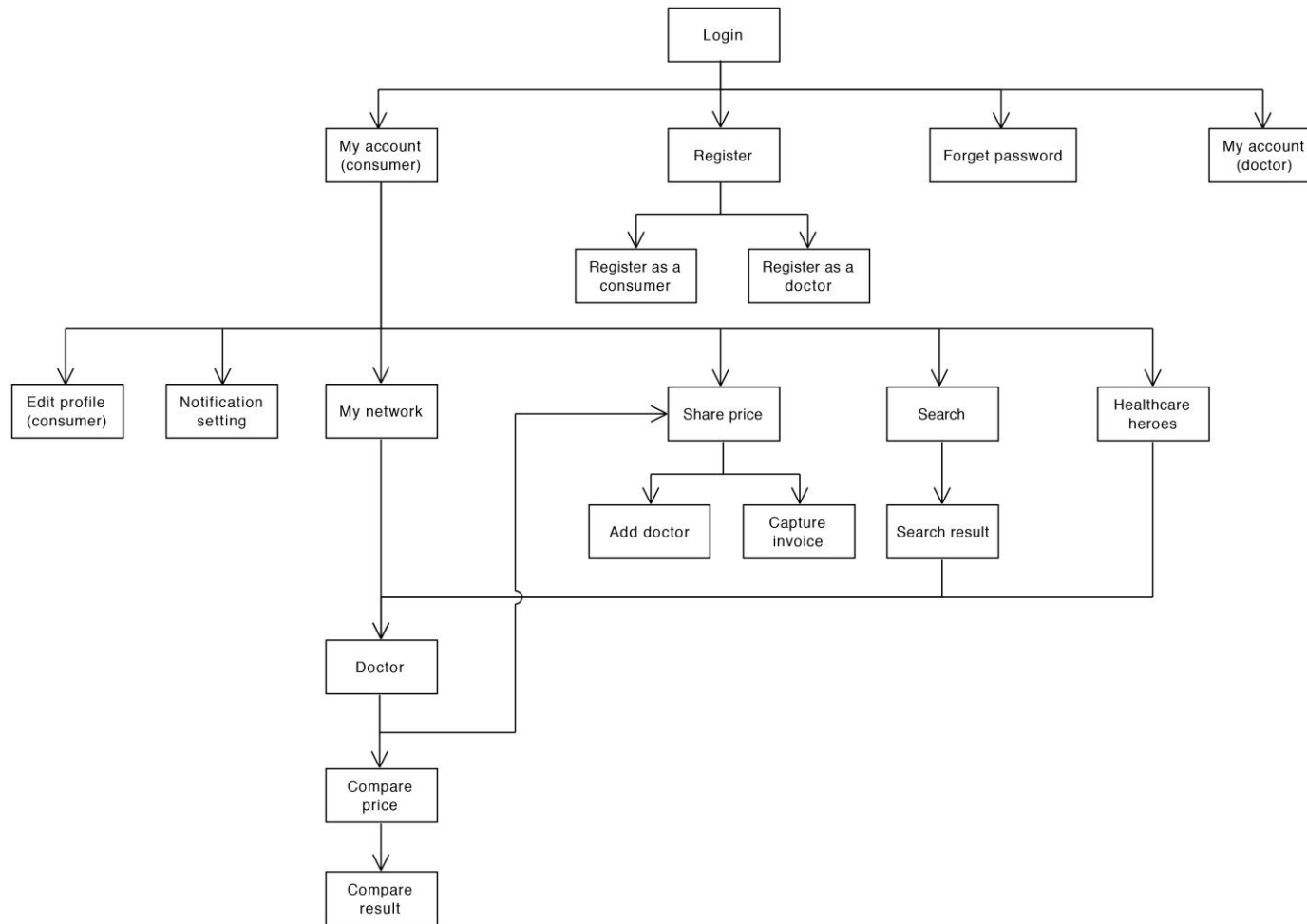
Figure 1: Navigation Flow of Cash Doctor System

3. Prototype Screenshot

Table 1: Login page

Description	Login page is the first page of this application. Users are required to login with their own account in order to use the application. Login session will help system to recognize users so that the system can provide information matching to their preferences. This page provides options to allow users request help when they forget their password and to register new account.
Related Capability	WC_3087: As a consumer I can access my existing account by user ID and password, I can view my existing dashboard. WC_3086: As a consumer I can register as a user.
Pre-condition	Users launch Cash Doctor application on their mobile phones.
Post condition	**Condition 1:** users enter username and password and then click "Login", redirect to my account page. **Condition 2:** users click "Forget password?", redirect to forget password page **Condition 3:** users click "Register new account", redirect to register page

Figure 2: Login page

Table 2: My account page (consumer)

Description	My account page (for consumer type account) is the page where consumers will receive updated information of doctors who consumers are subscribing. When users click menu, menu side bar will appear. Users can access many pages through list in the menu side bar.
Related Capability	WC_3087: As a consumer I can access my existing account by user ID and password, I can view my existing dashboard.
Pre-condition	Users account type consumer successfully login from login page
Post condition	**Condition 1:** if users click "My account", redirect to my account page (consumer) **Condition 2:** if users click "My network", redirect to my network page **Condition 3:** if users click "Share price", redirect to share price page **Condition 4:** if users click "Search", redirect to search page **Condition 5:** if users click "Healthcare heroes", redirect to healthcare heroes page **Condition 6:** if users click "Edit profile", redirect to edit profile page (consumer) **Condition 7:** if users click "Notification setting", redirect to notification setting page **Condition 8:** if users click "sign out", redirect to login page
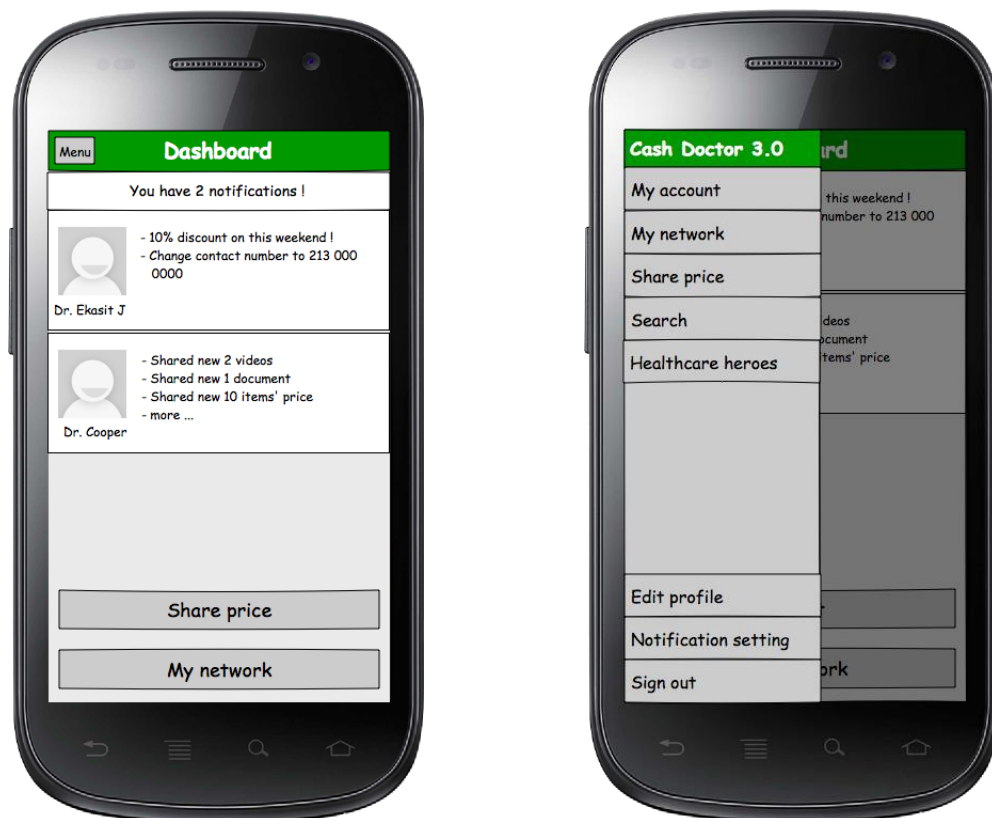
Figure 3: My account page (consumer)

Table 3: Edit profile page (consumer)

Description	Edit profile page allows users to change their information as well as change their account's password.
Related Capability	WC_3098: As a user I can subscribe to notifications so that I have access to relevant up-to-date information.
Pre-condition	Users click "Edit profile" from side menu bar
Post condition	After users click "Save change", their information will be changed according to data in this page. If users leave 3 fields of password blank, system will not change their password.
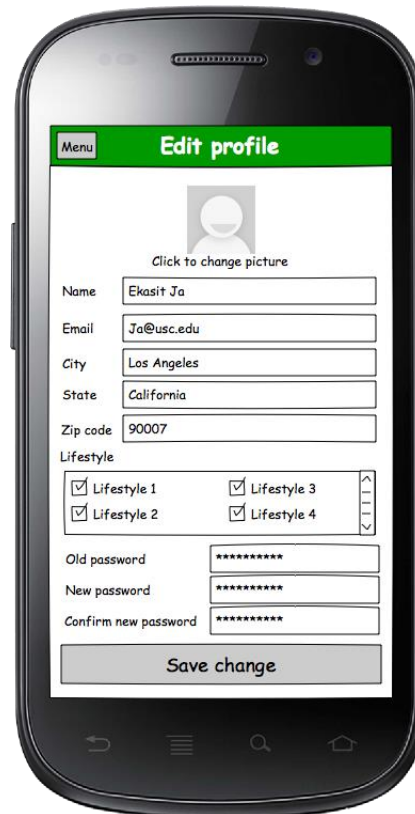
Figure 4: Edit profile page (consumer)

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Table 4: Notification setting page

Description	Notification page allows users to filter their notification. Therefore, users can choose to be noticed only when their preferred type of information is updated.
Related Capability	WC_3095: As a user I can filter notifications I Want to receive relating to the location, price, code, specialty, and provider.
Pre-condition	Users click "Notification setting" from side menu bar
Post condition	Users will receive only type of notifications that they choose to receive.
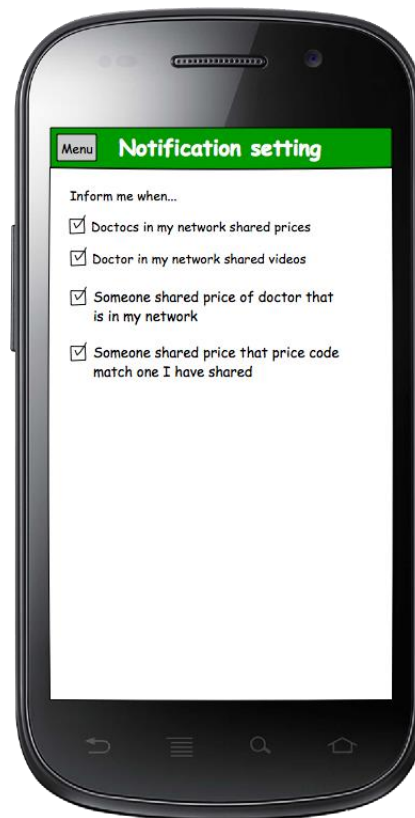
Figure 5: Notification setting page

Table 5: My network page

Description	My network page will display list of doctors whom users are subscribing. List will state briefly information about updated data. Users can click each doctor to go to doctor's page for more information.
Related Capability	WC_3088: As a consumer I can create a private network and join existing networks.
Pre-condition	**Condition 1:** users click "My network" from side menu bar or button in my account page **Condition 2:** users click "My network" from my account page (consumer)
Post condition	After users click select a doctor, redirect to doctor page of that doctor.

Figure 6: My Network page

Table 6: Doctor page

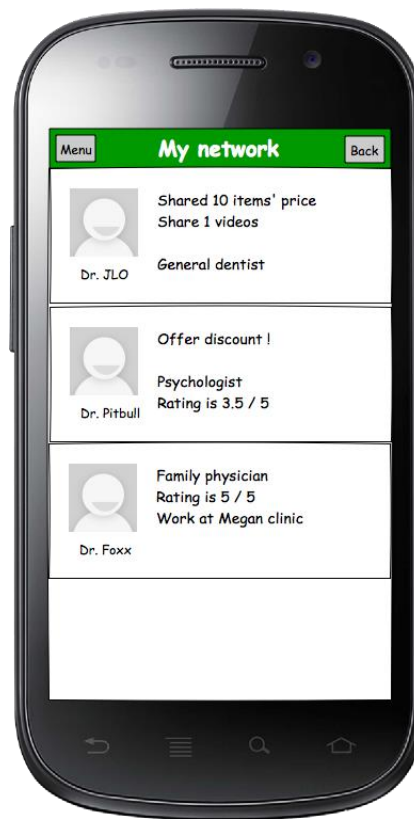|	
Description	Doctor page shows information of one doctor, for instance, profile picture, work address. This page also shows doctors' recent activities that they did such as shared price or update profile. Prices related to this doctor shared by consumers will appear on this page as well. Users can view offers, prices, videos, files related to this doctor via tab layout. User can share price related to this doctor as well as compare it with other doctors. Users can rate and review doctor, subscribe or unsubscribe on this page.
Related Capability	WC_3098: As a user I can subscribe to notifications so that I have access to relevant up-to-date information. WC_3091: As a consumer I can rate a provider. WC_3089: As a consumer I can create a review of a provider.
Pre-condition	Users click to select doctor from my network page, search result page, or healthcare heroes page
Post condition	**Condition 1:** if users click "Share price", redirect to share price page **Condition 2:** if users click "Compare price", redirect to compare price page **Condition 3:** if users click red pentagon to rate doctor, textbox will popup to allow users enter their review about this doctor. After users submit their review, system will save the score and review into database and calculate new average rating score of this doctor. **Condition 4:** if users click "Subscribe", system will save this action. The system will notice users if there is any update about this doctor. "Subscribe" will change to be "Unsubscribe" to let users stop subscribing this doctor.
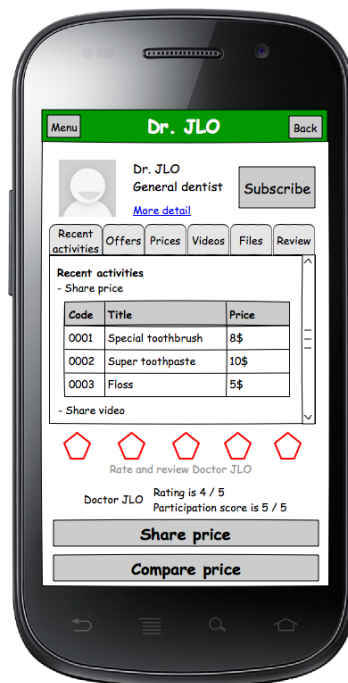
Figure 7: Doctor page

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Table 7: Compare price page

Description	Compare price feature allows user to select multiple doctors in order to compare their price list.
Related Capability	WC_3090: As a consumer I can compare healthcare prices.
Pre-condition	Users click "Compare price" from doctor page
Post condition	After users click "compare price", system will query prices of all selected doctor and create price comparison table, then redirect to compare result page
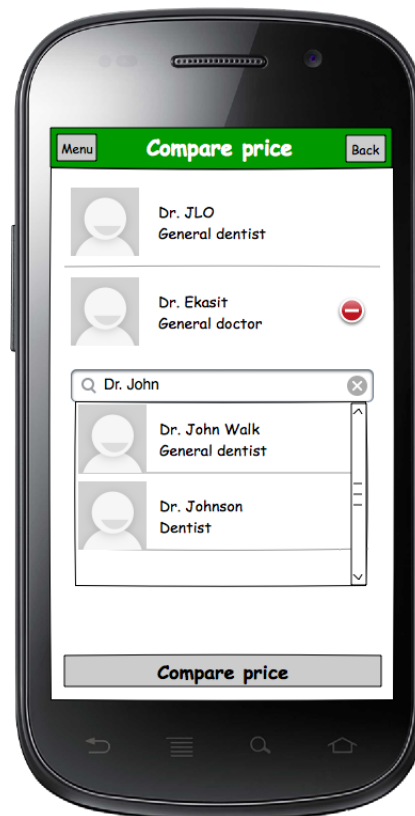
Figure 8: Compare price page

Table 8: Compare result page

Description	Compare result page will query system for all prices of selected doctors and create table to display the price comparison. Items that doctor has no price will be blank.
Related Capability	WC_3090: As a consumer I can compare healthcare prices.
Pre-condition	User select doctors and click "Compare price" from compare price page
Post condition	This page is only for display purpose. There is no next step for this page. Users may click "Back" or "Menu" to redirect to other pages.

Figure 9: Compare result page

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Table 9: Share price page

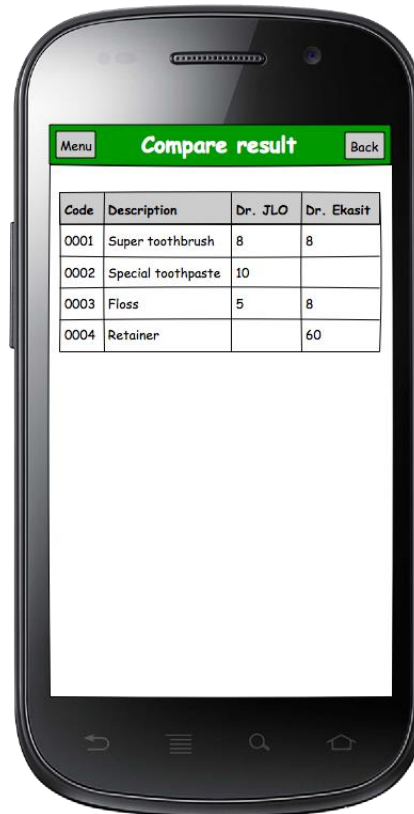| Description	Users can share price related to the doctor in this page. If users cannot find doctor in search box, they can add new one. Users have 2 options to provide price data. One is typing it manually. Second is capture photo of their bill. Sharing price will be the main function that drives medical price transparency.
Related Capability	WC_3083: an individual consumer can manually enter price information for sharing. WC_3082: An individual consumer can capture an image and code an invoice for sharing.
Pre-condition	**Condition 1:** if users click "Share price" from doctor page, doctor name field will be filled up by the system. **Condition 2:** users click "Share price" from side menu bar, all fields will be blank in this condition **Condition 3:** users click "Share price" from my account page, all fields will be blank in this condition
Post condition	**Condition 1:** if users click "Add doctor …", redirect to add doctor page **Condition 2:** if users click camera button, call feature camera of mobile phone, after users take a photo, redirect to capture invoice page **Condition 3:** if users click "Share", redirect to doctor page of selected doctor. System saves price information into database and then sends notification to all consumers who are subscribing this doctor.

Figure 10: Share price page

Table 10: Add doctor page

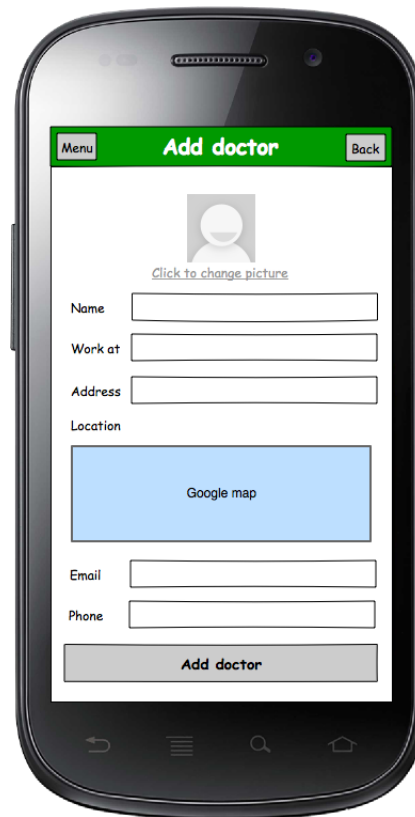| Description	Add doctor page allows user to create doctor while they are trying to post the price but they cannot find doctor in the search box.
Related Capability	This is proposed page beyond expected capability. It is necessary to allow users share information about doctor even that one has no account yet.
Pre-condition	Users type doctor name in search box of share price page and then click "Add doctor …"
Post condition	After user provide doctor's information and click "Add doctor", system will create doctor with provided data and redirect back to share price page

Figure 11: Add doctor page

Table 11: Capture invoice page

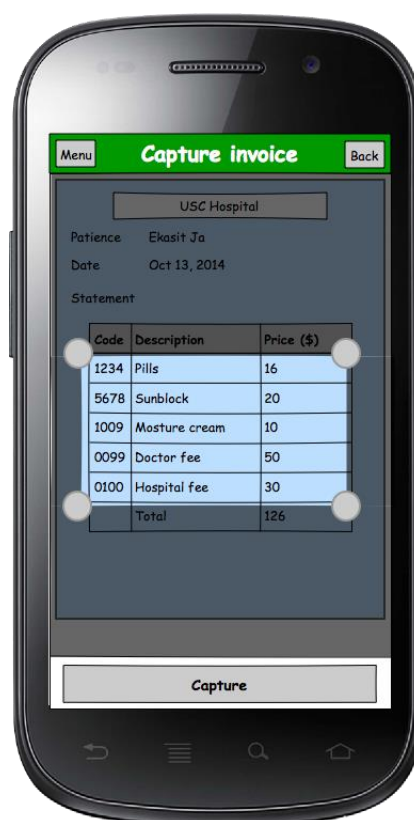|	
Description	Capture invoice page will help Optical Character Recognition (OCR) feature to perform work more efficient. After capturing photo from device's camera application, Users can choose focus area in order to reduce work of operation so that Cash Doctor application does not have to try to recognize text of the whole photo.
Related Capability	WC_3082: An individual consumer can capture an image and code an invoice for sharing.
Pre-condition	Users click camera button from share price page and successfully take a photo.
Post condition	After users click "Capture", redirect back to share price page and system fill up code, description, and price fields in the page with text recognized from captured photo in the focus area.

Figure 12: Capture invoice page

Table 12: Search page

| Description	Search page allows users to search for doctor with many criteria. Users can search for doctors by location, price code, specialty, lifestyle, or rating score. All fields will come up with empty value, users can fill up only fields that they want to search and leave the rest blank.
Related Capability	WC_3094: As a user I can find my current location so that I can access relevant providers in and around area (some mile radius). WC_3084: An individual consumer can search for healthcare pricing, provider by location, price, code, and specialty.
Pre-condition	Users click "Search" from side menu bar
Post condition	After users click "Search", get search criteria from field that is not blank then. System search for doctors that match criteria and redirect to search result page.
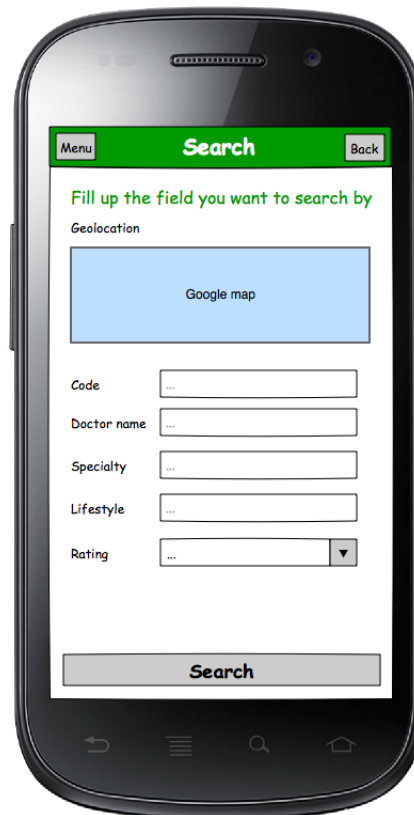
Figure 13: Search page

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Table 13: Search result page

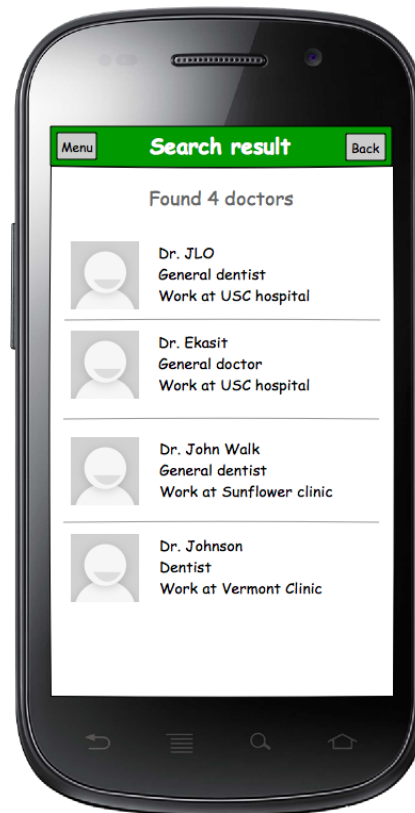| Description	Search result page will display doctors that match provided criteria from search page. Users can click each doctor to go to doctor page of that doctor and get more information.
Related Capability	WC_3094: As a user I can find my current location so that I can access relevant providers in and around area (some mile radius). WC_3084: An individual consumer can search for healthcare pricing, provider by location, price, code, and specialty.
Pre-condition	Users click "Search" in search page
Post condition	After users click select doctor, redirect to doctor page of that doctor.

Figure 14: Search result page

Table 14: Healthcare heroes page

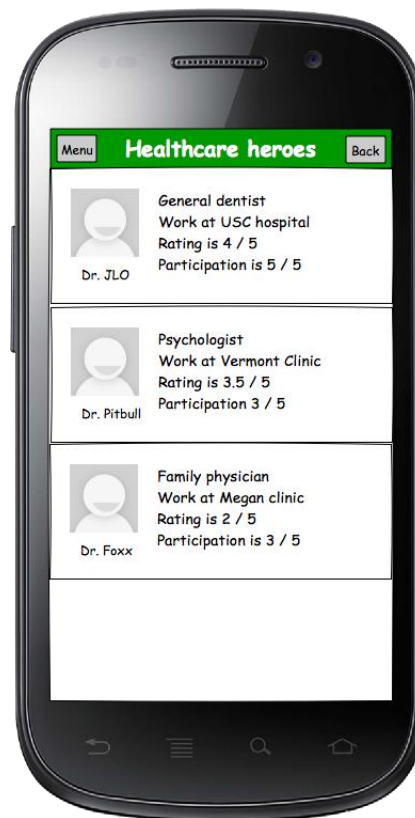| Description	Healthcare heroes page is a page that show list of doctors, who are near to your location, ranking by participation score. Participation score is a score given by numbers of activities that doctor has done. For instance, the more price that doctor shares, the more participation score he gets. This will drive doctors to share information in order to advertise themselves and provide alternative score for users to determine about doctors.
Related Capability	WC_3093: As a provider I can share pricing, offerings, and other content so that I can drive traffic and increase sales.
Pre-condition	Users click "Healthcare heroes" in side menu bar
Post condition	After users click select a doctor, redirect to doctor page of that doctor.

Figure 15: Healthcare heroes page

Table 15: Register page

Description	Register page is the page where users can create new account. There are 2 types of account. First is consumer who receives information from account type doctor. Second is doctor who provides information to users as well as offer special event such as discount.
Related Capability	WC_3086: As a consumer I can register as a user.
Pre-condition	Users click "Register new account" from login page
Post condition	**Condition 1:** if users click "Register as a consumer", redirect to register as a consumer page **Condition 2:** if users click "Register as a doctor", redirect to register as a doctor page **Condition 3:** if users click "Back", redirect to login page

Figure 16: Register page

Table 16: Register as a consumer page

Description	This is a page for creating account type consumer.
Related Capability	WC_3086: As a consumer I can register as a user.
Pre-condition	Users click "Register as a doctor" from register page
Post condition	**Condition 1:** After users provide all required information and click "Register", create consumer account, auto login, and redirect to my account page (consumer). **Condition 2:** if users click "Back", redirect to register page

Figure 17: Register as a consumer page

Table 17: Register as a doctor page

Description	This is a page for creating account type doctor.
Related Capability	There is no related win condition about this page. However, it is essential to have account type doctor that will be the page to provide much useful information for account type consumer.
Pre-condition	Users click "Register as a doctor" from register page
Post condition	**Condition 1:** After users provide all required information and click "Register", create doctor account, auto login, and redirect to my account page (doctor). **Condition 2:** if users click "Back", redirect to register page

Figure 18: Register as a doctor page

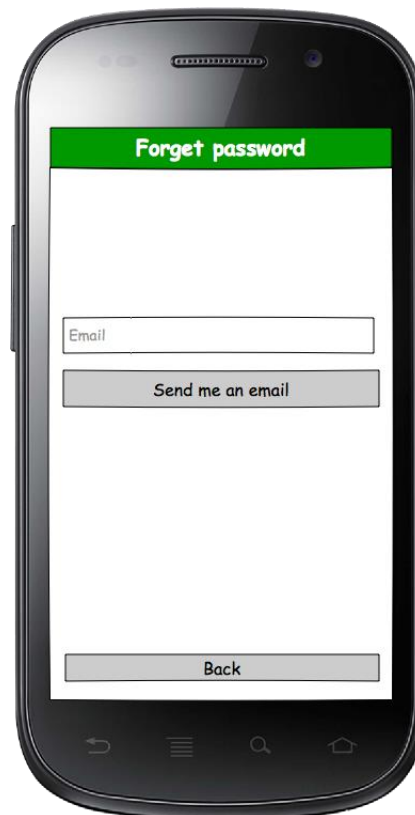| Description	Forget password page helps users to retrieve their password in case they do not remember it.
Related Capability	There is no related win condition about this page. However, it is crucially important to provide helps for users who forget their password.
Pre-condition	Users clicks "Forget password?" from login page
Post condition	**Condition 1:** After users enter email and click "Send me an email", System send password to that email and redirect to login page. **Condition 2:** if users click "Back", redirect to login page

Figure 19: Forget password page

Table 19: My account page (doctor)

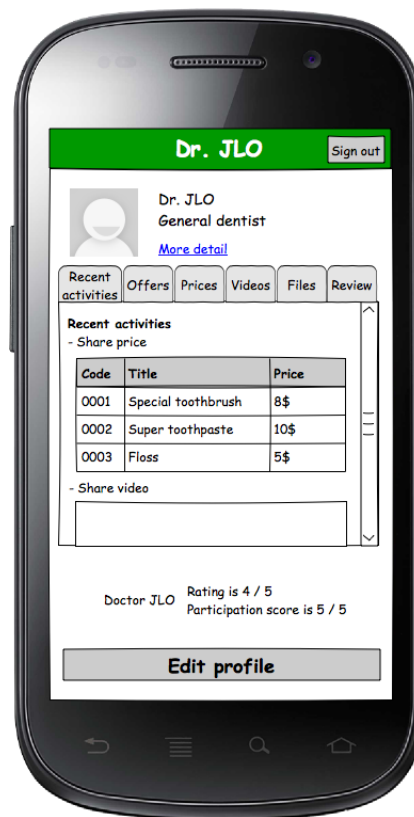| Description	My account page of doctor accounts is a preview page of how consumer accounts see doctor's profile page.
Related Capability	WC_3187: As a provider I am able to push content to users that is unique to their personal profile. WC_3093: As a provider I can share pricing, offerings, and other content so that I can drive traffic and increase sales.
Pre-condition	Users account type doctor successfully login from login page
Post condition	**Condition 1:** if users click "Edit profile", redirect to edit profile page (doctor) **Condition 2:** if users click "Sign out", redirect to login page

Figure 20: My account page (doctor)

Table 20: Edit profile page (doctor)

| Description	Edit profile page (doctor) is the page for updating doctor profile page. Users can select tabs offers, prices, videos or files to update the information.
Related Capability	WC_3187: As a provider I am able to push content to users that is unique to their personal profile. WC_3093: As a provider I can share pricing, offerings, and other content so that I can drive traffic and increase sales.
Pre-condition	Users clicks "Edit profile" from my account page (doctor)
Post condition	**Condition 1:** if users click "Save change", redirect to my account page (doctor) and system send notification to all consumer accounts that are subscribing this doctor. **Condition 2:** if users click "Back", discard all change and redirect to my account page (doctor)
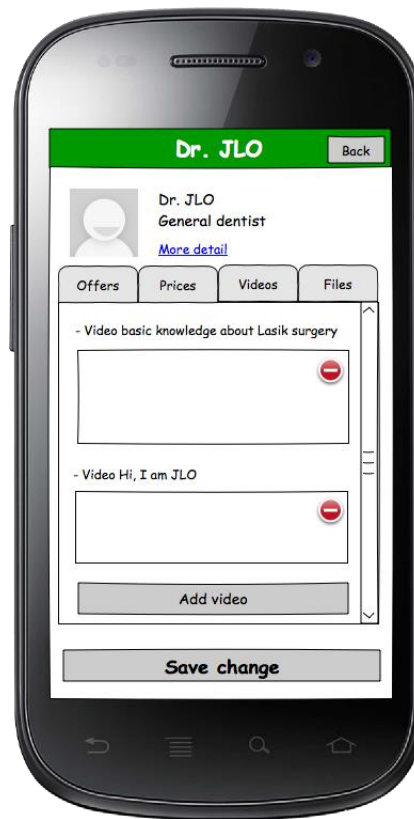
Figure 21: Edit profile page (doctor)

4. Prototype Functionality

The goal of this project is to make medical price transparency by persuasion people to share prices of their medicines and services fee. The first problem that comes up with this idea is providing a long list of medical bills will be tedious especially if users have to type it manually. Therefore, Optical Character Recognition (OCR) feature that helps users to extract text from capturing photo of their bill and type it automatically will be a great encouragement that makes people fun and feel easy to share the price. Hence, the OCR feature becomes crucially important and has a very high priority for our project.

However, development team has no experience in this OCR technology at all. Moreover, building the OCR from scratch is impossible within given schedule. Therefore, our team decides to employ open source of OCR technology and implement it in our application.

Our first platform for the application is Android. Therefore, we are focusing on OCR open source that can be used with Java programming language. After conducting research, we found 2 open sources of OCR technology that are Tesseract OCR and Java OCR. Both are famous and can be use in Java. Then, our team decides to make prototypes of OCR feature from these 2 open sources.

4.1 Tesseract OCR

Tesseract OCR is originally not Java but C programming language. However, there are communities that encapsulate Tesseract into Java. After testing this OCR, using encapsulation of Tesseract indicate no any sign problem about compatibility.

Screenshots below are sample of prototype application. Left picture is photo of prototype application. Middle picture is photo printed material that we use in testing. Right picture displays the result of text recognition.

After testing with several photos, we found that Tesseract cannot recognize text from handwriting materials at all. This will be its limitation. However, we design to use OCR as an auto-fill form that users can edit text later. Therefore, this limitation will not be a serious issue that prevents users from using application.

Because Tesseract on Android is an encapsulation of C programming language, the performance will be poor than original Java program. In addition, the more character on page, the longer time OCR will take to recognize text. Tesseract may consume high performance resources of mobile phone. Low performance phone users may feel unhappy with the feature because it takes too long time.
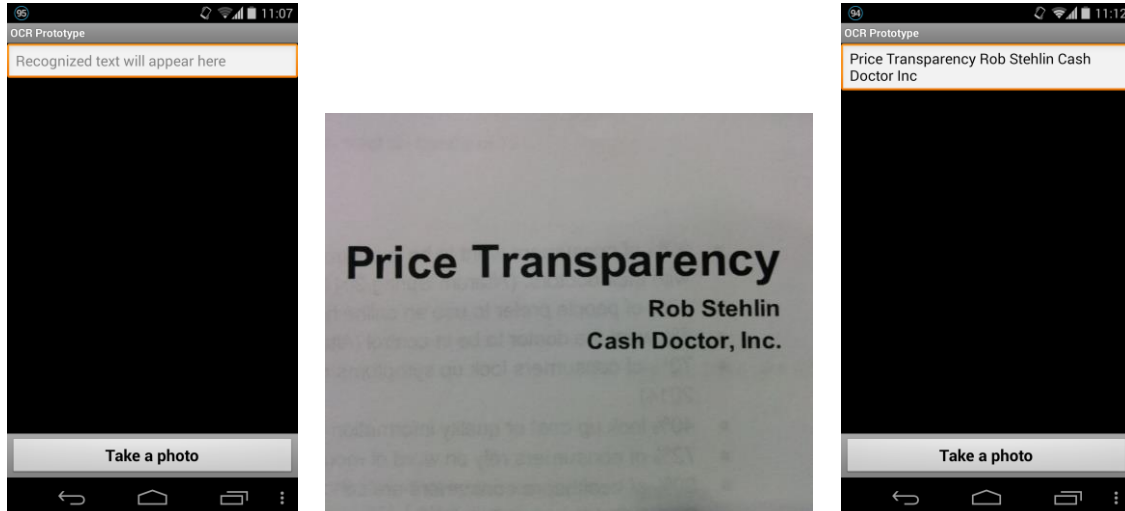

Figure 22: Tesseract OCR screenshots

4.2 Java OCR

Java OCR is developed in Java programming language. Its performance will be better than Tesseract. However, in order to make the OCR recognize text, we need data file that help the OCR to determine the text. The bigger data file will increase the accuracy of result. However, it will increase time consumption as well. After testing, we found that both Tesseract and Java OCR have no significant different in performance.

Below pictures are screenshots of sample prototype. Left picture is a photo of the application. Right photo is result of application trying to recognize text.

However, the disadvantage of Java OCR is that there is no update since 2012. Train data of Java OCR is not available so that we have to build train data ourselves. Conducting this train data will take too much effort. Moreover, Java OCR has very little documents. Most of OCR communities have moved to Tesseract OCR. This becomes a huge difficulty for our team in using Java OCR open source.
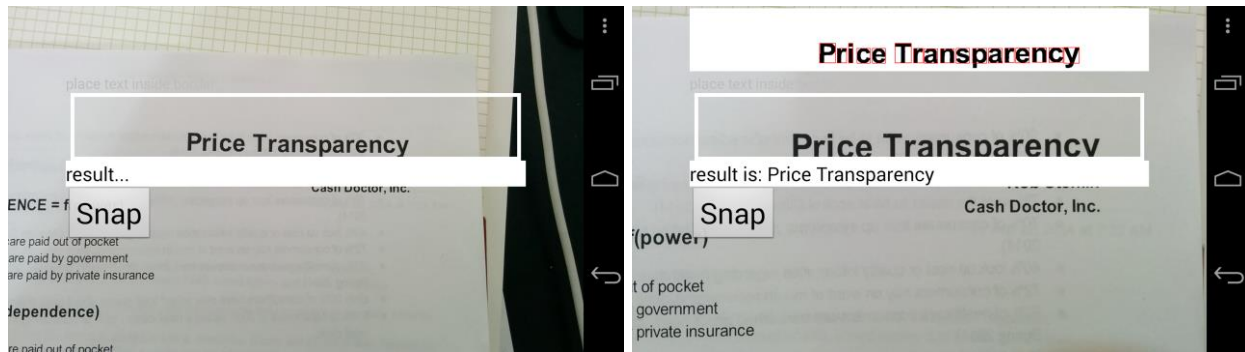

Figure 23: Java OCR screenshots

Because there is no significant difference in technology between Tesseract OCR and Java OCR, development team decide to employ Tesseract OCR open source to use in our application because it has better documents and has a stronger communities.