M*HEALTH* FOR HIGHER EDUCATION

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ABSTRACT

Better education is required better advanced tools to be used for students. Smart phone becomes main part of our daily life. New medical design interface is introduced for medicine student based mobile. The Graphic User Interface must be easy and simple. The main interface design issue for mobile is simple and easy to use. Human Mobile Interaction-HMI is the most advanced research area at present time. This research work is introducing new HMI for On Table Counter-OTC. OTC is the medicine that can sold directly to a consumer without a prescription from a healthcare professional. This research paper is introducing and creating new advanced teaching tool for higher education especially medical (Pharmacy) students using smart phone. Advanced MHealth system for basic symptoms applied for training medical student to have the best selection (diagnose). The MHealth system will give small and best list of Free Prescription Medicine - FPM using mobile device platform. Johnson &Johnson (J&J) Medicine Company has been used for creating our HMI mHealth database. It has one of the biggest OTC database medicine companies worldwide. J&J database is used for developing the proposed mHealth system. The main goal of this research work is designing smart and simple HMI interacting interface for the Mobile device. The research goal has been achieved. The OTC database size for mobile memory was 400KB. The proposed research work has been completed and new advanced HMI based mHealth application has been introduced.

Keywords: HMI, higher education, OTC, mHealth, mobile

INTRODUCTION

This research project is present new intelligent HMI package for smart phones platform to provide new Distance Learning for Higher education. The Free Prescription Medicine (OTC) System for mobile devices research project is came to mind to provide an easier and more useful way to improve higher education training tools. Medicine students are required to exam and learn more about medicine types, dosages and what is used for. The medicine options are classified and displayed based on the learner (user's) selection. It does display main symptoms on the main screen of the smart phone and in this way the mobile phone device enables students (learner) to see all the medicine options for patient's specific condition. The advance features in smart mobile devices enable us to provide immediate medical services. These medical services include provide basic OTC or free prescription medicine to user and/or the student around 24/7/365. HMI for mHealth ability to provide medicines in different levels of illness at any time and it gives better and safer services for patients and will enable the medical authorities to improve their services such as waiting queues emergency and services.

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For higher education, it will improve the medical student's skill and improve their medicine (drug) knowledge.   It is important that we have a touch of the technology to improve our healthcare system in such lifestyle we have now. Advances in technology make it for us easy to find solutions for such problems and give additional health control for the authorities.   The advances in Internet and/or building advanced intelligent package for mobile enable us provide free prescription medicine for any user could be beneficial form it. Introducing HMI based OTC is providing medical serves to huge number of users (patients) and it is help to control of spreading symptoms.

RELATED RESEARCH WORKS

The pedagogical triangle must take into account in the E learning contexts (A. Aburas, 2006), (Rosalind Keene, 2001), (Verduin, J.R. & Clark,T. A, 1991), (Leslie Painter,2001) and (Mulhauser, Max,1995). Two elements in this case, first of particular importance is the group and second is the mediation context.   In the (Rding, P., 2001), (Salmon, G. E-Moderating,2000) and (Schn, D,1990) have showed that in a learning environment, the social and the culture interaction and the cooperative work such as Medical Doctor in a community of learner has influence on the intern structure of the learner cognitive form (G. C. Roman,2000). Our software system is based on the principle that learner enriched also itself through the data exchanges. The confrontations are the competition and the interactions between both the learner and the FPMS. In this work, we introduce innovation new smart package for smart mobile and describe the FPMS as an interactive learning environment in the distant diagnosis context using either Internet or independent machine platforms. The achieved system is a software framework of Electronic Data Interchange-EDI dedicated to the relational Medical Manager database integrated with a special hardware interface. For the communication between the learners (users) we used must robust and integrated medical information and education tools (HCI) including advanced health notices and printed completed instructed prescription.

This project consists of two parts which are creating a database and forming interface. The database includes all the free prescription medicines of a company. For this aim the Johnson & Johnson Drug Company has been chosen because it is very big company in the drug industry and it has big number of free prescription medicines. Our database used Johnson & Johnson (www.jnj.com). J & J Company is the world's most comprehensive and broadly based manufacturer of health care products, as well as a provider of related services.

In research (J. Gong and P. Tarasewich,2004) they suggest that four of guidelines readily translate to mobile devices, including: enabling frequent users to use shortcuts, offering informative feedback, designing dialogs to yield closure, and supporting internal locus of control. The remaining rules must be modified to be made applicable to mobile development (J. Gong and P. Tarasewich, 2004). Context-awareness (G. C. Roman, G. P. Picco, and A. L. Murphy, 2000) is novel feature and one of the primary factors of our GUI design which is forming FPM interface to be popularity of one of the best mobile applications (A. I. Wasserman , 2010). There have been several main researches in attempting to create applicable user interface for smart devices (F. Balagtas-Fernandez, J. Forrai, and H. Hussmann, 2009).   Each mobile platform (manufacture) has different guide to address developer user interface requirements. Mobile interface applications must be dynamically and self-adapt to provide easy access and reduced communication with users.

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As a result, it should be using methods of software engineering (G. C. Roman, G. P. Picco, and A. L. Murphy, 2000) such as systems requirement specification approaches like RELAX J. Whittle, P. Sawyer, N. Bencomo, B. H. C. Cheng, and J.-M. Bruel, 2010). Graphical User Interface design is one of the most important considerations of quality of an application and acceptation it by the user for smart phones (J. Gong and P. Tarasewich, 2004). Android operating system provides secure and simple way to designing user interface (G. C. Roman, G. P. Picco, and A. L. Murphy, 2000).

OTC DATABASE STRUCTURE AND DESIGN

The database and its interrelated tables as illistrated in Figure: 1, places the most important part of the project. It has created carefully to be simple and clear. This database includes commercial name, scientific name, dosage, drug type, availability, symptom informations, directions to use, age limitations, duration, volume, side affects, warnings, advise and image of each product. The database of free prescription project is created using the Johnson & Jonson medicine company. It is constructed using MySQL. The database consists of group of small tables which are *age, available_in, disease, disease_and_symptoms, symptoms, drug type, duration and flavor*. Database is created with the aim of minimizing the size of the database and the jj_*freeprescriptipn_medicine* table is created as the main table of the database. In total 96 medicines are existed in our OTC database. The big medicine company J&J is used for building up MHealth system Mobile database. The database has OTC J&J which is the main table of the medicines. It contents all the prospectus information of each medicine such as name, type, age, flavor, duration, warring and for whom. The OTC database has been minimized using the standard data mining techniques. Data mining techniques is not part of this research paper. The description of each table is in the following sections.
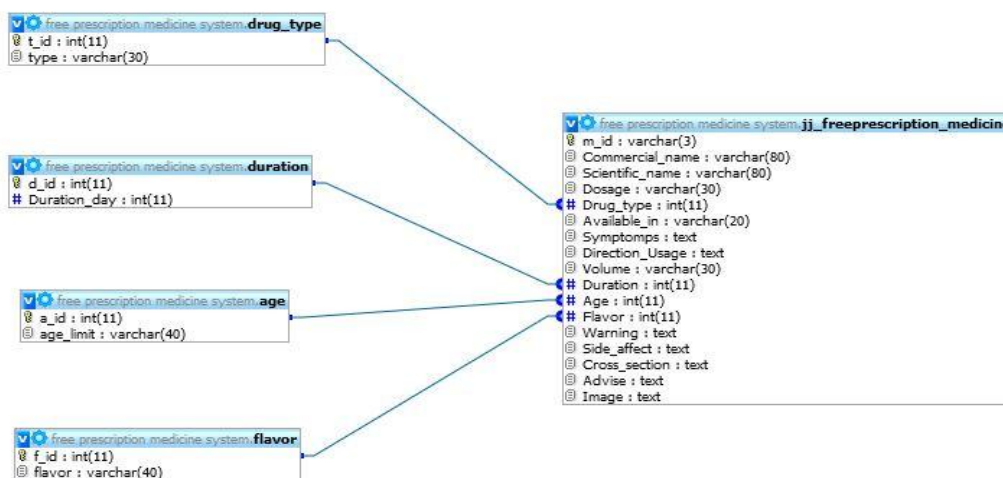

Figure: 1
Database relationships

Age
Age is one of the key factors for diagnoses process as in Figure2. Age limitations are named by different terms. These terms are baby, toddle, child and adult. An age between 0-2 is called as baby, 2-6 is called as toddle, and age between 6 and11 is called as child and 12 and over is called as adult. Age is one of the keys decision to obtain the suitable medicine.

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Figure: 2
Ages

Duration

Duration of taken a medicine most be known for any single medication course. Duration table is designed with 6 variables and id number that are assigned to each variable. These variables are specified by looking all the medicines duration times and/or days. This table will provide an important information to help the patient of how the medicine could be use and taken.

Flavor

Some of the available medicine is not tested in the favorite of the patient specially children. The medicine manufacture have added different flavor to the some medicines. FPM is made with different flavors so kids could drink it easily. Flavor table lists all the types of existing flavor of medicines. Each flavor has a unique id number connecting to the main table.

Medicine Types

OTC database has all types of medicines are inserted in the medicine type record. Different symptoms have to be treated using different type of medicines according to the circumstances of the patient. FPM is available in different size and contents based on the method of use.

OTC database medicine describes how the medicines are available to the patients such that if the drug is tablet/capsule then it is available in *count*. If the medicine is syrup/spray/liquids then it is available in *mL*. Finally if the medicine is gel then it is available in *mg*. The user should select the best option.

Disease and Symptom

All diseases and symptoms respectively are selected to be used in FPMS. These two tables (Table: 1 and Table: 2) are related to each other. Each disease has its own symptoms such as fewer than 6 specific diseases.

There are 30 symptoms in total in our database system. Name of the disease and/or symptom is given.

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Table: 1
List of symptoms

s_id	symptoms
1	Runny nose
2	Sneezing
3	Itchy
4	Watery eyes
5	Itching of the nose or throat
6	Minor burns
7	Sunburn
8	Minor cuts
9	Scrapes
10	Insect bites
11	Minor skin irritations
12	Rashes due to poison ivy, poison oak, and poison s...
13	Nasal congestion
14	Sinus congestion
15	Pressure
16	diarrhea
17	Bloating
18	Headache
19	Muscular aches
20	Minor pain of arthritis
21	Toothache
22	Backache
23	Menstrual cramps
24	Sleeplessness
25	Gas discomfort
26	Heartburn
27	Acid indigestion
28	Sour stomach
29	Upset stomach
30	Overindulgence in food and drink

Table: 2
Diseases

id	disease
1	Hay Fever / Allergies
2	Common Cold / Flue
3	Intential Gas
4	Stomac Gas
5	Skin Rashes and Itching
6	Minor Aches and Pain

Database size in Mobile Memory

Size of the database is essential in our design. We have managed to have small database in phone memory which reflects all diseases/symptom with associated medicine type. Data mining techniques are not included in this research paper. 200

In Table: 3, shows database size for each table size and in total value of KB of phone memory. The total memory size of all database tables is around 400KB, which is small and reliable for phone memory operations. Compare the existing Memory of smart phones which is more than one gigabyte. The FPM database could be extended to other medicine company with full OTC medicines.

Table: 3
Database size

Table	Rows	Type	Size
age	6	InnoDB	16.0 KiB
available_in	25	InnoDB	16.0 KiB
disease	6	InnoDB	16.0 KiB
disease_and_symptoms	42	InnoDB	48.0 KiB
drug_type	13	InnoDB	16.0 KiB
duration	6	InnoDB	16.0 KiB
flavor	9	InnoDB	16.0 KiB
jj_freeprescription_medicine	95	InnoDB	240.0 KiB
symptom	40	InnoDB	16.0 KiB
9 tables	**242**	--	**400.0 KiB**

Methodology

New development has guidelines for various aspects for smart phones. The Developer's Guide for Android operating system includes Best Practices section which addresses compatibility, performance, user interface application guidelines [17]. The layout and source code are created separately. It is the XML based design method so it is also called as xml layout. Android xml files for the GUI are stored in the layout folder inside a project (res/layout). Eclipse plugging does automatically all the references of the all layouts in R.java class and it is just important in main program to connect to interface. An xml file inside the layout folder/res/layout/main.xml is called in the program with *R.layout.main* and also it is needed to *import R.java.class*.

All the elements that are wanted to seen on the screen are called as Views. And their positions on the screen are specified with the help of Layout. An Andorid component called Activity is used to access the Views in Layout.

It enables them to response the user commands. In short, Activity controls which and when the dates are shown on the screen and user commands and response of commands. All the Views on the screen are the Elements of *android.view.View class.* Eclipse Android plugging presents different type of Widgets to provide the programmer a fast and easy way to design the user interface. Widgets are objects of the *View* and serve to interaction of interface with the users. Checkbox, text-view, list-view, spinner, button some examples of many Widget types.

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These Widgets are already stored and ready to use for the programmer. But also Android enables programmer to change and adding new styles to the existing widgets such as using images as pictogram as background of menu and buttons. Under*/res* folder there is Draw-able folder *(/res/ draw-able)* to loading images for the interface. For the free prescription project three screens is designed for the user interface.

FIRST SCREEN: HMI for Higher Education

Level one HMI
The Logo of our package is displayed on the main window (main Screen) of the smart phone as parts of the standard packages/software as illustrated in Figure 3.

Figure: 3
MainWin-Logo

The first level of HMI includes two spinners which are symptom spinner and age spinner. The age spinner display ages ranges to user to be selected as illustrated in Figure 4. Also includes two checkboxes as Female/Male to select the gender.
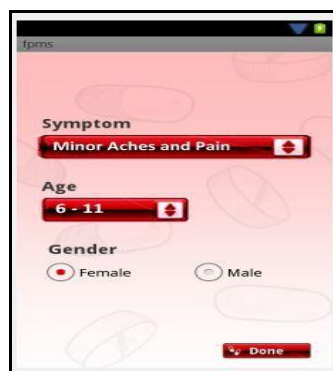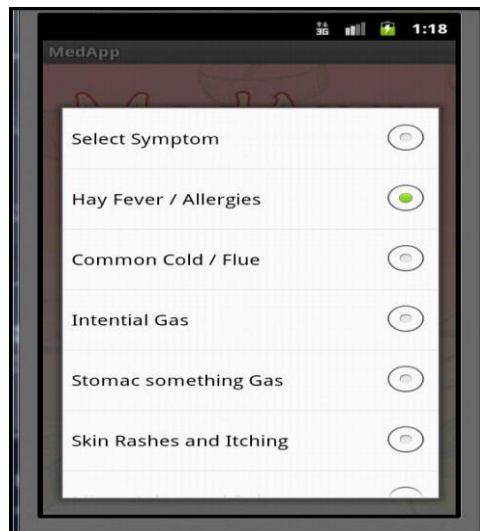

Figure: 4
Level One

The symptom spinner lists the symptom choices to be selected by the user (patient) as shown in Figure: 5. Lastly, button "Done" is store the previous information and to display second screen.

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Figure: 5
Symptoms

User is required to select the best of the specific medicine list (information) for his/her Health condition as illustrated in Figure: 5. In FigureÇ 6, the learner/user will have full information such as medicine type, dosage (direction), symptom, warring and side effects (if any). This useful information is important for patient to know of how to use it in the best way.

SECOND SCREEN

Level two HMI

Level two of HMI is display the best (diagnose) medicine list with full medicine name (commercial). Selection/diagnoses are the smart part of this new HMI software. This intelligent process of diagnoses is not covered in this research paper. Second screen places the medicines for the user according to user-specified symptom, age and gender. This list is limited to three medicines which have been selected by the program to reduce confusion. After selecting one of the medicines it goes third screen as illustrated in Figure 7.

Figure: 6
Level Two

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THIRD SCREEN

Level three HMI

Third level as illustrated in Figure 7. It is shows the prospectus information of the selected medicine. The proposed system is display all and important information for corresponding medicine.

Figure: 7
Level Three

It places an image of the medicine. It is provides user to see more information about the selected medicine such as commercial name, dosage, side effects, advice if it is exist. This screen is enables user to go back and select another medicine.

HMI samples

Our HMI/mHealth for higher education is an easy to use and learn. It is provide full, clean information about diagnose, medicine and dosage. Testing our package with different samples such as patient age, gender and symptoms are illustrated in Figure 8, 9 and 10 respectively.


Figure: 8
HMI Sample 1

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When the user is selected symptom, his/her age, and gender, then press done button. Next screen display list of all best medicines could be useful for the patient. The learner now can test/exam each medicine and can display all the information about the selected medicine. Medicine information is such as Drug type, dosage, symptom description, warning and side effect if any.

Figure: 9
HMI Sample 2
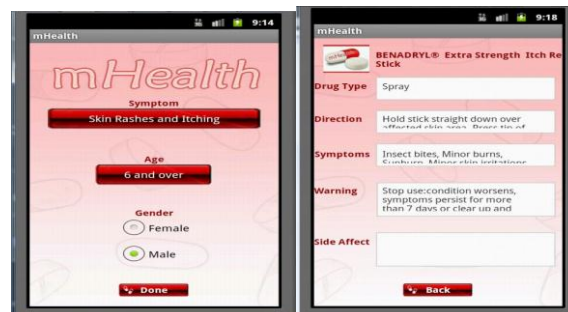
HMI Sample 3

CONCLUSION

New and advanced MHealth system is introduced. The proposed MHealth application could be used for Higher Education as part of the main training tools for medical (Pharmacy) students. HMI is used to design interactive interfaces.

OTC or Free Prescription Medicine-FPM is the field that most of the studies and techniques should be developed continuously. This research project aims to help mobile users such as students to get their free prescription medicine online. Selection/diagnoses are the smart part of this new HMI software. This intelligent process of diagnoses is not covered in this research paper. The proposed package is new advanced smart phones programs. This research project used advance technology named Human Mobile Interaction. This HMI proposed application using database of the most popular company producing free prescription medicine in the world. The advanced program is divided into two parts symptoms diagnoses and display best OTC medicine.

This research project design and build interfaces based HMI features. For portability and mobility Android operating system is used because it is an open source nature, easy implementing and testing features. SMS could be used to support free delivery OTC as part of future research work.

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