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Human Mobile Interaction based OTC Medicine (HMI for *mHealth*)

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Abstract: Smart phone becomes main part of our daily life. New design interface is introduced for mobile. The main interface design issue for mobile is simplicity. The Graphic User Interface must be easy and simple. 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 be sold directly to a consumer without a prescription from a healthcare professional. An OTC medicine (drugs) allows manufacturers freedom to formulate ingredients, or combinations of ingredients, into proprietary mixtures. This research paper is introduced and creates new mHealth system for users to select (diagnose) the best of free prescription medicine using mobile devices platform. Johnson &Johnson (J&J) Medicine Company has been chosen to be used for testing and quality assurance. It has one of the biggest OTC database medicine companies worldwide. The database is used for developing the proposed mHealth system. The research work is consists of two parts. First part is the designing smart and simple three levels interface for the Mobile device. The second part is a well-structured OTC database is designed and created. The OTC database size for mobile memory was 400KB. Both two parts of the proposed research work has been completed and new advanced HMI based mHealth application has been introduced.

Keywords: *HMI, OTC, mHealth, J&J, Mobile*

I. INTRODUCTION

This research project is present to mankind new intelligent HMI package for smart phones to provide 365 days and anywhere FREE PRESCRIPTION medicine. The Free Prescription Medicine System for mobile devices research project is came to mind to provide an easier and more useful way to people choosing medicines according to their health condition. The medicine options are classified based on the user's selections from the smart device and in this way device enables to people to see all the medicine options for patient's specific condition. The advances in smart mobile devices enable us to provide immediate medical services. These medical services include provide basic (On Table Counter – OTC) free prescription medicine to user and/or the employee's at round the clock 24/7/365. Ability to provide medicines in different locations at any time will give better and safer services for patients and will enable the medical authorities to improve their services such as waiting queues emergency and services**.** 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. To provide medical serves to huge number of users (patients) and it is very difficult to control of spreading symptoms.

II. Related research works

The pedagogical triangle must take into account in the E learning contexts [1, 2, 3, 4, 5]. Two elements in this case, first of particular importance is the group and second is the mediation context. In the [7, 8, 9] 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 [14]. 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 **E**lectronic **D**ata **I**nterchange-**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 [14]. 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 [13] 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 [13]. Context-awareness [15] 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 [16]. There have been several main researches in attempting to create applicable user interface for smart devices [11]. Each mobile platform (manufacture) has different guide to address developer user interface requirements

III. METHODOLOGY

The database of free prescription project is created using the Johnson & Jonson medicine company's OTC medicines. It is constructed in MySQL. The database consists of eight 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 build up FPM Mobile database. The database is build using seven tables OTC J&J 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 of the standard data mining techniques which are not present in this research paper. The description of each table is in the following sections.

III.1 AGE TABLE

Age is one of the key factors for diagnoses process. 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. Table 1 shows the age table.

a_id	age_limit
1	baby
2	toddle
3	child
4	adult
5	toddle and over
6	child and over

d_id	Duration_day
1	2
2	3
3	4
4	7
5	10
6	14

f_id	flavor
1	Original
2	Cherry
3	Mint
4	Berry
5	Grape
6	Bubblegum
7	Orange
8	Tropical Punch
9	Honey lemon

id	available_in
1	6 count
2	10 count
4	16 count
5	18 count
6	20 count
7	24 count
8	36 count
9	48 count
10	50 count
11	72 count
12	100 count
13	150 count
14	290 count
15	14 mL
16	15 mL
17	60 mL
18	118 mL
19	120 mL
20	240 mL
21	300 mL
19	120 mL
20	240 mL
21	300 mL
22	360 mL
23	700 mL
24	28.3 g
25	85 g
26	30 count

t_id	type
1	Capsule
2	Liquid-filled capsule
3	Tablet
4	Syrup
5	Ointment
6	Gel
7	Stick
8	Cablet
9	Spray
10	Pre-filled spoon
11	Liquid
12	Chew
13	Gelcap

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

III.2**DURATION TABLE**

Duration of any medicine most be known for 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 days. Table 2 shows the duration table.

III.3 FLAVOR TABLE

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. As illustrated in Table 3, Flavor table lists all the types of existing flavor of medicines. Each flavor has a unique id number connecting to the main table.

III.4 MEDICINE TYPE TABLE

All the types of medicines are inserted in the medicine type table. OTC database has all types of medicines are inserted in the medicine type record. As illustrated in Table 5. 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.

III.5 AVAILABLE IN TABLE

FPM is available in different size and contents based on the method of use. Table 4 shows the Available medicine and 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.

III.6 DISEASE AND SYMPTOM TABLES

In Table 6 and Table 7 are illustrated all diseases and symptoms respectively that are selected to be used in FPMS. These two tables 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. 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.

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 7. *List of all symptoms for all diseases*

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

Table 8. *Database size*

IV. OTC 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. In Table 8, shows database size in total and each table size in 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.

V. HMI DESIGN

Mobile interface applications must be dynamically and self-adapt to provide easy access and reduced communication with users. As a result, it should be using methods of software engineering [19] such as systems requirement specification approaches like RELAX [18]. 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 [13]. Android operating system provides secure and simple way to designing user interface [15]. 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 **Acvtivy** 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. 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.

V.1 MAIN SCREEN: LEVEL ONE HMI

The first level of HMI includes two spinners which are symptom spinner and age spinner. The symptom spinner lists the symptom choices to be selected by the user (patient) as shown in Figure 1 and Figure 2 respectively. The age spinner display ages ranges to user to be selected as shown in Figure 3. Also includes two checkboxes as Female/Male to select the gender. User is required to fill/select all the specific information for Health condition. Lastly, button "Done" is store the previous information and to display second screen as illustrated in Figure 1.

Figure 1 *symptom choice*

Figure 2 *Symptoms*

Figure 3 *Ages*

V.2 SECOND SCREEN: LEVEL TWO HMI

Selection and/or diagnoses are the smart part of this new HMI software. The algorithms are used in diagnoses are not presented in this research paper. We'll consider it for next and new research paper. This paper is considering and focusing only on the HMI part. Level two of HMI is display the best (diagnose) medicine list with full medicine name (commercial). 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 one of the medicines is selected it goes third screen as illustrated in Figure 4.

V.3 THIRD SCREEN: LEVEL THREE HMI

Third level as illustrated in Figure 5. It is shows the prospectus information of the selected medicine by filling the blank spaces for corresponding identifiers. 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.

Figure 4 *List of Medicines*

Figure 5 *Prospectus of Medicine*

VI. CONCLUSION

Since it is used in people's health OTC or Free Prescription Medicine-FPM is the field that most of the studies and techniques should be developed continuously. The aim of this research paper is to help mobile users to get their free prescription medicine online. Selection and/or diagnoses are the smart part of this new HMI software. The proposed package is one of new advanced smart phones program. This research project used advance technology for Human Mobile Interaction application. This HMI proposed interface is using the most popular company producing free prescription medicine in the world. The advanced program is divided into two parts. First part of the project all the free prescription medicines are gathered and this prospectus are divided into specifications. The database design and structured to hold all FPMs. The second part of the project design and build software parts include 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. Future

research works could be done on SMS could be used to support free delivery OTC. The algorithms are used in diagnoses are not presented in this research paper. We'll consider it for next and new research paper. The OTC database has been minimized using of the standard data mining techniques which are not present in this research paper.

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