An Android-Based Pregnancy Predicting System

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***Abstract*—Pregnancy is one of the valuable moments waited for by every married couple. Many people consider that without having a child, a marriage is not complete yet. On the other hand, a nine-month pregnancy is not an easy matter to go through, especially the first pregnancy. Many changes happen to a mother during her pregnancy term. Lack of knowledge and information will always become a problem for a mother-to-be. Utilizing the progressive development of sciences and also communication technology will enable us to readily collect any information during pregnancy. This article describes the android-based pregnancy predicting software. By this software, the user, especially pregnant women, can collect any information concerning pregnancy age, childbirth estimation, pregnancy information, pregnancy methods and also some choices of Islamic names for the baby to be born.**

***Index Terms*—pregnancy, Android-based pregnancy predicting, software**

I. Introduction

The development of information and communication technology is now getting fast and progressive and almost all aspects of human life are related to information and communication technology. Information and communication technology is not something new anymore. It is because many people have used information technology in engaging in their daily activities. Particularly upon the discovery of mobile devices such as smart phone, which anyone from the background and class whatsoever can buy and use it. Smart phone has now great influence on the people's life, since it functions not only as communication tool, but also as social media and information finder through internet facility existing in smart phone.

To operate the functions available in smart phone, an *Operating System* (OS) is highly necessary. One of the operating systems commonly used at present is android-based operating system. This android-based operating system is mostly used right now due to its wide application support that can be downloaded by the users through Android Market or Play store.

The open-source Android Operating System can be utilized by the developer to make a mobile application that can assist pregnant women particularly those who are highly activated in obtaining information concerning their pregnancy.

There are some mobile applications for pregnancy available in the market such as [1]:

- Mobile Pregnancy can determine the birth date.
- Pregnancy Weight Gain Calculator-Sure Baby by CX Interactive shows the appropriate weight during pregnancy.
- My Pregnancy Today by baby center can show the fetal development images and watch what's happening inside the womb with 3D animations.
- iPregnancy by Grogory P. More. Price 3.99 USD. This application has been awarded Best Pregnancy Planner by Parent Magazine, due to its comprehensive components that address every part of a woman's pregnancy experience, from conception right through to naming the baby. But only a preview of 2D-3D ultrasound data is shown each week of pregnancy.
- Sprout Pregnancy Essential by Med ART Studios. Price 3.99 USD can create and display 3D models of the developing fetus. The model can rotate at any direction to get more detail but it is available only for iOS.

II. Theoretical Basis

A. Pregnancy

Pregnancy is something very special since it relates to the physiological, biological and psychological aspects that change the life of a woman. It is a period where a woman brings with her fetus embryo in her womb/body. In the process of pregnancy there happens many gestations (for example in the cases such twin or triplet pregnancy). Human pregnancy takes place for 40 weeks between the menstruation time and 6-week childbirth as of the insemination. The medical term for pregnant woman is "*gravida*" while the human in her womb is called embryo (preliminary weeks) and then fetus (up to the childbirth). *Primigravida* is a woman who is pregnant for the first time, while *multigravida* is a woman who has ever been pregnant twice or more [2].

Pregnancy takes place for 40 weeks between the last menstruation time through the childbirth or about 38 weeks as of the insemination. The medical term for

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pregnant woman is gravida, while the human in her womb is called embryo in the preliminary weeks and then called fetus. Woman who is never pregnant is called gravida 0.

There are three trimesters of pregnancy stage, namely: (1). First Trimester of 1-3 months, (2). Second Trimester of 4-6 months, and (3). Third Trimester of 7-9 months [3].

B. *The Techniques of Calculating Pregnancy Age Using Naegele Method*

Calculating the pregnancy age is commonly carried out based on the menstruation cycle, namely on the last day of menstruation. This calculation will lead to the knowledge about the age and conditions of the fetus and predicting the day of childbirth. Many pregnant women just guesses the age of their pregnancy based only on their memory and feeling that they do not really know the exact age of their pregnancy.

By calculating the pregnancy age accurately, you can know exactly the development stages of the fetus in your womb. This will enable you to find and fulfill the pregnancy nutrition needed at the time of such development.

In addition to using special device to calculate the pregnancy age, the calculation can be done manually using the calendar of menstruation period. Calculating the pregnancy age by this method requires careful attention, especially concerning the menstruation cycle because the basis of calculation is the last day of menstruation.

To determine the pregnancy age, the Naegele formula [4] can be used as follows:

- Month less 3
- Year added 1
- Date added 7
- Note: 1 month = 30 days

The birth estimation day or *Hari Perkiraan Lahir/HPL* can be formulated as HPHT - 7, month HPHT-3, and add 1 in the year. But, if the month cannot be subtracted with three or the months January – March, then add it with 9, but do not add 1 in the year. For example, *HPHT* is on 17 August 2015, then the calculation is 17-7 = 10 (date), 8 (August) – 3 = 5 (May) and year 15 + 1 = 16. Thus, the birth estimation day or *HPL* is 10 May 2016. But, *HPL* is commonly given plus-minus time of about 7 days. Thus, the possibility of *HPL* is 3 – 17 May 2016. While, the method to calculate the pregnancy age, for example HPHT, is 17 August, meaning that 17 September is the first month and so forth.

C. *Android*

Android is *software* for mobile device covering operating system, *middleware* and key application. Android has some advantages as software that uses the computer code basis that can be distributed on an open source basis so that the users can develop new application in it [5]-[7].

The fans of open source then develop a community that develops and shares the *firmware*-based Android with a number of adjustments and additional features, such as FLAC *lossless audio* and capacity to store the application downloads in the micro SD card [8].

III. Analysis and System Design

There are some types of devices which used by the system. However, it is not absolute that every modelling device is integrated into the system. This means that we can use a half of the devices.

A. *Use Case Diagram*

Use Case Diagram is a modeling for information system behavior. It is made to identify any functions which exist in an information system and person who is eligible to use the function [9].

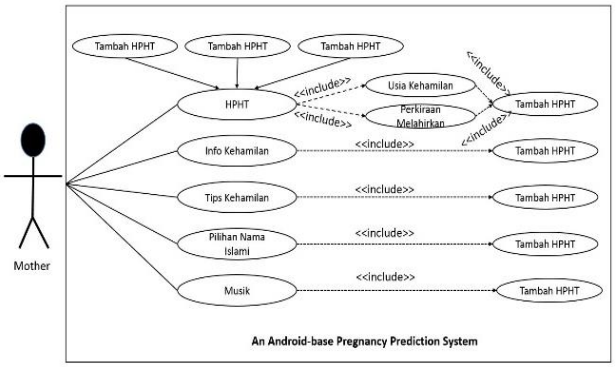

Figure 1. Use case diagram for Android pregnancy predicting

Use case constitutes a scenario depicting of the interaction between User and the system [10]. *Use case* diagram of Pregnancy Assistant Mobile is shown in Fig. 1 above.

B. *Class Diagram*

Class Diagram illustrates the system structure from the definition aspect of classes that will be made to develop the system. A class diagram describes the types of objects in the system and the various kinds of static relationships that exist among them [10]. Class diagram for the application of Pregnancy Assistant Mobile is shown in Fig. 2 below:

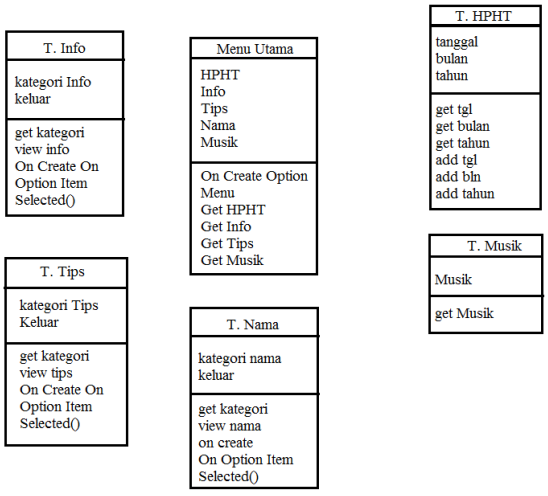

Figure 2. Class diagram for Android pregnancy predicting

C. Sequence Diagram

Illustrating the interaction among the objects in and around the system in form of the messages that is depicted toward time. The Sequence Diagram of *HPHT* is shown in Fig. 3 below.

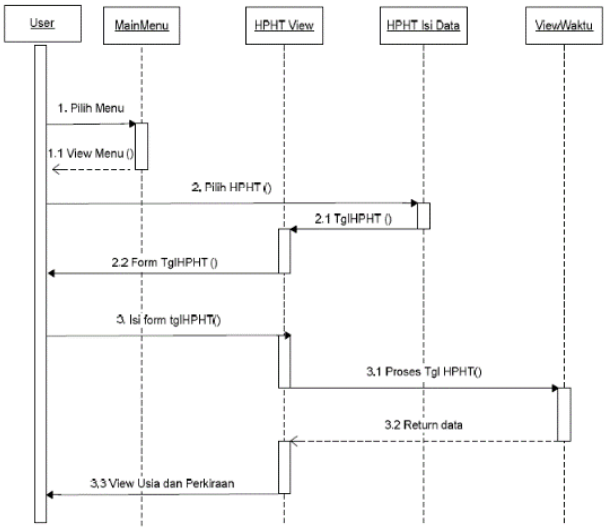

Figure 3. The sequence diagram of HPHT

D. Interface Design

Design is carried out to illustrate, plan and make the sketches of some separate elements to become a whole and functioning entity. The display of interface design is shown in Fig. 4 below:

Figure 4. Screen design of main menu

IV. Implementation and Discussion

A. The System's Main Page

Main page is preliminary display at the time of making access to an application. The preliminary display of the pregnancy assistant mobile application is displayed in Fig. 5 below.

The first main page display as in Fig. 5 is the page display on emulator and the second is the display in smart phone. The main menu display consists of menu *HPHT*, Pregnancy Information, Pregnancy Tips, and Islamic Name Choices. The user of pregnant mother can choose the menu existing on the main page such as *HPHT*, Pregnancy Info, Pregnancy Tips, Islamic Name Choices and Music.

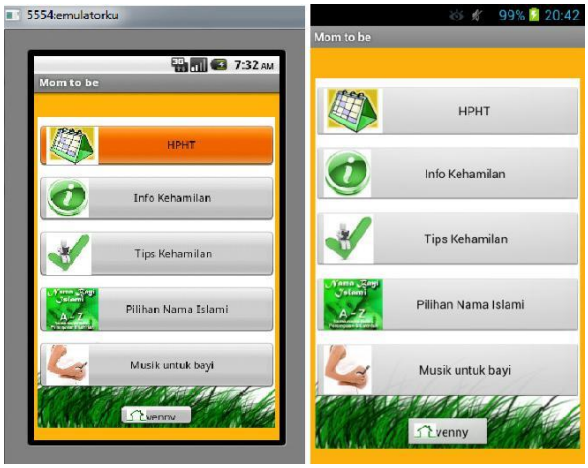

Figure 5. The main page display

B. HPHT Page

The *HPHT* Page is used to obtain information about pregnancy age and estimation of birth time. The display of *HPHT* page from emulator and smart phone is shown in Fig. 6 below:

Figure 6. The display of HPHT page

The display of *HPHT* page as in Fig. 6 can be used to calculate pregnancy age and birth estimation by inputting the date of the First Day of Last Menstruation (*HPHT*). Upon the date of HPHT has been input, it will be displayed the pregnancy age and the birth time estimation.

C. Page of Pregnancy Info

Pregnancy Info Page is a page containing any information needed by pregnant woman. There are information about Preliminary Signs of Pregnancy, Important Nutrition, Fetus Development, Foods to be avoided, and Good Sleeping Position during Pregnancy. The display of Pregnancy Info page from the emulator and smart phone is shown in Fig. 7 as follows:

Figure 7. Display of pregnancy info

D. Pregnancy Tips Page

The Pregnancy Tips Page is a page containing the tips around pregnancy and pregnancy plan. The display of pregnancy tips from the emulator and smart phone is shown in Fig. 8 below:

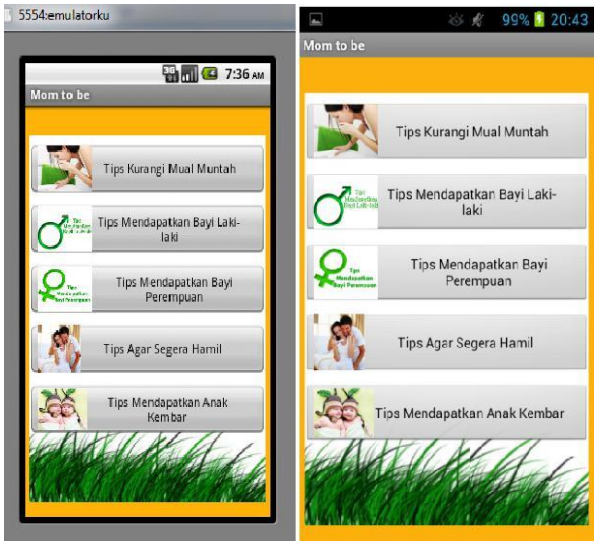

Figure 8. Display of pregnancy tips

E. The Page of Islamic Name Choices

The page of Islamic Name Choices contains the Islamic male and female names. The display of the Islamic name choices from the emulator and smart phone is shown in Fig. 9 below:

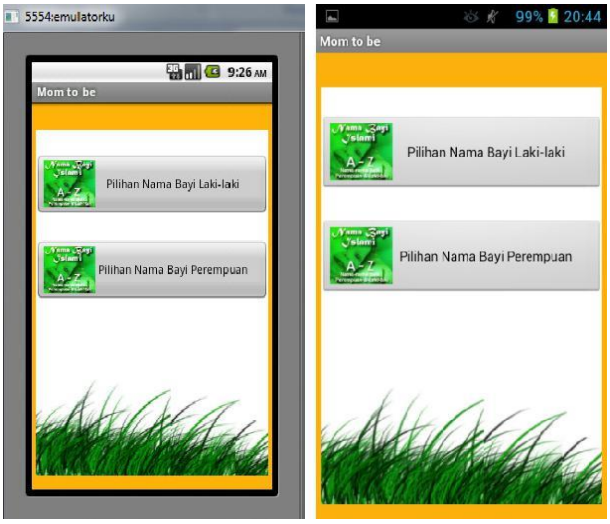

Figure 9. Display of Islamic name choices

1) Male name choices

The display of Male Name Choices contains information about the male name choice with the display from the emulator and smart phone being shown in Fig. 10.

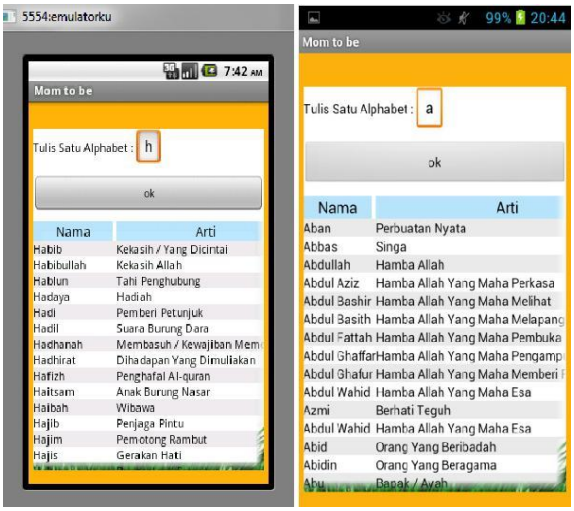

Figure 10. Display of male name choices

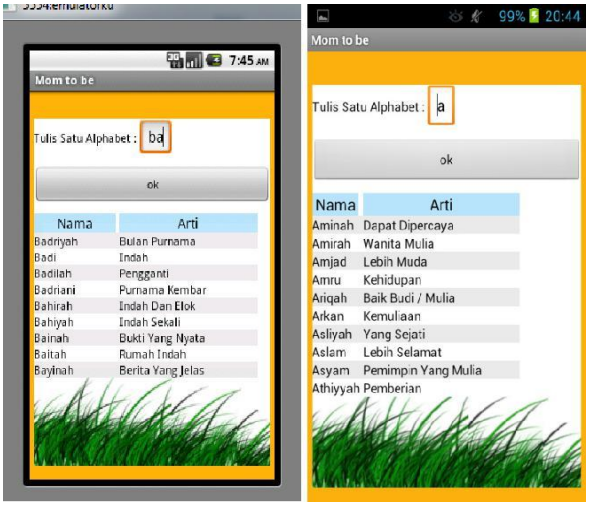

Figure 11. The display of female name choices

2) Female name choices

The display of Female Name Choices contains information about the choice of female names with the display being shown in Fig. 11.

F. Music Choice Page

The Music Choice Page is a page containing music choices. The display of music choice page from the emulator and smart phone is shown in Fig. 12 below:

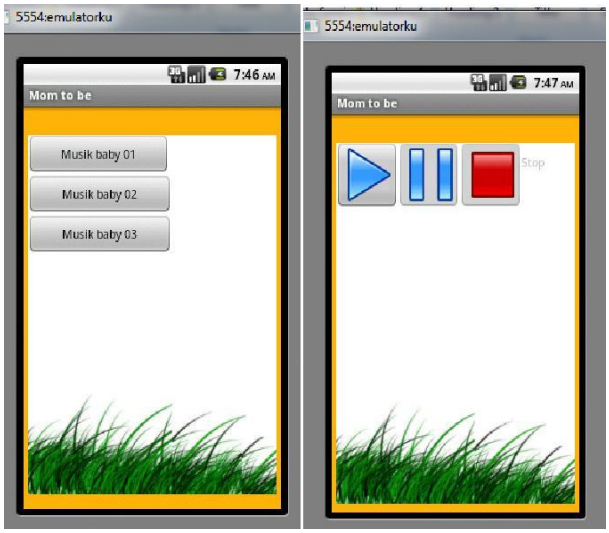

Figure 12. The display of music choices

V. Conclusion

Based on the results of Android-based Pregnancy Predicting Mobile Assistant, the following conclusions can be inferred: This application is developed to assist pregnant women in finding any information around their pregnancy and able to facilitate and accelerate the calculation of the pregnancy age estimation and birth time estimation. This application can be run in the Android-based devices with the minimum OS Froyo specification and also the simple alternatives for pregnant women who use the Android mobile device in finding information about pregnancy.

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