

보름달 – Period Tracker with NUGU Speaker

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Abstract—In a study conducted by 2 researchers from the Health Insurance Review & Assessment Service and the College of Nursing of Korea University, it has been found that 30% of women have irregular menstrual cycle and 42.4% of them suffer from PMS. It is very important that a woman has accurate information about her menstruation, such as her menstrual cycle and ovulation days, since it is a basic index of women's health. Services to monitor the cycle are already available, but the way they work aren't convenient on a daily basis, especially at home. 보름달 is a wonderful helper for women, which automatically records and calculates, only by talking to it.

Keywords—menstrual cycle, period tracker application, NUGU speaker, Full-moon, and etc.

Roles	Name	Task description and etc.
User	Kim Jeongin	Think of ideas and specify what people need. Also test the result in the user's perspective and give feedback.
Customer	Theophile	Tries to anticipate the needs of the users to raise their interest in the product. Also works with the Developer Team to make sure that the prototypes and final product meet those requirements as much as possible.
Software developer	Jung Sihyun	In charge of software development. Writes codes and make sure it executes. If problem occurs in software, settles down and develop the software.
Development manager	Kim Jina	Schedules and delegates tasks required to successfully complete project's initiatives. Leads to achieve the local planning vision & objectives. Assigns each member of the team to their own tasks.

1. INTRODUCTION

1.1. Motivation

In recent times, social situations such as extreme diet, stress, exposure to environmental hormones, and mixed

nights-days threaten women uterine health. Many people suffer from polycystic ovary disease, premature menopause, and infertility. The number of women with menstrual disorders has increased 3.56 times from 2000 to 2010 [1]. The establishment of menstrual cycles is important, not just for fertility or convenience of preparing for the next period, but also because it is a basic index of women's health. Thus, period tracker applications are essential for women.

However, service related to menstruation is not provided in NUGU speakers currently. If this service is available with a voice-based system, a small change will lead to certain convenience in women's daily lives.

Meanwhile, most women go through uncontrollable mood swings and pain as a part of premenstrual syndrome. Though NUGU speakers are not real people, they can be comforting to users, referring to SKT. They analyzed NUGU speakers and reported that the word "I love you" is spoken the most by users. Users want emotional interaction with AI speakers. Therefore, we planned a service, 보름달 that can satisfy not only the technical aspects but also the emotional aspects so that it can be helpful to women who are having a hard time because of PMS.

We named our service “보름달” because the moon and women's menstruation cycle were found to be somewhat related. The moon's brightness directly affects the secretion of melatonin hormones which regulate women's menstrual cycles. On a dark day when the crescent moon rises, the secretion of melatonin induces ovulation, and under the bright full moon, its secretion decreases and menstruation begins. By comparing the data of the menstrual cycle of 8,000 women around the world with changes in the moon's status, it has been confirmed that as in the past, modern women often ovulate in the crescent and begin menstrual periods in the full moon [2]. The monthly cycle of inner lining of the uterus to thicken and collapse is similar to that of the moon waxes and wanes.

1.2. Problem Statement

You run out of sanitary pads when the monthly period is upon. Menstruation begins suddenly when you are outside, so you should buy new pads at a high price though you already have plenty at home. They are all common situations to women in childbearing age, but it's still embarrassing. That's the reason many women use period tracker mobile applications which send notifications. However, there is a problem.

You may have seen a lot of notifications on the mobile phone when you wake up in the morning. Morning alarm,

missed calls overnight, push notifications from various applications, etc. You may usually ignore those alerts, because many people choose to erase all of them rather than checking them one by one. If you choose to receive alerts, it's uncomfortable to see unnecessary information. On the contrary, if you choose not to receive notifications, you can't get any useful information at all. 보름달 service based on NUGU speakers will send the notifications only what you want.

When you use mobile applications, you have to go through a series of steps to find where the cell phone is, unlock it, enter the app and find the information you want. Although you are accustomed to it, these steps may bother you. With NUGU Speakers, a tiresome process is not needed. All you have to do is just to call NUGU and ask for information. On a busy morning, you can get the information you need quickly and accurately with a short conversation instead of the hassle of checking the application.

보름달 automatically calculates and records menstrual cycles, and you can also manage physical condition by entering a BMI index. NUGU asks you whether to order relevant products like sanitary pads, ovulation tester, or pregnancy tester, affiliating with '11st' when the period approaches. It is also possible to record physical symptoms to help and detect diseases which initial treatment is important, such as venereal disease and vaginitis. In addition, NUGU lets you know information on birth control pills and alerts you not to miss time since the pills must be taken at the same time everyday.

This is not all of our service. 보름달 will be a good friend when you plan to have children. It will take care of your sex life by checking your sexuality and possibility of pregnancy. It will provide exercise information, food information, and tips in accordance with your menstruation cycle.

1.3. Research on Related Software

Multiple applications with similar features are already available on the Appstore and the Play store (Apple and Android).

Here are a few examples:

The first one is "Period Tracker". It's the most downloaded menstrual period tracker app on the Play store with more than 100M downloads. It allows you to monitor your menstrual cycle and ovulation cycle. With this app you can follow your chances of being pregnant or get pregnant daily. It also monitors your IMC, sexual life, weight, body temperature, symptoms and mood. Based on this information it not only allows you to keep an eye on your menstrual cycle, but also to lose weight while staying healthy at all time. Moreover, the App notifies you in when you're periods my start as well as when to take the pill. However, you can personalize the notification to make it more discreet when in public if that embarrasses you. Your data is saved on a database and linked to your google Account, so you don't lose anything even when changing the device you're using it with. How does it work: you Get a daily check of symptoms, mood, water drinking ... to determine your health and better monitor your menstrual cycle. Based on your personal history (that you can access on the app) and your previous daily check, you get previsions on your next menstrual cycle, fertility and time to take the pill for

example.

Another example is "Flo" (50M+ downloads on the Play store), a very similar app with added features. Indeed, it has all the features offered by the previous app but also offers mental and physical health related features. For example, the app can suggest physical training based on your physical health and suggest stories to help you go to bed and/or help you get rid of anxiety. This app monitors more things to be able to suggest physical training. It monitors your sleep and number of steps to be able to provide this feature for instance. The App also provides advices to take care of a baby, thus accompanying you even after pregnancy.

One thing to notice though, is that none of the most popular and used applications provide voice recognition features such as what 보름달 wants to achieve, thus giving us more reasons to develop such a service. Right now, to be able to use such a service that is so useful on a daily basis you have to use and carry your phone and be aware of notifications even at home where it should be a more relaxing place. Being able to speak like in a natural conversation with an AI on such a sensitive and personal subject is not a thing yet.

2. REQUIREMENTS

2.1. Functional Requirements

A. NUGU Speaker

- 1) NUGU speaker processes instructions received from the mobile application, and voice instructions.
- 2) NUGU spekaer starts 보름달 application.
- 3) NUGU speaker records the user's menstrual start and end dates by recognizing voice.
ex) I started my period.
- 4) NUGU speaker records dates that the user had sex by recognizing voice.
ex) I made love.
- 5) NUGU speaker records the user's physical condition, mood, weight and height by recognizing voice.
ex) I weigh -kg today.
- 6) NUGU speaker informs the expected date and period.
- 7) NUGU speaker asks whether to order sanitary pads in connection with "11st" when the scheduled date is imminent.
ex) Your next period is in 5 days. Do you want to order sanitary pads on '11st'?
- 8) Nugu speaker informs the possibility of pregnancy based on the entered data of the day of sexual relation.
ex) The possibility of prestige today is -%. If you are on birth control, be careful!
- 9) NUGU speaker alerts you when to take contraceptives. It also tells you how to take it according to the user's request.
ex) It's 11 a.m. time for contraceptives.
- 10) NUGU speaker sends the user's requests to mobile application.
- 11) NUGU speaker answers the user's questions based on stored data.
ex) When will my next period start? - It will be in 6 days.

12) NUGU speaker tells users how to relieve PMS.

13) NUGU speaker says comforting words.

ex) You are not alone. Don't be lonely.

B. Mobile Application

보름달 is an IOS and Android application. In the full moon application, the user can use all of the functions available on NUGU speaker. (Voice-based alerts will be replaced by push notifications.) The full moon application allows the users to check out and enter further information visually.

1) The full moon is an IOS and Android application.

2) The application calculates menstrual cycle and shows due date on the calendar.

3) The application informs the users how to take, where to buy contraceptives. It sends push alerts to take pills.

4) The application affiliates with '11st' to buy ovulation and pregnancy testers.

5) The application analyzes entered symptoms and checks various diseases such as STD and vaginitis.

6) The application calculates the possibility of pregnancy by setting pregnancy mode.

7) The application provides exercise, food, daily life tips on menstruation to help users.

2.2. Non-Functional Requirements

A. User Mangement

1) Download an app (Both available in IOS and Android)

2) Create a user account

3) Enter the user's menstrual information.

If the user doesn't remember, start to make a record from the first month.

4) Record information

Information that the user entered through NUGU speaker and the application will be stored in the database.

5) Automatic calculation

Calculates menstrual cycles and ovulation dates based on the user's information entered.

6) Register the payment method on the '11st' application.

For automatic ordering, the first agreement on the terms and conditions is also necessary.

7) Informs the user of her menstruation cycle.

REFERENCES

- [1] Korean Society of Obstetrics and Gynecology.
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