



# Menstrual Tracking for the Contraceptive Pill User

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## Introduction

Even though there are many menstrual cycle tracking apps out there today, there are two main issues. Firstly, they often give inaccurate prediction. Secondly, they do not have a good design that brings the users back everyday even though frequent user input is crucial for the accurate prediction. This project aims to improve people's experience of menstruation by solving these issues. Since there is currently no menstrual tracking app that focuses on the certain user group, it would be possible to achieve this by developing an app that targets users who take the contraceptive pill. There are two main objectives for this project; provide a stronger prediction feature allows users to record easily using NFC tag stickers.

## Method/Environment

- Swift 5
- Xcode
- NFC tag stickers
- Realm
- FSCalendar

1. Develop an algorithm and a formula to predict the expected date of the next menstruation using the hormone levels and the sample data.
2. Implement the basic feature such as the function to predict data using the algorithm developed and to keep track the past data. To store initial data as the setting, default argument in Swift was used. To store, past menstruation data and daily record, the database Realm was used.
3. Implement the function that makes it easy to record the time that the medication is taken with an NFC tag sticker
4. Add more functions such as edit the data input and delete the past data in the calendar view. For the calendar view, the framework FSCalendar was used.



## Algorithm for Prediction

Three variables were used to predict the expected next period.

1. A sample of data about menstruation from volunteers
2. Information from user input
3. Past Data

Many contraceptive pills contain both estrogen and progesterone, and when a person starts taking a placebo, the level of progesterone in the body that was supplied by the pills drops and becomes close to zero, causing menstruation. In addition, it is said that the amount of that hormone in the body can be reduced by half in one day when hormones are not taken.

With this in mind, I created a mathematical equation to show the relationship between the amount of progesterone in the pills and the number of days between the first day of period and withdrawal. This regression line was generated by Excel. Here is the formula.

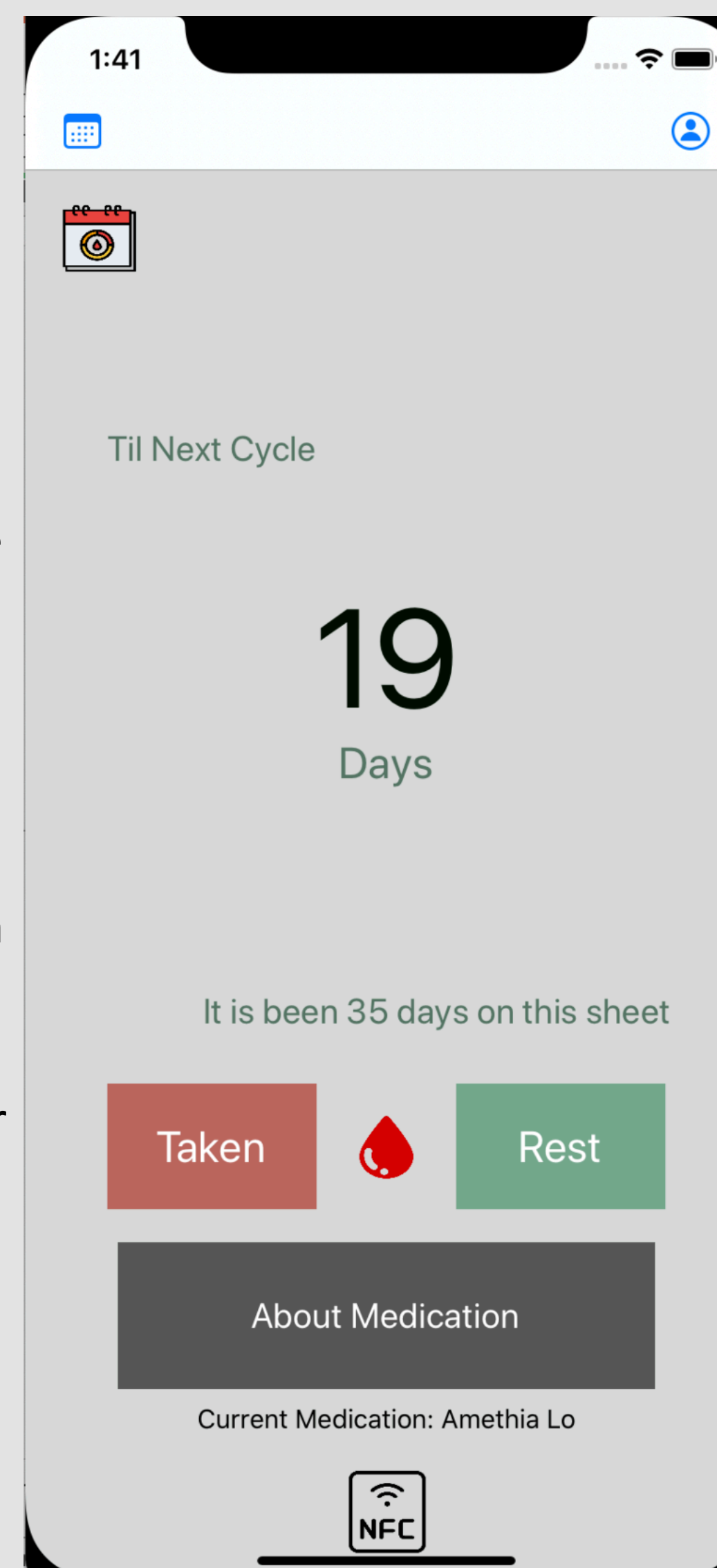
$$y = 2.0049x^{-0.406}$$

$x = \text{amount of progesterone (mg)}; y = \text{number of days}$

Using this formula and the medication information obtained from the user, the number of days until the next period is calculated. It also asks the user to input their medication style, since different medications require different number of days of placebo.

Moreover, hormone levels are not the only cause of the initiating menstruation; daily behaviors such as sleeping hours, stress, and alcohol intake also have an effect. Therefore, the average of the number of days between past periods, calculated with weighting on the past three months, and the number of days obtained by this formula is used as a prediction for the next period.

If the user is taking the medication in a way that does not involve taking a placebo, the average number of between periods, weighted on the past three months, is used as a prediction.



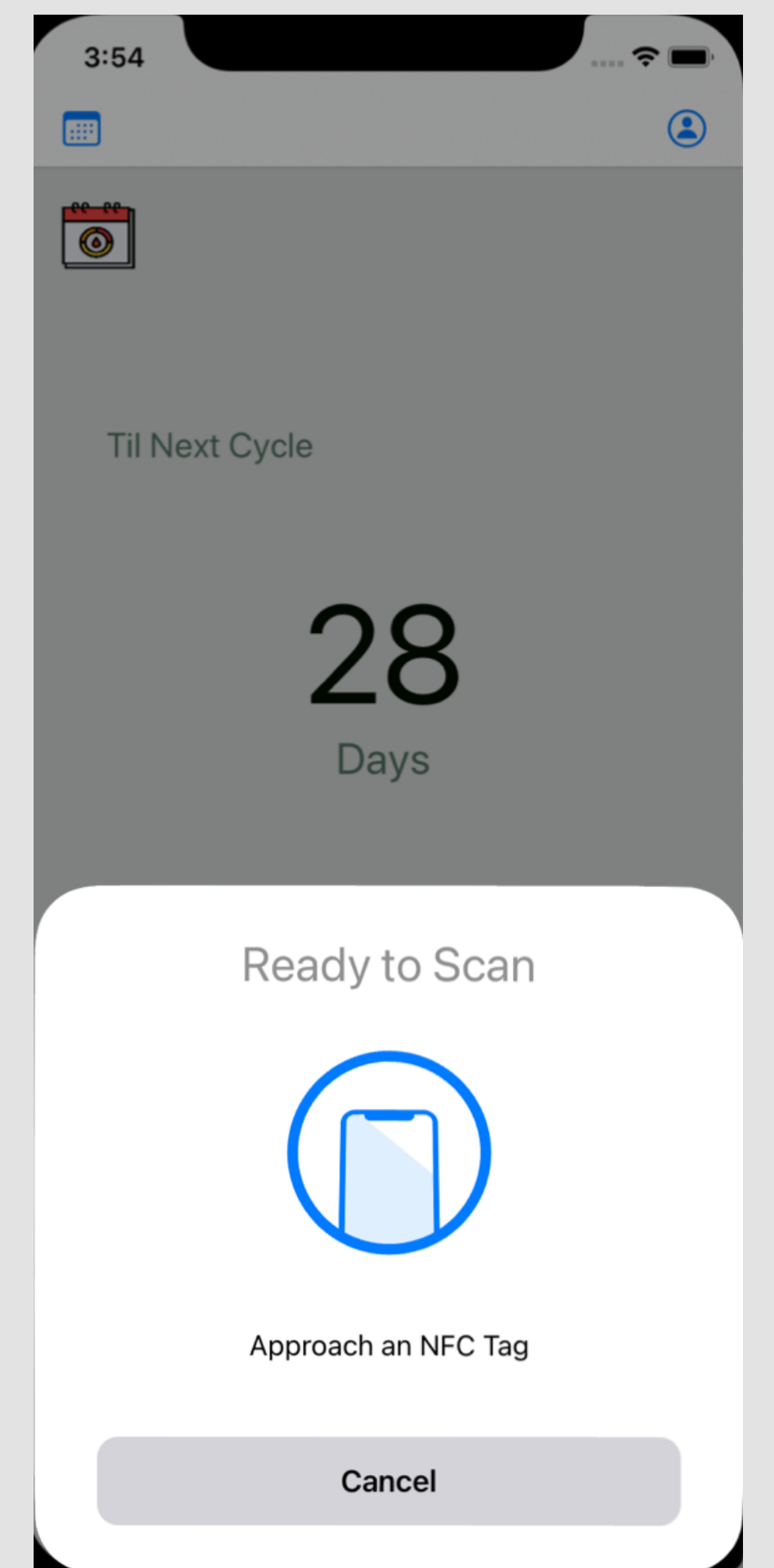
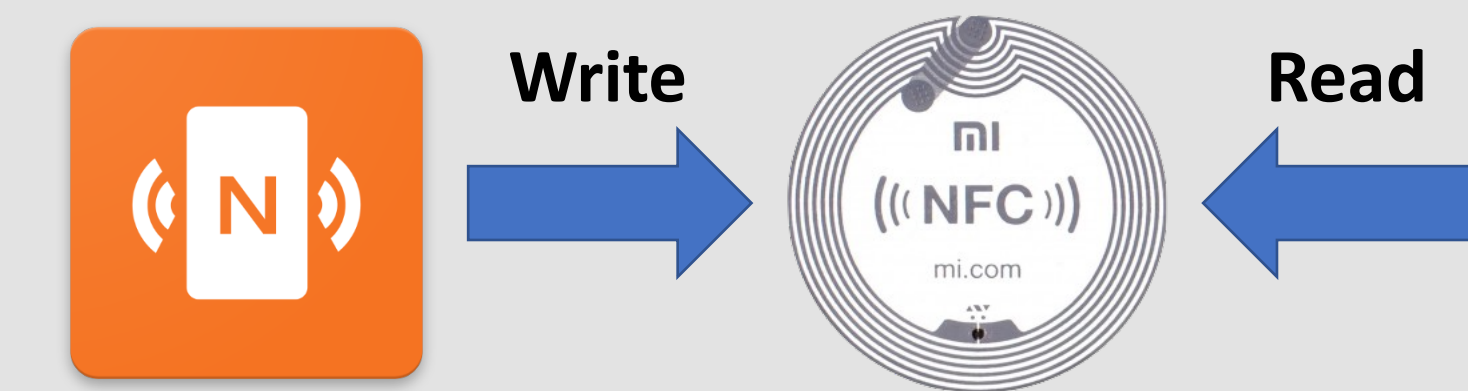
## NFC tag stickers

There are two stickers

1. "Taken" sticker
2. "Rest" sticker

Information are written using iOS app NFC Tools.

When the user touch the NFC button, it start scanning. Then it will record the data and time according to the information in the NFC tag stickers.



## Calendar

There are three main things that users can do at the calendar view.

1. View data that users entered before
2. Edit the data input
3. Delete specific data input
4. Delete all data (with alert display)

All data are stored in the database Realm, and it will be also updated in datanase if users make a change at the calendar view.

There is similar feature for the past period data.

