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# Remote Skincare Advice System Using Life Logs

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**Abstract**

Many women find it difficult to maintain beautiful skin since different skincare approaches require different amounts of effort, time, and special knowledge. Women often ask experts in cosmetic stores for skincare advice. However, this approach has the limitations of time, place, and personal information. To solve these problems, we propose a remote skincare advice system that uses life logs. This system helps users to automatically log information related to their skin condition and share these data with skincare experts in order to obtain appropriate advice.

**Keywords**

Skincare, advice, life log

**ACM Classification Keywords**

H.5.m Miscellaneous

**General Terms**

Human Factors, Management

**Introduction**

Many women hope to be beautiful forever. They also want to ensure that their skin stays beautiful. According

to a questionnaire survey on skincare in Japan<sup>1</sup>, 90% of the women who participated in the survey had some skin problems, and 80% of them were interested in skincare. Further, they often find it difficult to maintain beautiful skin, since the skin condition is related to various factors (such as UV rays, humidity, the balance between male and female sex hormones, dietary habits, amount of sleep, and the stress of daily life). According to the above questionnaire survey, only 60% of the skincare-oriented women actually care for their skin. The survey also reported that women find it difficult to care for their skin as they do not know the appropriate skincare methods. To compensate for this lack of knowledge, these women often ask experts in cosmetic stores for skincare advice. (We call this approach “face-to-face skincare advice.”). However, this approach has the limitations of time, place, and personal lifestyle. Moreover, according to the research by FANCL Corporation<sup>2</sup>, many women are hesitant to obtain face-to-face skincare advice. To solve this problem, we propose a remote skincare advice system that uses life logs: we call this system “Smart Skincare System (SSS)”. Using the SSS, women can easily maintain logs of information related to their skin condition by using the technique of life log, share these data with experts through the Web, and obtain special skincare advice from experts at anytime while sitting at home.

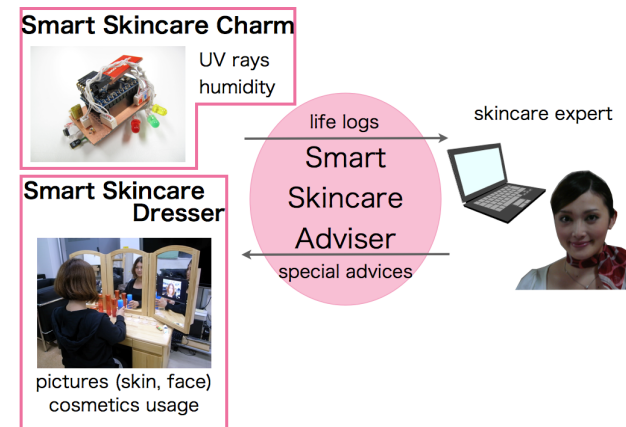
1 .[http://www.herstory.co.jp/jisya/200412/20041208skin\\_trouble.html](http://www.herstory.co.jp/jisya/200412/20041208skin_trouble.html)

2 .<http://www.fancl.co.jp/corporate/news/data/2009.10.30bihadakantei.pdf>

### Smart Skincare System (SSS)

This system consists of the following three components:

- Smart Skincare Dresser
- Smart Skincare Charm
- Smart Skincare Advisor



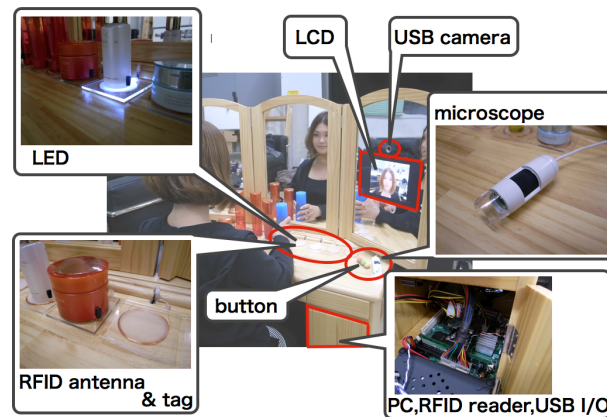
**figure 1.** Basic concept of Smart Skincare System

Smart Skincare Dresser is a device that helps users to photograph of their face and skin, and to easily record their use of their cosmetics. Smart Skincare Charm is a mobile device that logs details regarding the weather condition, such as amount of UV radiation and humidity. Smart Skincare Advisor is a Web-based application in which users can easily share data (collected from Smart Skincare Dresser and Smart Skincare Charm) with skincare experts, and obtain advice related to appropriate skincare methods.

### Smart Skincare Dresser

The basic concepts of Smart Skincare Dresser are as follows:

- Collection of information related to skin condition
- Special hardware that is suitable for use during the skincare routine



**figure 2.** Smart Skincare Dresser

First, Smart Skincare Dresser collects information related to the user's skin condition. Before the implementation of this device, we asked a skincare expert who works at Shiseido (a giant cosmetic company in Japan) about the requirements for skincare advice. According to her advice, we decided to collect three types of data: close-up pictures of the user's skin, photographs of the user's face, and details regarding the cosmetics used by the user. The close-up pictures of the user's skin are used for analyzing the abnormalities in

and the metabolism of the skin. The photographs of the user's face are used for detecting the sagging and spotting of the skin on the face: details regarding the cosmetics used are used for checking ingredients and the users' tastes. Therefore, we developed functions for taking pictures of the user's skin and face, and for logging in the in-use cosmetics easily.

Second, we designed special hardware that is suitable for use during a skincare routine since most women may not want to use computers during their skincare routine. Consequently, we attached all devices to a daily dresser since many women usually use dressers while caring for their skins. An illustration of Smart Skincare Dresser is given in figure.2.

Smart Skincare Dresser mainly consists of a USB microscope, a USB camera, an LCD monitor, cosmetics stands with white LEDs and RFID antennas, push buttons for operating the system, and a computer and other components (an RFID reader and an I/O board) attached inside a drawer. The LCD and the USB camera are embedded in the mirror for maintaining the appearance of the dresser. We attached nine cosmetics stands on the top board of the dresser<sup>3</sup>. Each cosmetic stand consisted of an RFID antenna and a white LED attached to an acrylic plate (dimensions: 7cm x 7cm<sup>4</sup>). The RFID antennas were connected to an RFID reader attached inside the dresser. This RFID function helps users to

3. Since skincare cosmetics are divided into six types (face lotion, milky lotion, special lotion, cream for massage, astringent, and night cream), we developed nine stands to be on the safe side.
4. The plate size is determined bearing in mind the size of commonly used cosmetics.

automatically log the use of their cosmetics (attached with RFID tags): that is, the system can detect which cosmetics were used by identifying the RFID tags. The system also can inform users about which cosmetics should be used next by turning on the corresponding LED.

Users can take pictures of their skin and face using physical buttons. We attached three buttons on the top panel of the dresser. These buttons can be used for (1) capturing skin pictures using a microscope, (2) capturing face pictures using a USB camera, and (3) canceling an operation. Next, we will explain the process of taking pictures quickly. First, when a user pushes the capture button, the captured picture is shown on the display. Next, she/he can save the picture by pushing the same button one more time. Otherwise, she/he can cancel the operation by pushing the cancel button. Thus, Smart Skincare Dresser enables users to easily log a variety of information related to their skin condition without having to perform any complicated operations.

### Smart Skincare Charm

The basic concepts of Smart Skincare Charm are as follows:

- Logs UV rays and humidity
- Offers real-time feedback
- Is suitable for mobile use

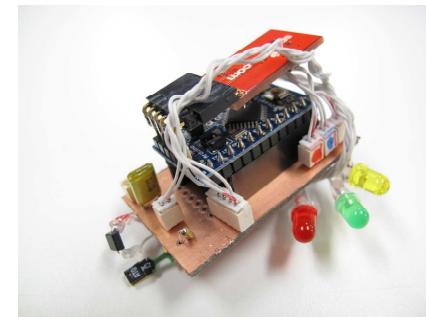
First, the Smart Skincare Charm can log information related two major factors that affect skin condition: amount of UV radiation and humidity. As is well known the UV rays and dry air have harm to the skin. However, most women are rather unconcerned about these factors since there are no methods to manage

them easily. To solve these problems, we have developed a logging function that can measure the amount of UV radiation and humidity in the environment and record the data on a memory card.

Second, Smart Skincare Charm offers real-time feedback for users. For example, when the amount UV radiation increases or the humidity decreases rapidly, the system warns the users of the same using built-in LEDs.

Third, Smart Skincare Charm is designed for mobile use. Although the Meteorological Agency provides basic data related to the amount of UV radiation and humidity in the environment, the actual data may differ depending on the user's environment. For this reason, Smart Skincare Charm is designed as a compact device suitable for mobile use.

Figure.3 shows the prototype of Smart Skincare Charm.



**figure 3.** Prototype of Skincare Charm

Smart Skincare Charm consists of a UV sensor (Hamamatsu Photonics K.K. / G5842) and a humidity sensor (Sensirion AG / SHT75), three LEDs (red, green, and yellow), a memory card (Transflash microSD card),

a lithium-polymer battery, and a microcontroller (Arduino Pro Mini) to control the abovementioned devices. The size of the entire device is approximately 5cm x 3cm x 3cm.

Next, we explain the system flow. When users carry Smart Skincare Charm, it automatically logs the amount of UV radiation and humidity in the environment into the micro SD card every 5 min. When the UV data is changed to the specified UV index<sup>5</sup> (3 or above incurrent), the red LED begins to blink. The blink speed becomes faster along with the UV rays become stronger. Moreover, when the humidity data is changed to less than 50%, the yellow LED begins to blink. Thus, users can easily notice the change in the amount of UV radiation and humidity at once.

### Preliminary evaluation

On this system, skincare experts have to provide advice to users on the basis of digital data like photographs instead of a direct examination of the skin. In order to confirm whether experts could provide appropriate advice, we performed a preliminary evaluation. Two females (22-year-old under graduate student and 24-year-old graduate student) and the same expert as that mentioned above participated in the experiment.

First, using Smart Skincare Dresser, the participants took pictures of their skin and face, and maintained a log of the cosmetics that they used. They transmitted these data with unrestrained comments about their skin to the expert. Next, the expert wrote her advice in a

free format based on the data and transmitted it to the participants. Then, the participants read the advice. Finally, we asked the participants for their impressions of and opinions on Smart Skincare Dresser and the expert's advice. We also asked the expert for her opinions on the proposed system.

### Result

The length of the expert's advice was approximately 2000 characters in Japanese, which is equivalent to a length of approximately 1000 words in English. The advice mainly consisted of four parts: evaluation of skin, evaluation of face appearance, explanation of skin condition, and recommendation of skincare methods. In particular, the advice mentioned the causes of the skin problems and provided practical skincare solutions.

The impressions of the participants were revealed as follows:

- The advice was easy to understand and helpful.
- As I feel hesitant about face-to-face skincare advice, I want to use this system continuously.
- Smart Skincare Dresser was easy to use.

The impressions of the expert were as follows:

- I could give the proper advice only with digital data.
- This system is suitable for customers who do not like face-to-face skincare advice. This system is also useful as an alternative to face-to-face skincare advice.

According to the expert's opinion, the data related to the amount of UV radiation and humidity in the user's

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<sup>5</sup>The UV Index is proposed by the National Weather Service and EPA. It divides the strength of UV rays into 11 categories: 1 (low) to 11+ (extremely high).

environment obtained from Smart Skincare Charm, will be useful in giving more appropriate skincare advice. Further, she mentioned that the information related to the amount of sleep and the user's basal body temperature is also desirable.

As a result, by using the digital data captured by Smart Skincare Dresser, the expert could provide appropriate skincare advice that satisfied the users. Therefore, this system is useful for both users and experts. Moreover, for obtaining more useful advice, we have to consider the collection of data related to the amount of sleep and the balance between the male and the female sex hormones.

### Related works

A technique of automatic evaluation of skins has been developed to support women who want to maintain beautiful skin [1]. Although there have been many studies related to the maintenance of beautiful skin, most of them have focused on the analysis of skin condition. Our system supports the maintenance of beautiful skin by easily managing information related to the skin condition.

Smart Makeup Mirror is a digital mirror with various functions to help users to apply make up easily [2]. While Smart Makeup Mirror focuses on improving the user's makeup skills, our system focuses on logging information related to the user's skin condition and sharing these data with experts for obtaining appropriate skincare advice.

"Bihada Kantei" is a product that measures skin moisture and automatically provides simple advice based on the measured data [3]. However, by using the proposed system, users can obtain more practical advice from experts.

### Conclusion and future plan

We proposed a remote skincare advice system the uses life logs. We built prototypes of Smart Skincare Dresser and Smart Skincare Charm, and a preliminary evaluation. Using the proposed system, users could easily create logs of information related to their skin condition, and share these data with experts in order to obtain practical skincare advice from the experts. We plan to perform a long-term evaluation for further improving the proposed system.

### Acknowledgements

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### Citations

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