UV – ASSISTANT: ULTRAVIOLET RADIATION RISK ANALIZOR

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1. Introduction

The ultraviolet (UV) radiation has the capacity to damage unicellular organisms and affect human cells, causing serious health problems, such as skin cancer: the most common in Brazil, equivalent to 32% from all diagnosed tumors over the country. According to 2014 records from the National Cancer Institute (INCA), there are over 135 thousand new cases per year of the disease in Brazil. This project consists in a system aiming to monitor the ultraviolet radiation's incidence in one's skin and notify the user when sunlight exposure become a hazard to his health.

2. Experimental Setup

Considering (1) World's Health Organization (WHO) estimation about the ultraviolet radiation intensity; (2) the Fitzpatrick's classification about different skin tones; and (3) the study from meteorologist Marina Seelig about the safe-time exposure to sunlight by each skin tone and the ultraviolet index; this system appoints the safe-time exposure to sunlight for each specific user. The complete project has two main components: an UV sensor and a microcontroller composes the first one, in which the UV radiation is measured and the process of integration of the UV energy and the communication with an Android application happens. The Android application is the second component of the system. It has all the user's information, the skin tone recognizer, an UV energy storage and it generates a notification for the user when the UV energy limits are exceeded. The Android application uses the smartphone's camera to capture an image of the user's skin tone. This image is processed in order to classify the skin type according to Fitzpatrick's table, which consider all the cutaneous phototypes. Each phototype has a maximum time of exposure for each UV index.

3. Results

The system is functional. It realizes the measure of the UV Index and send it to the smartphone with the application. In the application, multiple users records can be done, as the image capture and the skin tone recognizing. Considering the index of 90% correct tests about the skin tone recognizer, it was add a function, in the app, that allows the user to insert this information manually. The application generates an alert of the maximum exposure time of each user, according to him/her skin tone and enable to view the UV index from the moment and the elapsed time.

NATURAL LIGHTING		ARTIFICIAL LIGHTING	
Approximately user's skin tone	User's skin tone recognized by the app	Approximately user's skin tone	User's skin tone recognized by the app
2	2	2	1
2	3	2	2
2	2	2	2
3	3	3	3
3	3	3	4
3	3	3	3
4	4	4	3
4	4	4	4
4	4	4	4
5	5	5	5
Accuracy of 90%		**Accuracy of 70%**	

4. References

Schalka S, Steiner D, Ravelli FN, Steiner T, Terena AC, Marçon CR, et al. Consenso Brasileiro de Fotoproteção. An Bras Dermatol. 2014;89(6 Supl 1):S6-75.

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