Augmented reality based visualization of organ reflex points on palm for palm based reflexology treatments

Areas: Augmented Reality

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Abstract

This research deals with augmenting virtual 2D or 3D organs right on top of the respective organ reflex points of the palm. Here we employ the "palm based augmented reality and tracking" technique which aids palm based reflexology treatments. This project considers the user’s palm as input and overlays the virtual 2D or 3D organs on top of the corresponding organ reflexes (organ reflex points) of the palm. The application makes use of sophisticated augmented reality based visualization technique for displaying reflex points’ information on top of the palm. Thereby, the application is substantially beneficial for various therapeutics such as palm based reflexology treatments, self-fingertip therapies, palm therapies, and self-acupressure therapies. The output of the research application recognizes the user’s palm and helps to visualize key body zones from it. Specifically, the organs of the user’s body will be augmented in the form of 2D or 3D virtual contents on top of the corresponding organ reflex points of the palm. Palm movement does not hinder the output of this technique since this technique employs the effective palm tracking mechanism. Hence, augmented virtual objects or organs also move along with the palm during its movement.

1. INTRODUCTION AND MOTIVATION

We, the authors of this paper, used to attend yoga classes every day. We used to see palm reflexology [1] charts and posters that were present in the hall. During the course of our yoga classes, we used to observe palm reflexology charts and discuss about palm based reflexology treatments, reflex points present on the palm and various other self-therapies related to the palm.

By definition in [1], palm based reflexology is the practice of sensory experience, mainly pressure, applied to specific reflex points of the palm. This reflexology treatment provides various health benefits [2]. Acupressure therapies are also based on simulation of reflex points [3]. We used to think of ways to relate augmented reality to reflexology treatments, palm based acupressure therapies and palm based self-massage therapies. Later on, we came up with an idea of making use of “palm based augmented reality and tracking” mechanism in aiding palm based self-reflexology treatments, palm based acupressure therapies and palm based self-massage therapies. The paper describes a method of visualization of reflex points and display of organs’ reflex data on palm using augmented reality.
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Seeking a practitioner for reflexology treatments would be another investment. However, the book [1] says “During the reflexology treatments sensory signals are always sensory signals no matter who applies the pressure”. So, properly guided self-reflexology treatments will also work well in this regard. For self-reflexology treatments [1], acupressure therapies and self-therapies, accurate information of reflex points on the palm connecting to the respective organs will certainly be an important aspect. The hand along with the palm contains reflex points which represent the entire human-body system [2]. Organ reflexes such as spine reflex, pituitary gland reflex, heart reflex, pancreas reflex, stomach reflex, spleen reflex, liver reflex, adrenal reflex, kidney reflex, bladder reflex, colon reflex are present on the palm of the hand [2]. Undergoing reflexology treatments without prior knowledge of where these organ reflexes are present on the palm may lead to adverse effects after undergoing self-therapies or self-reflexology treatments. Therefore, we thought of building a real-time application or system which helps in augmenting information related to organ reflex points present on the palm. This application will help users to know about the reflex points present on their palm irrespective of the size of their palms (as the length and width of the palms differ from person to person). Our system provides accurate information about organ reflex points during self-therapies and self-reflexology treatments by augmenting related reflexology information on the palm in the form of 2D or 3D virtual contents or organs using augmented reality technology.

2. SYSTEM ARCHITECTURE

We have utilized Diffusion Studio [4] for creating the application. Programs/Codes are written using LUA [5], a computer scripting language.

3. SYSTEM PROCESS

First the system takes user’s palm as input through the webcam. Now this input is compared with the scanned image. If it matches, then the 2D or 3D virtual organs are overlaid on the respective organ reflex points of the palm. During the movement of the palm in front of the webcam, “palm tracking” mechanism is set in motion and corresponding 2D or 3D virtual objects also move along with the user’s palm. In this paper, we have abbreviated the research product as ARPR (Augmented Reality Palm based Reflexology) system or application.

When a new user wants to use this system, the user needs to register his/her palm with the proposed system. Registration of the new user’s palm is done using D’Fusion Computer Vision Framework [4]. The image which is registered in the computer vision is the “Tracking Object” and later, a batch file is created for the software. When the user runs the application, the batch file is executed first, thereon it initializes the webcam. Now the webcam API starts initializing an MLObject. MLObject is the abbreviation for “Marker Less Object”. MLObject is matched with the “Tracking Object” which was created before. If the matching is perfect, then D’fusion Framework returns the set of 3D Objects to the running application, which in turn overlays this set of 3D virtual objects onto the user’s palm. Object tracking also takes place, i.e. when the user’s palm is in motion, this set of 3D virtual objects will get overlaid onto the palm and will also move along with the palm.
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Below diagram/figure demonstrates the use cases of the system. The below figure clearly describes the actors and the use cases involved in the system.

Fig1. Use Case Diagram
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The event diagram illustrated below depicts the series of events that occur during system usage and also explains process execution in series.

Fig2. Event Diagram
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Timely order of events that occur during the interaction between the user and the system are represented with a diagram as shown below.

![Sequence Diagram](image)

Fig3. Sequence Diagram
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The graphical representations of workflows of stepwise activities and control of events occurring in the system are represented by an activity diagram as illustrated below.

![Activity Diagram](image)

Fig4. Activity Diagram
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4. CONCLUSION

When a patient undergoes self-help treatments such as self- acupressure therapies and self-reflexology treatments, there is a probability of applying pressure or massage treatments to falsely speculated organ reflex points on the palm rather than applying onto the right reflex points. This will not serve the actual purpose of treating health problems the right way and may even lead to some health hazards. As there is no specific software to display the organ reflex points on the palm, our research helps in displaying and providing accurate information about organ reflex points. This is done through proper visualization during self-therapies and self-reflexology treatments by augmenting related reflexology information on the palm in the form of 2D or 3D virtual contents or organs using augmented reality technology. Our research product helps in eradicating false assumptions about organ reflex points present on the palm. It also helps easy visualization of reflex points on the palm for palm based reflexology treatments.

REFERENCES

5. LUA: http://www.lua.org