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To Design and Develop Intelligent Exercise System

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Abstract: *As the population increases day by day, the pollution and chances of traumas are increases. The health monitoring is also important to make physically strong. The load of physiotherapist is increase which result in poor performance of patient exercise. The system is developed which increases the efficiency of physiotherapist. Kinet based exercise system is developed which monitor and assign an exercise to the person. In defensive and rehabilitative healthcare, physical exercises are powerful involvement. However, a program may need in the range of thousands of practice repetitions, and many people do not adhere to the program making the exercise futile, or even dangerous. In recent years, applications developed based on Kinet are getting admired since human poses can be more easily estimated based on the sensed RGB-D information. There is no accurateness of doing free-hand exercise prescribed by physiotherapy Doctor. On the other, doing exercise is not that much interesting to do alone.*

Keywords: *Kinect, Exercise, Skeleton Tracking, Physiotherapist.*

I. INTRODUCTION

The current state-of-the-art for exercise instruction and monitoring is usually restricted to written instructions, exercise recording logs, as well as simple repetition counting devices. Regrettably, this practice has a number of problems. The patient does not obtain any feedback on the quality of the prescribed exercises. The clinician has no way of knowing whether or not the patient has carried out the prescribed exercises correctly and with the required number of repetitions.

In recent years, applications developed based on Kinect are getting well-liked since human poses can be more easily estimated based on the sensed RGB-D information. There is no accuracy of doing free-hand exercise set by physiotherapy Doctor. On the other, doing exercise is not that much interesting to do alone. To meet these challenges, we are developing a system that connects Hardware with Software which allows user to do exercise accurately and regularly. Furthermore, it offers users to do exercise in a game-like environment. Hence, the patients will get interested to do exercise. Traditionally, the physical therapy and evaluation of patients is based on therapist's judgment and observations. All rehabilitation routines begin with a kinetic assessment of the patient by a trained physiotherapist to concentrate the affected motions and motor functions. Based on his assessment, a motor rehabilitation routine is designed by selecting the amount of exercises that are important for patient's recovery. Yet, the evaluation can be inaccurate for several reasons like the subjectivity of these clinical assessments. An aging population and people's higher survival to diseases and traumas that leave physical sequels are challenging aspects in the context of an efficient health management. Telemonitoring technologies have been proposed as a solution to reduce hospital overloads, and using such technologies data can be accessed remotely by healthcare professionals through the Internet and mobile devices. In the area of physiotherapy, telerehabilitation systems that support physiotherapy sessions at home could help reduce healthcare costs while also improving the quality of life of the users that need rehabilitation. Cost containment in health care while trying to maintain access to quality services has become essential in the last years, as we face an aging population.

II. LITRATURE SURVEY

Shoulder injuries are very regular in sports and certain labour concentrated occupations. While some injuries are minor and full recovery is within 1-2 weeks, some major injuries requires the person to consult a physiotherapist and follow an exercise plan. Hidden Markov Models (HMM) for recognition and a histogram-based comparison for computing the accuracy score. The Microsoft Kinect sensor is used to obtain 3D coordinates of human joints. Important features are extracted from the skeletal coordinates which are then quantized into 16 intermediate upper-body poses. It intends to help the patient by keeping track of daily exercise routine, advising for improvements and maintaining records for doctor to access. [1]

The difficulty of vision-based posture estimation is really decreased with the aid of profitable depth camera, such as Microsoft Kinect. Yet, there is still much to do to bridge the results of human posture estimation and the understanding of human movements. The experiments are conducted on the videos of ten action types, and the results show that the proposed human action descriptor is representative for action video retrieval and the tutor system can successfully help the user while learning action movements [2]

The design and implementation of a Kinect-based system for rehabilitation exercises monitoring and guidance has been developed in this paper. The Unity framework frame work has been used to implement system because it enables to use virtual reality techniques to demonstrate detailed movements to the patient, and to facilitate examination of the quality and quantity of the patient sessions by the clinician. A set of basic rule elements has been developed that can be used to express the correctness rules for common rehabilitation exercises [3].

The most important aspect of developing a gesture-based HCI system is to first track the user before any hand detection can occur. The skeletal tracking features of Kinect combined with the NUI library allow users and their actions to be recognized. According to Microsoft, the infrared (IR) camera can recognize up to six users in its field of view while only two users can be tracked in detail. It should be noted that the Kinect sensor itself does not recognize people; it simply sends the depth image to the host device, such as an Xbox or computer. Software running on the host device contains logic to decode the information and recognize elements in the image with characterise tic human shapes. The software has been “trained” with a wide variety of body shapes. It uses the alignment of the various body parts, along with the way that they move, to identify and track the[4].With skeleton tracking, a n application can locate twenty (5) skeletal joints of a user standing and ten upper -body joints (shoulders, elbows, wrists, arms and head) of a user sitting directly in front of the Kinect Sensor. Figure 1. Shows the various joints relative to the human body.

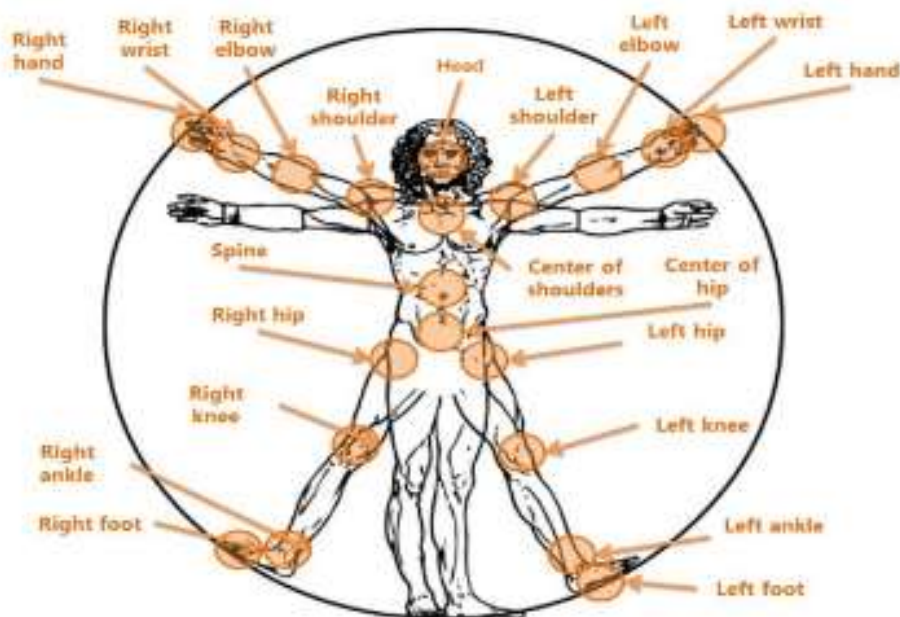


Figure 1: Tracked joints of a human [7]

After skeleton tracking is done, the position of each joint in 3D space is returned by the NUI library in the format of X, Y and Z coordinates expressed in meters according to the skeleton space coordinate system. Gestures, according to McNeill [9], fall broadly into four categories: gesticulations (which accompany speech and are often used for emphasis), emblems (which form part of a mutually understood gesture code, e.g. the “OK” sign), pantomimes (which are used in the absence of speech but are not part of a “code”), and sign language (which replaces speech altogether). In this context, gesture recognition for HCI and HRI is primarily split between using gesticulations, emblems and pantomimes to create new forms of interaction, and attempting to achieve automated sign language recognition for the deaf and thus enable natural communication for a set of users.

III. SYSTEM ARCHITECTURE

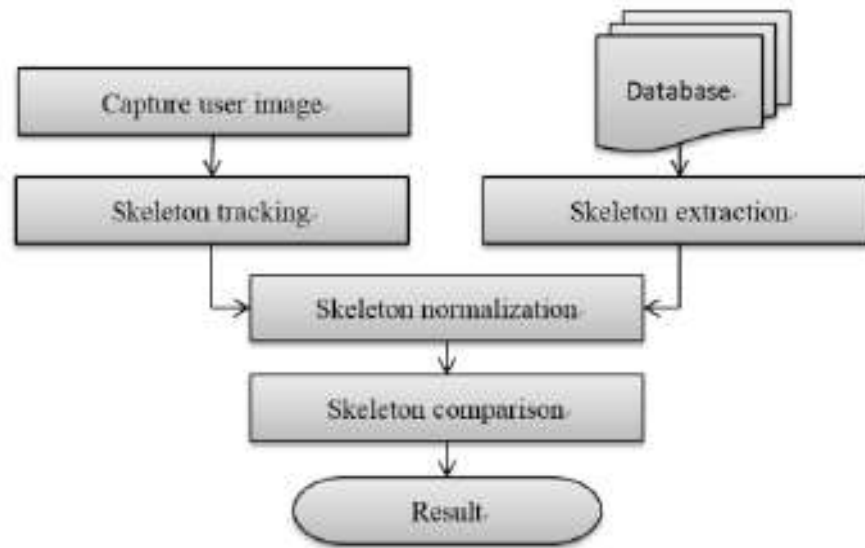


Fig.2. System flowchart

A system flowchart of the Kinect-based rehabilitation system is shown in Fig 1. Kinect sensor was utilized to record their movements as movement database. These movements performed by the coaches are considered as standard movement, and the skeleton of these movements are then extracted for comparison. When a patient uses this rehabilitation system, the system first displays standard movements on the screen. The patient follows the information on screen to perform compared to the movements of coaches by comparing the skeletons. The results will show on screen to inform the user.

CONCLUSION

The Kinect-based physical exercise increases the recognition rate as an approach to provide convenience for the patients who would like the medical care usually from the health professions. Most of the previous studies were driven from the patients' point of view. The proposed system aiming to simplify the recovery instruction from therapists, increasing patient's motivation to participate in the rehabilitation exercise. Furthermore, the architecture for developing such rehabilitation system is designed by motion capture, human action recognition and standard exercises prototype with Kinect device.

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