Augmented Reality Based Human Physical Training System

Manjit Singh Sidhu[1], Javid Iqbal[2]

[1,2] Universiti Tenaga Nasional,
College of Computing and Informatics,
Graphics & Multimedia Department, Selangor, Malaysia
E-mail: manjit@uniten.edu.my

Abstract

In this innovation, we proposed an Augmented Reality (AR) Based Human Physical Training System i.e. to train a learner how to do a particular dance like Western, Bharatnatyam and Bollywood. The trainee can imitate the motion demonstrated by a virtual trainer in the AR system. Meanwhile, the trainee's motions will be captured and analyzed by the system based on which motivational feedback is given back to them. The results of several user experience done in Malaysia and India showed that our system can successfully guide students to improve their artistic side i.e. dance skills. Additionally the system has a lot of promise for promoting dance from various cultures, exercise, music, and social engagement. More dance styles from other cultures are being added to the library of the AR system based on demand. The system is intended for commercialization to dance training/culture centres and dance enthusiastic.

Keywords: Augmented Reality, training, dance, interactive

1. INTRODUCTION

This novel and unique user experience (UX) design for a virtual training dance system aims to help people live a healthy life. A number of researchers and companies have developed fitness systems that use a virtual coach which shows the user with actions they should perform. However such systems can be difficult to accurately follow the virtual guide's motions and there are also limitations in the feedback provided to inform users of their correct body posture. This is because most systems are designed for users to simply watch and follow a character's motions (poses) from a third person perspective. In this dance training system, users are able to follow the exercise-postures of a virtual professional trainer shown in a first person viewpoint and receive coaching through a step-by-step motion. The system design is used as the preliminary analysis for dance and performance. The enhanced prototype is being updated with more dance styles in its database. Through a series of trails, the system design has shown to improve dance trainees. The prototype has great potential and capability to promote dance / fitness / culture and social interaction. The system is aimed to be commercialized to dance training/culture centers and individuals.

2. OBJECTIVE

The objective of the system is to provide a step-by-step guide to enthusiastic dance learners or beginners to learn how to dance based on the selected dance style from the database. More specifically it provides voice and gesture based feedback similar to a conventional choreographer which is one of the novelties of the system.

3. NOVELTY & INVENTIVENESS

The system has uniqueness especially in terms of new user interface experience (user just needs to use hand gesture to select commands), motivational feedback (focuses on motivational feedback to the dance learners i.e. encourages learner to follow instructor, repeat a particular step etc.), improved algorithm for multiple dancers (existing systems focuses on training a solo trainee but our system enables multiple trainees to benefit from the learning scenario in order to enhance the usability and effectiveness). Also no wired based body senses are used. The proposed system's architecture is made up of three main components: instruction with Kinect, motion capture, and performance assessment. Figure. 1 and the interface is shown in Figure 2.
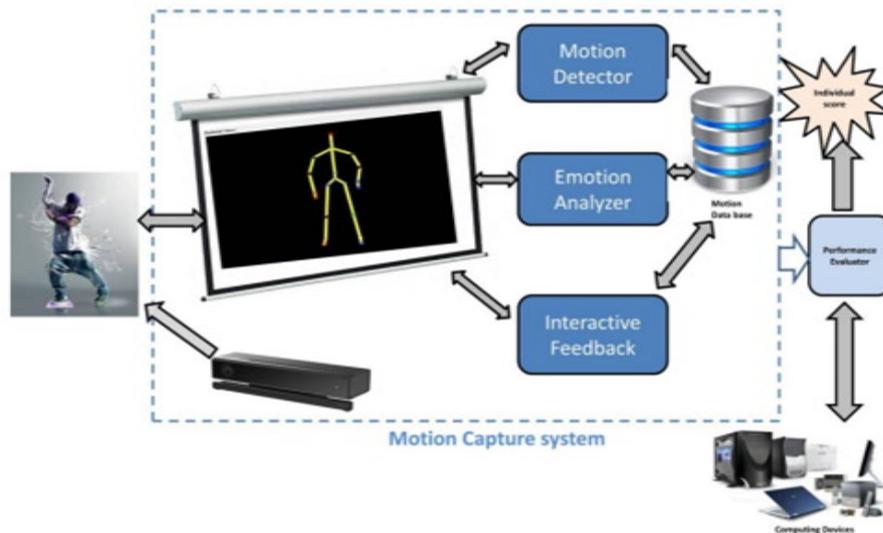

Figure 1. The dance training system architecture

Figure 2. The interface of the dance training system

4. PRACTICALITY & USEFULLNESS

The system is conducive for dance training. It provides an alternative and robust method in learning how to dance. It has huge potential in assisting the enthusiastic dance learners to learn how to dance, pre-training activity for movie directors, enhance tourists experience and promotes healthy lifestyle, for obesity, pre-diabetic and hypertension patients. Also as an alternative dance training system during this pandemic time.

5. CONCLUSION

In this project, an AR based choreographer system was developed to overcome the limitations of the currently available dance training systems. The test results of the dance training method showed that the system was useful and could assist trainees in properly understanding the dance steps of the specific dance. The implementation of the motion user interface using AR technologies was extremely beneficial to dance trainees while engaging with the dance training framework because it did not distract them from touching any gadget such as the keyboard, mouse, or screen. The system is conducive for dance training. It provides an alternative and robust method in learning how to dance. It has huge potential in assisting the enthusiastic dance learners to learn how to dance, pre-training activity for movie directors, enhance tourists experience and promotes better lifestyle, for obesity, pre-diabetic and hypertension patients. Also as an alternative dance training system during this pandemic time.