A Real-time Motion Capture System for 3-D Virtual Characters

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Abstract*: Motion tracking method is being issued as essential part of the entertainment, medical, sports, education and industry with the development of 3-D virtual reality. Virtual human character in the digital animation and game application has been controlled by interfacing devices; mouse, joysticks, midi-slider, and so on. Those devices could not enable virtual human character to move smoothly and naturally. Furthermore, high-end human motion capture systems in commercial market are expensive and complicated. In this paper, we proposed a practical and fast motion capturing system consisting of optic sensors, and linked the data with 3-D game character with real time. The prototype experiment setup is successfully applied to a boxing game which requires very fast movement of human character.*

Keywords: Motion, 3-D, Virtual Character, Virtual reality.

I. INTRODUCTION

The project is a real-time 3D computer vision system for detecting and tracking human movement. It provides a person with control over the movement of a virtual computer graphics character. A version of the previously developed W4 system [1], extended to operate on colour images, is run on each of the multiple cameras observing a person. Its silhouette analysis and template matching achieve real-time 3D estimation of human postures.

The estimated body postures are then reproduced in a 3Dgraphical character model by deforming the model according to the estimated data. Dynamics/kinematics model of human motion [2] and K al man filters are utilized to help the tracking process as well as to interpolate some3D joint locations (i.e. elbows). The system runs on a network of Dual-Pentium 400MHz PCs at 20-30 frames per second (depending on the size of person whom the system observes).
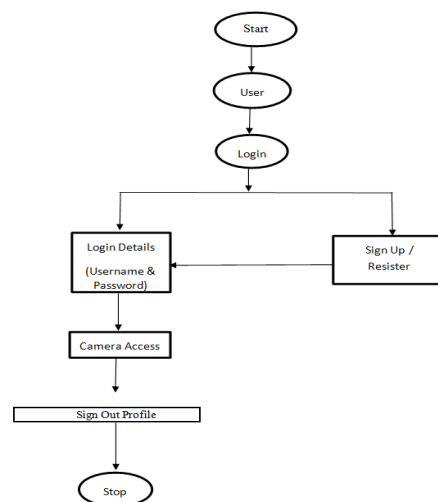
II. FLOW CHART OF PROPOSED METHOD

Figure 1- Flow Chart

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Figure 1 shows the flow chart of proposed method for real-time motion captor 3-D virtual character.

III. WORKING OF PROPOSED SYSTEM

Sensors and Cameras: These capture the movements of a person or object. Multiple cameras are often used to provide a 360 degree view of the subject. Markers or Sensors on the Subject: These can be reflective markers, LED lights, or wearable sensors attached to a person's body. They are used to track the position and orientation of body parts.

Computer Hardware: Powerful computers are required to process the data from cameras and sensors in real-time.

Developing an efficient and accurate real-time motion capture system for 3D virtual characters involves addressing various technical challenges and requirements in order to enable the seamless and realistic animation of virtual characters in realtime interactive environments. This problem can be broken down into several key components:

Real-Time Tracking: Creating a system that can accurately track the movements and poses of individuals or objects in real-time and instantly transfer this data to 3D virtual characters.

Low Latency: Minimizing the delay or latency between the physical movement and the corresponding animation in the virtual world, ensuring a natural and immersive experience.

High Accuracy: Achieving precise and reliable motion capture, reducing noise, and avoiding drift errors, especially in complex and dynamic movements.

Scalability: Designing a system that can adapt to different scenarios, from single-user applications to multi-user environments, and from small spaces to large-scale motion capture stages.

IV. RESULTS AND DISCUSSION

Figure 2- Front end of proposed system

Figure 2 the front end of proposed real-time motion captor 3-D virtual character. Developing a real-time motion capture system for 3D virtual characters requires a comprehensive integration of hardware and software components. The system involves capturing and processing motion data from markers on a subject, reconstructing a virtual skeleton, and mapping this motion onto a 3D character in real-time. The accuracy, latency, and adaptability of the system are crucial factors in its success, making calibration, data fusion, and feedback mechanisms essential for optimal performance.

V. CONCLUSION

In this paper, we proposed a practical and fast motion capturing system consisting of optic sensors, and linked the data with 3-D game character with real time. Developing a real-time motion capture system for 3D virtual characters requires a comprehensive integration of hardware and software components. The system involves capturing and processing motion data from markers on a subject, reconstructing a virtual skeleton, and mapping this motion onto a 3D

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