VR Technologies for Rich Sports Experience

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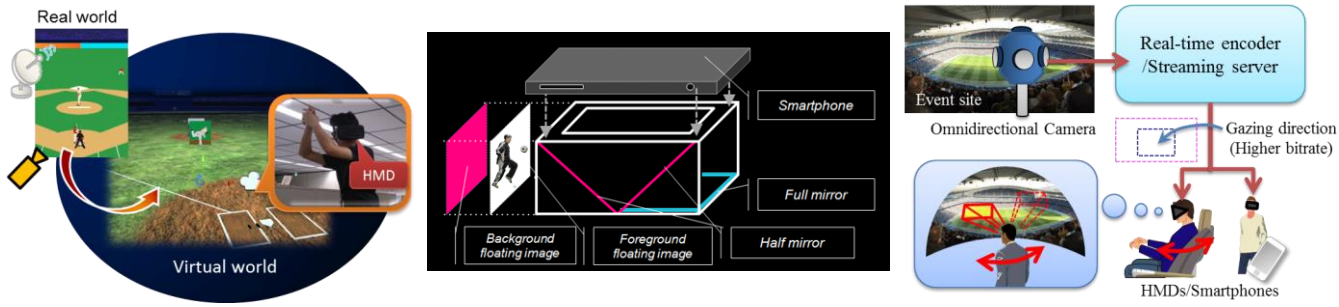

Figure 1: Diagram of "Sports Performance Enhancement System" (left), "Kirari! for Mobile" (center), and "Effective Live-streaming Method for Omnidirectional Video" (right).

Abstract

NTT has developed progressive VR technologies to provide a rich sports experience to its users from the perspectives of both entertainment and player performance enhancement. The "Sports Performance Enhancement System" we have developed provides a virtual experience that enables participants in sports to feel as if they were actually on the playing field. It enables both sports participants and their coaches to devise strategies for upcoming games through the use of a highly realistic immersive experience. The "Kirari! for Mobile" system, with which users can use compact multi-layered 3D technology on smartphones. It provides a 3D model that our free viewpoint capturing system can easily capture. Users can easily use and intuitively manipulate it by turning their smartphones in various directions to find out what is actually happening. The "Effective Live-streaming Method for Omnidirectional Video" enables real-time video streaming that reduces necessary network bandwidth requirements by 80% for a widely captured omnidirectional video, such as one for a sports event or a concert. This was made possible by streaming user viewing areas in real time at high resolution. The technologies are demonstrated to show their potential application to sports.

Keywords: sports performance enhancement, omnidirectional video streaming, multi-layered 3D

Concepts: • **Human-centered computing ~Human computer interaction (HCI);** *Interactive systems and tools;*

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1 Technology Summary

1.1 Sports Performance Enhancement System

This system enables users to enhance their sports performance by providing a VR experience relevant to a sport. It enables them to feel as if they are actually walking around the field freely and to view the moves or actions of other players from their own point of view. This highly immersive experience helps them relax so that they can perform to the extent that their ability allows them in an actual game. It also allows them to share their experience with their coaches, who do not see the game from their own view. This can help coaches to train their charges more effectively.

The key feature of this system is that makes it possible to reconstruct a virtual space based on a "real" game. In our system, we use multiple sensors such as cameras and radar devices set in the playing field, which enabled us to reconstruct a 3D world with a practical approach in terms of accuracy and efficiency.

1.2 Kirari! for Mobile

The "Kirari! for Mobile" (KfM) system is a compact multi-layered 3D system that enables users to easily watch floating images of 3D models on their smartphones.

In a KfM system demonstration, live 3D models captured by multiple Kinect V2 devices were displayed in real time. As a training tool, the system has good promise since during lectures its users (sportspersons, entertainers, etc.) can use it to check the forms or postures they assume from a wide range of viewpoints. The system can also show a professional performer's 3D model and a user's 3D model on different layer screens, which users can view with the aim of improving their own forms or postures. Since KfM is a portable system, users can easily check their forms/postures on their smartphones anywhere.

1.3 Effective Live-streaming Method for Omnidirectional Video

Many people dream of being able to feel they are actually attending a remote event from their home. Our approach is to

make content viewing an immersive experience; to achieve this we propose a streaming system for omnidirectional video [Ochi et al. 2015]. While there are many similar systems, ours takes into account human visual characteristics where people's visual awareness is concentrated near their gazing directions. For our system, we first divide a huge omnidirectional video into many tile-shaped regions and resolutions and synchronously encode them. We then implement a function in the user client that requests not only higher video resolution in the viewer's gazing direction, as measured by viewing device sensors, but also lower resolution for other areas. This enables us to reduce necessary network bandwidth requirements by 80%, which allows viewers to enjoy huge omnidirectional video images at a reasonable bitrate over a normal subscriber line.

In the demonstration the system that is specially enhanced for live streaming for this opportunity will be performed.

References

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