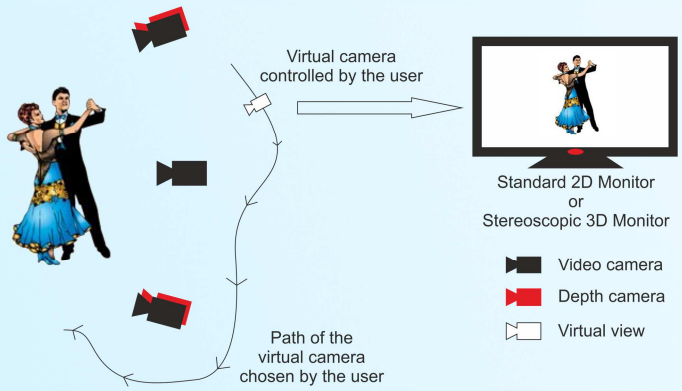
Poznań University of Technology
Chair of Multimedia Telecommunications and Microelectronics

Experimental Free Viewpoint Television System



Free Viewpoint Television

Free Viewpoint Television is a **next generation television system** that allows a user to freely navigate throughout the 3D scene freely.



A user can watch the spatial scene **from any desired direction**, even from places where no camera has been recording.

Free viewpoint represents a **new type of interactive television system**, where a user becomes a cameraman or a director. The system provides direct interaction with the scene instead of passive video consumption, and thus – a new, exciting immersive experience.

The system has been developed over past 6 years.

Applications

- Sports events
- Video instruction
- Education
- Entertainment
- Documentation

Acquisition System

Our multicamera acquisition system **is the only operational fully wireless multicamera system** in the world.

The system was designed in the way that allows a quick setup at various locations, without cabling and with limited interference to the scene.

To make it possible, we have developed an "all in one" camera unit. Each camera unit is fully equipped with:

- High resolution digital camera
- Wireless synchronization module
- Wireless control module
- Local recording device – fast and of high capacity
- Battery power supply providing 10 hours of operation

Our camera units can work with any SDI compatible camera that is available in the market.

Thanks to modular design we can customize our acquisition system depending on the particular application.

Benefits

- Suitable for indoor and outdoor environment
- Next generation of interactive television system
- Minimal cabling
- Can be used for other custom applications

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3D Video Compression technology

Captured data is compressed in the Multiview Video plus Depth (MVD) format. In the MVD format, typically **only a few views are actually coded**, along with the associated depth data, which represent the basic geometry of the captured video scene.

The developed compression technology is a **HEVC extension for 3D Video coding** that supports coding of multiple view and associated depth data.

It adds new coding tools to the HEVC design, which **allows efficient joint compression** of multiple video views and associated depth data.

The 3D HEVC extension developed by our team has been proposed to ISO/IEC MPEG and **was defined as starting point** for the HEVC based 3D video coding standard.

Depth Estimation Technique

A depth map is a basic geometric representation of the video scene. It represents the distance to the objects per each pixel.

The developed techniques require only 3 views of the scene in order to provide depth maps of good quality.

The developed techniques, such as soft segmentation or three view occlusion handling, are part of the internationally recognized Depth Estimation Reference Software (DERS) maintained by the MPEG. DERS represents state of the art in depth estimation.

Virtual View Rendering Technique

Based on the transmitted video pictures and depth maps, virtual view at any desired position is generated using depth image based rendering (DIBR) techniques at the receiver site.

The developed solution provides real-time high quality virtual views.

Also allows presentation of the 3D scene on various types of displays, including:

- monoscopic monitors
- stereoscopic polarization and shutter monitors
- autostereoscopic monitors that require no glasses in order to see the 3D effect

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