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Title **[FTV AHG] Video and depth multiview test sequences acquired with circular camera arrangement – "Poznan Service" and "Poznan People"**

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1 Introduction

During 106th to 111th MPEG meetings, the Ad-hoc Group on Free Viewpoint Television has identified a need for new, high quality 3D video test material corresponding to Free-Viewpoint Television (FTV) applications [1]. Poznań University of Technology has responded to such needs with the development of a video acquisition system with circular camera arrangement. This unique system was built by the authors, and was used in order to record test sequences that are suitable for experiments related to Free-Viewpoint Television.

This document provides a common description of two new test sequences produced by Poznań University of Technology, Chair of Multimedia Telecommunications and Microelectronics, Poznań, Poland. These sequences are "Poznan Service" and "Poznan People". New test sequences have acquired depth information from Kinects sensors. The presented test material is provided to MPEG (and the scientific community in general) for research and standards development purposes under the conditions mentioned in Section 5.

2 Wireless multi-camera acquisition system

The sequences have been recorded [2] with the use of 9 Full-HD cameras and 5 depth sensors placed around the scene (Fig.1) on an arc of radius of R=3 meters. The arc is 104 degree wide and the cameras are placed approximately every 13 degrees, while the depth sensor every 26 degrees.

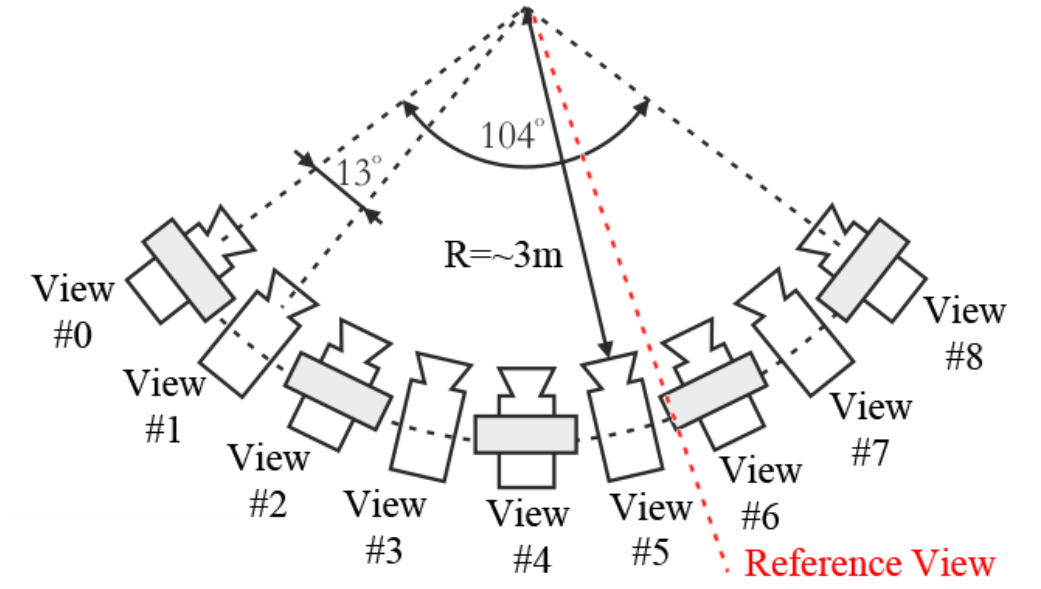

Figure 1. Circular camera setup used in the experiments reported in this document. Cameras with Microsoft Kinect One® are marked with gray box.

Additional 10th "reference" camera was placed in between cameras #5 and #6. The video from this "reference" camera can be used for research purposes, e.g. in order to test view synthesis quality in the middle of views.

All of the cameras have been mounted on special wireless mobile camera units (Fig. 2) developed at Poznan University of Technology. Each mobile camera unit is equipped with:

- high resolution digital camera (Canon XH G1),
- power supply (battery),
- wireless synchronization receiver (Fig. 2),
- remote control receiver,
- HDD recorder (with Seagate Momentus 500GB disks).

Five of the cameras have been additionally equipped with Microsoft Kinect One® module in order to obtain depth data. The usage of more depth sensors was not possible due to interference between Microsoft Kinect One ® modules.

Each camera module is able to record about 30 minutes of high resolution video. All cameras are precisely synchronized with the use of a wireless dedicated 869 MHz link. Each captured frame is signed with a time-code for error resilience. This also allows for the detection

of miss-synchronization. All cameras can be controlled by a dedicated system that also uses a separate WiFi wireless link (Fig. 3).

The usage of such camera modules is compliant with the strategy aimed at the development of practical low-cost Free-Viewpoint Television system that could be used within 2-3 years [3,4]. The camera modules have been developed in order to demonstrate that an FTV camera system may be easily developed even using the existing technology.

Figure 2. Wireless mobile camera module with Microsoft Kinect One ® module mounted on top.

Figure 3. Wireless synchronization module.

Figure 4. Multi-camera setup used in production of "*Poznan Service"* and *"Poznan People"* test sequences.

3 Test sequence specification

Both the *"Poznan Service"and "Poznan People"* sequences were recorded inside the building with artificial lighting. *"Poznan Service" sequence* presents two persons servicing a computer workstation (Fig. 5). The *"Poznan People"* sequence presents the team of Chair of Multimedia Telecommunications and Microelectronics during the stand-up around the workstation (Fig. 6).

	Video	**Depth**
Resolution:	1920x1080 - Full HD	512x424
Frame rate:	25 frames per second	30 frames per second
Number of views:	9 + 1 reference view	5
Length:	500 frames (20 seconds)	600 frames (20 seconds)

Recorded sequences were precisely calibrated. Radial distortion of the lenses has been removed. All views have been color-calibrated. Intrinsic and extrinsic camera parameters for each of the camera are provided along with the sequence.

Figure 5. Exemplary frames from *"Poznan Service"* sequence.

Figure 6. Exemplary frames from *"Poznan People"* sequence.

4 Availability

The sequences remain the property of Poznan University of Technology but they are licensed for free use within ISO/IEC JTC1/SC29/WG11 (MPEG) for the purposes of research and the development of standards. These sequences can be also freely used for research purposes outside MPEG. Any other use is prohibited unless an explicit permission is given by Poznań University of Technology, Chair of Multimedia Telecommunications and Microelectronics.

Acknowledgements are appreciated if the material was used in research and are **required if the material is to be used in publications.** The acknowledgement should use the reference to this document.

The abovementioned video sequences are available at ***ftp://multimedia.edu.pl/ftv*** ftp server. User credential will be provided upon request (see email to the authors).

5 Acknowledgement

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6 References

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[3] M. Domański, *"Practicing free-viewpoint television: multiview video capture and processing,"* in: M. Tanimoto, T. Senoh, "FTV seminar report," ISO/IEC JTC 1/SC 29/WG 11, Doc. MPEG M34564, July 2014.

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