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Immersive Future Media Technologies: From 3D Video to Sensory Experience

The past decade has witnessed a significant increase in the research efforts around the Quality of Experience (QoE) which is generally referred to as a human-centric paradigm for the Quality of a Service (QoS) as perceived by the (end) user. As it puts the end user in the center stage, it may have various dimensions and one dimension recently gained momentum is 3D video. Another dimension aims at going beyond 3D and promises advanced user experience through sensory effects, both introduced briefly in the following. 3D Video: Stereo and Multi-View Video Technology: 3D related media technologies have recently developed from pure research-oriented work towards applications and products. 3D content is now being produced on a wider scale and first 3D applications have been standardized, such as multi-view video coding for 3D Blu Ray disks. This part of the tutorial starts with an overview on 3D in the form of stereo video based systems, which are currently being commercialized. Here, stereo formats and associated coding are introduced. This technology is used for 3D cinema applications and mobile 3DTV environments. For the latter, user requirements and profiling will be introduced as a form to assess user quality of experience. For 3D home entertainment, glasses-free multi-view displays are required, as more than one user will watch 3D content. For such displays, the current stereo solutions need to be extended. Therefore, new activities in 3D video are introduced. These 3D solutions will develop a generic 3D video format with color and supplementary geometry data, e.g. depth maps, and associated coding and rendering technology for any multi-view display, independent of the number of views. As such technology is also developed in international consortia, the most prominent, like the 3D@HOME consortium, the EU 3D, Immersive, Interactive Media Cluster and the 3D video activities in ISO-MPEG are introduced. Advanced User Experience through Sensory Effects: This part of the tutorial addresses a novel approach for increasing the user experience – beyond 3D – through sensory effects. The motivation behind this work is that the consumption of multimedia assets may stimulate also other senses than vision or audition, e.g., olfaction, mechanoreception, equilibrioception, or thermoception that shall lead to an enhanced, unique user experience. This could be achieved by annotating the media resources with metadata (currently defined by ISO/MPEG as part of the MPEG-V standard) providing so-called sensory effects that steer appropriate devices capable of rendering these effects (e.g., fans, vibration chairs, ambient lights, perfumer, water sprayers, fog machines, etc.). In particular, we will review the concepts and details of the forthcoming MPEG-V standard and present our prototype architecture for the generation, transport, decoding and use of sensory effects. Furthermore, we will present details and results of a series of formal subjective quality assessments which confirm that the concept of sensory effects is a vital tool for enhancing the user experience.