

Le mardi 08 décembre 2020 à 16h en distanciel sur Teams

Conférence sur le thème :

## Point Cloud Compression in MPEG

Par :

**Dr Khaled MAMOU, Senior Software Engineering, APPLE, San Francisco, USA**

### Abstract:

Consumer and industry level 3D sensing devices are becoming more common than ever before, increasing the amount of available 3D data. 3D scans can capture the full geometry and details of a 3D scene, and are useful in many applications including virtual reality, 3D video, robotics and geographic information access. Among many representation formats for 3D data, point clouds are a tradeoff between the easiness of acquisition, realistic rendering, facility in manipulation and processing. However, point clouds are typically represented by extremely large amounts of data, which is a significant barrier for mass market applications. To address this challenge, the Moving Pictures Experts Group (MPEG) initiated a standardization activity on Point Cloud Compression (PCC).

This talk introduces the technologies developed during the MPEG standardization process for defining an international standard for point cloud compression. The diversity of point clouds in terms of density conducted to the design of two approaches: the first one, called V-PCC (Video based Point Cloud Compression) consists in projecting the 3D space into a set of 2D patches and encodes them by using traditional video technologies. The second one, called G-PCC (Geometry based Point Cloud Compression) is traversing directly the 3D space in order to create the predictors.

With the current V-PCC encoder implementation providing a compression of 125:1, a dynamic point cloud of 1 million points could be encoded at 8 Mbit/s with good perceptual quality. For the second approach, the current implementation of a lossless, intra-frame G PCC encoder provides a compression ratio up to 10:1 and acceptable quality lossy coding of ratio up to 35:1.

By providing high-level immersiveness at currently available bandwidths, the two MPEG standards are expected to enable several applications such as six Degrees of Freedom (6 DoF) immersive media, virtual reality (VR)/ augmented reality (AR), immersive real-time communication, autonomous driving, cultural heritage, and a mix of individual point cloud objects with background 2D/360-degree video.



**Khaled Mammou** received a Ph.D. degree in Applied Mathematics and Computer Science from the University of Paris V in 2008 and an Engineering Degree from Tunisia Polytechnic School in 2004. He is a Senior Software Engineer at Apple working on designing and optimizing multimedia codecs and has been a member of the ISO/IEC Moving Picture Experts Group (MPEG) Committee since 2005, especially focusing on 3D graphics compression. He chaired the MPEG Ad-Hoc Group on MR3DMC (Multi-Resolution 3D Mesh Coding) and significantly contributed to the standardization of the MR3DMC, SC3DMC (Scalable Complexity 3D Mesh Compression) and FAMC (Frame-based Animated Mesh Compression) MPEG standards for static and animated 3D mesh compression. Currently, he is the co-chair of the MPEG Point Cloud Compression Ah-Hoc Group and editor of the ISO/IEC specifications for video-based point cloud compression (ISO/IEC 23090-5) and geometry-based point cloud compression (ISO/IEC 23090-9).