The high quality and quantity of the contributions to this special issue, as well as the balance of the geographical points of origin clearly indicate that the subject of three-dimensional imaging and virtual reality has come of age. Advances in these areas will provide the viewer with the feeling of “being present in the scene” or a sense of “telepresence,” enhancing the quality of presentation. The need of an altogether different type of “telepresence” is increasingly evident when moving in virtual environments via the WWW infrastructure. Users will be telepresent there when they are able to move in the virtual 3D scenes, encountering 3D virtual objects and even virtual humans. The above trends and issues are reviewed and many related areas are covered by the articles devoted to the three-dimensional imaging and virtual reality area in the present issue. Further, special attention is paid to human face modeling and animation. With almost thirty years of history behind it, the research concerned with human face modeling and animation seemed to suffer from unrecoverable weakness, mainly due to the persistent difficulty in comparing the various solutions proposed. The recognized need for a common reference has recently led the facial animation community to become a relevant player in MPEG-4 standardization with the considerable achievement of having defined standard specifications for the representation, coding and transmission of face definition and animation parameters (FDP/FAP). This revolutionary result has given renewed enthusiasm to the entire research area and the number of interesting proposals for competing implementations and for challenging applications is increasing day by day. A multitude of animated characters is already pervading the web and, not too far away in the future, we will find them at home, in the car, on the train, at school, and on our mobile phone. Facial animation issues are no more “good only for publishing” but are becoming a serious and concrete technology with big commercial potentialities. Facial animation is becoming a business.

In the present issue, we have selected a couple of contributions focused on two key problems typical of any facial animation technology, namely the use of 3D natural video for the automatic model calibration and the realistic reproduction of facial expressions. The paper from Grammalidis et al. provides a novel solution for adapting the geometry of a generic 3D facial model to the semantics of a specific face together with the description of an animation mechanism driven by a text-to-speech (TTS) synthesizer. The paper from Raouzaiou et al., on the other hand, proposes an effective algorithm for interpolating FAP trajectories, able to achieve smooth reproduction of facial expressions with preservation of natural visual prosody. On the relevant analysis issue of head tracking Ström proposes a novel method for tracking nonmarked faces in nonconstrained scenes, providing the ability to use new points or texture as the face turns, along with improving on robustness through a solid reinitialization strategy.

Advances on 3D object modeling are introduced by Sarti and Tubaro with an innovative implementation based on a level set approach, able to improve the performances and reduce the computational cost with respect to other competing solutions. Lei and Hendriks examine the potential of teleconference applications, presenting a real-time multi-step
view reconstruction algorithm. Moreover, Galpin and Morin present a way to automatically build a series of 3D models of a scene from a video sequence. All 3D models are not consistent with each other, but each model is consistent with its predecessor and successor, due to a bundle adjustment step called “sliding adjustment.” Finally, Choo et al. propose a novel algorithm for simplifying 3D mesh data by removing vertexes based on examining a so-called interior angle and triangle height.

The paper by Triantafyllidis et al. deals with the detection of occlusions, visible foreground and background regions between the left and the right frames of a stereo sequence, along with the extraction of the uncovered-background areas between two successive frames of the stereo sequence. A Bayesian framework is adopted to develop a well-founded solution based on a six hypotheses process. The issue concludes with the work of Park et al. who propose a new measure of dissimilarity between two 3D models, using the Z-buffer to calculate depth at specific points.

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