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ABSTRACT OF THE OPENING CEREMONY SPEAKER

Automatic modelling of Virtual Humans

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Nowadays, various fields such as medical and entertainment industries, education or cultural Preservation are using virtual humans. Much work has been done in the computer graphics domain to push the limits of realism of virtual humans further and also to automatize the pipeline for the virtual human creation. Human body modelling is a difficult task that has required manual work of designers and animators to create a 3D geometry that represents a real person. In this presentation, we will discuss the state of the art in modelling virtual humans and also present faster methods for human body modelling that use recent image-based 3D reconstruction approaches. Photogrammetry in this domain could play an essential role.

The time-consuming manual process of the creation of virtual humans or avatars has been replaced over time by several more automatic techniques. Different methodologies have been proposed and can be classified into three main categories: creative (Ratner, 2012), reconstructive (Allen et al., 2003) and interpolated methods (Bastioni et al., 2008). We have worked on a reconstruction based technique that uses an image-based 3D scanner to capture the user in a fast and accurate manner. The setup is movable and can be installed easily in different places. The position of the cameras can also be adjusted to change the acquisition volume. Finally, the post-processing time and the cost of the installation have been significantly decreased.

Our new system is based on photogrammetry technologies. It is composed of a large number of compact cameras that are synchronized and controlled by a computer. Within less than a second, pictures of the subject are taken by the camera cluster from different angles. This very short delay during the capture minimizes user movements drastically and reduces the noise in the generated model. The images can then be used for 3D reconstruction. Finally, a virtual skeleton is inserted into the model to be able to animate it. Kinematic and physics based data and models can be also used in the simulation of motions.

In our presentation, we will show 3 applications: 1) in fashion model modelling, 2) in modelling athletes for replay ancient sports and 3) in modelling virtual anatomical and physiological specific patients.