The Augmented Painting

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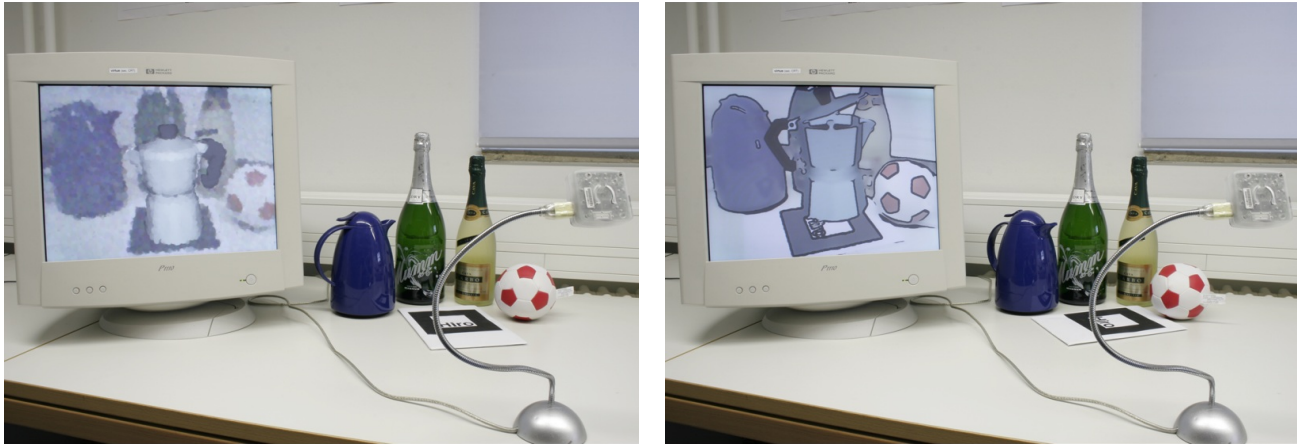
Figure 1: The *Augmented Painting* shows the real scene augmented with a virtual coffee maker in a painterly and a cartoon-like style.

1   Introduction

The *Augmented Painting* is an interactive tabletop augmented reality setup consisting of a computer, a webcam, and an observed area containing several background objects. As well, a special black-and-white marker pattern for camera tracking is placed in the observed scene. The user can interactively manipulate the placement of the camera and the objects. The user can also add or remove objects. An augmented version of the observed scene with added virtual graphical models is shown on the computer monitor. The virtual objects are rendered with correct spatial alignment relative to the tracking marker. However, unlike in conventional augmented reality, the output image is a stylized version of the observed scene. Both the real camera image and the virtual models are shown in the same artistic or illustrative style. It is possible to choose between three different types of stylization; a cartoon-like style made up of colored patches and silhouettes, a painterly style consisting of small brush strokes recreating the pointillism style of painting, and a black-and-white technical illustration style (the first two styles are demonstrated in Fig. 1). All of these stylized augmented video streams are rendered in real-time, providing a truly interactive user experience. As a result of the stylization, virtual and real parts of the augmented image are difficult to distinguish. The integrated digital "still life" or "augmented painting" created provides a novel experience of an augmented environment and digital art for the observer.

2   Technical Contribution

The *Augmented Painting* setup combines augmented reality techniques with real-time artistic stylization methods. This concept, which we call "stylized augmented reality" is still very new and was only recently introduced [Fischer et al. 2005]. The overall setup integrates video acquisition, video-based camera tracking, artistic video stylization, and artistic rendering in a single interactive real-time system. Several new stylization algorithms were developed in order to be able to generate a stylized augmented video stream at real-time frame rates. Some of these algorithms utilize the programmability of modern graphics processing units, which allow

processing of the video stream at high speed and with a high quality. This would have been impossible only a few years ago. The *Augmented Painting* is the first comprehensive presentation and interactive installation of the newly developed concept of stylized augmented reality. For the first time, the different types of stylization are integrated into a single, easy-to-use setup. This makes the idea of a painterly or illustrative presentation of an augmented environment accessible to non-expert users.

3   Conclusion

The *Augmented Painting* provides the unique experience of seeing reality in a novel way - the observed scene is rendered as an interactive artwork showing virtual objects as well as the real environment. Observers can manipulate the observed area or change the placement of the camera, creating an individual composition in the displayed image. Since it is also possible to switch between the different styles, the attendees are able to compare different artistic representations of the same augmented scene.

Apart from an art installation such as the one proposed here, several other interesting potential applications can be conceived for stylized augmented environments. Combined stylized representations of virtual and real objects can provide a novel experience in augmented reality games, entertainment scenarios, and education and training applications. Since physical and graphical objects are difficult to distinguish in this type of augmented video stream, this might also lead to new impulses for immersive AR settings using head-mounted displays (HMDs) or translucent display setups. Since the user cannot tell whether an object in the immersive augmented environment is real or virtual, the technology might actually become more effective for some applications thanks to the stylization. We are currently considering potential uses in psychotherapy (e.g., phobia therapy) and psychophysics (e.g., face recognition in virtual environments).

Bibliography

FISCHER, J., BARTZ, D., AND STRASSER, W. 2005. Stylized Augmented Reality for Improved Immersion. In *Proc. of IEEE Virtual Reality*, 195–202.

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