City Guide *

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Abstract

We have developed a mobile augmented reality system which can be used outdoors and is based on real-time hybrid tracking of six degrees of freedom of user's head pose. The system requires a 3D city model, from which promising features to track are extracted in an offline preprocessing step. During online operation, these features are tracked in the urban scene and head (i.e. camera) pose is calculated at rates of up to 30Hz. The proposed demonstration will use a 3m wide $\times$ 2.5m high poster showing a facade. The fully mobile user can walk in front of the facade and will perceive virtual 3D augmentations in real-time (sidewalk, tubes, signs, CAD model of the interior, etc.).

1 System Components and Algorithms

Our hybrid tracking system for outdoor augmented reality applications is described in detail in [1]. Its main algorithmic components are: natural landmark detection, vision-based pose computation, and fusion with inertial sensors.

The demonstration will use a mobile system which consists of a helmet and a backpack. Its main components are shown by fig. 1. The helmet carries sensors (a CMOS camera for 6DoF pose computation, a 6DoF inertial pose sensor, and a webcam for gesture-based interaction) and a stereo video-see-through head mounted display for 3D virtual augmentation of the real scene. The backpack contains batteries, power supply, and two computing subsystems: The tracking subsystem (a single-board PC with LAN, USB2 and serial interfaces), and the visualization subsystem (a Laptop with 3D graphics acceleration).

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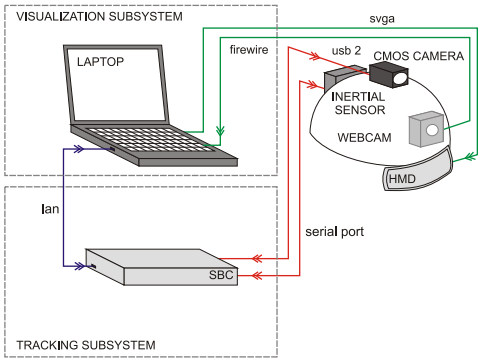

Figure 1: Main components of the mobile AR system

2 Planned Demonstration

We will bring our own facade which is comprised of a 3m × 2.5m poster with real phototexture (fig. 2(a)). The fully mobile user (fig. 2(b), helmet fig. 2(c)) will be able to walk around in front of the poster. The augmentation in real-time will show accurately overlaid 3D graphics, e.g. a virtual sidewalk, tubes running underneath, signs, or a wireframe model of the interior of the building.

(a) facade (b) mobile gear (c) the helmet

Figure 2: The planned demonstration setup using a poster of a facade

References

[1] M. Ribo, H. Ganster, M. Brandner, P. Lang, Ch. Stock, and A. Pinz. Hybrid tracking for outdoor AR applications. *IEEE Computer Graphics and Applications Magazine*, 22(6):54–63, Nov/Dec 2002.