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Panoramic Three-dimensional Image Capture Using Smart Glasses

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ABSTRACT

This disclosure describes smart glasses that enable a user to capture a stereoscopic, panoramic image of a scene.

KEYWORDS

- Smart glasses
- Three-dimensional image
- Stereoscopy
- Panoramic image
- Virtual reality
- Augmented reality

BACKGROUND

Although smart glasses, smartphones, and other devices can capture photos or video, the resulting images lack an immersive quality, e.g., suitable for virtual reality display.

DESCRIPTION

This disclosure describes smart glasses that enable a user to capture a stereoscopic, panoramic, e.g., up to 360-degree, image of a scene.

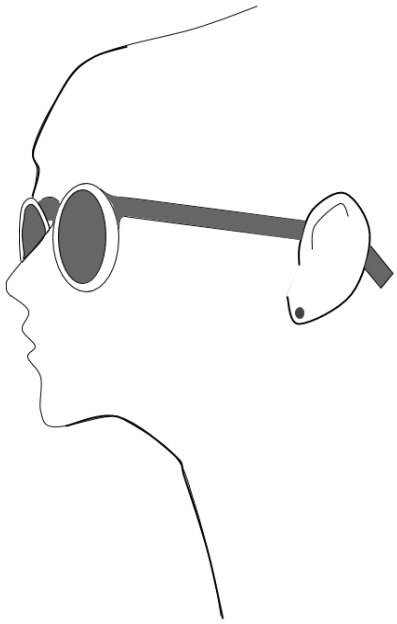

Fig. 1: Smart glasses for stereoscopic, panoramic image capture

As illustrated in Fig. 1, smart glasses for stereoscopic, panoramic image capture can have an external appearance substantially similar to ordinary glasses. However, the smart glasses include various onboard components such as high-resolution, stereo (e.g., dual or more) cameras, computer-vision units, microphone arrays, two or more speakers (e.g., open-air speakers), stereo audio, global and local positioning hardware, wireless audio such as Bluetooth, motion capture and tracking units, a processor configured with machine learning models, voice-recognition units, proximity sensors, inertial measurement units, internet connectivity units, image processing (e.g., image stitching) units, etc. The speakers are positioned and configured such that audio output by the speakers is audible only to the user that is wearing the smart glasses.

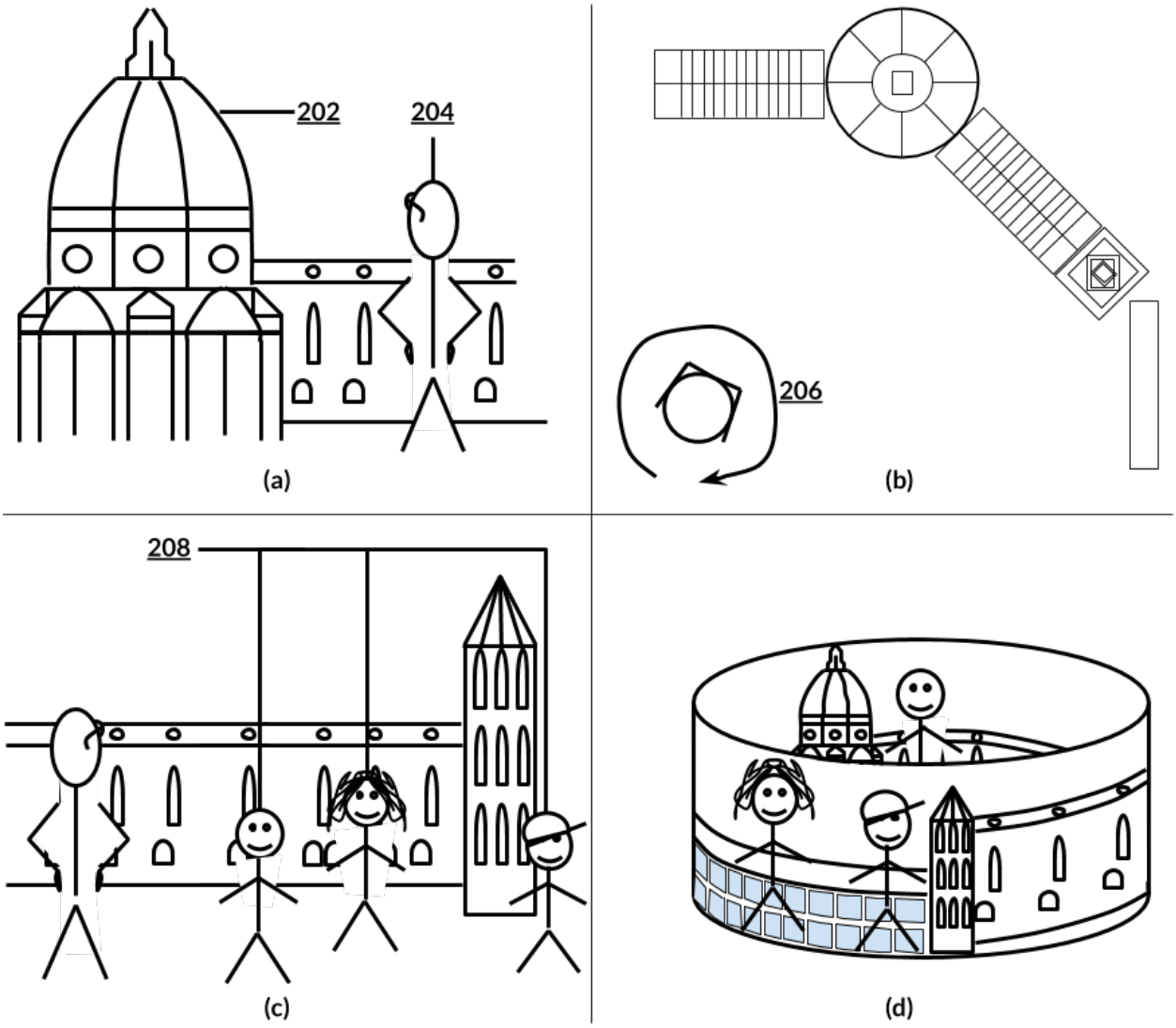

Fig. 2: Stereoscopic, panoramic image capture

The use of smart glasses for stereoscopic, panoramic image capture is illustrated by the example illustrated in Fig. 2. In Fig. 2(a), a user (204), observing a scene (202), e.g., of a heritage building, decides to capture a panoramic image of it. The user can activate the smart glasses via a suitable mechanism, e.g., by issuing a verbal command such as “start 3-D mapping.” The smart glasses activate capture mode, after which the user can perform a slow turn in the physical space (206).

During the turning motion, indicated in top view in Fig. 2(b), the smart glasses provide audio indications (e.g., tick-tock sounds) that a certain section of the scene has been captured. This input assists the user to pace the turning motion. With user permission, the smart glasses recognize faces (208) that are familiar to the user and that appear in the field of vision. Upon the appearance of a familiar face, the smart glass may provide audio cues, e.g., statements such as "I just captured an image of Joe."

During image capture, the user can command the smart glasses to increase or decrease the rate of image capture. The flexibility of changing the rate of image capture enables the user to focus on the aspects of the scene that are of greater interest. The user can complete the image capture procedure either by verbal command or by executing a 360-degree turn. The entire panoramic scene is reconstructed in three-dimensions, e.g., stereoscopically, from captured images. The user is offered a selection of images of familiar faces to insert at suitable locations within the panorama. The smart glasses provide as output a three-dimensional reconstruction of the scene at the user's location with images of user-selected people inserted at appropriate locations, as illustrated in Fig. 2(d).

The final, three-dimensional, panoramic image can be consumed, or viewed, in a number of ways, as follows:

- The image can be viewed using a virtual reality head-mounted device (HMD).
- The image can be projected on a screen in a room, where it can be viewed simultaneously by multiple people. Such an image can be seen stereoscopically, e.g., by a viewer using three-dimensional glasses, or can be seen in two-dimensions by using only one of the multi-camera channels that captured the image.

- The image can be uploaded to a virtual room in online panorama websites or shared via social media.
- A two-dimensional or three-dimensional video that summarizes or navigates through the scene can be automatically created and shared, e.g., via mobile applications.

In this manner, by enabling a user to capture three-dimensional panoramic images of a scene with relative ease, the techniques of this disclosure enable the user to record/save memories. By capturing and sharing 3D panoramic image content that is likely of interest to other users of social media platforms, users can become social-media influencers.

CONCLUSION

This disclosure describes smart glasses that enable a user to capture a stereoscopic, panoramic image of a scene.