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CAPTURING PANORAMA IMAGES

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ABSTRACT

A panorama imaging system can be used to reduce parallax errors when capturing high quality panoramas. The panorama imaging system includes a panorama guidance apparatus and an image capturing device. A user of the system attaches the panorama guidance apparatus to the image capturing device and captures a panorama image with the image capturing device while maintaining a stable position of the panorama guidance apparatus.

PROBLEM STATEMENT

Panoramic photography is a photography technique that creates images with extended fields of view. Modern digital camera technology allows for continuous capturing of images up to a 360 degree field of view. The images can then be stitched together to form a single panorama photograph. High quality panorama photographs requires low parallax errors that can be achieved if the camera taking the images is in exactly the same place for each image in the panorama. Parallax is a displacement or difference in the apparent position of an object viewed along two different lines of sight. If the parallax errors are large, low quality panorama photographs are produced with stitching errors, missing sections, blurred regions, etc.

Capturing high quality panoramic photographs can be a frustrating experience if people are not aware that the camera must be held steady or they struggle to hold the camera steady. To overcome this problem, people mount their camera on a tripod and rotate the tripod when capturing panoramic photographs. Alternatively, people invest in various self-rotating devices

available in the market that help rotate their camera or mobile device uniformly and capture 360 degree panoramas. These self-rotating devices and tripods are very expensive solutions to the aforementioned problem. A simple and inexpensive system for generating high quality panoramas is described.

DETAILED DESCRIPTION

The systems and techniques described in this disclosure relate to a panorama imaging system. The panorama imaging system can include a panorama guidance apparatus, an image capturing device, and software to generate panorama images. The software can be implemented for use in an Internet, an intranet, or another client and server environment. The software can be implemented locally on a client device, e.g., the image capturing device, or implemented across a client device and server environment. The image capturing device can be any electronic device capable of capturing images, such as a mobile device, a camera, a smartphone, a tablet, a handheld electronic device, a wearable device, etc.

Fig. 1 illustrates an example method 100 to capture a panorama image. The method can be performed by a system that captures panorama images, for example, the panorama imaging system. A user of the system attaches a panorama guidance apparatus to a mobile device (102).

Fig. 2 illustrates an example panorama guidance apparatus 200. The panorama guidance apparatus 200 can be attached to a mobile device, a camera, a smartphone, a tablet, a handheld electronic device, a wearable device, or any other image capturing device. The apparatus includes a string 202. An adhesion surface 204, e.g., a suction cup, is attached at one end of the string 202 and a weighted object 210 is attached to the other end of the string 202. The weighted

object 210 can be any object of any size or shape that weighs down the string 202 when the apparatus is in use. Instead of a string, a stick or any other material can used to connect the adhesion surface 204 with the weighted object 210. The adhesion surface 204 and the weighted object 210 can be tied to the string. Alternatively, or additionally, the string can be attached to adhesion surface 204 and weighted object 210 in such a way that the string length can be adjusted from either ends or from anywhere along the length of the string. A disk 206 is suspended along the length of the string 202 with the help of one or more supporting strings 212 that are also attached to the string 202. The disk 206 is suspended such that the string 202 passes through a hole 208 of the disk 206. The disk 206 and hole 208 can be of any shape or size.

Fig. 3 illustrates an example panorama guidance apparatus 200 attached to a mobile device 302. The user can attach the panorama guiding apparatus 200 to his mobile device 302. The panorama guiding apparatus 200 is attached to the mobile device 302, e.g., the adhesion surface 204 can be a suction cup that adheres to the screen 304 of the mobile device or a sticky surface that can adhere to any surface on the mobile device 302. The adhesion surface 204 can be placed on the screen 304 directly opposite the shutter of the mobile device 302 or exactly behind the camera of the mobile device 302. Alternatively, the adhesion surface 204 can be placed around the camera of the mobile device 302 or anywhere on the mobile device 302. Placing the adhesion surface behind the camera of the mobile device 302 helps in reducing parallax. As the adhesion surface 204 is placed exactly behind the camera, the difference in the apparent position of the object captured by the camera and the adhesion surface 204 would be at a minimum, thereby reducing parallax.

Further, in Fig. 1, the user of the system captures a panorama image with the mobile device while maintaining a position of the panorama guidance apparatus (104). The user can capture the panorama image with the help of the panorama guidance apparatus attached to the mobile device. While capturing the panorama image, the user can keep rotating the mobile device while keeping the string of the panorama guidance apparatus as straight as possible. The weighted object attached to the string rests on the ground, thereby helping in keeping the string straight and affixed to a position on the ground. The attached weighted object also provides stability and balance while capturing panoramas.

While capturing the panorama image, the user can maintain the string at a constant position within the hole of the disk while the weighted object rests on the ground. Maintaining the string at one constant position within the hole of the disk ensures that the mobile device remains gravitationally vertical and is not leaning over in any direction while capturing the panorama image. If the user accidently or unknowingly leans the mobile device in any direction, the user can visually notice that the string is no longer in the centre of the hole of the disk and can accordingly adjust the position of the mobile device to maintain a consistent position.

Keeping the string straight ensures that the mobile device is maintained at a same height while capturing the panorama image. If the user accidently or unknowingly alters the height of the mobile device while capturing the panorama image, the loosening of the string or displacement of the weighted object from the ground provides a visual indication to the user that the height has changed and the user can accordingly try to maintain a consistent height. Additionally, keeping the string straight and maintaining the string at a constant position within

the hole of the disk ensures good stitching of the multiple images captured. In one example, the user maintains the string of the panorama guiding apparatus in the middle of the hole in the disk.

The panorama guiding apparatus assists the user in maintaining the image capturing device to maintain the same position throughout the panorama capture, thereby, resulting in high quality panoramas. Additionally, the small size and collapsible (or foldable) structure of the panorama guiding apparatus makes it very handy for the users to transport or carry the apparatus, if necessary. The panorama guiding apparatus can be used with any imaging system that is capable of taking panorama images.

The subject matter described in this disclosure can be implemented in software and/or hardware (for example, computers, circuits, or processors). The subject matter can be implemented on a single device or across multiple devices (for example, a client device and a server device). Devices implementing the subject matter can be connected through a wired and/or wireless network. Such devices can receive inputs from a user (for example, from a mouse, keyboard, or touchscreen) and produce an output to a user (for example, through a display). Specific examples disclosed are provided for illustrative purposes and do not limit the scope of the disclosure.

DRAWINGS

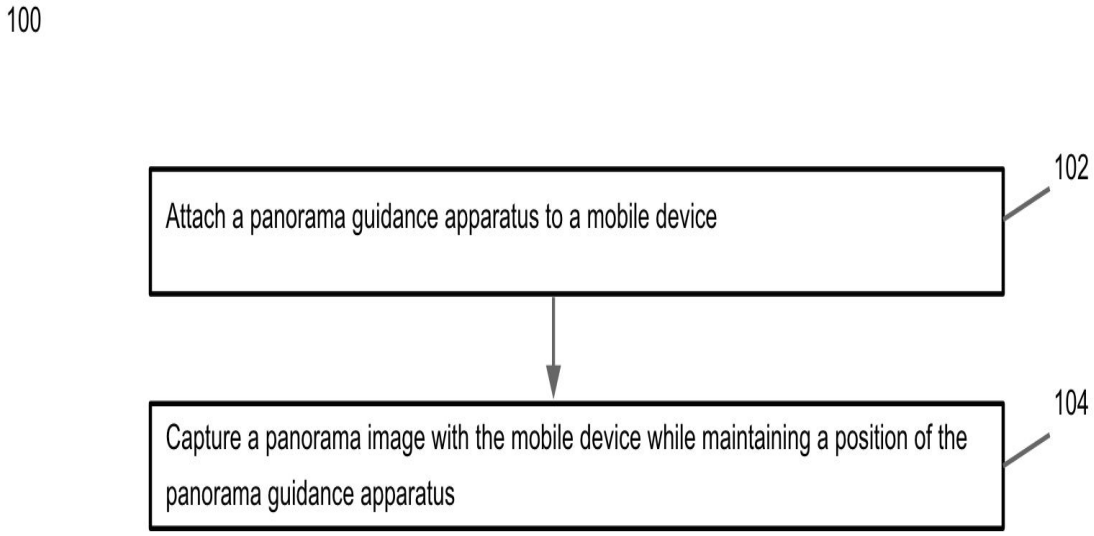

Fig. 1

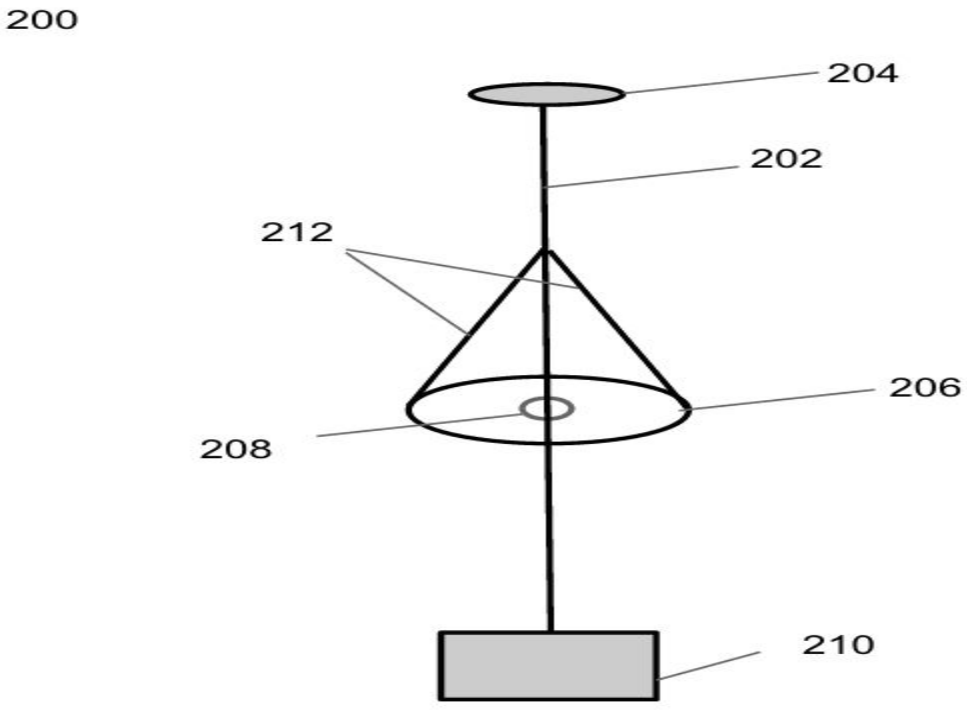

Fig. 2

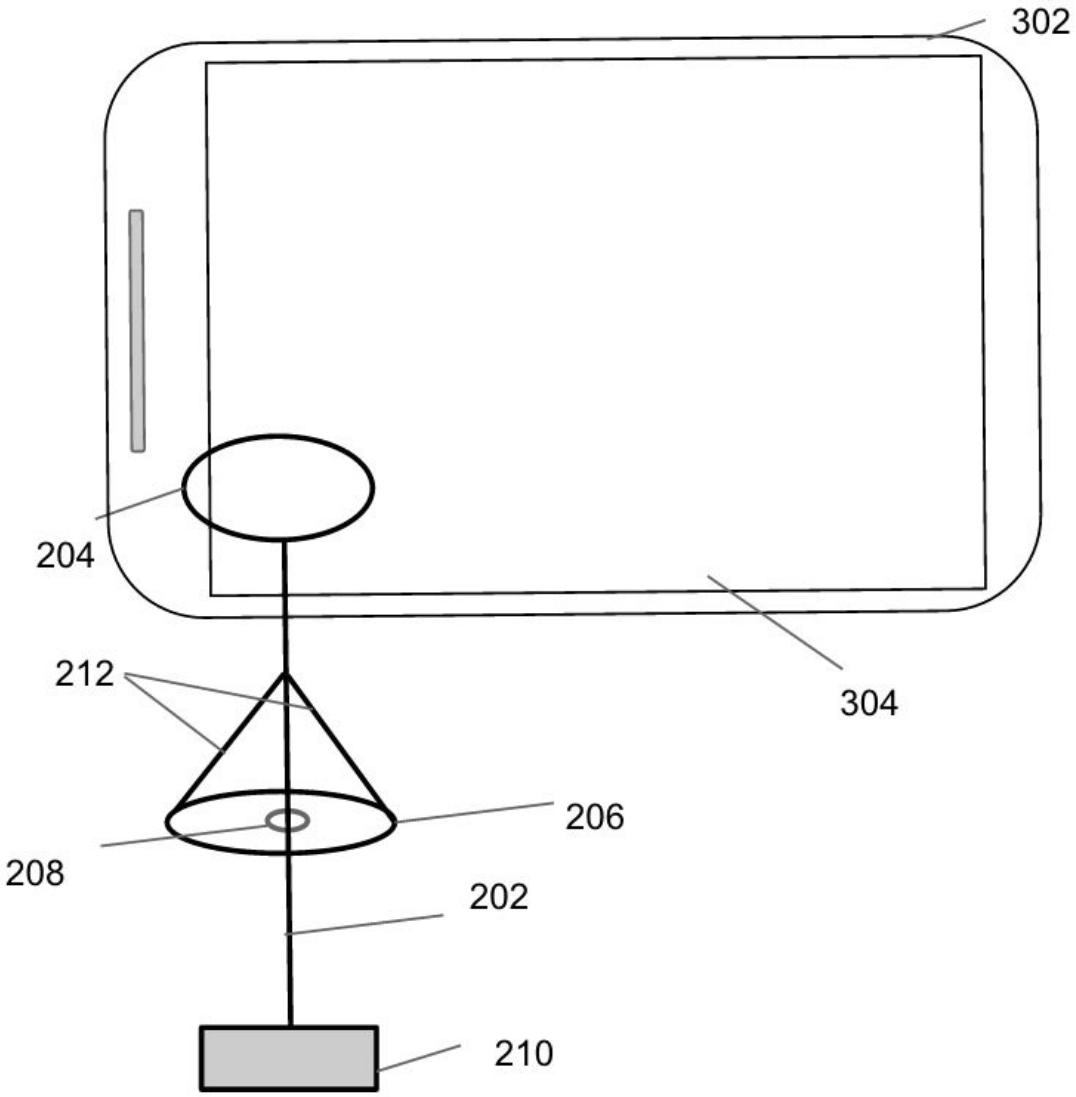

Fig. 3