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Advertising using augmented reality

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ABSTRACT

Heads-up displays have been gradually implemented in automobiles. These displays can provide information to drivers, such as speed, temperature, remaining fuel, navigation, and more, while minimizing distraction. Some vehicle heads-up displays add turn by turn directions based on GPS information onto a real-time street view. This disclosure describes techniques to show advertisements to passengers in vehicles using windows capable of implementing augmented reality (AR) - AR-capable windows.

KEYWORDS

- Augmented reality
- Heads-up display
- Augmented reality advertising
- AR
- Display on vehicle window

BACKGROUND

Heads-up displays (HUDs) in vehicles are displays used to present information while minimizing distraction. Heads-up displays are currently implemented in planes, automobiles, and some mobile devices. Current implementations present information such as speed, temperature, objects, and navigation information, while minimizing distraction. HUDs can be built into vehicles, such as automobile windshields, but can also be implemented using after-market

devices, such as using a mobile device to project information onto a transparent surface such as a vehicle window.

DESCRIPTION

This disclosure describes techniques to use augmented-reality (AR) HUDs to overlay advertisements onto the window through which a user views spaces and objects outside the vehicle. Cameras are mounted around the vehicle capturing real-time video feeds displayed onto AR-capable displays mounted on the front, side, and rear windows of vehicles. The video is processed in real-time to find locations to place AR-based advertisements.

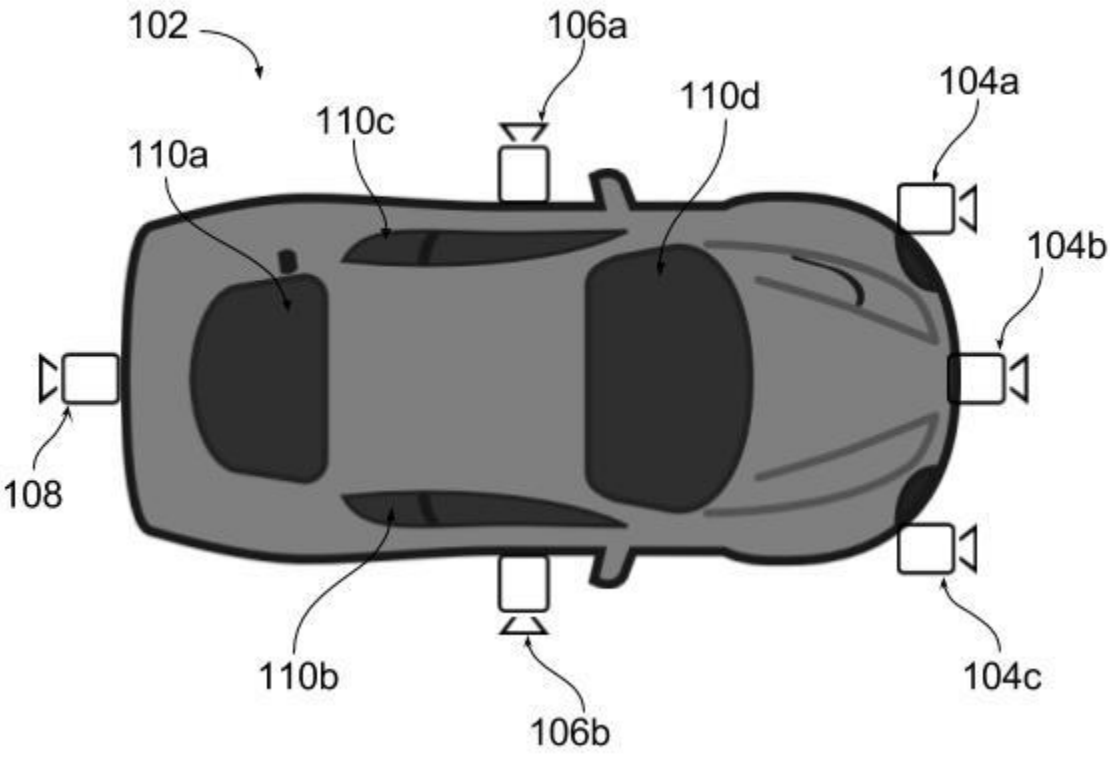

Fig. 1: Example configuration of vehicle cameras and AR-capable windows

Figure 1 illustrates an example configuration of a vehicle containing AR-capable windows and vehicle-mounted cameras. Cameras mounted on the exterior of the vehicle capture

video. The video is then displayed on AR-capable windows installed in the vehicle. Cameras 104a-c capture video from the front of the vehicle. Cameras 106a and 106b capture video from the sides of the vehicle. Camera 108 collects video from the rear of the vehicle. The video is processed; it may be processed by an onboard device (e.g., the camera) or by a remote server, or by a combination of a remote-server and an onboard-device.

Processed video is displayed on the front AR-capable windshield (110d). The driver and front passenger are able to see advertisements in the form of computer generated images that are placed on spaces or objects displayed in the front windshield (110d). Cameras 106a and 106b capture video, the video is processed, and then displayed on the side AR-capable windows (110b, 110c). Rear passengers are able to see advertisements generated and overlaid on objects or spaces visible from these windows (110b, 110c). Camera 108 captures real-time video from the rear of the vehicle, that videos is processed, and then displayed on the rear AR-capable window (110a).

The video feeds collected from the vehicle-mounted cameras are processed using machine-learning to identify suitable spaces or objects that will not affect driving on which to overlay advertisements using augmented reality. Vehicle occupants are able to see these advertisements overlaid onto scenes or objects outside the vehicle as if they were present in reality.

Variations of the vehicle-mounted camera configuration and AR-capable windows are possible. For example, a vehicle may have more windows than the number presented in Figure 1 (e.g., a moonroof, or sunroof, or other windows). Additionally, more or fewer cameras may be used depending on the number of windshields or the shape of the vehicle.

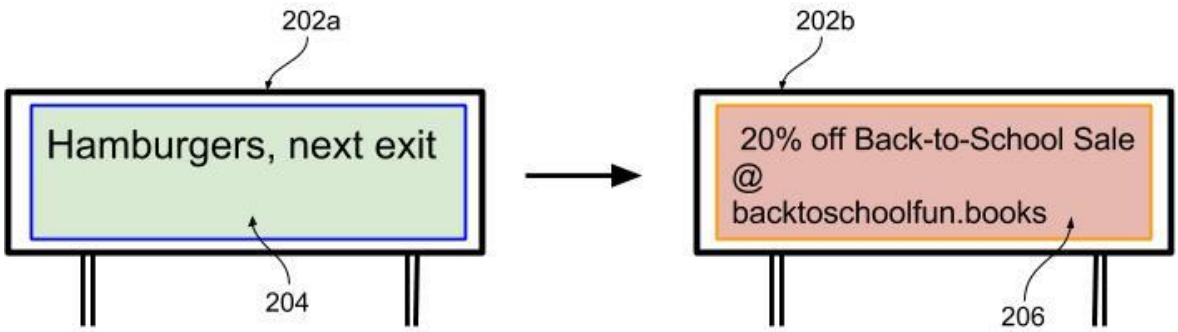

Fig. 2: Example placement of advertisement in augmented-reality

Figure 2 illustrates an example placement of an advertisement in augmented reality. Machine learning identifies billboard 202a outside the vehicle using vehicle-mounted cameras. The billboard 202a can appear anywhere around the vehicle so long as it is visible to the mounted cameras. Once the billboard 202a is identified, the real-time video capture of the billboard 202a is processed using machine learning techniques to determine that the billboard location 202a is a suitable place to insert a new advertisement that will not affect driving. A new computer generated advertisement billboard 202b is placed on top of the image of the billboard 202a, the new billboard 202b is displayed on the AR-capable window using augmented-reality. From the occupant's perspective looking through the heads up display window, the contents of the virtual advertisement 206 are visible and displayed on billboard 202b. The augmented reality billboard 202b is effectively shown to the vehicle occupants via AR-capable windows, such as those depicted in Figure 1.

Billboards are one example. Advertisements may be placed anywhere that will not affect driving. For example, machine learning can identify blank spaces on the side of the road, such as a group of trees, a fence, or even the sides of other vehicles. Advertisements can be overlaid onto these surfaces in augmented reality and shown to vehicle occupants using AR-capable windows.

An augmented-reality computational engine can be used to make advertisements placed in augmented reality look as though they were present in reality. For example, computer generated advertisements will effectively from the occupant's perspective move down the road as the vehicle moves forward (e.g., advertisements placed on the side of an adjacent truck moving along the road next to the vehicle with AR-capable windows). Cameras mounted inside the vehicle could track occupant's head and/or eye movement and move the overlaid AR advertisements on the AR-capable windows to align with the occupant's head and/or eye movement. Cameras mounted on the interior of the vehicle aid in the implementation of the techniques described in this disclosure, but are not necessary.

Another variation of this process is to effectively hide advertisements present outside the vehicle that are deemed sensitive for selected occupants. A driver may provide preferences that prompt the AR-enabled windows to block advertisements from underage vehicle occupants, such as blocking advertisements for adult-content by overlaying an alternative advertisement over the sensitive advertisement using the described techniques.

In situations in which certain implementations discussed herein may collect or use personal information about users (e.g., user data, information about a user's social network, user's location and time at the location, user's biometric information, user's activities and demographic information), users are provided with one or more opportunities to control whether information is collected, whether the personal information is stored, whether the personal information is used, and how the information is collected about the user, stored and used. That is, the systems and methods discussed herein collect, store and/or use user personal information specifically upon receiving explicit authorization from the relevant users to do so. For example, a user is provided with control over whether programs or features collect user information about

that particular user or other users relevant to the program or feature. Each user for which personal information is to be collected is presented with one or more options to allow control over the information collection relevant to that user, to provide permission or authorization as to whether the information is collected and as to which portions of the information are to be collected. For example, users can be provided with one or more such control options over a communication network. In addition, certain data may be treated in one or more ways before it is stored or used so that personally identifiable information is removed. As one example, a user's identity may be treated so that no personally identifiable information can be determined. As another example, a user's geographic location may be generalized to a larger region so that the user's particular location cannot be determined.

CONCLUSION

This disclosure discloses techniques to use cameras mounted on vehicles to capture real-time video, process the video, and then display overlaid computer generated content such as advertisements on AR-capable windows.