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Acoustically Transparent Camera Cover For Smart Devices

ABSTRACT

Smart displays, tablets, laptops, and other portable devices often include a camera and a protective cover that enables the user to cover the camera. The cover ensures that the camera view is blocked when cover is set in place in front of the camera. In such devices, placement of the cover in a manner that covers a device microphone can interfere with the functioning of the microphone. This disclosure provides a solution that overcomes the microphone interference problem caused by inadvertent placement of the cover in a manner that blocks or interferes with a device microphone. The camera cover is made of optically opaque and acoustically transparent cover such that it blocks the camera view when placed in front of the device camera without blocking audio signals when placed in front of the device microphone.

KEYWORDS

- Smart speaker
- Smart display
- Acoustically transparent material
- Camera cover
- Camera block
- Privacy
- Voice activation
- Spoken input
- Wake word
- Activation word

BACKGROUND

Smart displays, tablets, laptops, and other portable devices often include one or many cameras. Many such devices are outfitted with lens/camera protective covers to protect the camera as well as to enable the user to cover the camera for privacy. The cover ensures that the camera view is blocked when cover is set in place in front of the camera.

In some devices, the protective cover is designed such that when not in use, it is positioned elsewhere on the device. This avoids the user inadvertently losing the cover, while allowing the user to remove it altogether from the device for aesthetic or other reasons if they wish to do so. However, the design of the device in such a case may be such that when the cover is not in use, the user can place it on the device in a way that it blocks or otherwise interferes with a microphone of the device. This can impede the ability of the device to receive or interpret spoken input

DESCRIPTION

This disclosure provides a solution that overcomes the microphone interference problem caused by placement of the cover in a manner that blocks or interferes with a device microphone.

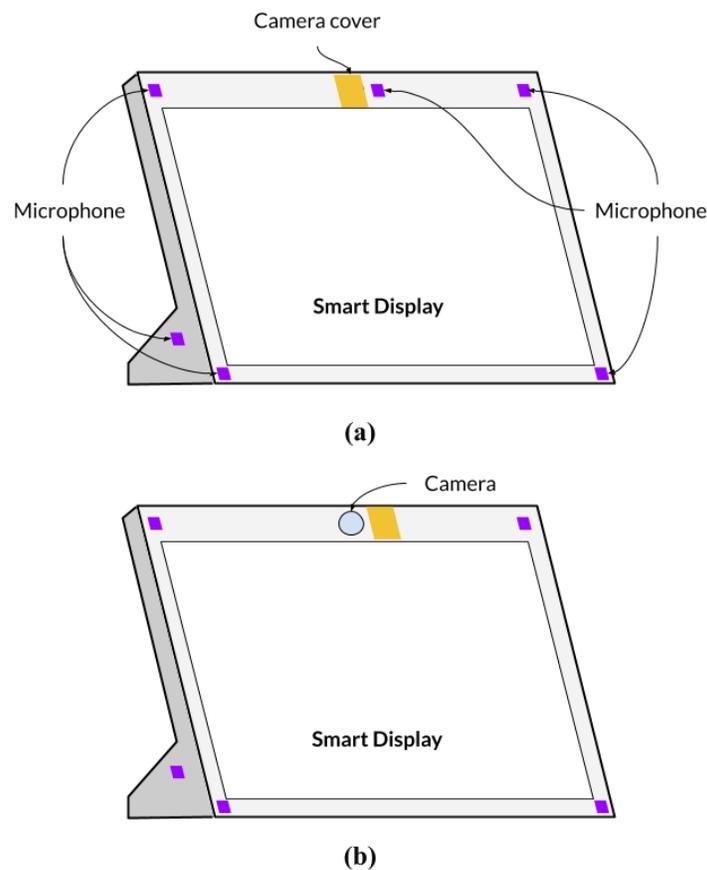


Fig. 1: Optically opaque and acoustically transparent cover

Fig. 1 illustrates a smart display with a microphone and camera that are placed next to each other (though the described techniques work for any placement of camera and/or microphone). A camera cover is provided that is made of an optically opaque material that is acoustically transparent. Such materials include, e.g., open cell foams, fabrics, porous polymers, etc. The cover made from this type of material is designed so as to minimize attenuation and interference with the microphone response as a function of frequency for various possible placements of the cover on the device. Different materials and types of covers are feasible, and can be implemented with different physical, mechanical, or aesthetic properties, as suitable for the particular device for which the cover is designed.

As illustrated in Fig. 1(a), when the camera cover is in place, it blocks the camera. As illustrated in Fig. 1(b) the cover can be moved to a position that covers the microphone and does not obstruct the camera. Since the cover is made of an acoustically transparent material, it does not interfere with the microphone array. In this manner, placing the camera cover on any of the microphones of the device is supported without interfering with the microphone function.

CONCLUSION

This disclosure provides a solution that overcomes the microphone interference problem caused by inadvertent placement of the cover in a manner that blocks or interferes with a device microphone. The camera cover is made of optically opaque and acoustically transparent cover such that it blocks the camera view when placed in front of the device camera without blocking audio signals when placed in front of the device microphone.