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Certification

Park IP Translations

This is to certify that the attached translation is, to the best of my knowledge and belief, a true and accurate translation from Japanese into English of: Japanese Unexamined Patent Application Publication Number, Sho 62-16073.

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(66) References
Japanese unexamined patent application publication Sho 49-95333 (JP, A) Unexamined Utility Model Application Publication Sho 56-42443 (JP, U)

(57) Scope of Claims for Patent

1. A road-surface view display device characterized by being equipped with a plurality of television cameras mounted onto an automobile, that capture the road surface in a vicinity of the automobile; a circuit that includes a processing device connected to an output of the plurality of television cameras, that synthesizes into one continuous video signal by converting video output from the television cameras into a predetermined density, and converting this video signal into coordinates centering on the automobile; and a cathode ray tube disposed at the driver's seat of the automobile, for displaying the video signal converted to the coordinate.

Detailed Description of the Invention

[Technical Field to Which the Invention Belongs]

The present invention relates to road-surface view display devices, that display on a cathode ray tube at a driver's seat a road surface surrounding an automobile.

[Description of the Prior Art]

Conventionally, a rear-view mirror is widely known as means for a driver to detect an image surrounding an automobile. While manufacturing a rear-view mirror is simple, and mirrors are easy to handle, a blind area exists that cannot be reflected. Also, because the image is distorted, there is a disadvantage in that it is difficult for the driver to gain a sense of distance.

Also, a device is well-known for a driver to confirm a rear of the vehicle by mounting a television camera at an upper rear portion of the vehicle, and a cathode ray tube at the driver's seat. This device optimally obtains an image, but

it has a same disadvantage as a rear-view mirror in that a blind area exists where it is not possible to view.

[Object of the Invention]

To improve the disadvantage described above, an object of the present invention is to provide a road-surface view display device that eliminates a blind spot of an automobile, seen from a driver's seat, and that makes it possible correctly to know a distance between obstacles in the vicinity of the vehicle and another vehicle.

[Overview of the Invention]

The present invention is characterized by being equipped with a plurality of television cameras mounted onto an automobile, that capture the road surface in a vicinity of the automobile; a circuit that includes a processing device connected to an output of the plurality of television cameras, that synthesizes into one continuous video signal by converting video output from the television cameras into a predetermined density, and converting this video signal into coordinates centering on the automobile; and a cathode ray tube disposed at the driver's seat of the automobile, for displaying the video signal converted to the coordinate.

[Description Using a Working Example]

A working example will now be described in detail with reference to the drawings.

Fig. 1 is a side view of an automobile equipped with a working example of the present invention; Fig. 2 is an electrical circuit diagram of the device. In both drawings, 1 - 3 denote television camera. The television camera 1 is mounted to a roof of the automobile, at a front end thereof; the television camera 2 is mounted to the roof of the automobile, at a center portion thereof; and the television camera 3 is mounted to the roof of the automobile, at a rear end thereof. Each camera is mounted to display a road surface in the vicinity of the automobile. These television cameras 1 – 3 are embedded with a wide-angle lens to be able to obtain a wide view.

Also, each of the video outputs of the television cameras 1 – 3 is connected to each input of a video amplifier 5 – 7 that amplifies these video signals. Each output from these video amplifiers 5 – 7 is connected to each input of limiters 9 – 11 that classify the amplified video signals to a predetermined density level. Each output from these limiters 9 - 11 is connected to each input of AD converters 13 – 15, and connected to a CPU 18 via an input interface 17. A fixed memory device (referred to as ROM below) 19 that stores a coordinate centered on the automobile, is connected to the CPU 18. The CPU 18 synthesizes the video signals from the three television cameras 1 – 3 into one continuous video signal so that the status in the vicinity of the automobile is seen from directly above the automobile, and corrects so that the video signals are at the same magnification, regardless of whether they are close or far away from the vehicle, and converts the coordinates into a coordinate plane stored in the ROM 19.

CPU coordinate conversion will now be described.

Two operations are included in the coordinate conversion operation. In other words, this is an operation to convert coordinates of the video signal captured with a wide-angle lens into plane coordinates to have the same magnification regardless of being near or far, and a coordinate-synthesis

operation to synthesize three video signals into one video.

The operation to convert into plane coordinates of a first same magnification converts the coordinate of the video (perspective) captured by the lens. This operation converts a perspective view into coordinates in a plan view. Also, the screen image obtained by a wide-angle lens is not at a perspective with the same magnification. For that reason, the distorted sense of perspective is corrected.

Next, when synthesizing the video signals that have three reference points, firstly, one common reference point in a coordinate system for two videos is set. Using that reference point, two videos are synthesized into one video. Then, that synthesized video signal is synthesized with one more video.

Also, in this synthesizing of the pictures, a portion of the blind area exists, but it does not appear as the video, so it is possible to represent that portion as a blind area in a special picture. Also, it is acceptable to reverse the order of coordinate conversion, and to convert and to correct the coordinates as soon as the videos are synthesized.

Also, image processing that implements the coordinate conversion and synthesis is disclosed in the following literature.

Literature: Television Picture Engineering Handbook
Ohmsha December 30, 1980
Pages 464 to 470

The CPU 18 is connected to an input of a DA converter 22 via an output interface 21. Output from the DA converter 22 is connected to the cathode ray tube 25 via an image amplifier 23. The cathode ray tube 25 is incorporated in a same position as instruments of the driver's seat and is disposed so that the driver can easily view it even while driving.

With such a constitution, by activating the device of this working example, the road surface in the vicinity centering on the automobile is displayed making it easy for the driver to confirm oncoming traffic and passing vehicles, as shown in the cathode ray tube 25 depicted in Fig. 3.

Also, the example above describes using three television cameras. However, there is no particular limit to the number of cameras.

Also, a gyro-compass is installed in the vehicle to standardize a predetermined bearing of the vehicle. It is possible to have a constitution that changes to the same bearing as the vehicle, centering on the picture in the cathode ray tube, when the automobile changes its bearing.

[Effect of the Invention]

As described above, pursuant to the present invention, a plurality of television cameras is installed at a top portion of an automobile. By displaying the road surface in the vicinity on the cathode ray tube disposed at the driver's seat, it is possible for the driver easily to check on an undistorted video a presence of a passing vehicles when starting, a distance from an obstacle when backing, and a tendency of another vehicle while traveling, thereby attain the excellent effect of improving driving safety.

Brief Description of the Drawings

Fig. 1 is a side view of an automobile equipped with a working example of a device pursuant to the present invention; Fig. 2 is an electrical circuit diagram of the device; and Fig. 3 is a view of a display sample of a cathode ray tube in the device.

1 – 3 • • • Television camera
5 – 7 • • • Video amplifier
9 – 11 • • • Limiter
13 – 15 • • • AD converter
17 • • • Input interface
18 • • • CPU
19 • • • Fixed memory device (ROM)
21 • • • Output interface
22 • • • DA converter
23 • • • Video amplifier
25 • • • Cathode ray tube

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