(12) UK Patent Application (19) GB (11) 2617557 (13) A

(43) Date of A Publication 18.10.2023

(21) Application No: 2205186.6

(22) Date of Filing: 08.04.2022

(71) Applicant(s):
Mercedes-Benz Group AG
(Incorporated in the Federal Republic of Germany)
Mercedesstraße 120, Stuttgart, Germany

(72) Inventor(s):
Kevin Gee
Alexander Hilliger von Thile
Sangho Kim

(74) Agent and/or Address for Service:
Hofstetter, Schurack & Partner
c/o Walker Morris LLP, 33 Wellington Street, Leeds,
Yorkshire, LS1 4DL, United Kingdom

(51) INT CL:
B60K 35/00 (2006.01) ***B60K 37/02*** (2006.01)
G06V 20/56 (2022.01)

(56) Documents Cited:
GB 2603120 A **US 20190361454 A1**
US 20150003669 A1

(58) Field of Search:
INT CL **B60K, G06V**
Other: **WPI, EPODOC, Patent Fulltext**

(54) Title of the Invention: **A display device for displaying an information of surroundings of a motor vehicle as well as a method for displaying an information**
Abstract Title: **A display for a vehicle including a plurality of moveable sticks**

(57) A display device 12 for displaying information 14 of the surroundings (16, Figure 1) of a motor vehicle (10, Figure 1) is provided. The display device comprises an electronic computing device 18 for receiving the information 14 of the surroundings 16 from a capturing device 20 of the motor vehicle 10. The display device 12 further comprises a plurality of movable sticks 22, and the surroundings 16 are presented by controlling the movable sticks 22 and by displaying a three-dimensional presentation 26 of the surroundings 16 by the movable sticks 22. The invention also relates to a corresponding method.

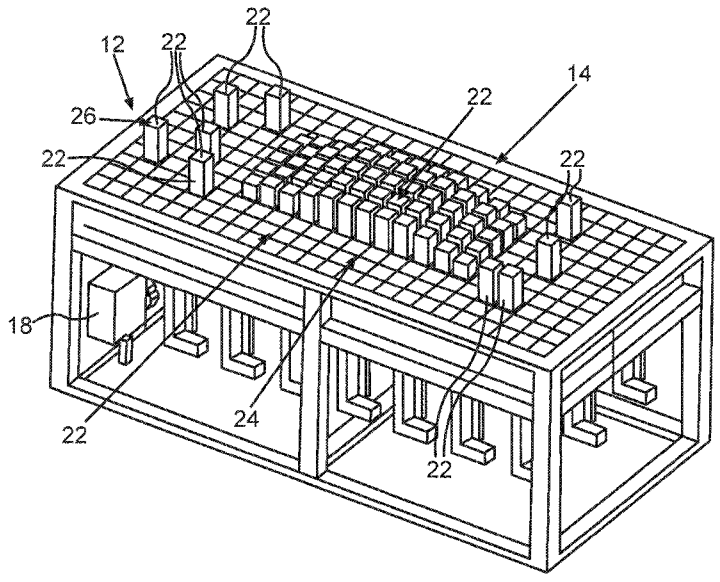

Fig.2

GB 2617557 A

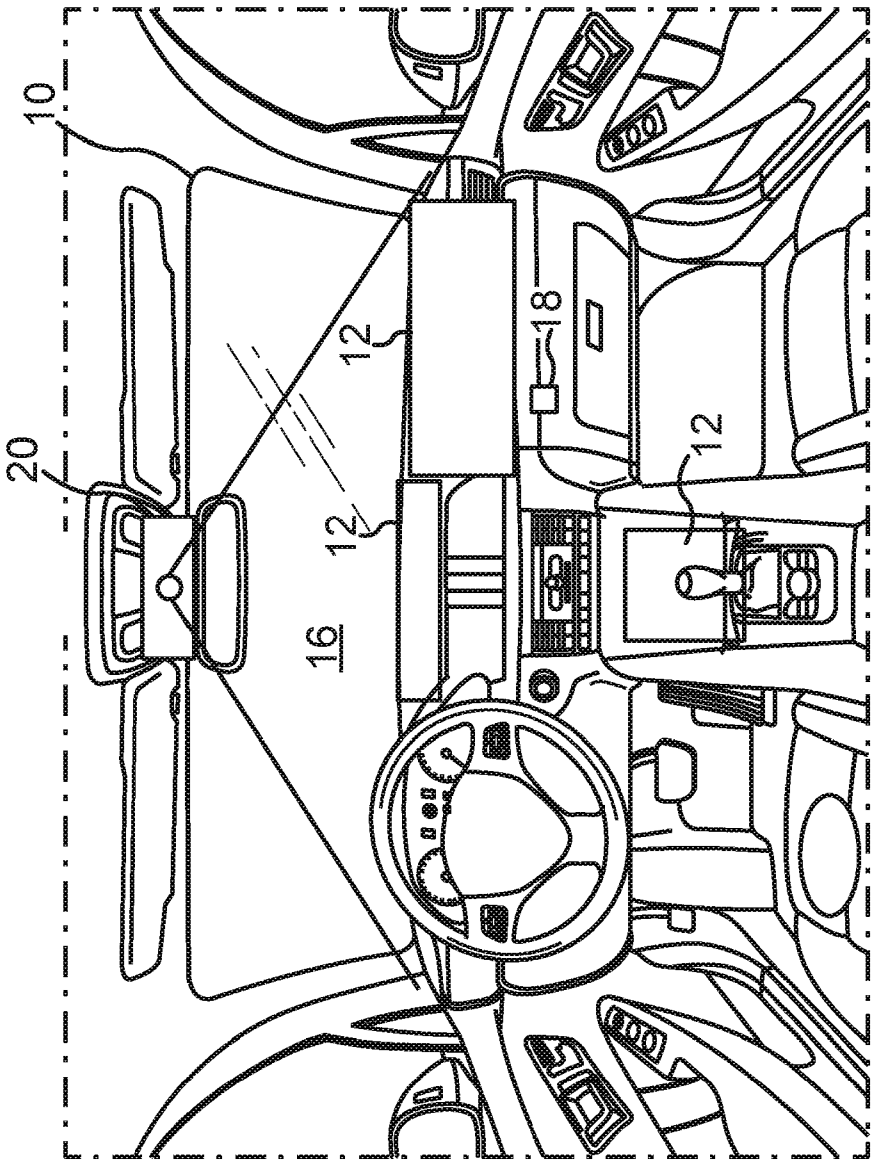

Fig.1

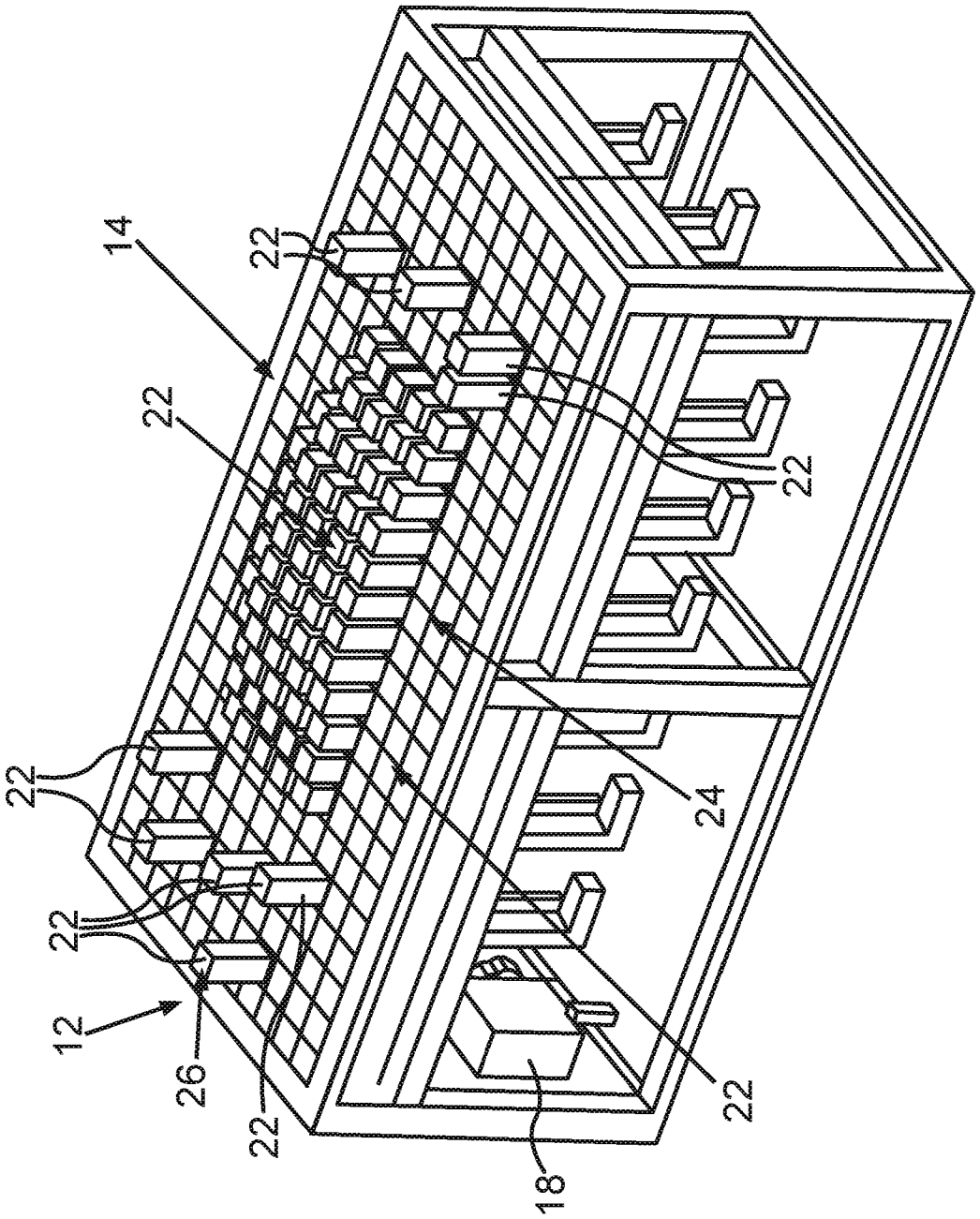

Fig.2

A DISPLAY DEVICE FOR DISPLAYING AN INFORMATION OF SURROUNDINGS OF A MOTOR VEHICLE AS WELL AS A METHOD FOR DISPLAYING AN INFORMATION

FIELD OF THE INVENTION

[0001] The invention relates to the field of automobiles. More specifically, the information relates to a display device for displaying an information of the surroundings of a motor vehicle. Furthermore, the invention relates to a corresponding method.

BACKGROUND INFORMATION

[0002] In the state of the art, display devices for displaying surroundings of a motor vehicle are already known. For example, the display device may be configured for a driver dashboard of a motor vehicle or, for example, as a display device of a central infotainment system in a center console of the motor vehicle.

SUMMARY OF THE INVENTION

[0003] It is an object of the invention to provide a display device as well as a method by which a better displaying of the surroundings of a motor vehicle may be realized.

[0004] This object is solved by a display device as well as a method according to the independent claims. Advantageous forms of configurations are presented in the dependent claims.

[0005] One aspect of the invention relates to a display device for displaying an information of the surroundings of a motor vehicle, comprising an electronic computing device for receiving the information of the surroundings from a capturing device.

[0006] In an embodiment, the display device comprises a plurality of movable sticks, and the surroundings are presented by controlling the movable sticks and by displaying a three-dimensional presentation of the surroundings by the movable sticks.

[0007] Therefore, a morphing surface hardware is presented, which may comprise a plurality of sticks, which may also be called stixels, wherein the stixels are column-like and are provided for displaying and display mirroring. The stixel hardware is designed to give a user of the display device visual feedback and/or user interface interactions based on their interactions with the vehicle's infotainment system. The surface may change dynamically depending on how the user is interacting with the main infotainment display.

[0008] Therefore, the invention increases user experience when driving the motor vehicle.

[0009] In an embodiment, each stick of the plurality of sticks comprises a lighting device for lighting the stick.

[0010] In another embodiment, each lighting device is configured for displaying different colors.

[0011] Furthermore, each stick is additionally configured as a button for operating at least one functional device of the display device and/or the motor vehicle.

[0012] In another embodiment, the electronic computing device is configured for lowering the resolution of the information from the capturing device for displaying the surroundings in a lower resolution.

[0013] Another aspect of the information relates to a motor vehicle comprising the display device according to the preceding aspect.

[0014] Furthermore, another aspect of the invention relates to a method for displaying information on a display device according to the preceding aspect, wherein an electronic computing device of the display device receives an information from a capturing device of the motor vehicle and depending on the received information, a plurality of movable sticks of the display device are controlled and moved for displaying the surroundings.

[0015] Advantageous forms of the display device are regarded as advantageous forms of the method. Therefore, the display device and/or the motor vehicle comprises means for performing the method.

[0016] The method is in particular a computer-implemented method. Therefore, another aspect of the invention relates to a computer program product comprising program code means for performing the method. Furthermore, the invention relates to a computer-readable storage medium comprising at least the computer program product.

[0017] Further advantages, features, and details of the invention derive from the following description of preferred embodiments as well as from the drawings. The features and feature combinations previously mentioned in the description as well as the features and feature combinations mentioned in the following description of the figures and/or shown in the figures alone can be employed not only in the respectively indicated combination but also in any other combination or taken alone without leaving the scope of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The novel features and characteristic of the disclosure are set forth in the appended claims. The accompanying drawings, which are incorporated in and constitute a part of this disclosure, illustrate exemplary embodiments and together with the description, serve to explain the disclosed principles. The same numbers are used throughout the figures to reference like features and components. Some embodiments of system and/or methods in accordance with embodiments of the present subject matter are now described below, by way of example only, and with reference to the accompanying figures.

[0019] The drawings show in:

[0020] Fig. 1 a schematic view of an embodiment of a motor vehicle comprising an embodiment of the display device;

[0021] Fig. 2 a schematic view according to an embodiment of the display device.

[0022] In the figures the same elements or elements having the same function are indicated by the same reference signs.

DETAILED DESCRIPTION

[0023] In the present document, the word "exemplary" is used herein to mean "serving as an example, instance, or illustration". Any embodiment or implementation of the present subject matter described herein as "exemplary" is not necessarily to be construed as preferred or advantageous over other embodiments.

[0024] While the disclosure is susceptible to various modifications and alternative forms, specific embodiments thereof have been shown by way of example in the drawings and will be described in detail below. It should be understood, however, that it is not intended to limit the disclosure to the particular forms disclosed, but on the contrary, the disclosure is to cover all modifications, equivalents, and alternatives falling within the scope of the disclosure.

[0025] The terms “comprises”, “comprising”, or any other variations thereof, are intended to cover a non-exclusive inclusion so that a setup, device or method that comprises a list of components or steps does not include only those components or steps but may include other components or steps not expressly listed or inherent to such setup or device or method. In other words, one or more elements in a system or apparatus preceded by “comprises” or “comprise” does not or do not, without more constraints, preclude the existence of other elements or additional elements in the system or method.

[0026] In the following detailed description of the embodiment of the disclosure, reference is made to the accompanying drawings that form part hereof, and in which is shown by way of illustration a specific embodiment in which the disclosure may be practiced. This embodiment is described in sufficient detail to enable those skilled in the art to practice the disclosure, and it is to be understood that other embodiments may be utilized and that changes may be made without departing from the scope of the present disclosure. The following description is, therefore, not to be taken in a limiting sense.

[0027] Fig. 1 shows a schematic view according to an embodiment of a motor vehicle 10 comprising at least one display device 12. As shown in Fig. 1, the display device 12 can be arranged in different places inside the motor vehicle 10. For example, the display device 12 may be arranged in a central console of the motor vehicle 10 or in a dashboard of the motor vehicle 10.

[0028] The display device 12 is for displaying an information of the surroundings 16 of the motor vehicle 10, wherein the display device 12 comprises at least one electronic computing device 18 for receiving the information 14 of the surroundings 16 from a capturing device 20 of the motor vehicle 19.

[0029] Fig. 2 shows another schematic view according to an embodiment of the display device 12. The display device 12 comprises a plurality of movable sticks 22, and the surroundings 16 are presented by controlling the movable sticks 22 and by displaying a three-dimensional presentation 26 of the surroundings 16 by the movable sticks 22.

[0030] According to an embodiment, each movable stick 22 of the plurality of movable sticks 22 comprises a lighting device 26 for lighting the stick 22. In particular, each lighting device 26 may be configured for displaying different colors.

[0031] In another embodiment, each movable stick 22 is additionally configured as a button for operating at least one functional device of the display device 12 and/or the motor vehicle 10.

[0032] Furthermore, the electronic computing device 18 may be configured for lowering the resolution of the information 14 from the capturing device 20 for displaying the surroundings 16 in a lowering resolution.

[0033] The invention also relates to a method for displaying the information 14 on the display device 12, wherein the electronic computing device 18 of the display device 12 receives the information 14 from the capturing device 20 of the motor vehicle 10, and depending on the received information 14 the plurality of movable sticks 22 of the display device 12 are controlled and moved for displaying the surroundings 16.

[0034] In particular, Fig. 2 shows a morphing surface, which may comprise stixels, which are the movable sticks 22, wherein the movable sticks 22 are column-like and display mirroring. The stixel hardware is designed to give a user visual feedback and/or user interface interactions based on their interactions with the vehicle's infotainment system. The surface may change dynamically depending on how the user is interacting with the main infotainment display.

[0035] For instance, if the user has an active route and the navigation application is on the main infotainment display, the movable sticks 22 may create a physical three-

dimensional map of the surroundings area on it. A projection then provides a color to each column. The surface may also dynamically change while the motor vehicle 10 is in motion creating a mini simulation. Fig. 2 shows that the display device 12 may also be paired with vehicle safety systems and shows physical three-dimensional objects to the user. Such a visualized pedestrians crossing near the motor vehicle 10. The hardware can be placed along the dashboard or near the center console within reach of the user.

[0036] The display device 12 may be activated by the infotainment system and mirrors what is seen on the main display. The hardware is driven by reading display data from the main display and then converting it to a lower resolution. This lower resolution is then displayed on the display device 12 using a projector. Heights of each of the movable sticks 22 may be determined using the three-dimensional map data or a vehicle's stereo camera used by their safety systems. If the movable sticks 22 are placed within reach of the user, it can then be used as a tactile display with touch inputs. The movable sticks 22 may then morph into custom button configurations that can be created by the user. The projector can then highlight the areas for the buttons.

Reference Signs

10	motor vehicle
12	display device
14	information
16	surroundings
18	electronic computing device
20	capturing device
22	stick
24	three-dimensional presentation
26	lighting device

CLAIMS

1. A display device (12) for displaying an information (14) of the surroundings (16) of a motor vehicle (10), comprising an electronic computing device (18) for receiving the information (14) of the surroundings (16) from a capturing device (20) of the motor vehicle (10),
characterized in that
the display device (12) comprises a plurality of movable sticks (22), and the surroundings (16) are presented by controlling the movable sticks (22) and by displaying a three-dimensional presentation (26) of the surroundings (16) by the movable sticks (22).

2. The display device (12) according to claim 1,
characterized in that
each movable stick (22) of the plurality of movable sticks (22) comprises a lighting device (26) for lighting the stick (22).

3. The display device (12) according to claim 2,
characterized in that
each lighting device (26) is configured for displaying different colors.

4. The display device (12) according to any one of claims 1 to 3,
characterized in that
each movable stick (22) is additionally configured as a button for operating at least one functional device of the display device (12) and/or the motor vehicle (10).

5. The display device (12) according to any one of claims 1 to 4,
characterized in that
the electronic computing device (18) is configured for lowering the resolution of the information (14) from the capturing device (20) for displaying the surroundings (16) in a lower resolution as a three-dimensional presentation (24).

6. A method for displaying an information (14) on a display device (12) according to any one of claims 1 to 5, wherein an electronic computing device (18) of the display device (12) receives an information (14) from a capturing device (20) of the motor vehicle (10), and depending on the received information (14) a plurality of movable sticks (22) of the display device (12) are controlled and moved for displaying the surroundings (16) as a three-dimensional presentation (24).

Intellectual Property Office

Application No:	GB2205186.6	**Examiner:**	Mr Kevin Hewitt
Claims searched:	1 to 6	**Date of search:**	4 October 2022

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
A	-	US 2015/003669 A1 (SOLGI et al.) See especially the Abstract; and mention of stixels in paragraphs [0042] - [0044].
A	-	US 2019/0361454 A1 (ZENG et al.) See especially the references to stixels in Paragraphs [0011] & [0022]; and the Abstract.
A,E	-	GB 2603120 A (DAIMLER) See especially the Abstract; and the references to stixels in Paragraphs [0002] - [0005].

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^{X} :

Worldwide search of patent documents classified in the following areas of the IPC

B60K; G06V

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC, Patent Fulltext

International Classification:

Subclass	Subgroup	Valid From
B60K	0035/00	01/01/2006
B60K	0037/02	01/01/2006
G06V	0020/56	01/01/2022