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Toyota Motor Engineering & Manufacturing North America Inc. Patent Issued for Systems and methods for presenting virtual-reality information in a vehicular environment (USPTO 11030818)

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2021 JUN 29 (VerticalNews) -- By a News Reporter-Staff News Editor at Information Technology Newsweekly -- A patent by the inventors Kyle, Roger Akira (Lewisville, TX, US), Wang, Timothy (Ypsilanti, MI, US), Yamasaki, Bryan E. (Ypsilanti, MI, US), filed on November 19, 2019, was published online on June 8, 2021, according to news reporting originating from Alexandria, Virginia, by VerticalNews correspondents.

Patent number 11030818 is assigned to Toyota Motor Engineering & Manufacturing North America Inc. (Plano, Texas, United States).

The following quote was obtained by the news editors from the background information supplied by the inventors: "Vehicle occupants, particularly during long or repeated trips, sometimes seek engaging forms of entertainment such as movies and video games. As autonomous vehicles are developed and improved, vehicle occupants-including the driver-will have increased opportunities for leisure and entertainment while in transit. Whether a vehicle is manually or autonomously driven, virtual-reality and augmented-reality technologies can provide a wide variety of entertainment options to vehicle occupants."

In addition to the background information obtained for this patent, VerticalNews journalists also obtained the inventors' summary information for this patent: "An example of a system for presenting virtual-reality information in a vehicular environment is presented herein. The system comprises a virtual-reality display apparatus, one or more processors, and a memory communicably coupled to the one or more processors. The memory stores a communication module including instructions that when executed by the one or more processors cause the one or more processors to receive, at a first vehicle, a set of presentation attributes for a second vehicle that is in an external environment of the first vehicle, the set of presentation attributes for the second vehicle corresponding to a virtual vehicle that is different from the second vehicle and within a same vehicle category as the second vehicle. The memory also stores a scene virtualization module including instructions that when executed by the one or more processors cause the one or more processors to present to an occupant of the first vehicle, via the virtual-reality display apparatus in a virtual-reality space, the second vehicle in accordance with the received set of presentation attributes for the second vehicle while the second vehicle is visible from the first vehicle in the external environment of the first vehicle.

"In another embodiment, a method of presenting virtual-reality information in a vehicular environment is disclosed. The method comprises receiving, at a first vehicle, a set of presentation attributes for a second vehicle that is in an external environment of the first vehicle, the set of presentation attributes for the second vehicle corresponding to a virtual vehicle that is different from the second vehicle and within a same vehicle category as the second vehicle. The method also includes presenting to an occupant of the first vehicle, in a virtual-reality space, the second vehicle in accordance with the received set of presentation attributes for the second vehicle while the second vehicle is visible from the first vehicle in the external environment of the first vehicle.

"In another embodiment, a method of presenting virtual-reality information in a vehicular environment is disclosed. The method comprises receiving, at a cloud server, a selection of a set of presentation attributes for a first vehicle, the set of presentation attributes for the first vehicle corresponding to a virtual vehicle that is different from the first vehicle and within a same vehicle category as the first vehicle. The method also includes determining, at the cloud server, that a second vehicle is within a predetermined distance from the first vehicle. The method also includes transmitting the set of presentation attributes for the first vehicle from the cloud server to a virtual-reality system in the second vehicle that presents to an occupant of the second

vehicle, in a virtual-reality space, the first vehicle in accordance with the set of presentation attributes for the first vehicle.

"To facilitate understanding, identical reference numerals have been used, wherever possible, to designate identical elements that are common to the figures. Additionally, elements of one or more embodiments may be advantageously adapted for utilization in other embodiments described herein."

The claims supplied by the inventors are:

"1. A system for presenting virtual-reality information in a vehicular environment, the system comprising: a virtual-reality display apparatus; one or more processors; and a memory communicably coupled to the one or more processors and storing: a communication module including instructions that when executed by the one or more processors cause the one or more processors to receive, at a first vehicle, a set of presentation attributes for a second vehicle that is in an external environment of the first vehicle, the set of presentation attributes for the second vehicle corresponding to a virtual vehicle that is different from the second vehicle and within a same vehicle category as the second vehicle, wherein the same vehicle category is one of automobiles, watercrafts, and aerial vehicles and the virtual vehicle differs from the second vehicle in at least one of a model year, a make, a model, one or more colors, a custom logo, custom detailing, one or more advertising messages, and one or more sounds; and a scene virtualization module including instructions that when executed by the one or more processors cause the one or more processors to present to an occupant of the first vehicle, via the virtual-reality display apparatus in a virtual-reality space, the second vehicle in accordance with the received set of presentation attributes for the second vehicle while the second vehicle is visible from the first vehicle in the external environment of the first vehicle.

"2. The system of claim 1, wherein the set of presentation attributes for the second vehicle is selected by a person associated with the second vehicle.

"3. The system of claim 1, wherein the communication module includes instructions to receive the set of presentation attributes for the second vehicle from one of a cloud server and the second vehicle.

"4. The system of claim 1, wherein the scene virtualization module includes further instructions to present, to the occupant of the first vehicle, in the virtual-reality space, a virtual interior passenger compartment of the first vehicle.

"5. The system of claim 4, wherein the virtual interior passenger compartment of the first vehicle includes at least one virtual occupant of the first vehicle.

"6. The system of claim 1, wherein the scene virtualization module includes further instructions to present to the occupant of the first vehicle, in the virtual-reality space, at least one additional virtual element in the external environment of the first vehicle besides the second vehicle, as presented in accordance with the received set of presentation attributes for the second vehicle.

"7. The system of claim 1, further comprising a user interface module including instructions that when executed by the one or more processors cause the one or more processors to receive, from a person associated with the first vehicle, a selection of a set of presentation attributes for the first vehicle, the set of presentation attributes for the first vehicle corresponding to another virtual vehicle that is different from the first vehicle and within a same vehicle category as the first vehicle.

"8. The system of claim 1, wherein the occupant of the first vehicle is an operator of the first vehicle.

"9. A method of presenting virtual-reality information in a vehicular environment, the method comprising: receiving, at a first vehicle, a set of presentation attributes for a second vehicle that is in an external environment of the first vehicle, the set of presentation attributes for the second vehicle corresponding to a virtual vehicle that is different from the second vehicle and within a same vehicle category as the second vehicle, wherein the same vehicle category is one of automobiles, watercrafts, and aerial vehicles and the virtual vehicle differs from the second vehicle in at least one of a model year, a make, a model, one or more colors, a custom logo, custom detailing, one or more advertising messages, and one or more sounds; and presenting to an occupant of the first vehicle, in a virtual-reality space, the second vehicle in accordance with the received set of presentation attributes for the second vehicle while the second vehicle is visible from the first vehicle in the external environment of the first vehicle.

"10. The method of claim 9, wherein the set of presentation attributes for the second vehicle is selected by a person associated with the second vehicle.

"11. The method of claim 9, further comprising presenting to the occupant of the first vehicle, in the virtual-reality space, at least one additional virtual element in the external environment of the first vehicle besides the second vehicle, as presented in accordance with the received set of presentation attributes for the second vehicle.

"12. The method of claim 9, further comprising presenting, to the occupant of the first vehicle, in the virtual-reality space, a virtual interior passenger compartment of the first vehicle.

"13. The method of claim 9, further comprising overriding, in the virtual-reality space, at least a portion of the set of presentation attributes for the second vehicle in response to a command from the occupant of the first vehicle.

"14. The method of claim 9, further comprising receiving, from a person associated with the first vehicle, a selection of a set of presentation attributes for the first vehicle, the set of presentation attributes for the first vehicle corresponding to another virtual vehicle that is different from the first vehicle and within a same vehicle category as the first vehicle.

"15. The method of claim 9, further comprising: receiving, at the second vehicle, a set of presentation attributes for the first vehicle, the set of presentation attributes for the first vehicle corresponding to another virtual vehicle that is different from the first vehicle and within a same vehicle category as the first vehicle; and presenting to an occupant of the second vehicle, in the virtual-reality space, the first vehicle in accordance with the received set of presentation attributes for the first vehicle while the first vehicle is visible from the second vehicle in an external environment of the second vehicle.

"16. A method of presenting virtual-reality information in a vehicular environment, the method comprising: receiving, at a cloud server, a selection of a set of presentation attributes for a first vehicle, the set of presentation attributes for the first vehicle corresponding to a virtual vehicle that is different from the first vehicle and within a same vehicle category as the first vehicle, wherein the same vehicle category is one of automobiles, watercrafts, and aerial vehicles and the virtual vehicle differs from the first vehicle in at least one of a model year, a make, a model, one or more colors, a custom logo, custom detailing, one or more advertising messages, and one or more sounds; determining, at the cloud server, that a second vehicle is within a predetermined distance from the first vehicle; and transmitting the set of presentation attributes for the first vehicle from the cloud server to a virtual-reality system in the second vehicle that presents to an occupant of the second vehicle, in a virtual-reality space, the first vehicle in accordance with the set of presentation attributes for the first vehicle."

URL and more information on this patent, see: Kyle, Roger Akira. Systems and methods for presenting virtual-reality information in a vehicular environment. U.S. Patent Number 11030818, filed November 19, 2019, and published online on June 8, 2021. Patent URL: <http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetacgi%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=11030818.PN.&OS=PN/11030818RS=PN/11030818>

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Toyota Motor Engineering & Manufacturing North America Inc. Patent Issued for Autonomous Vehicle Virtual Reality Navigation System (USPTO 10,921,138)

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2021 MAR 6 (VerticalNews) -- By a News Reporter-Staff News Editor at Journal of Transportation -- From Alexandria, Virginia, VerticalNews journalists report that a patent by the inventors Kusano, Kristofer D. (Ann Arbor, MI); Li, Yi (Ann Arbor, MI); Hada, Hideki (Ann Arbor, MI); Johnson, Miles J. (Ann Arbor, MI), filed on May 16, 2018, was published online on March 1, 2021.

The patent's assignee for patent number 10,921,138 is Toyota Motor Engineering & Manufacturing North America Inc. (Plano, Texas, United States).

News editors obtained the following quote from the background information supplied by the inventors: "The 'background' description provided herein is for the purpose of generally presenting the context of the disclosure. Work of the presently named inventors, to the extent it is described in this background section, as well as aspects of the description which may not otherwise qualify as prior art at the time of filing, are neither expressly or impliedly admitted as prior art against the present invention.

"Navigation systems found in many vehicles have developed to include displaying the vehicle's current position to give the operator an estimate of where the vehicle is in relation the route they are on. Navigation systems can assist the driver in route guidance so the operator can focus on operating the vehicle. With the introduction of autonomous vehicles, navigation systems are not only utilized to display information to the operator, but many of the features of navigation systems, such as the current position of the vehicle, can also provide information responsible for allowing autonomous vehicles to navigate their environment autonomously."

As a supplement to the background information on this patent, VerticalNews correspondents also obtained the inventors' summary information for this patent: "The foregoing paragraphs have been provided by way of general introduction, and are not intended to limit the scope of the following claims. The described embodiments, together with further advantages, will be best understood by reference to the following detailed description taken in conjunction with the accompanying drawings.

"Embodiments of the disclosed subject matter relate generally to systems, apparatuses, and methods for an autonomous vehicle virtual reality navigation system. The system can display the autonomous vehicle operating at a predetermined amount of time in the future. Displaying the autonomous vehicle can be in a virtual reality, via a virtual reality display, such that the virtual reality is immersive multimedia or a computer simulated reality, for example. In other words, an operator (i.e., driver/passenger) in the autonomous vehicle can view what the autonomous vehicle is planning to do at a predetermined amount of time in the future (e.g., continue driving forward, change lanes, make a turn, decelerate, etc.). Additionally, the virtual reality is displayed continuously as if the operator is viewing a video or virtual representation of the autonomous vehicle executing vehicle maneuvers at the predetermined amount of time in the future.

"The system can include a virtual reality interface. Upon selection of a desired location (on the road, for example), the operator can view the autonomous vehicle executing one or more vehicle maneuvers to reach the selected location in virtual reality. The one or more vehicle maneuvers can be the predicted path of the autonomous vehicle. The one or more vehicle maneuvers can be predicted to require a predetermined amount of time to execute. The execution time being the same amount of time as the predetermined amount of time in the future the operator views on the virtual reality display. For example, if the operator is viewing the autonomous vehicle at 10 seconds in the future on the virtual reality display, the operator can select a different location on the road, via the virtual reality interface, indicating that the operator wants to adjust the predicted path of the autonomous vehicle. The virtual reality display and/or interface can display the one or more maneuvers that the autonomous vehicle plans to execute to reach the selected position. Because the autonomous vehicle was previously displayed 10 seconds in the future, the updated position of the vehicle will be different based on the alternate route selected by the operator. Therefore, the vehicle maneuvers can be displayed up until the autonomous vehicle reaches a position corresponding to the newly selected position, then continue on the new path after reaching the selected position at the predetermined amount of time in the future."

The claims supplied by the inventors are:

"The invention claimed is:

"1. A device comprising: circuitry configured to: receive output from a plurality of sensors, receive a current position of a vehicle, display the vehicle via a display at a first predetermined amount of time in the future based on the output from the plurality of sensors and the current position of the vehicle, receive a selection for a first alternate route, determine if the first alternate route is available, display the vehicle executing one or more maneuvers to reach the first alternate route when the first alternate route is available, and display the vehicle on the first alternate route in a position corresponding to the first predetermined amount of time in the future when the first alternate route is available.

"2. The device of claim 1, wherein the circuitry is further configured to automatically suggest a second alternate route when the first alternate route is not available, the second alternate route being an available alternate route most similar to the first alternate route, determine if the second alternate route is selected within a second predetermined amount of time, display the vehicle executing one or more maneuvers to reach the second alternate route when the second alternate route is selected within the predetermined amount of time, and display the vehicle on the second alternate route in a position corresponding to the first predetermined amount of time in the future when the second alternate route is selected within the second predetermined amount of time.

"3. The device of claim 2, wherein the first predetermined amount of time is indicative of the position of the vehicle that amount of time in the future, the position of the vehicle being a predetermined position based on a planned route of the autonomous vehicle.

"4. The device of claim 3, wherein the first predetermined amount of time can be adjusted via a virtual reality interface.

"5. The device of claim 1, wherein the display displays a 2D animation of the vehicle and its surroundings operating at the first predetermined amount of time in the future.

"6. The device of claim 1, wherein the display displays a 3D animation of the vehicle and its surroundings operating at the first predetermined amount of time in the future.

"7. The device of claim 6, wherein the display is a display system including a Heads Up Display (HUD), a hologram projection system, or a liquid crystal display (LCD).

"8. The device of claim 2, wherein the selection for the first alternate route is an interaction via a virtual reality interface.

"9. The device of claim 2, wherein the automatic suggestion for the second alternate route is displayed on a virtual reality interface.

"10. The device of claim 9, wherein the second alternate route is confirmed within the second predetermined amount of time via an interaction with the virtual reality interface.

"11. The device of claim 9, wherein the second alternate route is automatically suggested when the autonomous vehicle is not able to safely execute one or more maneuvers to reach the first alternate route.

"12. The device of claim 2, wherein the circuitry is configured to not execute a maneuver to any alternate route when the second alternate route is not selected within the predetermined amount of time.

"13. The device of claim 2, wherein the one or more maneuvers executed by the vehicle to reach any alternate route are displayed as an animation on the display.

"14. The device of claim 2, wherein the one or more maneuvers executed by the vehicle to reach any alternate route are displayed as an animation on a virtual reality interface.

"15. The device of claim 2, wherein the one or more maneuvers executed by the vehicle to reach any alternate route are displayed as an animation on the display and a virtual reality interface.

"16. The device of claim 15, wherein the one or more maneuvers executed by the vehicle to reach any alternate route are displayed up until the first predetermined amount of time in the future.

"17. A method comprising: receiving output from a plurality of sensors; receiving a current position of a vehicle; displaying the vehicle via a display at a first predetermined amount of time in the future based on the output from the plurality of sensors and the current position of the vehicle; receiving a selection for a first alternate route; determining, via processing circuitry, if the first alternate route is available; displaying the vehicle executing one or more maneuvers to reach the first alternate route when the first alternate route is

"18. The method of claim 17, further comprising: automatically suggesting a second alternate route when the first alternate route is not available, the second alternate route being an available alternate route most similar to the first alternate route; determining, via processing circuitry, if the second alternate route is selected within a second predetermined amount of time; displaying the vehicle executing one or more maneuvers to reach the second alternate route when the second alternate route is selected within the predetermined amount of time; and displaying the vehicle on the second alternate route in a position corresponding to the first predetermined amount of time in the future when the second alternate route is selected within the second predetermined amount of time.

"19. A non-transitory computer-readable storage medium storing computer-readable instructions that, when executed by a computer, cause the computer to perform the method of: receiving output from a plurality of sensors; receiving a current position of a vehicle; displaying the vehicle via a display at a first predetermined amount of time in the future based on the output from the plurality of sensors and the current position of the vehicle; receiving a selection for a first alternate route; determining if the first alternate route is available; displaying the vehicle executing one or more maneuvers to reach the first alternate route when the first alternate route is available; and displaying the vehicle on the first alternate route in a position corresponding to the first predetermined amount of time in the future when the first alternate route is available.

"20. The method of claim 19, further comprising: automatically suggesting a second alternate route when the first alternate route is not available, the second alternate route being an available alternate route most similar to the first alternate route; determining if the second alternate route is selected within a second predetermined amount of time, displaying the vehicle executing one or more maneuvers to reach the second alternate route when the second alternate route is selected within the predetermined amount of time; and displaying the vehicle on the second alternate route in a position corresponding to the first predetermined amount of time in the future when the second alternate route is selected within the second predetermined amount of time."

<http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetacgi%2FPTO%2Fsrchnum.htm&r=1&f=G&i=50&s1=10.921.138.PN&OS=PN/10.921.138RS=PN/10.921.138>

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Search Summary

Text	(hd=toyota motor) and wc>100 and hd=(virtual real estate or virtual properties or digital real esate or digital real assets or digital properties or metaverse properties or digital plots or virtual plots or virtual land or virtual reality platform or manufacturing simulation or virtual simulation or digital twins or virtual manufacturing or immersive learning or mixed-reality learning or metaverse learning or VR learning or AR learning or VR training or virtual recruitment or 3d training or training metaverse or virtual retail or virtual shopping or virtual clienteling or omnichannel shopping or humanising digital retail or immersive virtual stores or 3d virtual store or metaverse shopping or virtual clothing or virtual goods or gaming or digital avatar or digital character or virtual game or 3D avatars or virtual reality or interoperable VR space or digital financial ecosystems or metaverse wallets or robo advisory or virtual financial data or digital bank branches or digital touchpoint or blockchain wallets or digital wallets or digital wedding or virtual wedding or virtual event or virtual concert or virtual theme park or virtual classroom or virtual learning or virtual school or immersive learning or metaverse)
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