

US Patent & Trademark Office

Patent Public Search | Text View

United States Patent	12391297
Kind Code	B2
Date of Patent	August 19, 2025
Inventor(s)	Kim; Eun Sik

Driving operation apparatus for vehicle

Abstract

A driving operation apparatus for a vehicle, and a steering unit provided on a center display, an acceleration unit provided on a right display, and a braking unit provided on a left display become a driving operation system of a vehicle and is integrally modularized as one system, and the driving operation apparatus may have a display to assist to improve a passenger's entertainment in an autonomous driving situation and provide vehicle information and nearby information in a manual driving mode.

Inventors: Kim; Eun Sik (Gwangmyeong-si, KR)

Applicant: HYUNDAI MOTOR COMPANY (Seoul, KR); KIA CORPORATION (Seoul, KR)

Family ID: 1000008767059

Assignee: HYUNDAI MOTOR COMPANY (Seoul, KR); KIA CORPORATION (Seoul, KR)

Appl. No.: 18/504792

Filed: November 08, 2023

Prior Publication Data

Document Identifier	Publication Date
US 20250033686 A1	Jan. 30, 2025

Foreign Application Priority Data

KR	10-2023-0097469	Jul. 26, 2023
----	-----------------	---------------

Publication Classification

Int. Cl.: B62D1/14 (20060101); B60K26/02 (20060101); B60K35/00 (20240101); B60K35/22 (20240101); B60K35/53 (20240101); B60T7/08 (20060101); B60W50/14 (20200101); B60W60/00 (20200101)

U.S. Cl.:

CPC B62D1/14 (20130101); B60K26/02 (20130101); B60K35/00 (20130101); B60T7/085 (20130101); B60W50/14 (20130101); B60W60/001 (20200201); B60K2026/024 (20130101); B60K2026/028 (20130101); B60K35/22 (20240101); B60K35/53 (20240101); B60K2360/1523 (20240101); B60W2050/146 (20130101)

Field of Classification Search

CPC: B62D (1/14); B62D (1/12); B62D (1/02); B62D (1/04); B60K (35/00); B60K (35/22); B60K (35/53); B60K (2026/024); B60K (2026/028); B60K (35/223); B60K (35/29); B60K (2360/175); B60R (11/0229); B60R (2011/0085)

References Cited

U.S. PATENT DOCUMENTS

Patent No.	Issued Date	Patentee Name	U.S. Cl.	CPC
9193375	12/2014	Schramm	N/A	B60R 11/0235
10496102	12/2018	Riefe	N/A	B60K 35/10
10988161	12/2020	Krstic	N/A	B62D 1/189
11358625	12/2021	Harmon	N/A	B60K 35/80
2016/0375770	12/2015	Ryne	701/23	B60K 35/215
2016/0375860	12/2015	Lubischer	74/493	B62D 1/183
2021/0107358	12/2020	Shibata	N/A	B60K 35/654
2024/0253687	12/2023	Wang	N/A	G06F 9/451

FOREIGN PATENT DOCUMENTS

Patent No.	Application Date	Country	CPC
2025003210	12/2024	JP	B60K 35/60
2020-0037630	12/2019	KR	N/A

OTHER PUBLICATIONS

Computer generated English translation of JP 2025/003210 (Year: 2025). cited by examiner

Primary Examiner: Dickson; Paul N

Assistant Examiner: Webb; Tiffany L

Attorney, Agent or Firm: MCDONNELL BOEHNEN HULBERT & BERGHOFF LLP

Background/Summary

CROSS REFERENCE TO RELATED APPLICATIONS

(1) The present application claims priority to Korean Patent Application No. 10-2023-0097469,

filed Jul. 26, 2023, the entire contents of which is incorporated herein for all purposes by this reference.

BACKGROUND

Field of the Disclosure

(2) The present disclosure relates to a driving operation apparatus for a vehicle, and more specifically, to a driving operation apparatus for a vehicle, which has a driving operation system for steering, acceleration, and braking integrally modularized as one system, is hidden not to be operated by a driver in an autonomous driving situation, and popped up to be operated by the driver in a manual driving mode.

Description of the Related Art

(3) Autonomous driving vehicles are smart vehicles incorporating an autonomous driving technology in which the vehicle travels to a destination by itself even without a driver directly operating a steering wheel, an accelerator pedal, a brake, or the like.

(4) When autonomous driving situations are universally realized, the driver may select a manual driving mode in which the driver directly drives the vehicle, and an autonomous driving mode in which the vehicle travels to the destination by itself without the driver directly driving the vehicle.

(5) A driving operation system of an autonomous driving vehicle typically includes a steering operation system, an acceleration operation system, and a braking operation system, and conventionally, operation systems for steering, acceleration, and braking are each configured individually, and thus there is a disadvantage in that there are many spatial limits because the number of components is large and each requires an installation space and in particular, the cost is expensive.

(6) In addition, a larger number of displays are required to improve a passenger's convenience in the autonomous driving situation, and conventionally, there is a disadvantage in that there is a limit to satisfying the passenger's needs because the display is provided to only a restricted position.

(7) The matters explained as the background art are for the purpose of enhancing the understanding of the background of the present disclosure and should not be taken as acknowledging that they correspond to the related art already known to those skilled in the art.

SUMMARY

(8) The present disclosure is directed to providing a driving operation apparatus for a vehicle, which may have a driving operation system for steering, acceleration, and braking integrally modularized as one system, thereby achieving a reduction in a weight and a reduction in a cost by decreasing the number of components and maximizing the utilization of an indoor space by minimizing a layout required for an installation space.

(9) In addition, the present disclosure is directed to providing a driving operation apparatus, which may have a configuration that is hidden not to be operated by a driver in an autonomous driving situation and popped up to be operated by the driver in a manual driving mode, thereby allowing the driver to rest comfortably and achieving safety improvement by blocking a mal-operation in the autonomous driving situation.

(10) In addition, the present disclosure is directed to providing a driving operation apparatus, which may have a display to assist to improve a passenger's entertainment in an autonomous driving situation and provide vehicle information and nearby information in a manual driving mode, thereby improving convenience and safety.

(11) A driving operation apparatus for a vehicle for achieving the objects includes a driving operation apparatus for a vehicle including a center display rotatably installed on a center fascia inside the vehicle, a right display and a left display rotatably coupled to right and left sides of the center display, respectively, a steering unit provided on the center display and the center fascia and configured to generate a signal related to a steering of the vehicle when the center display is rotated in a clockwise direction or counterclockwise direction by a driver's operation, an acceleration unit provided on any one of the right display and the left display and configured to generate a signal

related to an acceleration of the vehicle during the driver's operation, and a braking unit provided on the other one of the right display and the left display and configured to generate a signal related to a braking of the vehicle during the driver's operation.

(12) In an autonomous driving mode, a screen in which the center display, the right display, and the left display may be unfolded in a row in a left-right direction and connected as one may be provided.

(13) In a situation of the autonomous driving mode, positions of the right display and the left display unfolded in a row may be restricted by contact with the center fascia.

(14) In a manual driving mode, the right display and the left display may be popped up by being rotated toward the driver rearward from the center display, and in the popped-up state, screens in which the center display, the right display, and the left display are individually separated may be provided.

(15) The right display and the left display popped up in the manual driving mode may form a right angle or an obtuse angle with respect to the center display, and in the case of the obtuse angle, popped-up angles of the right display and the left display may be the same.

(16) Positions of the right display and the left display popped up at the right angle may be restricted during contact with the right and left sides of the center display or positions of the right display and the left display popped up at the obtuse angle may be restricted by locking of an actuator configured to pop up the right display and the left display.

(17) The driving operation apparatus may further include a first power unit connecting the center display to the right display and configured to rotate the right display with respect to the center display when operated, wherein the first power unit may include a first motor fixed to a right side portion of the center display, and a first motor rod which is rotated by power of the first motor, which is integrally coupled after passing through a left side portion of the right display, and of which an end portion is rotatably installed on the right side portion of the center display.

(18) The driving operation apparatus may further include a second power unit connecting the center display to the left display and configured to rotate the left display with respect to the center display when operated, wherein the second power unit may include a second motor fixed to a left side portion of the center display, and a second motor rod which is rotated by power of the second motor, which is integrally coupled after passing through a right side portion of the left display, and of which an end portion is rotatably installed on the left side portion of the center display.

(19) The center display may include a steering shaft protruding forward to pass through the center fascia and configured to rotate with respect to the center fascia, a steering shaft clip coupled to the steering shaft and configured to prevent the steering shaft from being separated from the center fascia, and a steering return spring having both ends coupled to the center fascia and the steering shaft and configured to provide a return force when the steering shaft is rotated.

(20) The steering unit may include a first permanent magnet coupled to a front surface of the center display or the steering shaft, and a first printed circuit board (PCB) installed to face the first permanent magnet and configured to recognize a change in magnetic flux when the first permanent magnet is rotated and generate a signal related to a steering.

(21) The acceleration unit may include a first slider installed to be moved in a longitudinal direction of the right display and having an end portion provided with a first handle, a third power unit connecting the right display to the first slider and configured to move the first slider with respect to the right display when operated, an acceleration button rotatably provided on the first handle and operated by a driver's pressing, a second permanent magnet coupled to the acceleration button, and a second PCB installed on the first slider to face the second permanent magnet and configured to recognize a change in magnetic flux when the second permanent magnet is moved by an operation of the acceleration button and generate a signal related to an acceleration.

(22) The third power unit may include a third motor fixed to the right display, a first ball screw configured to be rotated by power of the third motor, a first ball screw nut coupled to the first ball

screw and configured to move along the first ball screw when the first ball screw is rotated, and a first guider coupled to the first ball screw nut and the first slider and configured to move the first slider while moving with the first ball screw nut.

(23) The third power unit may further include a first guide rod disposed parallel to the first ball screw and installed to have one end fixed to the right display and the other end passing through the first guider.

(24) An acceleration button protrusion may be provided to protrude outward from the acceleration button, and a full stroke position of the acceleration button may be restricted when the acceleration button protrusion is in contact with an inner wall surface of the first handle, and when the acceleration button protrusion is in contact with an inner upper surface of the first handle, a return position or initial position of the acceleration button may be restricted.

(25) The braking unit may include a second slider installed to be moved in a longitudinal direction of the left display and having an end portion provided with a second handle, a fourth power unit connecting the left display to the second slider and configured to move the second slider with respect to the left display when operated, a braking button rotatably provided on the second handle and operated by a driver's pressing, a third permanent magnet coupled to the braking button, and a third PCB installed on the second slider to face the third permanent magnet and configured to recognize a change in magnetic flux when the third permanent magnet is moved by an operation of the braking button and generate a signal related to a braking.

(26) The fourth power unit may include a fourth motor fixed to the left display, a second ball screw configured to be rotated by power of the fourth motor, a second ball screw nut coupled to the second ball screw and configured to move along the second ball screw when the second ball screw is rotated, and a second guider coupled to the second ball screw nut and the second slider and configured to move the second slider while moving with the second ball screw nut.

(27) The fourth power unit may further include a second guide rod disposed parallel to the second ball screw and installed to have one end fixed to the left display and the other end passing through the second guider.

(28) A braking button protrusion may be provided to protrude outward from the braking button, and a full stroke position of the braking button may be restricted when the braking button protrusion is in contact with an inner wall surface of the second handle, and when the braking button protrusion is in contact with an inner upper surface of the second handle, a return position or initial position of the braking button may be restricted.

(29) In addition, a driving operation apparatus for a vehicle includes a center display installed on a center fascia inside the vehicle to be rotated in a clockwise direction or counterclockwise direction, and a right display and a left display coupled to right and left sides of the center display, respectively to be rotated in a front-rear direction, wherein in an autonomous driving mode, a screen in which the center display, the right display, and the left display are unfolded in a row in a left-right direction and connected as one is provided, and in a manual driving mode, the right display and the left display are popped up by being rotated toward the driver rearward from the center display, and the center display, the right display, and the left display, which have been popped up, become a driving operation system of the vehicle.

(30) The driving operation system may include steering, acceleration, and braking of the vehicle, an acceleration button may be provided on the right display, and a braking button may be provided on the left display, the steering of the vehicle may be executed when the center display is rotated in a clockwise direction or a counterclockwise direction by a driver's operation, and the acceleration or braking of the vehicle may be executed when the driver operates the acceleration button or the braking button.

(31) The driving operation apparatus for a vehicle according to the present disclosure may have the configuration that has the driving operation system for steering, acceleration, and braking of the vehicle through the steering unit **400** provided on the center display **100**, the acceleration unit **500**

provided on the right display **200**, and the braking unit **600** provided on the left display **300** integrally modularized as one system, thereby achieving the reduction in the weight and the reduction in the cost by decreasing the number of components and in particular, maximizing the utilization of the indoor space by minimizing the layout required for the installation space.

(32) In addition, the driving operation apparatus according to the present disclosure may have the configuration that becomes a hide state in which the driver's operation is not available as the center display **100**, the right display **200**, and the left display **300** are unfolded in a row from side to side and are in close contact with the center fascia **10** in the autonomous driving situation and is popped up so that the right display **200** and the left display **300** protrude toward the driver to be operated by the driver in the manual driving mode, thereby allowing the driver to rest comfortably in the autonomous driving situation and achieving safety improvement by block the mal-operation.

(33) In addition, the driving operation apparatus according to the present disclosure may have the display to assist to improve the passenger's entertainment in the autonomous driving situation and provide the vehicle information and the nearby information in the manual driving mode, thereby improving convenience and safety.

Description

BRIEF DESCRIPTION OF THE FIGURES

- (1) FIG. **1** is a view illustrating a hide state in which a center display, a right display, and a left display are unfolded in a row from side to side as a driving operation apparatus for a vehicle according to the present disclosure.
- (2) FIG. **2** is a view illustrating a state in which the right display and the left display are popped up at a right angle in FIG. **1**.
- (3) FIG. **3** is a view illustrating a state in which an acceleration unit and a braking unit are slid to protrude toward a driver in FIG. **2**.
- (4) FIG. **4** is a view illustrating another embodiment in which the right display and the left display are popped up at an obtuse angle.
- (5) FIG. **5** is a view illustrating a state in which the center display is rotated in a counterclockwise direction and steered in FIG. **3**.
- (6) FIG. **6** is a view illustrating the driving operation apparatus according to the present disclosure separated from a center fascia.
- (7) FIGS. **7** and **8** are views for describing another embodiment in which a first permanent magnet according to the present disclosure is provided on a steering shaft.
- (8) FIG. **9** is a view illustrating a state in which the center display, the right display, and the left display are unfolded in a row viewed from the front.
- (9) FIG. **10** is an enlarged view illustrating the state in FIG. **9** and a view for describing a first power unit and a second power unit according to the present disclosure.
- (10) FIGS. **11**, **12**, **13**, **14**, **15**, **16**, and **17** are views for describing the acceleration unit according to the present disclosure.
- (11) FIGS. **18**, **19**, **20**, **21**, **22**, and **23** are views for describing the braking unit according to the present disclosure.

DETAILED DESCRIPTION

(12) Hereinafter, embodiments disclosed in this specification will be described in detail with reference to the accompanying drawings, and the same or similar components are denoted by the same reference numerals regardless of the drawing symbols, and overlapping descriptions thereof will be omitted.

(13) The suffixes “module” and “unit” for components used in the following description are given or used interchangeably in consideration of ease of preparing the specification and not have

meanings or roles that are distinct from each other by themselves.

(14) In describing the embodiments disclosed in the specification, when it is determined that a detailed description of a related known technology may obscure the gist of the embodiments disclosed in this specification, a detailed description thereof will be omitted.

(15) In addition, the accompanying drawings are only for easy understanding of the embodiments disclosed in the specification, and it should be understood that the technical spirit disclosed in the specification is not limited by the accompanying drawings, and all changes, equivalents, or substitutes included in the spirit and technical scope of the present disclosure are included in the accompanying drawings.

(16) Terms including ordinal numbers such as first or second may be used to describe various components, but the components are not limited by the terms. The terms are used only for the purpose of distinguishing one component from another.

(17) When a first component is described as being “connected” or “coupled” to a second component, it should be understood that the first component may be directly connected or coupled to the second component or a third component may be present therebetween.

(18) On the other hand, when the first component is described as being “directly connected” or “directly coupled” to the second component, it should be understood that the third component is not present therebetween.

(19) The singular expression includes the plural expression unless the context clearly dictates otherwise.

(20) In the specification, it should be understood that terms such as “comprise” or “have” are intended to specify that a feature, a number, a step, an operation, a component, a part, or a combination thereof described in the specification is present, but do not preclude the possibility of the presence or addition of one or more other features, numbers, steps, operations, components, parts, or combinations thereof.

(21) In addition, a unit or control unit included in the name of a motor control unit (MCU), a hybrid control unit (HCU), or the like is the term widely used for naming a controller for controlling a specific function of a vehicle and does not mean a generic function unit.

(22) A controller may include a communication device for communicating with another controller or a sensor to control a function in charge, a memory for storing an operating system or logic commands and input and output information, and one or more processors for performing determination, calculation, decision, and the like necessary for controlling the function in charge.

(23) Hereinafter, a driving operation apparatus for a vehicle according to preferred embodiments of the present disclosure will be described with reference to the accompanying drawings.

(24) As illustrated in FIGS. **1** to **23**, the driving operation apparatus according to the present disclosure includes a center display **100** rotatably installed on a center fascia **10** inside a vehicle, a right display **200** and a left display **300** rotatably coupled to right and left sides of the center display **100**, respectively, a steering unit **400** provided on the center display **100** and the center fascia **10** and for generating a signal related to a steering of the vehicle when the center display **100** is rotated in a clockwise direction or a counterclockwise direction by a driver's operation, an acceleration unit **500** provided on any one of the right display **200** and the left display **300** and for generating a signal related to an acceleration of the vehicle during the driver's operation, and a braking unit **600** provided on the other one of the right display **200** and the left display **300** and for generating a signal related to a braking of the vehicle during the driver's operation.

(25) The driving operation apparatus according to the embodiment of the present disclosure may have a configuration that has a driving operation system for steering, acceleration, and braking of the vehicle through the steering unit **400** provided on the center display **100**, the acceleration unit **500** provided on the right display **200**, and the braking unit **600** provided on the left display **300** integrally modularized as one system, thereby achieving a reduction in a weight and a reduction in a cost by decreasing the number of components and in particular, maximizing the utilization of an

indoor space by minimizing a layout required for an installation space.

(26) The center display **100** may be positioned at the center, may function as a main display, and may be formed to have a relatively larger screen than the right display **200** and the left display **300** as a length in a left-right direction is formed longer than those of the right display **200** and the left display **300**.

(27) The right display **200** and the left display **300** may function as auxiliary displays connected to sides of the center display **100** and may be formed to have a relatively smaller screen as the lengths in the left-right direction are formed shorter than that of the center display **100**.

(28) The center display **100** may be rotated in the clockwise direction or the counterclockwise direction with respect to the center fascia **10** during the driver's operation, and the right display **200** and the left display **300** are respectively coupled to the right and left sides of the center display **100** to be rotated in a front-rear direction.

(29) Although the embodiment of the present disclosure has suggested an example in which the acceleration unit **500** is provided on the right display **200**, and the braking unit **600** is provided on the left display **300**, the braking unit **600** may be provided on the right display **200**, and the acceleration unit **500** may be provided on the left display **300**, as necessary.

(30) In an autonomous driving mode, as illustrated in FIG. **1**, a screen in which the center display **100**, the right display **200**, and the left display **300** are unfolded in a row in the left-right direction and connected as one is provided.

(31) In the autonomous driving mode, a wide screen may be provided by the center display **100**, the right display **200**, and the left display **300**, which are straightly unfolded, and the driver may more conveniently enjoy entertainment information, such as movies and games, provided through the wide screen.

(32) In a situation of the autonomous driving mode illustrated in FIG. **1**, positions of the right display **200** and the left display **300** unfolded in a row may be restricted by contact with the center fascia **10**.

(33) As the autonomous driving mode is executed, when the center display **100**, the right display **200**, and the left display **300** become a state of being unfolded in a row, the driving operation apparatus becomes a hide state in which the driver's operation is not available, thereby allowing the driver to rest comfortably and assist to improve safety by blocking a mal-operation.

(34) In a manual driving mode, as illustrated in FIGS. **3** and **4**, the right display **200** and the left display **300** are popped up by being rotated toward the driver rearward from the center display **100**, and in the popped-up state, screens in which the center display **100**, the right display **200**, and the left display **300** are individually separated are provided.

(35) As the manual driving mode is executed, when the right display **200** and the left display **300** are popped up, the driver's operation is available from this moment.

(36) In a situation of the manual driving mode, vehicle information (cluster information) and the like may be provided through the center display **100**, information about a right side mirror, information about a change to a right lane line, and the like may be provided through the right display **200**, and information about a left side mirror, information about a change to a left lane line, and the like may be provided through the left display **300**.

(37) The right display **200** and the left display **300** popped up in the manual driving mode form a right angle with respect to the center display **100** as illustrated in FIG. **3** or form an obtuse angle with respect to the center display **100** as illustrated in FIG. **4**, and in the case of the obtuse angle, popped-up angles of the right display **200** and the left display **300** are the same.

(38) As illustrated in FIG. **3**, when the right display **200** and the left display **300** are popped up at the right angle, the driver may not keep an eye on the right display **200** and the left display **300**, and thus necessary information may be provided through only the center display **100**, and in this case, the right display **200** and the left display **300** may maintain a power saving mode.

(39) As illustrated in FIG. **4**, when the right display **200** and the left display **300** are popped up at

the obtuse angle, information may be provided through all of the center display **100**, the right display **200**, and the left display **300**, or necessary information may be provided through only the center display **100**.

(40) When the right display **200** and the left display **300** are popped up at the obtuse angle, the popped-up angles are the same, and thus the driver may grip the acceleration unit **500** and the braking unit **600** with both arms in a balanced manner and operate the acceleration unit **500** and the braking unit **600** with a more comfortable attitude.

(41) When the right display **200** and the left display **300** are popped up at the right angle, it is advantageous for drivers who want to narrowly grip the right display **200** and the left display **300** while closing both arms, and in particular, this may become an advantageous condition for female drivers with narrow shoulders.

(42) In addition, when the right display **200** and the left display **300** are popped up at the obtuse angle, it is advantageous for drivers who want to broadly grip the right display **200** and the left display **300** while opening both arms, and in particular, this may become an advantageous condition for male drivers with broad shoulders.

(43) As illustrated in FIG. 3, when the right display **200** and the left display **300** are popped up at the right angle, the right display **200** and the left display **300** may be in contact with the right and left sides of the center display **100**, respectively, and thus positions of the right display **200** and the left display **300** popped up at the right angle may be restricted.

(44) In addition, as illustrated in FIG. 4, when the right display **200** and the left display **300** are popped up at the obtuse angle, positions of the right display **200** and the left display **300** popped up at the obtuse angle may be restricted by locking of an actuator for popping-up the right display **200** and the left display **300**.

(45) In particular, when the actuator for popping up the right display **200** and the left display **300** is configured as a step motor, the right display **200** and the left display **300** may be fixed at various obtuse angle positions.

(46) The driving operation apparatus according to the embodiment of the present disclosure further includes a first power unit **700** (shown in FIGS. 9-10) connecting the center display **100** to the right display **200** and for rotating the right display **200** with respect to the center display **100** when operated.

(47) The first power unit **700** includes a first motor **710** fixed to a right side portion of the center display **100**, and a first motor rod **720** which is rotated by power of the first motor **710**, which is integrally coupled after passing through a left side portion of the right display **200**, and of which an end portion is rotatably installed on the right side portion of the center display **100**.

(48) The first motor **710** may function to not only rotate the right display **200** but also lock the right display **200** not to be rotated.

(49) In particular, when the first motor **710** is configured as a step motor, a popped-up position of the right display **200** may be accurately fixed at various positions desired by the driver, and thus the right display **200** may be fixed at various obtuse angle positions suitable for the driver's body type.

(50) The driving operation apparatus according to the embodiment of the present disclosure further includes a second power unit **800** connecting the center display **100** to the left display **300** and for rotating the left display **300** with respect to the center display **100** when operated.

(51) The second power unit **800** includes a second motor **810** fixed to a left side portion of the center display **100**, and a second motor rod **820** which is rotated by power of the second motor **810**, which is integrally coupled after passing through a right side portion of the left display **300**, and of which an end portion is rotatably installed on the left side portion of the center display.

(52) The second motor **810** may function to not only rotate the left display **300** but also lock the left display **300** not to be rotated.

(53) In particular, when the second motor **810** is configured as a step motor, a popped-up position of the left display **300** may be accurately fixed at various positions desired by the driver, and thus

the left display **300** may be fixed at various obtuse angle positions suitable for the driver's body type.

(54) The first motor **710** and the second motor **810** are operated by the control of a vehicle control unit when a driving mode of the vehicle is changed from the autonomous driving mode to the manual driving mode or changed from the manual driving mode to the autonomous driving mode, and when operated, it is preferable that the first motor **710** and the second motor **810** are operated together and have the same operating time, but the present disclosure is not limited thereto.

(55) The center display **100** according to the present disclosure includes a steering shaft **110** protruding forward to pass through the center fascia **10** and configured to rotate with respect to the center fascia **10**, a steering shaft clip **120** coupled to the steering shaft **110** and for preventing the steering shaft **110** from being separated from the center fascia **10**, and a steering return spring **130** of which both ends are coupled to the center fascia **10** and the steering shaft **110** and which provides a return force when the steering shaft **110** is rotated.

(56) One end of the steering shaft **110** is provided to be integrally connected to a front central portion of the center display **100**, the other end of the steering shaft **110** passes through the center fascia **10** and protrudes forward, and the steering shaft clip **120** is coupled to an end portion of the steering shaft **110** passing through the center fascia **10** and functions to prevent the steering shaft **110** from being separated from a hole of the center fascia **10**.

(57) The steering return spring **130** is formed of a coil spring, the end portion of the steering shaft **110** passing through the center fascia **10** passes through the center of the steering return spring **130**, and the steering return spring **130** has both ends coupled to the center fascia **10** and the steering shaft **110** and provides an elastic force of returning the steering shaft **110** to a neutral position when the steering shaft **110** is rotated.

(58) The steering unit **400** according to the present disclosure includes a first permanent magnet **410** coupled to a front surface of the center display **100** or the steering shaft **110**, and a first printed circuit board (PCB) **420** installed to face the first permanent magnet **410** and for recognizing a change in magnetic flux when the first permanent magnet **410** is rotated and generating a signal related to a steering.

(59) It is preferable that two first permanent magnets **410** are formed for safety, but the present disclosure is not limited thereto.

(60) As illustrated in FIGS. **6**, **9**, and **10**, the two first permanent magnets **410** may be fixed to the front surface of the center fascia **10** symmetrically based on the steering shaft **110**, and in this case, the first PCB **420** is fixed to face the center display **100**, recognizes the change in magnetic flux through the Hall sensor when the first permanent magnet **410** is rotated by the rotation of the center display **100**, and generates the signal related to the steering.

(61) As another example, as illustrated in FIGS. **7** and **8**, the two first permanent magnets **410** may be fixedly provided on the steering shaft **110**.

(62) FIG. **7** is a view illustrating a configuration in which the two first permanent magnets **410** are symmetrically coupled to a circumferential portion of the steering unit **110**, and FIG. **8** is a view illustrating a configuration in which the two first permanent magnets **410** are symmetrically coupled to an end portion surface of the steering shaft **110** passing through the center fascia **10**.

(63) As illustrated in FIG. **8**, when the first permanent magnet **410** is coupled to an end portion surface of the steering shaft **110**, the first PCB **420** is provided to face the first permanent magnet **410** in a state of being spaced apart from the center fascia **10**, and in this case, the first PCB **420** is installed to be connected to the center fascia **10** or a nearby body via a separate bracket, recognizes the change in magnetic flux through the Hall sensor when the first permanent magnet **410** is rotated by the rotation of the steering shaft **110**, and generates the signal related to the steering.

(64) The acceleration unit **500** according to the present disclosure includes a first slider **520** installed to be moved in a longitudinal direction of the right display **200** and having an end portion provided with a first handle **510**, a third power unit **530** connecting the right display **200** to the first

slider **520** and for moving the first slider **520** with respect to the right display **200** when operated, an acceleration button **540** rotatably provided on the first handle **510** and operated by the driver's pressing, a second permanent magnet **550** coupled to the acceleration button **540**, and a second PCB **560** installed on the second slider **520** to face the second permanent magnet **550** and for recognizing the change in magnetic flux when the second permanent magnet **550** is moved by the operation of the acceleration button **540** and generating the signal related to the acceleration.

(65) The right display **200** may be formed in a hollow type with an empty inside, and the first slider **520** may be installed to be inserted into an internal space of the right display **200** and slide from side to side in the longitudinal direction of the right display **200**.

(66) The first handle **510** that a driver may grip with his/her hand is provided on an end portion of the first slider **520** protruding from the right display **200**, and the driver may perform a steering operation by gripping the first handle **510** and rotating the center display **100**, and thus the first handle **510** functions as a steering handle for enabling the driver's steering operation.

(67) The acceleration button **540** has one end rotatably coupled to an upper end of the first handle **510** via a hinge **541**, and the driver presses the other end and operates the acceleration button **540**.

(68) The more the driver presses the acceleration button **540**, the faster the vehicle may accelerate.

(69) The acceleration button **540** is installed to be supported by an acceleration return spring **570**.

(70) The acceleration return spring **570** is installed to have one end supported by an inner side of the acceleration button **540** and the other end supported by an inner surface of the first handle **510** and functions to provide a return force when the acceleration button **540** is operated.

(71) It is preferable that a plurality of acceleration return springs **570** are formed for safety and may be formed of a coil spring.

(72) It is preferable that two second permanent magnets **550** are formed for safety, but the present disclosure is not limited thereto.

(73) As illustrated in FIGS. **14** to **16**, the two second permanent magnets **550** may be fixed to an inner upper surface of the acceleration button **540**, and in this case, the second PCB **560** is fixed to an inner upper surface of the first handle **510** facing the second permanent magnet **550**, recognizes a change in magnetic flux through the Hall sensor when the second permanent magnet **550** is moved by the rotation of the acceleration button **540**, and generates the signal related to the acceleration.

(74) As another example, as illustrated in FIG. **17**, the two second permanent magnets **550** may be fixed to a side surface of the acceleration button **540**, and in this case, the second PCB **560** may be fixed to an inner side surface of the first handle **510** to face the second permanent magnet **550**.

(75) The third power unit **530** includes a third motor **531** fixed to the right display **200**, a first ball screw **532** rotated by power of the third motor **531**, a first ball screw nut **533** coupled to the first ball screw **532** and for moving along the first ball screw **532** when the first ball screw **532** is rotated, and a first guider **534** coupled to the first ball screw nut **533** and the first slider **520** and for moving the first slider **520** while moving with the first ball screw nut **533**.

(76) The third motor **531** may be installed to be positioned on a left lower end inside the right display **200**, and the first ball screw **532** has one end connected to the third motor **531** and the other end passing through the first guider **534** and then positioned as an internal space of the first slider **520**, and to this end, it is preferable that the first slider **520** is formed in a hollow type with an empty inside, but the present disclosure is not limited thereto.

(77) When the driving mode of the vehicle is changed from the autonomous driving mode to the manual driving mode or changed from the manual driving mode to the autonomous driving mode, the first motor **710** and the second motor **810** are operated together, the center display **100**, the right display **200**, and the left display **300** may be popped up or hidden, the third motor **531** may also be operated together, and the first slider **520** slides along the right display **200**.

(78) When the right display **200** is popped up, as illustrated in FIG. **13**, the first slider **520** is moved in a direction protruding from the right display **200** by rotational power of the third motor **531**, and

when the right display **200** is hidden, the first slider **520** is moved in a direction of being inserted into the right display **200**.

(79) In addition, when comparing a case in which the right display **200** is popped up at the right angle with respect to the center display **100** and a case in which the right display **200** is popped up at the obtuse angle with respect to the center display **100**, an amount of protrusion of the first slider **520** in the case in which the right display **200** is popped up at the right angle may be relatively smaller.

(80) Since the first handle **510** is positioned closer to the driver in the case in which the right display **200** is popped up at the right angle than in the case in which the right display **200** is popped up at the obtuse angle, it is preferable that the amount of protrusion of the first slider **520** becomes smaller in the situation in which the right display **200** is popped up at the right angle than in the situation in which the right display **200** is popped up at the obtuse angle so as to allow the driver to grip the first handle **510** more stably.

(81) The third motor **531** may be configured to be operated together under the control of the vehicle control unit when the first and second motors **710** and **810** are operated or configured to be individually operated regardless of the first and second motors **710** and **810** by operating a separate switch by the driver.

(82) The third power unit **530** further includes a first guide rod **535** disposed parallel to the first ball screw **532** and installed to have one end fixed to the right display **200** and the other end passing through the first guider **534**.

(83) The first guide rod **535** is a rod having a straight circular cross-section and disposed above the first ball screw **532**.

(84) The first guide rod **535** may function to guide the movement of the first guider **534** to straightly move stably, and in particular, additionally support the first guider **534** to increase the stiffness of the first handle **510**, and thus even when the driver operates the first handle **510** with a strong force, may function to prevent the deformation of the first handle **510**.

(85) According to the present disclosure, an acceleration button protrusion **580** may be provided to protrude outward from the acceleration button **540**, and the acceleration button protrusion **580** may be integrally formed with the acceleration button **540**.

(86) As illustrated in FIG. **16**, when the acceleration button protrusion **580** is in contact with an inner wall surface of the first handle **510** by the driver's operation of the acceleration button **540**, a pull stroke position of the acceleration button **540** may be restricted, and as illustrated in FIG. **15**, when the acceleration button protrusion **580** is in contact with the inner upper surface of the first handle **510**, a return position or initial position of the acceleration button **540** may be restricted.

(87) The acceleration button **540** has one end rotatably coupled to the upper surface of the first handle **510** via the hinge **541** and the other end formed with the acceleration button protrusion **580** protruding outward.

(88) Therefore, when the driver presses and operates the acceleration button **540**, as illustrated in FIG. **16**, the acceleration button **540** may be inserted into the first handle **510** while rotating about the hinge **541**, and at this time, when the acceleration button protrusion **580** is in contact with the inner wall surface of the first handle **510**, the full stroke position when the acceleration button **540** is operated may be restricted.

(89) In addition, when the driver removes a pressing force from the acceleration button **540** in the state of FIG. **16**, as illustrated in FIG. **15**, the acceleration button **540** may be rotated about the hinge **541** by a spring force of the acceleration return spring **570** to protrude outward from the first handle **510**, and at this time, when the acceleration button protrusion **580** is in contact with the inner upper surface of the first handle **510**, the return position or initial position of the acceleration button **540** may be restricted.

(90) The braking unit **600** according to the present disclosure includes a second slider **620** installed to be moved in a longitudinal direction of the left display **300** and having an end portion provided

with a second handle **610**, a fourth power unit **630** connecting the left display **300** to the second slider **620** and for moving the second slider **620** with respect to the left display **300** when operated, a braking button **640** rotatably provided on the second handle **610** and operated by the driver's pressing, a third permanent magnet **650** coupled to the braking button **640**, and a third PCB **660** installed on the second slider **620** to face the third permanent magnet **650** and for recognizing a change in magnetic flux when the third permanent magnet **650** is moved by the operation of the braking button **640** and generating the signal related to the braking.

(91) The left display **300** may be formed in a hollow type with an empty inside, and the second slider **620** may be installed to be inserted into an internal space of the left display **300** and slide from side to side in the longitudinal direction of the left display **300**.

(92) The second handle **610** that a driver may grip with his/her hand is provided on an end portion of the second slider **620** protruding from the left display **300**, and the driver may perform a steering operation by gripping the second handle **610** and rotating the center display **100**, and thus the second handle **610** functions as a steering handle for enabling the driver's steering operation.

(93) The driver may perform the steering operation by rotating the center display **100** in the clockwise direction or counterclockwise direction in a state of gripping the first handle **510** provided on the first slider **520** and the second handle **610** provided on the second slider **620** with both hands.

(94) The more the driver performs the steering rotation during steering operation, the larger a steering angle of the vehicle becomes.

(95) The braking button **640** has one end rotatably coupled to an upper end of the second handle **610** via a hinge **641**, and the driver presses the other end and operates the braking button **640**.

(96) The more the driver presses the braking button **640**, the faster the vehicle may be braked.

(97) When the driver operates the acceleration button **540** and the braking button **640** at the same time, in principle, only a braking signal is generated for safety so that the braking of the vehicle is preferentially executed, and an acceleration signal is ignored and not generated.

(98) The braking button **640** is installed to be supported by a braking return spring **670**.

(99) The braking return spring **670** is installed to have one end supported by an inner side of the braking button **640** and the other end supported by an inner surface of the second handle **610** and functions to provide a return force when the braking button **640** is operated.

(100) It is preferable that a plurality of braking return springs **670** are formed for safety and may be formed of a coil spring.

(101) It is preferable that two third permanent magnets **650** are formed for safety, but the present disclosure is not limited thereto.

(102) As illustrated in FIGS. **21** to **23**, the two third permanent magnets **650** may be fixed to an inner upper surface of the braking button **640**, and in this case, the third PCB **660** is fixed to an inner upper surface of the second handle **610** facing the third permanent magnet **650**, recognizes the change in magnetic flux through the Hall sensor when the third permanent magnet **650** is moved by the rotation of the braking button **640**, and generates the signal related to the braking.

(103) As another example, the two third permanent magnets **650** may be fixed to a side surface of the braking button **640** in the form as illustrated in FIG. **17**, and in this case, the third PCB **660** may be fixed to an inner side surface of the second handle **610** to face the third permanent magnet **650**.

(104) The fourth power unit **630** includes a fourth motor **631** fixed to the left display **300**, a second ball screw **632** rotated by power of the fourth motor **631**, a second ball screw nut **633** coupled to the second ball screw **632** and for moving along the second ball screw **632** when the second ball screw **632** is rotated, and a second guider **634** coupled to the second ball screw nut **633** and the second slider **620** and for moving the second slider **620** while moving with the second ball screw nut **633**.

(105) The fourth motor **631** may be installed to be positioned on a right lower end inside the left display **300**, and the second ball screw **632** has one end connected to the fourth motor **631** and the

other end passing through the second guider **634** and then positioned as an internal space of the second slider **620**, and to this end, it is preferable that the second slider **620** is formed in a hollow type with an empty inside, but the present disclosure is not limited thereto.

(106) When the driving mode of the vehicle is changed from the autonomous driving mode to the manual driving mode or changed from the manual driving mode to the autonomous driving mode, the first motor **710** and the second motor **810** are operated together, the center display **100**, the right display **200**, and the left display **300** may be popped up or hidden, the fourth motor **631** may also be operated together, and the second slider **620** slides along the left display **300**.

(107) When the left display **300** is popped up, as illustrated in FIG. **20**, the second slider **620** is moved in a direction protruding from the left display **300** by rotational power of the fourth motor **631**, and when the left display **300** is hidden, the second slider **620** is moved in a direction of being inserted into the left display **300**.

(108) In addition, when comparing a case in which the left display **300** is popped up at the right angle with respect to the center display **100** and a case in which the left display **200** is popped up at the obtuse angle with respect to the center display **100**, an amount of protrusion of the second slider **620** in the case in which the left display **200** is popped up at the right angle may be relatively smaller.

(109) Since the second handle **610** is positioned closer to the driver in the case in which the left display **300** is popped up at the right angle than in the case in which the left display **300** is popped up at the obtuse angle, it is preferable that the amount of protrusion of the second slider **620** becomes smaller in the situation in which the left display **300** is popped up at the right angle than in the situation in which the left display **300** is popped up at the obtuse angle so as to allow the driver to grip the second handle **610** more stably.

(110) The fourth motor **631** may be configured to be operated together under the control of the vehicle control unit when the first and second motors **710** and **810** are operated or configured to be individually operated regardless of the first and second motors **710** and **810** by operating a separate switch by the driver.

(111) It is preferable that the third motor **531** and the fourth motor **631** are operated together and the operating times are the same, but the present disclosure is not limited thereto.

(112) The fourth power unit **630** further includes a second guide rod **635** disposed parallel to the second ball screw **632** and installed to have one end fixed to the left display **300** and the other end passing through the second guider **634**.

(113) The second guide rod **635** is a rod having a straight circular cross-section and disposed above the second ball screw **632**.

(114) The second guide rod **635** may function to guide the movement of the second guider **634** to straightly move stably, and in particular, additionally support the second guider **634** to increase the stiffness of the second handle **610**, and thus even when the driver operates the second handle **610** with a strong force, may function to prevent the deformation of the second handle **610**.

(115) According to the present disclosure, a braking button protrusion **680** may be provided to protrude outward from the braking button **640**, and the braking button protrusion **680** may be integrally formed with the braking button **640**.

(116) As illustrated in FIG. **23**, when the braking button protrusion **680** is in contact with an inner wall surface of the second handle **610** by the driver's operation of the braking button **640**, a pull stroke position of the braking button **640** may be restricted, and as illustrated in FIG. **22**, when the braking button protrusion **680** is in contact with the inner upper surface of the second handle **610**, a return position or initial position of the braking button **640** may be restricted.

(117) The braking button **640** has one end rotatably coupled to the upper surface of the second handle **610** via the hinge **641** and the other end formed with the braking button protrusion **680** protruding outward.

(118) Therefore, when the driver presses and operates the braking button **640**, as illustrated in FIG.

23, the braking button **640** may be inserted into the second handle **610** while rotating about the hinge **641**, and at this time, when the braking button protrusion **680** is in contact with the inner wall surface of the second handle **610**, the full stroke position when the braking button **640** is operated may be restricted.

(119) In addition, when the driver removes a pressing force from the braking button **640** in the state of FIG. 23, as illustrated in FIG. 22, the braking button **640** may be rotated about the hinge **641** by a spring force of the braking return spring **670** to protrude outward from the second handle **610**, and at this time, when the braking button protrusion **680** is in contact with the inner upper surface of the second handle **610**, the return position or initial position of the braking button **640** may be restricted.

(120) In addition, the driving operation apparatus according to the present disclosure includes the center display **100** installed on the center fascia **10** inside a vehicle to be rotated in the clockwise direction or the counterclockwise direction, and the right display **200** and the left display **300** coupled to the right and the left sides of the center display **100**, respectively to be rotated in the front-rear direction, in which in the autonomous driving mode, the screen in which the center display **100**, the right display **200**, and the left display **300** are unfolded in a row in the left-right direction and connected as one is provided, in the manual driving mode, the right display **200** and the left display **300** are popped up by being rotated toward the driver rearward from the center display **100**, and the center display **100**, the right display **200**, and the left display **300**, which have been popped up, become the driving operation system for a vehicle.

(121) The driving operation system includes the steering, acceleration, and braking of the vehicle, the acceleration button **540** is provided on the right display **200**, the braking button **640** is provided on the left display **300**, the steering of the vehicle is executed when the center display **100** is rotated in the clockwise direction or the counterclockwise direction by the driver's operation, and the acceleration or braking of the vehicle is executed during the driver's operation of the acceleration button **540** or the braking button **640**.

(122) As described above, the driving operation apparatus for a vehicle according to the present disclosure may have the configuration that has the driving operation system for steering, acceleration, and braking of the vehicle through the steering unit **400** provided on the center display **100**, the acceleration unit **500** provided on the right display **200**, and the braking unit **600** provided on the left display **300** integrally modularized as one system, thereby achieving the reduction in the weight and the reduction in the cost by decreasing the number of components and in particular, maximizing the utilization of the indoor space by minimizing the layout required for the installation space.

(123) In addition, the driving operation apparatus according to the present disclosure may have the configuration that becomes a hide state in which the driver's operation is not available as the center display **100**, the right display **200**, and the left display **300** are unfolded in a row from side to side and are in close contact with the center fascia **10** in the autonomous driving situation and is popped up so that the right display **200** and the left display **300** protrude toward the driver to be operated by the driver in the manual driving mode, thereby allowing the driver to rest comfortably in the autonomous driving situation and achieving safety improvement by blocking the mal-operation.

(124) In addition, the driving operation apparatus according to the present disclosure may have the display to assist to improve the passenger's entertainment in the autonomous driving situation and provide the vehicle information and the nearby information in the manual driving mode, thereby improving convenience and safety.

(125) Although the specific embodiments of the present disclosure have been illustrated and described, it will be apparent to those skilled in the art that the present disclosure may be variously improved and changed without departing from the technical spirit of the present disclosure provided by the appended claims.

Claims

1. A driving operation apparatus for a vehicle, comprising: a center display rotatably positioned on a center fascia inside the vehicle; a right display rotatably coupled to a right side of the center display, and a left display rotatably coupled to a left side of the center display; a steering unit positioned on the center display and the center fascia, the steering unit being configured to generate a signal related to a steering of the vehicle when the center display is rotated in a clockwise direction or counterclockwise direction by a driver's operation; an acceleration unit positioned on one of the right display and the left display, the acceleration unit being configured to generate a signal related to an acceleration of the vehicle during the driver's operation; and a braking unit positioned on an other one of the right display and the left display than the acceleration unit, the braking unit being configured to generate a signal related to a braking of the vehicle during the driver's operation.
2. The driving operation apparatus according to claim 1, further comprising a screen in which the center display, the right display, and the left display are unfolded in a row in a left-right direction and are connected as one during an autonomous driving mode.
3. The driving operation apparatus according to claim 2, wherein in the autonomous driving mode, positions of the right display and the left display unfolded in a row are restricted by contact with the center fascia.
4. The driving operation apparatus according to claim 1, wherein in a manual driving mode, the right display and the left display are popped up by being rotated toward the driver rearward from the center display, and in the popped-up state, screens in which the center display, the right display, and the left display are individually separated are provided.
5. The driving operation apparatus according to claim 4, wherein the right display and the left display popped up in the manual driving mode form a right angle or an obtuse angle with respect to the center display, and when the right display and the left display form the obtuse angle, popped-up angles of the right display and the left display are the same.
6. The driving operation apparatus according to claim 5, wherein positions of the right display and the left display popped up at the right angle are restricted during contact with the right and left sides of the center display, or positions of the right display and the left display popped up at the obtuse angle are restricted by locking of an actuator configured to pop up the right display and the left display.
7. The driving operation apparatus according to claim 1, further comprising a first power unit connecting the center display to the right display, the first power unit being configured to rotate the right display with respect to the center display when operated, and wherein the first power unit includes: a first motor fixed to a right side portion of the center display; and a first motor rod which is rotated by the first motor, which is integrally coupled after passing through a left side portion of the right display, and wherein an end portion of the first motor rod is rotatably connected to the right side portion of the center display.
8. The driving operation apparatus according to claim 1, further comprising a second power unit connecting the center display to the left display, the second power unit being configured to rotate the left display with respect to the center display when operated, and wherein the second power unit includes: a second motor fixed to a left side portion of the center display; and a second motor rod which is rotated by the second motor, which is integrally coupled after passing through a right side portion of the left display, and wherein an end portion of the second motor rod is rotatably installed on the left side portion of the center display.
9. The driving operation apparatus according to claim 1, wherein the center display includes: a steering shaft protruding forward to pass through the center fascia, and configured to rotate with respect to the center fascia; a steering shaft clip coupled to the steering shaft and configured to

prevent the steering shaft from being separated from the center fascia; and a steering return spring having two ends, wherein both ends are coupled to the center fascia and the steering shaft, and wherein the steering return spring is configured to provide a return force when the steering shaft is rotated.

10. The driving operation apparatus according to claim 9, wherein the steering unit includes: a first permanent magnet coupled to a front surface of the center display or the steering shaft; and a first printed circuit board (PCB) positioned to face the first permanent magnet and being configured to recognize a change in magnetic flux when the first permanent magnet is rotated and generate a signal related to a steering.

11. The driving operation apparatus according to claim 1, wherein the acceleration unit includes: a first slider configured to be moved in a longitudinal direction of the right display and having an end portion provided with a first handle; a third power unit connecting the right display to the first slider, the third power unit being configured to move the first slider with respect to the right display when operated; an acceleration button rotatably provided on the first handle and operated by a driver's pressing; a second permanent magnet coupled to the acceleration button; and a second PCB installed on the first slider to face the second permanent magnet, the second PCB being configured to recognize a change in magnetic flux when the second permanent magnet is moved by the acceleration button, and to generate a signal related to an acceleration.

12. The driving operation apparatus according to claim 11, wherein the third power unit includes: a third motor fixed to the right display; a first ball screw configured to be rotated by the third motor; a first ball screw nut coupled to the first ball screw and configured to move along the first ball screw when the first ball screw is rotated; and a first guider coupled to the first ball screw nut and the first slider and configured to move the first slider while moving with the first ball screw nut.

13. The driving operation apparatus according to claim 12, wherein the third power unit further includes a first guide rod positioned parallel to the first ball screw, and configured to have one end fixed to the right display and an other end passing through the first guider.

14. The driving operation apparatus according to claim 11, wherein an acceleration button protrusion protrudes outwardly from the acceleration button, and a full stroke position of the acceleration button is restricted when the acceleration button protrusion is in contact with an inner wall surface of the first handle, and when the acceleration button protrusion is in contact with an inner upper surface of the first handle, a return position or initial position of the acceleration button is restricted.

15. The driving operation apparatus according to claim 1, wherein the braking unit includes: a second slider configured to be moved in a longitudinal direction of the left display and having an end portion provided with a second handle; a fourth power unit connecting the left display to the second slider and configured to move the second slider with respect to the left display when operated; a braking button rotatably provided on the second handle and operated by a driver's pressing; a third permanent magnet coupled to the braking button; and a third PCB installed on the second slider to face the third permanent magnet, the third PCB being configured to recognize a change in magnetic flux when the third permanent magnet is moved by an operation of the braking button, and to generate a signal related to a braking.

16. The driving operation apparatus according to claim 15, wherein the fourth power unit includes: a fourth motor fixed to the left display; a second ball screw configured to be rotated by the fourth motor; a second ball screw nut coupled to the second ball screw and configured to move along the second ball screw when the second ball screw is rotated; and a second guider coupled to the second ball screw nut and the second slider and configured to move the second slider while moving with the second ball screw nut.

17. The driving operation apparatus according to claim 16, wherein the fourth power unit further includes a second guide rod positioned parallel to the second ball screw, and configured to have one end fixed to the left display and an other end passing through the second guider.

18. The driving operation apparatus according to claim 15, wherein a braking button protrusion protrudes outwardly from the braking button, and a full stroke position of the braking button is restricted when the braking button protrusion is in contact with an inner wall surface of the second handle, and when the braking button protrusion is in contact with an inner upper surface of the second handle, a return position or initial position of the braking button is restricted.

19. A driving operation apparatus for a vehicle, comprising: a center display positioned on a center fascia inside the vehicle configured to be rotated in a clockwise direction or counterclockwise direction; and a right display coupled to a right side of the center display and a left display coupled to a left side of the center display, the right and left displays being configured to be rotated in a front-rear direction; a screen in which the center display, the right display, and the left display are unfolded in a row in a left-right direction and connected as one during an autonomous driving mode; and in a manual driving mode, the right display and the left display are popped up by being rotated toward the driver rearward from the center display, and the center display, the right display, and the left display, which have been popped up, become a driving operation system of the vehicle.

20. The driving operation apparatus according to claim 19, wherein the driving operation system includes steering, acceleration, and braking of the vehicle, an acceleration button is positioned on the right display, and a braking button is positioned on the left display, the steering of the vehicle is executed when the center display is rotated in a clockwise direction or a counterclockwise direction by a driver, and the acceleration or braking of the vehicle is executed when the driver operates the acceleration button or the braking button.
