

Appeal decision

Appeal No. 2017-17235

U.S.A.

Appellant

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The case of appeal against the examiner's decision of refusal of Japanese Patent Application No. 2016-506621, entitled "Systems and Methods for Transitioning Control of an Autonomous Vehicle to a Driver" [international publication on October 9, 2014: WO 2014/165681, and national publication of the translated version on August 4, 2016: National Publication of International Patent Application No. 2016-522769] has resulted in the following appeal decision:

Conclusion

The appeal of the case was groundless.

Reason

No. 1 History of the procedures

The present application was originally filed on April 3, 2014 (Heisei 26) as an International Patent Application (claim of priority under the Paris Convention was received by the foreign receiving office on April 5, 2013 (US) the United States of America), and the history of the procedures thereof is as follows.

September 21, 2016 (date of dispatch) : A written notice of reasons for refusal

December 19, 2016 : Submission of a written opinion and a written amendment

January 25, 2017 (date of dispatch) : A written notice of reasons for refusal

June 20, 2017 : Submission of a written opinion and a written amendment

August 16, 2017 (date of dispatch) : A decision to dismiss amendment on the written amendment on June 20, 2017, and a decision of refusal

November 21, 2017 : Submission of a written demand for trial, and a written amendment

No. 2 Decision to dismiss the amendment made on November 21, 2017

[Conclusion of Decision to Dismiss Amendment]

The amendment made on November 21, 2017 (hereinafter, referred to as "the Amendment") shall be dismissed.

[Reason]

1. Regarding the Amendment

(1) The statement of Claim 1 of the scope of claims amended by the amendment made on December 19, 2016 before the Amendment is as follows.

"[Claim 1]

A method, comprising:

a step of receiving an indication for transitioning control of a vehicle operating in an autonomous operation mode via a computing device configured to control the vehicle in the autonomous operation mode, the indication for transitioning the control including detection of a change of a steering system of the vehicle that exceeds a threshold level, and has no relation with the control of the vehicle in the autonomous operation mode;

a step of judging, by the computing device, a state of the vehicle based on at least one parameter associated with an operation of the vehicle in the autonomous operation mode;

a step of determining a strategy, based on the state and the indication, for transitioning control of one or more systems of the vehicle from the autonomous operation mode to the manual driving mode, the strategy including information indicating each system among the one or more systems of the vehicle for which control should be transited from the autonomous operation mode to the manual driving mode, and one or more periods configured in such a way that the transitioning control of each system of the one or more systems of the vehicle from the autonomous operation mode to the manual driving mode is performed; and

a step of giving the strategy in such a way that the transitioning control of the

one or more systems of the vehicle from the autonomous operation mode to the manual driving mode is performed, the strategy indicating a time when transitioning of control of each system among the one or more systems of the vehicle from the autonomous operation mode to the manual driving mode is carried out in a series of transitions over a given period based on the state of the vehicle and the received indication."

(2) Then, by the Amendment, the above statement of Claim 1 of the scope of claims before the Amendment has been amended as indicated below (the underlined portions are amended portions).

"[Claim 1]

A method, comprising:

a step of receiving an indication for transitioning control of a vehicle operating in an autonomous operation mode via a computing device configured to control the vehicle in the autonomous operation mode, the indication for transitioning the control including detection of a change of a steering system of the vehicle that exceeds a threshold level, and has no relation with the control of the vehicle in the autonomous operation mode;

a step of judging, by the computing device, current and future states of the vehicle based on at least one parameter associated with current and future operations of the vehicle in the autonomous operation mode;

a step of determining a strategy, based on the current and future states of the vehicle and the indication, for transitioning control of one or more systems of the vehicle from the autonomous operation mode to the manual driving mode, the strategy including information indicating each system among the one or more systems of the vehicle for which control should be transited from the autonomous operation mode to the manual driving mode, and one or more periods configured in such a way that the transitioning control of each system of the one or more systems of the vehicle from the autonomous operation mode to the manual driving mode is performed; and

a step of giving the strategy in such a way that the transitioning control of the one or more systems of the vehicle from the autonomous operation mode to the manual driving mode is performed, the strategy indicating a time when transitioning of control of each system among the one or more systems of the vehicle from the autonomous operation mode to the manual driving mode is carried out in a series of transitions over a given period based on the current and future states of the vehicle and the received indication."

2. Propriety of amendment

The Amendment is an amendment that adds limitation of "current and future" regarding "operation" that is a matter necessary for specifying the invention described in Claim 1 before the Amendment, and, in addition, adds, regarding "state", limitation of "current and future", and, fields of industrial application and problems to be solved are identical between the invention described in Claim 1 before the Amendment and the invention described in Claim 1 after the Amendment. Therefore, it falls under the category of ones for the purpose of restriction of the scope of claims of Article 17-2(5)(ii) of the Patent Act.

Consequently, whether Claim 1 of the scope of claims after the Amendment (hereinafter, referred to as "the Amended Invention") complies with the provisions of Article 126(7) of the same Act as applied mutatis mutandis pursuant to the provisions of Article 17-2(6) of the same Act (whether it is one that can be granted a patent independently at the time of filing of the patent application) will be examined below.

(1) The Amended Invention

The Amended Invention is one that has been described in the above-mentioned 1. (2).

(2) Described matters in the cited documents

A Cited Document 1

In Japanese Unexamined Patent Application Publication No. H9-222922 (hereinafter, referred to as "Cited Document 1") that is a cited document in the reasons for refusal stated in the examiner's decision, and was distributed or made available to the public through electric communication lines before the priority date of the present application, there are described the following statements along with drawings relating to "auto-drive control unit for vehicles" (in particular, refer to FIG. 1 and FIG. 2). (Underlines were given by the body for the purpose of facilitating understanding. The same applies hereafter.)

(A) "[0005] The present invention has been made in view of the problems to be solved of the above-mentioned prior art, and its object is to provide an auto-drive control unit for vehicles that can perform transition to a manual running mode smoothly, by inhibiting mode switching from an autonomous running mode to the manual running mode when vehicle running is in an unstable state and allowing mode switching only when it is in a stable state.

[0006]

[Means for solving the problem] To achieve the above object, the present invention includes a running control means for carrying out automatic driving based on detection signals from a plurality of sensors, a switching means for switching between the automatic driving mode and the manual driving mode, an evaluation means for evaluating a running stability when a steering angle is within a predetermined range and is in an approximately neutral condition, and a mode control means for inhibiting switching from the automatic driving mode to the manual driving mode by the switching means when vehicle running is evaluated as being in an unstable state by the evaluation means."

(B) "[0009] <The first embodiment> In FIG. 1, there is shown a configuration block diagram of this embodiment. As an autonomous running system, a course recognition/obstacle detection sensor 10 such as a CCD camera, a vehicle speed sensor 11, a road-vehicle communication device 12 such as an infrared transceiver, and a GPS 14 are provided, and each detection signal is supplied to an automatic driving ECU (Electronic Control Unit) 20. The automatic driving ECU 20 performs autonomous running by driving a steering actuator 22, a brake actuator 24, and an accelerator actuator 26 based on these detection signals. In addition, a switching interface (manual turnover switch) 16 for switching between autonomous driving (automatic driving) and manual driving is provided near the driver's seat, and, by operating this switch, it is possible to switch between autonomous driving and manual driving mutually. In this regard, however, switching from automatic driving to manual driving is possible only under certain conditions, which are discussed later. Meanwhile, a driving situation monitoring display 18 displays, for assisting smooth operation, distinction between in-automatic-driving/in-manual-driving, distinction of whether or not switching (transition) from automatic to manual driving is allowed, and operation guidance in accordance with a situation (such as guiding a method for transition to manual driving during automatic driving, etc.), and it can be configured by providing an LED display on an instrument panel.

[0010] On the other hand, as means for detecting various kinds of state quantities necessary for evaluating running stability of a vehicle, a pitch angle sensor/pitch angular velocity sensor 34, a yaw rate sensor 38, a lateral G sensor 40, a forward/backward G sensor 42, and a roll angle sensor/roll angular velocity sensor 44 are provided, and each detection signal is supplied to the automatic driving ECU 20. Furthermore, ECUs 28, 30, and 32 for controlling each of systems of TRC (Traction Control: registered

trademark), ABS (antilock brake system), and VSC (vehicle stability control), which are running safety devices mounted on a vehicle, can be used as state detection sensors. Accordingly, in the following cases, it is possible to judge that running of a vehicle is in an unstable state generally.

- [0011] (A) When a lateral G equal to or greater than a predetermined value is occurring
(B) When a forward/backward G equal to or greater than a predetermined value is occurring
(C) When a yaw rate equal to or greater than a predetermined value is occurring
(D) When a roll angle and a roll angular velocity equal to or greater than predetermined values are occurring
(E) When a pitch angle and a pitch angular velocity equal to or greater than predetermined values are occurring
(F) When TRC is operating
(G) When ABS is operating
(H) When VSC is operating

In this connection, the predetermined value of a lateral G may be determined to be, for example, a value equal to or greater than 0.02 G in consideration of a vehicle speed and a turning radius. In addition, as the predetermined value of a forward/backward G may be determined to be, for example, equal to or greater than 0.4 G, and, also regarding predetermined values of other physical quantities, it is possible to assign optimum values according to various kinds of experimentation.

[0012] In view of any one or a combination of the above items, the automatic driving ECU 20 as the evaluation means and the mode control means evaluates whether running of a vehicle is in the stable state or in the unstable state, and, when the vehicle is determined to be in an unstable state, inhibits switching from automatic driving to manual driving without exception even if the vehicle is running on a straight road. By this, it is possible to reduce a burden of steering operation on a driver associated with carrying out manual driving in an unstable state, thus enabling maintenance of smooth running."

(C) "[0014] In FIG. 2, a flow chart of the switching processing is shown. First, the automatic driving ECU 20 determines whether or not the manual turnover switch (manual transition switch) 16 has been operated (S101). When the turnover switch is operated by a driver during autonomous (automatic) driving, next, the automatic driving ECU 20 determines whether or not a running safety device is in operation based on operation signals from each ECU (S102). When any one or more of the running safety

devices 28-32 are being in operation, the automatic driving ECU 20 determines whether or not a predetermined time t1 has elapsed after the operation start (S107). When the predetermined time has not elapsed, the automatic driving ECU 20 inhibits transition to the manual driving mode regardless of the operation of the turnover switch (S109). This transition inhibition will be executed even if the vehicle is running on a straight-line road. Then, when the predetermined time has elapsed, a message to the effect that "Switching was canceled because the running state had been unsuitable for switching to manual driving. Please try switching to manual driving once again." is displayed on a display (S108), and the processing from S101 and later is repeated.

[0015] When the manual turnover switch is turned on by the driver again in this state, transition to manual driving is inhibited if a running safety device is in operation, but, when the running safety device has finished its operation, the automatic driving ECU 20 determines whether or not a compulsory manual switch is turned on (S103). This compulsory manual switch is a switch for intervening in the operation forcibly by an intention of the driver side, and is a switch to be used on the occasion when a driver wants to perform transition to manual driving, even when a turning state continues for a long time, or even when an irregular ground road continues, for example, upon due recognition of such state. This compulsory manual switch 17 can be provided near the turnover switch 16 as shown in FIG. 3, for example. When the compulsory manual switch 17 is not being turned on, whether or not vehicle behavior is equal to or greater than a set value is determined, next (S110). This is determination that determines any one of the above (A)-(E), or an AND condition of a plurality of these, and, when such condition is satisfied even if a running stabilization device is not operating, transition to manual driving is inhibited for the reason that transition to manual driving increases a burden on a driver (S111, S112). On the other hand, when vehicle behavior is not equal to or greater than the set value, it is considered that vehicle running is in a stable state, and thus beginning of transition to manual driving is allowed (S104). In addition, when both the manual turnover switch 16 and the compulsory manual switch 17 are made to be ON, it is according to intention of the driver, and, therefore, transition to manual driving is begun regardless of whether there exists vehicle behavior (S104). By this, the following mode will be realized.

[0016] (1) Running safety device in operation

Inhibit transition to manual driving without exception

(2) Running safety device not in operation and vehicle behavior value being equal to or greater than a predetermined value

Inhibit transition to manual driving by manual turnover switch ON

Allow transition to manual driving by manual turnover switch ON and compulsion turnover switch ON

(3) Running safety device not in operation and vehicle behavior value being below predetermined value

Allow transition to manual driving by manual turnover switch ON

In this regard, however, since a certain amount of time is needed until transition to manual driving is completed, there is a possibility that the running state changes in such period, causing transition from a stable state to an unstable state. Therefore, whether or not a predetermined time t2 has elapsed is determined (S105), and, in a case where the time t2 has not elapsed and a running safety device is in operation, transition to manual driving is canceled even if the compulsory manual switch 17 is made ON (S114, S115, and S108). On the other hand, when a running safety device is not operating, whether or not the compulsory manual switch has been made ON is determined, next (S116). When the compulsory manual switch 17 has not been operated, and only the manual turnover switch 16 is simply being made ON, whether or not vehicle behavior has been changed to an unstable state is determined, further (S117), and, when the vehicle running state has changed to an unstable state, transition to manual driving is canceled (S119). On the other hand, when the vehicle behavior has not changed during the predetermined time t2, since switching to manual driving can be made smoothly, and transition to manual driving is completed (S106). In addition, when the compulsory manual switch 17 has been turned on, since it is the intention of a driver, as described above, transition to manual driving is completed regardless of whether or not there is vehicle behavior (S106)."

(D) "[0017] In this way, when a running safety device is in operation, transition to manual driving is inhibited without exception, and, in conjunction with this, even if a running safety device is operating, when it is determined that the vehicle behavior is equal to or greater than a predetermined value and is thus in an unstable state, transition to manual driving is inhibited regardless of the manual driving turnover switch being ON. For this reason, cases where a driver is required to perform sophisticated steering operations immediately after the switching are decreased, enabling smooth transition to manual driving. In addition, it is also possible to cope with a running circumstance change sufficiently because, even if vehicle running was in a stable state at the time when the manual driving turnover switch was operated, transition to manual driving is canceled if the running state is changed to an unstable state, by monitoring a running state change until transition is completed. Furthermore, in consideration of magnitude

relation between activation threshold values of running stabilization devices and predetermined values of vehicle-behavior physical quantities such as a lateral G, intervention of a driver by the compulsory manual switch operation is allowed in a case where only such vehicle-behavior value(s) is equal to or greater than a predetermined value, and it is possible to cope with a case where a skilled driver wishes manual driving under a some degree of unstable state.

[0018] In this connection, in this embodiment, although an unstable state of running is evaluated in a manner dividing it into two stages of a case where a physical quantity such as a lateral G force is equal to or greater than a predetermined value and a case where the running safety device is operating, stabilization/destabilization of running may be evaluated only by operation/non-operation of a running safety device, for example, or stabilization/destabilization of running may be evaluated only by whether a physical quantity such as a lateral G force is equal to or greater than a predetermined value."

(E) "[0019] <The second embodiment> A system configuration of this embodiment is shown in FIG. 4. There is provided a course/obstacle detection sensor 50 such as a CCD camera in the front of a vehicle, and detection signals are supplied to an automatic driving ECU (Electronic Control Unit) 52. The automatic driving ECU 52 controls, based on inputted detection signals (or also based on signals from other sensors such as a vehicle speed sensor), a steering actuator 56, and, when a distance between an obstacle, such as a forward vehicle, and the own vehicle becomes equal to or less than a predetermined distance, drives a brake actuator 58 to perform automatic braking. In addition, an automatic/manual turnover switch 54 is a switch that directs the automatic driving ECU 52 to perform mode switching between autonomous running (automatic driving) and manual driving, and is provided near the driver's seat.

[0020] Here, the characteristic points in this embodiment are that: when the turnover switch 54 is operated during execution of autonomous running, although the automatic driving ECU 52 as a mode control means transits to the manual driving mode, transition to the manual driving mode is inhibited during executing automatic braking and the automatic braking is maintained; and that, by this, it is made possible to secure safety of running and to perform smooth transition to manual driving."

When these described matters and the illustrated contents of the drawings are put together, and are organized in accordance with the way of description of the Amended Invention, there is described in Cited Document 1 the following invention

(hereinafter, referred to as "Cited Invention").

"An auto-drive control unit for vehicles, comprising:

determining, by the automatic driving ECU 20 for performing automatic driving, whether or not the manual turnover switch 16 has been operated (S101);

determining, by the automatic driving ECU 20, whether vehicle behavior is equal to or greater than a set value from detection signals of the pitch angle sensor/pitch angular velocity sensor 34, the yaw rate sensor 38, the lateral G sensor 40, the forward/backward G sensor 42, and the roll angle sensor/roll angular velocity sensor 44 (S110);

in the case of the vehicle behavior being equal to or greater than the set value, transition to manual driving being inhibited (S111, S112); when the vehicle behavior is not equal to or greater than the set value, beginning of transition to manual driving being allowed (S104); determining whether or not the predetermined time t2 has elapsed because a certain degree of time is required until transition to manual driving is completed (S105); when the predetermined time t2 has not elapsed, determining whether or not the vehicle behavior has changed to an unstable state (S117); when the vehicle running state has changed to an unstable state, transition to manual driving is canceled (S119); and, when the vehicle behavior has not changed during the predetermined time t2, transition to manual driving is completed (S106)."

B Cited Document 2

In Japanese Unexamined Patent Application Publication No. H9-240502 (hereinafter, referred to as "Cited Document 2") that is a cited document in the reasons for refusal stated in the examiner's decision, and was distributed or made available to the public through electric communication lines before the priority date of the present application, there are described the following statements along with drawings relating to "vehicular steering apparatus".

(A) "[0024]

[Object of the Invention] An object of the present invention is to provide a vehicular steering apparatus that can improve inconvenience existing in such conventional examples, and, more particularly, a vehicular steering apparatus that can switch between automatic driving and manual driving by capturing the intention of a driver accurately without switching operation."

(B) "[0025]

[Means for solving the problem] Therefore, the present invention includes, as a first means (Claim 1): a steering mechanism to change a direction of a steered wheel; a steering force transmission means for transmitting steering force from a driver to the steering mechanism; a running state sensor unit to capture a running state such as a vehicle speed of the own vehicle; an automatic steering control unit to calculate a target steering amount in accordance with a running state of the own vehicle captured by the running state sensor unit when a predetermined automatic steering mode is being set; and a motor to drive the steering mechanism in accordance with the target steering amount calculated by the automatic steering control unit. Furthermore, the running state sensor unit includes a torque sensor to detect a magnitude of steering force from a driver. Furthermore, together with the automatic steering control unit, there are provided: a switching control unit that sets to an automatic steering mode when a torque sensor output is less than a predetermined threshold value, and sets to a power steering mode when the output from the torque sensor is equal to or greater than the predetermined threshold value; and a power steering control unit to calculate a target steering amount that assists or suppresses steering force from a driver in accordance with a running state of the own vehicle when the power steering mode has been set by the switching control unit. In addition, it has a configuration in which, together with a motor, there is provided a motor driving control unit to perform driving control of the motor in accordance with a target steering amount calculated by the automatic steering control unit depending on each mode set by the switching control unit or on a target steering amount calculated by the power steering control unit.

[0026] In the first means, the switching control unit sets the automatic steering mode when a torque sensor output is less than a predetermined threshold value, and the automatic steering control unit calculates, during the automatic steering mode, a target steering amount in accordance with a running state of the own vehicle, and, on the other hand, the switching control unit sets the power steering mode when the torque sensor output is equal to or greater than the predetermined threshold value, and the power steering control unit calculates, during the power steering mode, a target steering amount that assists or suppresses steering force from a driver in accordance with a running state of the own vehicle such as a vehicle speed. Therefore, automatic steering and a manual operation will be switched depending on steering force from a driver to the steering wheel, and, in addition, during manual steering, a power steering operation is performed by the motor used for automatic steering."

(C) "[0030] FIG. 1 is a block diagram illustrating a configuration of a vehicular steering apparatus according to the present invention. The vehicular steering apparatus includes: a steering mechanism 4 to change a direction of a steered wheel; a steering force transmission means 6 for transmitting steering force from a driver to the steering mechanism; a running state sensor unit 10 to capture a running state such as a vehicle speed of an own vehicle; an automatic steering control unit 12 to calculate a target steering amount in accordance with the running state of the own vehicle captured by the running state sensor unit 10 while it is switched the automatic steering mode by a predetermined switching signal; and a motor 2 to drive the steering mechanism 4 in accordance with the target steering amount calculated by the automatic steering control unit 12.

[0031] Furthermore, the running state sensor unit 10 includes a torque sensor 11 to detect a magnitude of steering force from a driver. The running state sensor unit 10 is one that is similar to the conventional running state sensor unit 71 indicated in FIG. 12.

[0032] Furthermore, together with the automatic steering control unit 12, there are provided: a switching control unit 18 to output a switching signal to the automatic steering control unit 12 when torque sensor output is less than a predetermined threshold value, and, together with this, set the power steering mode when output from the torque sensor 11 is equal to or greater than a predetermined threshold value; and a power steering control unit 14 to calculate a target steering amount to assist or suppress steering force from a driver in accordance with a running state of an own vehicle when the power steering mode has been set by the switching control unit 18.

(D) "[0036] In the present embodiment, the motor 2 is used as both a power source of automatic steering and an auxiliary power source (power assistance) at the time of manual steering. In addition, a torque sensor attached to the electric power steering system is made to be a switch used for switching between the automatic steering mode and the power steering mode. By this, a switching operation of a switch is eliminated, and operability is improved."

(E) "[0041] FIG. 4 is an explanatory drawing showing an example of switching between the power steering mode and the automatic steering mode. The switching control unit 18 suspends, based on a predetermined threshold value A, automatic steering when the torque sensor output exceeds this threshold value A, and performs switching to manual driving. Furthermore, when switching to the manual driving is made, the power steering control unit 14 calculates an assist amount (target steering amount) in

accordance with the torque output based on a power steering map. Then, the motor driving control unit 16 performs control to assist or suppress the steering force added to the steering wheel 61 in accordance with this target steering amount."

When these described matters and the illustrated contents of the drawings are put together, and organized in accordance with the way of description of the Amended Invention, there is described in Cited Document 2 the following matter (hereinafter, referred to as "Described Matter in Cited Document 2").

"That, when torque sensor output of the steering mechanism exceeds a predetermined threshold value, automatic steering is suspended, and switching to manual driving is performed."

(3) Comparison with Cited Invention

In comparison of the Amended Invention with the Cited Invention, "the automatic driving ECU 20 for performing automatic driving" of the latter corresponds to "a computing device configured to control the vehicle in the autonomous operation mode" of the former as viewed from its function, configuration, and technical significance, and "the manual turnover switch 16 has been operated" of the latter corresponds to "an indication for transitioning control of a vehicle operating in an autonomous operation mode" of the former.

From the above, "determining, by the automatic driving ECU 20 for performing automatic driving, whether or not the manual turnover switch 16 has been operated (S101)" of the latter corresponds to "a step of receiving an indication for transitioning control of a vehicle operating in an autonomous operation mode via a computing device configured to control the vehicle in the autonomous operation mode" of the former.

Next, "determining" "whether vehicle behavior is equal to or greater than a set value from detection signals of the pitch angle sensor/pitch angular velocity sensor 34, the yaw rate sensor 38, the lateral G sensor 40, the forward/backward G sensor 42, and the roll angle sensor/roll angular velocity sensor 44 (S110)" of the latter and "a step of judging" "current and future states of the vehicle based on at least one parameter associated with current and future operations of the vehicle in the autonomous operation mode" of the former are identical to the extent of being "a step of judging a current state of the vehicle based on at least one parameter associated with a current operation of the vehicle in the autonomous operation mode".

In addition, "in the case of the vehicle behavior being equal to or greater than the set value, transition to manual driving being inhibited (S111, S112); when the vehicle behavior is not equal to or greater than the set value, beginning of transition to manual driving being allowed (S104)" of the latter corresponds to, when the statements of "The automatic driving ECU 20 performs autonomous running by driving a steering actuator 22, a brake actuator 24, and an accelerator actuator 26 based on these detection signals. In addition, a switching interface (manual turnover switch) 16 for switching between autonomous driving (automatic driving) and manual driving is provided near the driver's seat, and, by operating this switch, it is possible to switch between autonomous driving and manual driving mutually. In this regard, however, switching from automatic driving to manual driving is possible only under certain conditions, which are discussed later." of paragraph [0009] of (2)A(B) are put together, "a strategy" "for transitioning control of one or more systems of the vehicle from the autonomous operation mode to the manual driving mode" of the former.

Then, when descriptions of paragraph [0009] of the above-mentioned Cited Document 1 are put together determining "whether or not the predetermined time t2 has elapsed because a certain degree of time is required until transition to manual driving is completed" of the latter corresponds to "information indicating each system among the one or more systems of the vehicle for which control should be transited from the autonomous operation mode to the manual driving mode, and one or more periods configured in such a way that the transitioning control of each system of the one or more systems of the vehicle from the autonomous operation mode to the manual driving mode is performed" of the former.

Then, "in the case of the vehicle behavior being equal to or greater than the set value, transition to manual driving being inhibited (S111, S112); when the vehicle behavior is not equal to or greater than the set value, beginning of transition to manual driving being allowed (S104); determining whether or not the predetermined time t2 has elapsed because a certain degree of time is required until transition to manual driving is completed (S105)" of the latter and "a step of determining a strategy, based on the current and future states of the vehicle and the indication, for transitioning control of one or more systems of the vehicle from the autonomous operation mode to the manual driving mode, the strategy including information indicating each system among the one or more systems of the vehicle for which control should be transited from the autonomous operation mode to the manual driving mode, and one or more periods configured in such a way that the transitioning control of each system of the one or more systems of the vehicle from the autonomous operation mode to the manual driving

mode is performed" of the former are identical to the extent of being "a step of determining a strategy, based on the current state of the vehicle and the indication, for transitioning control of one or more systems of the vehicle from the autonomous operation mode to the manual driving mode, the strategy including information indicating each system among the one or more systems of the vehicle for which control should be transited from the autonomous operation mode to the manual driving mode, and one or more periods configured in such a way that the transitioning control of each system of the one or more systems of the vehicle from the autonomous operation mode to the manual driving mode is performed".

Furthermore, "determining whether or not the predetermined time t_2 has elapsed" "(S105); when the predetermined time t_2 has not elapsed, determining or not whether the vehicle behavior has changed to an unstable state (S117); when the vehicle running state has changed to an unstable state, transition to manual driving is canceled (S119); and, when the vehicle behavior has not changed during the predetermined time t_2 , transition to manual driving is completed (S106)" of the latter corresponds to "a step of giving the strategy in such a way that the transitioning control of the one or more systems" "from the autonomous operation mode to the manual driving mode is performed" of the former, and "the predetermined time t_2 " of the latter corresponds to "a given period based on" "the received indication" of the former because it is a time needed "because a certain degree of time is required until transition to manual driving is completed".

Then, "determining whether or not the predetermined time t_2 has elapsed" "(S105); when the predetermined time t_2 has not elapsed, determining whether or not the vehicle behavior has changed to an unstable state (S117); when the vehicle running state has changed to an unstable state, transition to manual driving is canceled (S119); and, when the vehicle behavior has not changed during the predetermined time t_2 , transition to manual driving is completed (S106)" of the latter and "a step of giving the strategy in such a way that the transitioning control of the one or more systems of the vehicle from the autonomous operation mode to the manual driving mode is performed, the strategy indicating a time when transitioning of control of each system among the one or more systems of the vehicle from the autonomous operation mode to the manual driving mode is carried out in a series of transitions over a given period based on the current and future states of the vehicle and the received indication" of the former are identical to the extent of being "a step of giving the strategy in such a way that the transitioning control of the one or more systems of the vehicle from the autonomous operation mode to the manual driving mode is performed, the strategy indicating a time

when transitioning of control of each system among the one or more systems of the vehicle from the autonomous operation mode to the manual driving mode is carried out in a series of transitions over a given period based on the current state of the vehicle and the received indication".

In addition, since "auto-drive control unit" of the latter is one that executes a flow chart of switching processing, it is obvious that it includes "method" of the former.

Therefore, both are identical in a point of being

"A method comprising:

- a step of receiving an indication for transitioning control of a vehicle operating in an autonomous operation mode via a computing device configured to control the vehicle in the autonomous operation mode;

- a step of judging, by the computing device, a current state of the vehicle based on at least one parameter associated with a current operation of the vehicle in the autonomous operation mode;

- a step of determining a strategy, based on the current state of the vehicle and the indication, for transitioning control of one or more systems of the vehicle from the autonomous operation mode to the manual driving mode, the strategy including information indicating each system among the one or more systems of the vehicle for which control should be transited from the autonomous operation mode to the manual driving mode, and one or more periods configured in such a way that the transitioning control of each system of the one or more systems of the vehicle from the autonomous operation mode to the manual driving mode is performed; and

- a step of giving the strategy in such a way that the transitioning control of the one or more systems of the vehicle from the autonomous operation mode to the manual driving mode is performed, the strategy indicating a time when transitioning of control of each system among the one or more systems of the vehicle from the autonomous operation mode to the manual driving mode is carried out in a series of transitions over a given period based on the current state of the vehicle and the received indication."

, and differ in terms of the following points.

[Different Feature 1]

A point that, in the former, "the indication for transitioning the control including detection of a change of a steering system of the vehicle that exceeds a threshold level, and has no relation with the control of the vehicle in the autonomous operation mode", whereas, the latter does not include such constitution.

[Different Feature 2]

A point that the former is one in which, based on at least one parameter associated with current "and future" operations of a vehicle, current "and future" states of the vehicle are judged, and transitioning from the autonomous operation mode to the manual driving mode is made in a series of transitions over a given period based on the current "and future" states of the vehicle and the received indication, whereas, the latter is one in which "judging a current state of a vehicle based on at least one parameter associated with a current operation of the vehicle in the autonomous operation mode" is performed, and "transitioning" "from the autonomous operation mode to the manual driving mode is carried out in a series of transitions over a given period based on the current state of the vehicle and the received indication".

(4) Judgment

The different features will be discussed below.

Different Feature 1 is discussed.

Described Matter in Cited Document 2 is as follows.

"That, when torque sensor output of the steering mechanism exceeds a predetermined threshold value, automatic steering is suspended, and switching to manual driving is performed."

In comparison of the Amended Invention with the technology described in Cited Document 2, "threshold value" of the latter corresponds to "threshold level" of the former as viewed from its function, constitution, and technical significance, and, in a similar fashion, "torque sensor output of the steering mechanism exceeds a predetermined threshold value" corresponds to "indication for transitioning control", because, when it occurs, automatic steering is suspended and switching to manual driving is made.

In addition, regarding "when torque sensor output of the steering mechanism exceeds a predetermined threshold value" of the latter, it is an event that a torque sensor detects a change in the magnitude of steering force from a driver, and that has no relation with control in automatic driving (refer to the above (2)B(C) to (2)B(E)), and, therefore, corresponds to "detection of a change of a steering system of a vehicle that" "has no relation with the control of the vehicle in an autonomous operation mode".

Then, when the Described Matter in Cited Document 2 is organized using terms of the Amended Invention, it can be said to be the following matter.

"A technology in which an indication for transitioning control is detection of a change of a steering system of a vehicle that exceeds a threshold level, and has no relation with control of vehicle in the autonomous operation mode."

The Described Matter in Cited Document 2 is a technology related to switching from automatic driving to manual driving, and is common with that of Cited Invention. Besides, it is one that switches between automatic driving and manual driving by capturing the driver's intention accurately without switching operation (refer to the above (2)B(A)), and, therefore, special difficulties cannot be found in applying to Cited Invention the Described Matter in Cited Document 2.

Then, in the Cited Invention, it could have been conceived by person skilled in the art with ease to make it have the matters specifying the invention of the Amended Invention concerning the above Different Feature 1 based on Described Matter in Cited Document 2.

Different Feature 2 is discussed below.

Concerning "judging" "current and future states of the vehicle based on at least one parameter associated with current and future operations of the vehicle" of the Amended Invention, there are descriptions that "The computing device may be configured to use possible future movements or commands that the autonomous vehicle may execute as time progress. For example, the computing device may judge that a vehicle is about to execute turning, acceleration, braking, lane-changing, etc. Further, the computing device may judge that a vehicle is approaching a traffic signal, an obstacle, a desired destination, or other parameters, etc. The computing device may judge various parameters that define a current or future operation state of a vehicle using one or more components associated with a vehicle as described in FIG. 1. Some examples of such components may include a global positioning system (GPS), other computing devices, a laser, an image detecting device, a radar, a sensor, a gauge, or other components." in the detailed description of the invention and the drawings of the present application (refer to paragraph [0073] of the detailed description of the invention and drawings of the present application).

On the one hand, the automatic driving ECU 20 of the Cited Invention is one that performs autonomous running by driving the steering actuator 22, the brake actuator 24, and the accelerator actuator 26 based on detection signals of the course

recognition/obstacle detection sensor 10 such as a CCD camera, the vehicle speed sensor 11, the road-vehicle communication device 12 such as an infrared transceiver, and the GPS 14 (refer to paragraph [0009] of the above (2)A(B)). It can be said that the automatic driving ECU 20 that drives the steering actuator 22, the brake actuator 24, and the accelerator actuator 26 based on detection signals of the course recognition/obstacle detection sensor 10 such as a CCD camera, the vehicle speed sensor 11, an infrared transceiver such as the road-vehicle communication device 12, and the GPS 14 is one that performs, as viewed from the above descriptions of the present application, "judging a future state of a vehicle" based on "at least one parameter associated with a future operation" of the Amended Invention. In addition, it can be said that the statement of "when the vehicle is determined to be in an unstable state, inhibits switching from automatic driving to manual driving without exception even if the vehicle is running on a straight road." of Cited Document 1 (refer to paragraph [0012] of the above (2)A(B)) indicates that, as viewed from the above-mentioned descriptions of the present application, transition from an autonomous operation mode to a manual driving mode is made in a series of transitions over a given period based on a future state of a vehicle of the Amended Invention.

Furthermore, it can be said that also the statement of "transition to the manual driving mode is inhibited during execution of automatic braking to be carried out when a distance between an obstacle such as a forward vehicle and the own vehicle becomes equal to or less than a predetermined distance" of Cited Document 1 (refer to the above (2)A(E)) indicates that, as viewed from the above-mentioned descriptions of the present application, transition from an autonomous operation mode to a manual driving mode is made in a series of transitions over a given period based on a future state of a vehicle of the Amended Invention.

When these matters are put together, there is suggested in Cited Document 1 a matter of "judging" "current and future states of the vehicle based on at least one parameter associated with current and future operations of the vehicle", and "transitioning" "from the autonomous operation mode to the manual driving mode in a series of transitions over a given period based on the current and future states of the vehicle and the received indication" of the Amended Invention.

From this, in Cited Invention, it could have been conceived with ease by a person skilled in the art within the range of usual creative ability to make Cited Invention have the matters specifying the invention of the Amended Invention concerning the above Different Feature 2 based on the matter suggested in Cited Document 1.

In addition, The Amended Invention is not one, even when examined as a whole, that exerts a special effect that cannot be predicted from the Cited Invention, the matter suggested in Cited Document 1, and Described Matter in Cited Document 2.

Therefore, The Amended Invention could have been invented by a person skilled in the art with ease based on the Cited Invention, the matter suggested in Cited Document 1, and Described Matter in Cited Document 2, and, thus, the appellant should not be granted a patent for it independently at the time of patent application under the provisions of Article 29(2) of the Patent Act.

3. Closing

As mentioned above, the Amendment violates the provisions of Article 126(7) of the Patent Act which is applied *mutatis mutandis* pursuant to Article 17-2(6) of the same Act, and should be dismissed under the provisions of Article 53(1) of the same Act which is applied *mutatis mutandis* by replacing certain terms pursuant to Article 159(1) of the same Act.

Accordingly, in conclusion, the above-mentioned decision to dismiss the amendment has been made.

No. 3 Regarding the invention

1. The Invention

As the amendment made on November 21, 2017 was dismissed as above, the inventions according to Claims 1 to 18 of the present application are ones that are specified by the matters described in Claims 1 to 18 of the scope of claims amended by the amendment made on December 19, 2016, and, therefore, the invention according to Claim 1 thereof (hereinafter, referred to as "the Invention") is one that is specified by the matters described in Claim 1 thereof as described in No. 2, 1.(1).

2. Reasons for refusal stated in the examiner's decision

The reason for refusal stated in the examiner's decision is that, since the Invention could have been invented with ease by a person having usual knowledge in the technical field to which the Invention belongs before the application was filed based on the invention described in the following cited documents distributed or available to the public through electric communication lines before the priority date of the present application, the appellant should not be granted a patent for it in accordance with the

provisions of Article 29(2) of the Patent Act.

Cited Document A: Japanese Unexamined Patent Application Publication No. H9-222922 (Cited Document 1 in the appeal decision)

Cited Document B: Japanese Unexamined Patent Application Publication No. H9-240502 (Cited Document 2 in the appeal decision)

Cited Document C: Japanese Unexamined Patent Application Publication No. 2007-196809

3. Cited Documents

Cited Document 1 and Cited Document 2 cited in the reasons for refusal stated in the examiner's decision and the Cited Invention and Described Matter in Cited Document 2 are as have been described in No. 2, [Reason], 2. (2).

4. Comparison / Judgment

The Invention is an invention in which, from the Amended Invention examined in No. 2, [Reason], 1. (2), the limitation of "current and future" regarding "operation", and the limitation of "current and future" regarding "state" are eliminated.

Then, since the Amended Invention, which corresponds to an invention that includes all the matters specifying the invention of the Invention and other matters added further, could have been invented by a person skilled in the art with ease based on the Cited Invention, the matter suggested in Cited Document 1, and Described Matter in Cited Document 2 as has been described in No. 2, [Reason], 2.(3) and (4), and the Invention is, by similar reason, an invention that could have been invented by a person skilled in the art with ease based on the Cited Invention and Described Matter in Cited Document 2.

No. 4 Closing

As mentioned above, the appellant should not be granted a patent for the Invention under the provisions of Article 29(2) of the Patent Act, and, therefore, without examining the inventions according to the other claims, the present application should be rejected.

Therefore, the appeal decision shall be made as described in the conclusion.

July 31, 2018

Chief administrative judge: TOMIOKA, Kazuhito
Administrative judge: MIZUNO, Haruhiko
Administrative judge: SUZUKI, Mitsuru