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**Datasheet for the decision
of 29 November 2011**

Case Number: T 1720/08 - 3.2.01
Application Number: 04736293.4
Publication Number: 1638801
IPC: B60K 28/06, B60K 31/00
Language of the proceedings: EN

Title of invention:

Method and arrangement for controlling vehicular subsystems
based on interpreted driver activity

Applicant:

VOLVO TECHNOLOGY CORPORATION

Headword:

-

Relevant legal provisions:

EPC 1973 Art. 54(2)
RPBA Art. 13(1)

Keyword:

"Novelty - main request (no)"
"Admissibility - first to third auxiliary request (no)"
"Novelty - fourth to sixth auxiliary request (no)"

Decisions cited:

-

Catchword:

-



Case Number: T 1720/08 - 3.2.01

D E C I S I O N
of the Technical Board of Appeal 3.2.01
of 29 November 2011

Appellant:
(Applicant)

VOLVO TECHNOLOGY CORPORATION
S-405 08 Göteborg (SE)

Representative:

Fröhling, Werner Otto
Volvo Technology Corporation
Corporate Patents 06820, M1.7
S-405 08 Göteborg (SE)

Decision under appeal:

Decision of the Examining Division of the
European Patent Office posted 6 February 2008
refusing European patent application
No. 04736293.4 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman: G. Pricolo
Members: W. Marx
S. Hoffmann

Summary of Facts and Submissions

- I. On 18 March 2008 the Appellant (Applicant) lodged an appeal against the decision of the Examining Division posted 06 February 2008 concerning the refusal of the European application No. Nr. 04 736 293.4 (published under international publication No. WO 2004/108466) and paid the appeal fee. The statement setting out the grounds of appeal was received on 11 June 2008.

The Examining Division held that the main request did not meet the requirements of Article 123(2) EPC and that the subject-matter of claim 1 of the auxiliary request was not new with respect to any of the documents

D6: US 4 234 051; or

D2: WO 02/096694 A1.

- II. In response to the Board's preliminary assessment the Appellant filed a new main request and auxiliary requests 1 to 3 on 28 October 2011.
- III. Oral proceedings were held on 29 November 2011. During the oral proceedings the Appellant filed new auxiliary requests 1 to 3 and requested that the decision under appeal be set aside and that a patent be granted on the basis of the main request filed on 28 October 2011 or the auxiliary requests 1 to 3 filed during the oral proceedings or the auxiliary requests 4 to 6 filed as auxiliary requests 1 to 3 on 28 October 2011.

IV. Claim 1 according to the main request reads as follows:

"A method for controlling at least one subsystem of a vehicle dependent upon a sensed level of driver inattentiveness to vehicle driving tasks, wherein the subsystem is indented to relieve the driver from driving tasks by performing a driving task on an automated basis said method comprising:

- measuring, on a substantially real-time basis, a driver's eye movement and/or a driver's eye-gaze direction and/or a driver's eye-closure amount and/or a driver's blinking movement and/or a driver's head movement and/or a driver's head position and/or a driver's head orientation and/or driver's movable facial features and/or a driver's facial temperature image and/or a driver's grip force on a steering wheel and/or movement of a steering column which correlates to a driver's inattentiveness to vehicle driving tasks; and
- assessing the driver's present level of inattentiveness to vehicle driving tasks based at least partially on the substantially real-time measurement;
- increasing the driver's level of attentiveness by not relieving the driver from driving tasks by preventing engagement and/or disengaging performance of the at least one subsystem of the vehicle when said assessment of the driver's present level of inattentiveness exceeds a predetermined threshold level and thereby assuring that a behavior of the vehicle appropriately matches the driver's present level of inattentiveness."

Auxiliary request 1

Claim 1 of the auxiliary request 1 has been amended, compared to claim 1 of the main request, with regard to the last method step, which now reads as follows:
(for ease of comprehension, the Board has indicated additions compared to claim 1 of the main request by underlining and deletions by striking out)

"...

- ~~increasing the driver's level of attentiveness by not relieving the driver from driving tasks by~~
preventing engagement and/or disengaging
performance of the at least one subsystem of the
vehicle for avoiding that the at least one
subsystem establishes driving conditions that
become inherently more dangerous, when said
assessment of the driver's present level of
inattentiveness exceeds a predetermined threshold
level ~~and thereby assuring that a behavior of the~~
~~vehicle appropriately matches the driver's present~~
~~level of inattentiveness."~~

Auxiliary request 2

Claim 1 of the auxiliary request 2 has been amended, compared to claim 1 of the auxiliary request 1, by additionally specifying the subsystem in the first paragraph of claim 1 in more detail:
(for ease of comprehension, the Board has indicated additions compared to claim 1 of the auxiliary request 1 by underlining and deletions by striking out)

"A method for controlling at least one subsystem of a vehicle comprised in the group consisting of a cruise control system, an adaptive cruise control system and a lane keeping support system, dependent upon a sensed level of driver inattentiveness to vehicle driving tasks, ~~wherein the subsystem is intended to relieve the driver from driving tasks by performing a driving task on an automated basis~~ said method comprising: ... "

Auxiliary request 3

Claim 1 of the auxiliary request 3 has been amended, compared to claim 1 of the auxiliary request 2, by modifying the last method step in the following manner: (for ease of comprehension, the Board has indicated additions compared to claim 1 of the auxiliary request 2 by underlining and deletions by striking out)

" ...

- preventing engagement and/or disengaging performance of the at least one subsystem of the vehicle ~~for avoiding that the at least one subsystem establishes driving conditions that become inherently more dangerous~~ for preventing at least one subsystem from self-powering and/or self-steering into an obstacle, when said assessment of the driver's present level of inattentiveness exceeds a predetermined threshold level."

Auxiliary request 4

Claim 1 according to the auxiliary request 4 reads as follows:

"A method for controlling at least one subsystem of a vehicle dependent upon a sensed level of driver inattentiveness to vehicle driving tasks, wherein the subsystem is indented to benefit the driver said method comprising:

- measuring, on a substantially real-time basis, a direct physiological characteristic of the driver or a vehicle characteristic being an indirect measure for a physiological characteristic of the driver which correlates to a driver's inattentiveness to vehicle driving tasks; and
- assessing the driver's present level of inattentiveness to vehicle driving tasks based at least partially on the measured physiological characteristic;

characterized by

- preventing engagement of the at least one subsystem of the vehicle when said assessment of the driver's present level of inattentiveness exceeds a predetermined threshold level and thereby assuring that behavior of the vehicle appropriately matches the driver's present level of inattentiveness."

Auxiliary request 5

Claim 1 according to the auxiliary request 5 reads as follows:

"A method for controlling at least one subsystem of a vehicle dependent upon a sensed level of driver inattentiveness to vehicle driving tasks, wherein the

subsystem is indented to benefit the driver said method comprising:

- measuring, on a substantially real-time basis, a driver's eye movement and/or a driver's eye-gaze direction and/or a driver's eye-closure amount and/or a driver's blinking movement and/or a driver's head movement and/or a driver's head position and/or a driver's head orientation and/or driver's movable facial features and/or a driver's facial temperature image and/or a driver's grip force on a steering wheel and/or movement of a steering column which correlates to a driver's inattentiveness to vehicle driving tasks; and
- assessing the driver's present level of inattentiveness to vehicle driving tasks based at least partially on the substantially real-time measurement;
- preventing engagement of the at least one subsystem of the vehicle when said assessment of the driver's present level of inattentiveness exceeds a predetermined threshold level and thereby assuring that a behavior of the vehicle appropriately matches the driver's present level of inattentiveness."

Auxiliary request 6

Claim 1 according to the auxiliary request 6 has been restricted to the first alternative of the main request so that the last method step of claim 1 now reads as follows: (for ease of comprehension, the Board has indicated deletions compared to claim 1 of the main request by striking out)

"...

- increasing the driver's level of attentiveness by not relieving the driver from driving tasks by preventing engagement ~~and/or disengaging performance~~ of the at least one subsystem of the vehicle when said assessment of the driver's present level of inattentiveness exceeds a predetermined threshold level and thereby assuring that a behavior of the vehicle appropriately matches the driver's present level of inattentiveness."

V. The Appellant's arguments may be summarised as follows:

Claim 1 according to the main request included two alternatives. According to a first alternative, the performance of at least one system was disengaged when the assessment of the driver's present level of inattentiveness exceeded a predetermined threshold level. Under these same conditions, according to a second alternative, at least one subsystem of the vehicle was prevented from engaging.

As regards the first alternative, in contrast to what was disclosed in the prior art, the invention aimed at cancelling a comfort function for performing a driving task on an automated basis, thereby giving control over the vehicle back to the driver, in order to force the latter to take over control again and pay attention to driving tasks. This was expressed in claim 1 of the main request by the feature "increasing the driver's level of attentiveness by not relieving the driver from driving tasks by preventing engagement and/or

disengaging performance of the at least one subsystem of the vehicle".

By contrast, D2 showed a system using driver assistance systems in order to bring the vehicle to a safe state, i.e. instead of giving the control back to the driver, the vehicle (or system) took over control by automatically driving the vehicle e.g. to the kerbside and then stopping the engine. Using the cruise control for slowing the vehicle was not the same as disengaging performance of the cruise control. In the first case the cruise control was still active and therefore not deactivated, i.e. not disengaged. In addition, contrary to what was argued by the Examining Division, the possibility of switching off the engine as disclosed in D2 was not a disclosure of the feature that the subsystem's performance was disengaged during driving. In fact, the wording of the claim clearly required the method steps to be carried out during driving, i.e. during operation of the vehicle.

As regards the second alternative, the idea of the invention expressed by "preventing engagement" was that a comfort function such as that provided by the cruise control was not available for the driver in case of driver inattentiveness (e.g. drowsiness). This idea based on the recognition that comfort functions that tended to relieve the driver from driving tasks facilitated relaxation thereby fostering inattentiveness and excessive drowsiness. By not making available the comfort function, the driver was forced to increase the level of attentiveness.

However, D2 did not show that a comfort function was inhibited in case of driver inattentiveness. Even considering that D2 disclosed that ignition was switched off when it was detected that the driver was no longer fit to drive, D2 could still not take away novelty of the latter alternative. As a matter of fact, the step of "preventing engagement" could not be effected when ignition was switched off, since according to the wording of the claim it had to be carried out when the vehicle was still running.

Auxiliary requests 1 to 3 were filed during the oral proceedings by the Appellant in an attempt to obtain adequate protection for its invention. In particular, the amendments provided with auxiliary requests 1 to 3 were aimed at clarifying the dangerous driving situation which should be avoided, i.e. a driving situation with the subsystem running the vehicle and the driver not controlling the vehicle. Besides, the representative justified the late filing of auxiliary requests by not having been able to reach the Applicant until one week before oral proceedings took place.

Finally, auxiliary requests 4 to 6 were restricted to the alternative of preventing engagement of at least one subsystem of the vehicle when detecting driver inattentiveness, which was inventive for the above-mentioned reasons.

Reasons for the Decision

1. The appeal is admissible.

2. *Main request*

The subject-matter of claim 1 of the main request is not new in view of D2 (Article 54(1) and (2) EPC 1973).

2.1 D2 discloses a method for controlling at least one subsystem of a vehicle (see method claim 1; or page 7, lines 2-26: "*wird Einfluss genommen auf die Fahrerassistenzsysteme 15, um z. B. mittels ACC die Geschwindigkeit ... zu beeinflussen*") dependent upon a sensed level of driver inattentiveness to vehicle driving tasks (page 7, lines 17-22: "*entsprechend der Vorgabe des Fahrerzustandsmonitors 1*"), wherein the subsystem is indented to relieve the driver from driving tasks by performing a driving task on an automated basis (implicit for ACC defined as "Adaptive Cruise Control" on page 6, lines 11-13) said method comprising:

- measuring, on a substantially real-time basis, a driver's eye movement and/or a driver's eye-gaze direction and/or a driver's eye-closure amount and/or a driver's blinking movement and/or a driver's head movement and/or a driver's head position and/or a driver's head orientation and/or driver's movable facial features and/or a driver's facial temperature image and/or a driver's grip force on a steering wheel and/or movement of a steering column which correlates to a driver's inattentiveness to vehicle driving tasks (see page 8, lines 4-13 and page 10, lines 4-16: "*Mit einem optischen Sensor 23 ... können die Gesichtsbewegungen ... und insbesondere der Augenlidschluss bzw. die Frequenz, mit welcher die Augenlider des Fahrers geschlossen werden, ... Ein*

weiterer Schlüsselparameter kann die Griffkraft sein"); and

- assessing the driver's present level of inattentiveness to vehicle driving tasks based at least partially on the substantially real-time measurement (page 11, lines 22-26: "*Der Zustand des Fahrers ... insbesondere hinsichtlich Belastung, Müdigkeit ... wird durch die Messung der physiologischen Schlüsselparameter und deren Auswertung ermittelt.*");
- increasing the driver's level of attentiveness by not relieving the driver from driving tasks (result of the measures defined in the following) by preventing engagement and/or disengaging performance of the at least one subsystem of the vehicle (page 7, lines 8-11 or lines 22-24; also page 5, lines 4-9: braking the vehicle via the ACC, i.e. overriding the normal functionality of the ACC - which provides speed control based on the traffic conditions, see page 6, lines 11-13 - dependent on the driver's level of inattentiveness, which means disengaging performance of the ACC) when said assessment of the driver's present level of inattentiveness exceeds a predetermined threshold level (page 8, lines 14-16: "*Vergleich der erfassten Daten mit entsprechenden gespeicherten Daten*"; also page 10, lines 13-31; or page 7, lines 22-25: "*bei vom Fahrerzustandsmonitor festgestelltem Ausfall oder Fastausfall des Fahrers*" implicitly means that a threshold level is exceeded) and thereby assuring that a behavior of the vehicle appropriately matches the driver's present level of inattentiveness (page 7, lines 23-26: "*bei vom*

Fahrerzustandsmonitor festgestelltem Ausfall oder Fastausfall des Fahrers das Fahrzeug abgebremst ... und der Motor abgestellt werden. Dadurch wird das Fahrzeug in einen sicheren Zustand gebracht.").

Therefore, as identified with regard to the second alternative claimed ("disengaging performance of the at least one subsystem"), D2 discloses all the features according to claim 1 of the main request.

2.2 Contrary to the Appellant's assertion, and supported by passages in the description of the present application itself (see in particular para. 32 or 61), the feature "disengaging performance" does not necessarily mean "giving back control over the vehicle to the driver" so that the driver is forced to take over control of the vehicle. On the contrary, as mentioned e.g. in para. 32 of the present application, which reads

- "In one aspect of the present invention, the information about the degree of driver distraction or drowsiness is used to control certain aspects of the vehicle including **subsystems operating, or operable thereupon. ... a vehicle's cruise control may be governed to disengage, or slow the vehicle**",

it is clear that either an operating cruise control is deactivated or - no matter whether the subsystem has been activated or not - is controlled to slow the vehicle in case of an inattentive driver. The latter corresponds exactly to what is disclosed in D2 (page 5, lines 4-8: "*adaptive Geschwindigkeitskontrolle ... um das Fahrzeug abzubremsen*"; page 7, lines 22-24: "*bei vom Fahrerzustandsmonitor festgestelltem Ausfall oder Fastausfall des Fahrers das Fahrzeug abgebremst*").

Moreover, according to D2 (page 7, lines 8-11: "*mittels ACC die Geschwindigkeit ... beeinflussen*") as well as according to the present application (para. 32: "subsystems ... operable thereupon"), the subsystem normally providing a comfort function - or to be more precise: the means making up said subsystem, e.g. controllers and actuators - is used to slow down the vehicle when a predetermined level of inattentiveness is exceeded. Thereby, the comfort function normally provided in D2 is overridden or cancelled, i.e. performance of said subsystem is disengaged as claimed. Moreover, it is noted that claim 1 as it stands does not require that disengaging the subsystem's performance requires that the engine is running or the vehicle is being driven. Therefore, even switching off the engine or ignition as disclosed in D2 corresponds to the feature "disengaging performance" as claimed.

When the vehicle slows down, the driver (unless being completely asleep) will experience an unexpected deceleration or at least will notice after some time that the speed of the vehicle is unexpectedly low. As a result the "driver's level of attentiveness" is increased as claimed. Therefore, by overriding/cancelling the comfort function provided by an ACC subsystem, the method known from D2 necessarily results in a modification of the driving conditions which effect is directly noticeable by a driver (at least one in normal conditions), thereby increasing its level of attentiveness. Accordingly, even if the objective of increasing the level of attentiveness of the driver is not explicitly disclosed in D2, this document discloses all the method steps which, as in the present application, have as a direct result the

achievement of said objective. From the above it follows that the driver's level of attentiveness is increased "by not relieving the driver from driving tasks", because once the comfort function is overridden/cancelled, it is up to the driver to decide on how to carry on the corresponding driving task, i.e. in the end, the driver is forced to take back full control of the vehicle.

3. *Auxiliary requests 1 to 3*

Article 13(1) RPBA (Rules of Procedure of the Boards of Appeal, OJ EPO 2007, 536) states that "Any amendment to a party's case after it has filed its grounds of appeal or reply may be admitted and considered at the Board's discretion. The discretion shall be exercised in view of inter alia the complexity of the new subject matter submitted, the current state of the proceedings and the need for procedural economy."

The present auxiliary requests 1 to 3 were filed only during the oral proceedings, although a set of three auxiliary requests had been filed already in response to the annex to the summons for oral proceedings.

The explanation given by the representative, that the representative had only been able to reach the Applicant one week before the oral proceedings took place and changed his mind with regard to the protection sought, does not justify the filing of the auxiliary requests 1 to 3 at such a very late stage of the proceedings.

Moreover, as compared to claim 1 according to the main request, in claim 1 according to auxiliary requests 1 and 2 the wording "for avoiding that the at least one subsystem establishes driving conditions that become inherently more dangerous" is added and in claim 1 according to auxiliary request 3 the wording "for preventing at least one subsystem from self-powering and/or self-steering into an obstacle" is added. It is not clear what further limitations these additions would provide over D2, as they merely define some generic desiderata. Besides, as to claim 1 according to auxiliary request 3, it appears that new problems arise with regard to Article 123(2) EPC since the feature added is taken from the description (para. [34] of the published application) where it is disclosed in the specific context of preventing the subsystem from being driver engaged which is not fully reflected in claim 1.

Hence, given the advanced state of the proceedings and the fact that the amendments did not provide any further clear limitations of the claimed subject-matter or even raised new questions which could not be resolved without a further, detailed examination, the Board decided not to admit the auxiliary requests 1 to 3 into the appeal proceedings.

4. *Auxiliary request 4*

The subject-matter of claim 1 of auxiliary request 4 is not new in view of D2 (Article 54(1) and (2) EPC 1973).

- 4.1 As compared to claim 1 according to the main request, claim 1 according to auxiliary request 4 is restricted to the first alternative of "preventing engagement of

the at least one subsystem" whilst it leaves out the feature "increasing the driver's level of attentiveness by not relieving the driver from driving tasks".

Braking the vehicle and switching off ignition in case of an extremely inattentive driver, as described in D2 (page 5, lines 9-12; page 7, lines 8-26: "*Zündung abschalten*" or "*Motor abgestellt werden*"), results in comfort systems not being able any more to control the vehicle so that e.g. the cruise control in D2 ("ACC") is prevented from accelerating the vehicle to a set speed again. As a result, even if the driver's level of inattentiveness falls below the predetermined threshold level later on again (e.g. if the driver wakes up again), cruise control in D2 is prevented from engaging. Therefore, contrary to the assertion of the Appellant, D2 discloses that a comfort function is inhibited and not available for a driver when the driver's level of inattentiveness was exceeded previously.

The Appellant argued that the idea of not making available the comfort function to the driver means either that when activated such function should be cancelled, as already discussed above in para. 2.2, or when deactivated such function should be prevented from being driver-activated. However, when switching off ignition as described in D2, any comfort function is at the same time cancelled and prevented from being driver-activated again.

The Appellant further argued that D2 could not take away novelty because the claimed method would only make sense when the vehicle was running. However, the

introductory part of claim 1 ("method for controlling at least one subsystem") is rather vague and not restricted to embodiments where - as argued by the Appellant - the vehicle is running and ignition has to be switched on; such interpretation would imply that "preventing engagement" can only be realized by means of software running in a control unit and inhibiting the comfort function to be operated. However, the method according to claim 1 of the main request also includes embodiments where the subsystem is controlled by hardware means to prevent engagement of a comfort function, e.g. by switching off ignition as known from D2. Hence, it is not due to an ex post facto analysis but due to the broad definition given in claim 1 that D2 also takes away novelty of the first alternative claimed.

4.2 Moreover, the definition of the subsystem as given in claim 1 of the main request ("wherein the subsystem is indented to relieve ...") has been replaced by "wherein the subsystem is indented to benefit the driver". However, the adaptive cruise control system disclosed in D2 again falls under said rather broad definition, since a cruise control as disclosed by D2 is definitely intended to benefit a driver.

4.3 Furthermore, the method step of "measuring ..." according to claim 1 of auxiliary request 4 has been formulated in such a broad manner - "measuring, on a substantially real-time basis, a direct physiological characteristic of the driver or a vehicle characteristic ..." - compared to the main request that said step encompasses the specific measuring options defined in D2, showing that

physiological characteristics such as the driver's blinking movement are measured (see point 2.1 above).

From this it follows that the amendment to the assessing step, which now refers to the "measured physiological characteristic", also cannot serve to distinguish the claimed subject-matter from the method known from D2.

4.4 Hence, the subject-matter of claim 1 of the auxiliary request 4 does not contain any feature which could establish novelty over D2.

5. *Auxiliary request 5*

Claim 1 of auxiliary request 5, compared to claim 1 of auxiliary request 4, reintroduces the measuring and assessing steps as already defined in claim 1 of the main request.

Hence, as already argued above, there is no feature in claim 1 of the auxiliary request 5 that could confer novelty over document D2 (Article 54(1) and (2) EPC 1973).

6. *Auxiliary request 6*

Since the subject-matter of claim 1 of the auxiliary request 6 is identical to the subject-matter of claim 1 of the main request except for the restriction to the first alternative claimed in the final method step ("preventing engagement"), it is referred to the argumentation presented above in para. 2.1 and in

particular in para. 4.1 with regard to the claimed embodiment.

The Appellant further argued that D2 could not take away novelty because the claimed method would only make sense when the vehicle was running, inherently expressed in claim 1 e.g. by the feature that "the subsystem is indented to relieve the driver from driving tasks by performing a driving task on an automated basis". However, the passage cited only defines the subsystem in more detail, restricting it to subsystems which perform a driving task on an automated basis. It cannot be accepted that said passage provides a limitation with regard to the method steps, in particular it cannot be accepted that said passage inherently means that each method step listed in claim 1 requires a running vehicle with ignition switched on.

Consequently, the subject-matter of claim 1 of auxiliary request 6 is not new in view of D2 (Article 54(1) and (2) EPC 1973).

7. In summary, the Board finds that none of the appellant's requests are allowable and that, therefore, the present appeal has to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

A. Vottner

G. Pricolo