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Datasheet for the decision of 19 January 2016

Case Number: T 2385/11 - 3.5.02

Application Number: 09151294.7

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Language of the proceedings: EN

Title of invention:
Method and system for forward collision avoidance in an automotive vehicle

Applicant:
Volvo Car Corporation

Relevant legal provisions:
EPC Art. 111(1)

Keyword:
Appeal decision -
remittal to the department of first instance (yes)

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Case Number: T 2385/11 - 3.5.02

D E C I S I O N
of Technical Board of Appeal 3.5.02
of 19 January 2016

Appellant: (Applicant)	Volvo Car Corporation 405 31 Göteborg (SE)
Representative:	Valea AB Teknikringen 10 583 30 Linköping (SE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 27 June 2011 refusing European patent application No. 09151294.7 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	R. Lord
Members:	M. Léouffre
	R. Cramer

Summary of Facts and Submissions

I. On 24 August 2011 the applicant appealed against the decision of the Examining Division, posted on 27 June 2011, to refuse the European patent application No. 09 151 294.7. The statement setting out the grounds of appeal was received on 2 November 2011.

II. The Examining Division held that the subject-matter of the claims then on file did not meet the requirements of Articles 52(1) and 54 EPC, having regard to the following documents:

D1 : EP 2 001 003 A1;
D2 : US 2006/0 282 218 A1; and
D3 : DE 10 2007 015 032 A1.

III. In a communication accompanying a summons to oral proceedings dated 2 October 2015 the appellant was informed that the Board tended to share the opinion of the examining division. With respect to the auxiliary request filed with the grounds of appeal which claimed an automotive vehicle forward collision avoidance system for preventing collisions with pedestrians and a corresponding method, the Board cited the following documents

D4 : DE 100 41 714 A1;
D5 : JP 2008 186 170 A;
D6 : JP 2004 268 829 A; and
D7 : JP 2003 346 297 A.

IV. With a letter dated 18 December 2015 the appellant filed a new "main" request replacing both requests previously on file.

V. Oral proceedings before the Board were held on 19 January 2016.

During the course of the oral proceedings, the Board indicated its opinion that the system of claim 1 of the request filed with the letter dated 18 December 2015 differed from that of D3, as discussed in the communication accompanying the summons, only in that the target object was specified to be a pedestrian and that the risk zone was defined as an area representing the predicted coverage of the host vehicle based on the host vehicle width and an extra width on each side of the host vehicle.

The Board also indicated its conclusion that the subject-matter of this claim lacked an inventive step (Article 56 EPC) having regard to D3, because a person skilled in the art would have applied the teaching of D3 to a pedestrian without exercising any inventive skill. The Board noted that D3 considered different vehicles like cars, lorries or motorbikes as target objects (see D3, sections [0019] and [0033]), that a pedestrian was only a further example of a possible target object, and that the collision avoidance system of D3 would not operate differently when the value of the width of the car was modified and increased with an extra width.

At the end of the oral proceedings, the appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of claims 1 to 3 and 5 to 8 of the main request filed during the oral proceedings.

VI. Claim 1 of the appellant's sole request reads as follows:

"An automotive vehicle forward collision avoidance system (1), characterized in that it comprises:

means for establishing the presence of a pedestrian (10) in front of a vehicle (2) hosting said system (1);
means for estimating the position, velocity and acceleration of the pedestrian (10);
means for establishing a risk zone in front of the host vehicle (2) arranged to establish the risk zone as an area representing the predicted coverage of the host vehicle (2) based on the host vehicle (2) width (w) and an extra width (d) on each side of the host vehicle (2) along a predicted path of the host vehicle (2);
and the host vehicle (2) is equipped with a lane marker sensor for detection of lane markers and that either the area between the detected left hand side and right hand side lane markers (11) is used to define the risk zone or, in the case that only lane markers (11) at one side of the host vehicle (2) are detected, these detected lane markers (11) at one side of the host vehicle 2 are used for defining that side of the risk zone whilst the host vehicle (2) width (w) and an additional width (d) are used for defining the other side of the risk zone;
means for predicting the future path of the pedestrian (10) and the host vehicle (2) in order to predict the lateral position (y) of the pedestrian (10) at a moment when the host vehicle (2) reaches the pedestrian in a longitudinal direction (x);
means for executing a collision avoidance task arranged such that:
- if the pedestrian (10), based on the pedestrian's (10) current position, velocity and acceleration, is predicted as being able to stop before entering the risk zone through applying a certain predetermined maximum acceleration for pedestrians in a direction opposite to the pedestrian's (10) velocity, the pedestrian (10) is predicted to stop at a position just before entering the risk zone and no collision avoidance task is executed; and;

- if the pedestrian (10), based on the pedestrian's (10) current position, velocity and acceleration, is predicted as not being able to stop before entering the risk zone, then the future position of the pedestrian (10) is predicted using the assumption that the pedestrian (10) will continue to move according to an observation based motion model and a collision avoidance task is executed."

Claims 2, 3, 5 and 6 are dependent on claim 1.

Claim 7 reads as follows:
"A method in an automotive vehicle forward collision avoidance system, characterized in that it comprises the steps of:
establishing the presence of a pedestrian (10) in front of a vehicle (2) hosting said system;
estimating the position, velocity and acceleration of the pedestrian (10);
establishing a risk zone in front of the host vehicle (2) as an area representing the predicted coverage of the host vehicle (2) based on the host vehicle (2) width (w) and an extra width (d) on each side of the host vehicle (2) along a predicted path of the host vehicle (2);
and detection of lane markers and using either the area between the detected left hand side and right hand side lane markers (11) to define the risk zone or, in the case that only lane markers (11) at one side of the host vehicle (2) are detected, use these detected lane markers (11) at one side of the host vehicle 2 for defining that side of the risk zone whilst the host vehicle (2) width (w) and an additional width (d) are used for defining the the other side of the risk zone;
predicting the future path of the pedestrian (10) and the host vehicle (2) in order to find the pedestrian's

(10) lateral position at a moment when the host vehicle (2) reaches the pedestrian (10) in a longitudinal direction;
executing a collision avoidance task such that:
- if the pedestrian (10), based on its current position, velocity and acceleration, is predicted as being able to stop before entering the risk zone through applying a certain predetermined maximum acceleration for pedestrians in a direction opposite to its velocity, the pedestrian (10) is predicted to stop at a position just before entering the risk zone and no collision avoidance task is executed;
- if the pedestrian (10), based on its current position, velocity and acceleration, is predicted as not being able to stop before entering the risk zone, then the future position of the pedestrian (10) is predicted using the assumption that the pedestrian (10) will continue to move according to an observation based motion model and a collision avoidance task is executed."

Claim 8 is dependent on claim 7.

VII. The appellant essentially argued as follows:

The system and method for avoiding collision with pedestrians according to the present invention were based on a model which assumed that pedestrians were aware of the danger of crossing a road when a vehicle was approaching. The usual assumption that a crossing object would not change its motion characteristics when a vehicle was approaching led to an excessive number of false alarms and consequent collision avoidance manoeuvres when the objects are pedestrians. In most cases a pedestrian is aware of the danger and would stop before entering a risk zone defined in front of an

incoming vehicle. Taking account of the special behaviour of pedestrians, the vehicle system of the present invention executed a collision avoidance task only when the pedestrian was predicted as not being able to stop before entering a risk zone established in front of the approaching vehicle. A pedestrian was more vulnerable and required more attention than other objects. The risk zone was therefore enlarged by an extra width which was partly defined by lane markers. The thus defined extra margin contributed to enhancing the safety of pedestrians and led to fewer false alarms and collision avoidance manoeuvres. None of the documents D1 to D3 disclosed a collision avoidance system for pedestrians and none of the cited documents aims at predicting the ability of a pedestrian to stop before entering a risk zone. The subject-matter of claims 1 and 7 was therefore novel and involved an inventive step.

Reasons for the Decision

1. The appeal is admissible.

2. The appellant's sole request was filed during the oral proceedings before the Board, in reaction to the objection of the Board to the request previously on file.

2.1 The request was submitted after oral proceedings had been arranged. Its admission into the appeal proceedings is thus subject to the provisions of Article 13(3) RPBA. On the one hand, such a request should not be admitted if it raises issues which the board could not reasonably be expected to deal with without adjournment of the oral proceedings. On the other hand, it is established case

law that an amendment at a late stage is justifiable if it is an appropriate reaction to unforeseeable developments in the proceedings - for example, if it addresses comments or objections first raised in the proceedings - whereby the criterion of clear allowability should also be taken into account (Case Law of the Boards of Appeal of the EPO, 7th edition 2013, IV.E.4.2.1 and 4.2.3).

2.2 Compared to the features of claim 1 as originally filed and constituting the basis of the contested decision, the newly filed claim 1 comprises the following further features:
- the object is a pedestrian,
- the means for establishing a risk zone in front of the host vehicle is arranged to establish the risk zone as an area representing the predicted coverage of the host vehicle based on the host vehicle width and an extra width on each side of the host vehicle along a predicted path of the host vehicle,
- the host vehicle is equipped with a lane marker sensor for detection of lane markers, and
- either the area between the detected left hand side and right hand side lane markers is used to define the risk zone or, in the case that only lane markers at one side of the host vehicle are detected these are used for defining that side of the risk zone whilst the host vehicle width and an additional width are used for defining the other side of the risk zone.

Method claim 7 has been amended accordingly.

2.3 The features recited above are the features of the original claims 3, 5 and 6 with the further addition that the target object has been defined to be a pedestrian. This limitation to pedestrians satisfies the

requirement following from Article 123(2) EPC since section [0020] of the published application recites: "The present invention especially relates to prediction of future paths of pedestrians 10". Indeed the term "pedestrian" occurs 24 times in the published description.
The amendments to the newly filed claim 1 were therefore prima facie clearly allowable under Article 123(2) and 84 EPC, such that the Board was of the preliminary opinion that the new main and single request should be admitted into the proceedings.

3. The Examining Division did not express any opinion on the subject-matter of original claim 6 and commented under item 3.2 of the official communication dated 12 May 2009, which was the only communication issued by the examining division, that the features of claims 3 to 5 related to minor design details and were rendered obvious by the cited prior art. The patentability of these features was neither assessed in combination with a system for pedestrians nor in combination with the features of original claim 6. The Board notes also that the available prior art cited by the department of first instance did not reveal any collision avoidance system in relation to pedestrians, despite the fact that the original description unambiguously mentioned pedestrians as a major target object and that, at the date of filing, collision avoidance systems for pedestrians did exist (see for example D4 to D7 cited by the Board). Thus the numerous features added to claims 1 and 7 constitute substantial amendments which might require an additional search or a search in an additional class and a substantial further examination in relation to both the formal and the substantive requirements of the EPC.

4. For these reasons the Board expressed the preliminary opinion that the new request should be admitted into the proceedings and, exercising its discretion under Article 111(1) EPC, considered it appropriate to remit the case to the department of first instance, with the order to examine and decide whether the further amendments to the claims, filed during the oral proceedings before the Board, are allowable (see also Case Law of the Boards of Appeal of the European Patent Office, 7th edition 2013, Chapter IV.E.7.3. page 1023).

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance for further prosecution.

The Registrar: The Chairman:

U. Bultmann R. Lord

Decision electronically authenticated