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**Datasheet for the decision  
of 9 January 2020**

**Case Number:** T 1879/17 - 3.4.02

**Application Number:** 05851654.3

**Publication Number:** 1817689

**IPC:** G01C23/00, B60R1/00

**Language of the proceedings:** EN

**Title of invention:**

IMPROVED IMAGE ACQUISITION AND PROCESSING SYSTEMS FOR VEHICLE  
EQUIPMENT CONTROL

**Patent Proprietor:**

Gentex Corporation

**Opponents:**

Knorr-Bremse  
Systeme für Nutzfahrzeuge GmbH  
Valeo Schalter und Sensoren GmbH

**Headword:**

**Relevant legal provisions:**

EPC Art. 123(2), 113(1)  
EPC 1973 Art. 84, 111(1)  
RPBA Art. 12(4), 13(1)  
RPBA 2020 Art. 11, 25(2), 25(3)

**Keyword:**

Amendments - added subject-matter (yes) - main request  
Claims - clarity (no) - first auxiliary request  
Right to be heard - substantial procedural violation (yes)  
Remittal to the department of first instance - (yes)

**Decisions cited:**

**Catchword:**



**Beschwerdekammern**

**Boards of Appeal**

**Chambres de recours**

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Case Number: T 1879/17 - 3.4.02

**D E C I S I O N**  
**of Technical Board of Appeal 3.4.02**  
**of 9 January 2020**

**Appellant:**  
(Patent Proprietor)

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**Decision under appeal:**

**Decision of the Opposition Division of the  
European Patent Office posted on 23 June 2017  
revoking European patent No. 1817689 pursuant to  
Article 101(3) (b) EPC.**

**Composition of the Board:**

<b>Chairman</b>	R. Bekkering
<b>Members:</b>	A. Hornung
	G. Decker

## **Summary of Facts and Submissions**

I. The patentee appealed against the decision of the opposition division revoking European patent No. 1 817 689.

II. A first opposition had been filed by opponent 1 (Knorr-Bremse Systeme für Nutzfahrzeuge GmbH) against the patent as a whole and based on the grounds of Article 100(a), together with Articles 54(1) and 56 EPC, and of Article 100(c), together with Article 123(2) EPC.

A second opposition had been filed by opponent 2 (Valeo Schalter und Sensoren GmbH) against the patent as a whole and based on the grounds of Article 100(a), together with Articles 54(1) and 56 EPC, Article 100(b) and Article 100(c), together with Article 123(2) EPC.

III. The opposition division held that the grounds for opposition mentioned in Article 100(c) EPC, together with Article 123(2) EPC, prejudiced maintenance of the patent as granted, as well as maintenance of the patent as amended according to auxiliary requests 1 to 25 then on file. Moreover, the opposition division did not admit into the proceedings the patentee's auxiliary requests 26 to 32, filed during the oral proceedings, for being late filed.

IV. Oral proceedings before the board were held on 9 January 2020.

V. The patentee (appellant) requested as a main request that the decision under appeal be set aside and that the patent be maintained as granted. As first and second auxiliary requests, it requested that the decision under appeal be set aside and that the patent be maintained on the basis of the claims of the first auxiliary request, filed as "3<sup>rd</sup> auxiliary request" with the statement of grounds of appeal,

or the second auxiliary request filed at the oral proceedings on 9 January 2020.

VI. Opponents 1 and 2 (respondents 1 and 2) requested that the appeal be dismissed.

VII. Independent claim 1 according to the main request reads as follows:

"An apparatus (115) having at least one image sensor (396, 397); and at least one processor (601) configured to receive at least a portion of at least one image from said at least one image sensor (396, 397), wherein an aim of said at least one image sensor is a function of said at least one image; said processor is further configured to generate at least one vehicle equipment control signal as a function of at least one feature extracted from at least a portion of at least one image;  
wherein the apparatus is characterized by being configured to detect at least one lane marker for establishing a position of a center of a road in an image."

- Independent claim 1 according to the first auxiliary request reads as follows:

"An apparatus (115) having at least one image sensor (396, 397); and at least one processor (601) configured to receive at least a portion of at least one image from said at least one image sensor (396, 397), wherein an aim of said at least one image sensor is a function of said at least one image; said processor is further configured to generate at least one vehicle equipment control signal as a function of at least one feature extracted from at least a portion of at least one image;  
wherein the apparatus is characterized by being configured to detect two lane markers for establishing a position of a

center of a road in an image, wherein linear regression is performed to determine lines fitting the two lane markers if a sufficient number of pixels are found for right or left lanes;

wherein the apparatus is further configured, if only one of said two lines is found in the image, to detect one lane marker for establishing a position of a center of a road in an image, wherein linear regression is performed to determine said one line fitting said one lane marker, and to approximate a second line on the basis of a relationship existing between the slopes of the right and left lane experimentally determined using examples of data collected when two lanes are present; and

wherein the center of the road is computed as the intersection of the two lines."

- Independent claim 1 according to the second auxiliary request reads as follows (added or deleted features with respect to claim 1 of the first auxiliary request are highlighted or struckthrough, respectively):

"An apparatus (115) having at least one image sensor (396, 397); and at least one processor (601) configured to receive at least a portion of at least one image from said at least one image sensor (396, 397), wherein an **image calibration** of said at least one image sensor is **established as** a function of said at least one image; said processor is further configured to generate at least one vehicle equipment control signal as a function of at least one feature extracted from at least a portion of at least one image;

wherein the apparatus is ~~characterized by being~~ configured to detect two lane markers for establishing a position of a center of a road in an image, wherein linear regression is performed to determine lines fitting the two lane markers if a sufficient number of pixels are found for right or left

lanes;

~~wherein the apparatus is further configured, if only one of said two lines is found in the image, to detect one lane marker for establishing a position of a center of a road in an image, wherein linear regression is performed to determine said one line fitting said one lane marker, and to approximate a second line on the basis of a relationship existing between the slopes of the right and left lane experimentally determined using examples of data collected when two lanes are present; and~~

wherein the center of the road is computed as the intersection of the two lines,

**wherein the apparatus is further configured to determine the position of identified bright peaks in the image relative to the position of the center of the road;**

**wherein a position of an identified object relative to the road center can be used for a classification of the object; and**

**wherein the motion of detected objects is considered to determine the center of the image."**

## **Reasons for the Decision**

### 1. Main request - amendments

Claim 1 contains subject-matter which extends beyond the content of the application as filed, contrary to the requirement of Articles 100(c) EPC 1973 and 123(2) EPC.

#### 1.1 Claim 1 as granted has been amended with respect to claim 1 as originally filed by adding the feature "wherein the apparatus is characterized by being configured to detect at least one lane marker for establishing a position of a center of a road in an image".



1.2 As submitted by opponent 1, according to the amended feature, the detection of at least one lane marker is logically connected to the establishing of the position of the center of a road in an image.

1.3 The board acknowledges, as submitted by the patentee, that, on the one hand, claim 2 as originally filed discloses an apparatus "configured to detect at least one lane marker" and that, on the other hand, paragraph [0032] of the description as originally filed discloses that "the present invention is able to (...) establish the position of the center of the road in the image".

However, there is no basis in the application as originally filed for the logic connection between the detection of at least one lane marker and the establishing of the position of the center of a road in an image in general, contrary to the requirement of Articles 100(c) EPC 1973 and 123(2) EPC.

1.4 The board further acknowledges that a specific type of logic connection between the detection of lane markers and the computation of the center of the road is disclosed in paragraph [0036] of the description as originally filed: if both left and right lanes are identified, the center of the road is computed as the intersection of two lines. In case that only one lane marker is detected, the second line is approximated by using the knowledge of the relationship between the slopes of the right and left lane.

However, the amended feature of claim 1 is not so limited as the specific disclosure in paragraph [0036], since it defines the detection of *at least one* lane marker in broad terms and it does not specify the computation of the center of the road as the *intersection of two lines*. There is no basis in the application as originally filed for extracting

isolated features from the set of features disclosed in combination in [0036]. Therefore, the amended feature of claim 1 represents an inadmissible intermediate generalisation of the disclosure of paragraph [0036], contrary to the requirement of Articles 100(c) EPC 1973 and 123(2) EPC.

- 1.5 The patentee argued that paragraph [0032] disclosed that the invention in general was able to establish the position of the center of the road in the image - without any reference to the number of lanes necessary for the determination. This goal of the invention was generally valid, in particular, for an apparatus as defined in claim 2 as originally filed and being configured to detect at least one lane marker.

The board is not convinced by this argument because paragraph [0032] remains silent about the circumstances under which the general goal of the invention can be obtained. In particular, it cannot unambiguously be deduced from paragraph [0032] that the detection of *at least one* lane marker, as claimed, is sufficient for establishing the road center. The concrete circumstances and conditions for achieving the goal of the invention are described, for instance, in paragraph [0036] teaching that further features are necessary for achieving the goal of the invention. Similarly, while claim 2 defines in general terms an apparatus configured to detect at least one lane marker, it cannot unambiguously be deduced therefrom that this apparatus allows for establishing the center of a road.

- 1.6 The patentee referred to paragraph [0036], lines 8 and 9 of the paragraph, arguing that even in the description of this specific embodiment of the invention there was a general statement that the center of a road could be established from a single lane, thereby providing a basis for the amended feature.

The board cannot accept the patentee's argument since the quoted sentence is not a generally valid statement but taken out of the specific context of the embodiment described in paragraph [0036].

1.7 It follows that claim 1 of the main request comprises added subject-matter contrary to the requirement of Articles 100(c) EPC 1973 and 123(2) EPC.

2. First auxiliary request

2.1 Admissibility

The first auxiliary request is admitted into the proceedings (Article 12(4) RPBA 2007, Article 25(2) RPBA 2020).

2.1.1 The present first auxiliary request has been filed as third auxiliary request with the statement of grounds of appeal. According to Article 12(4) RPBA 2007, everything presented by the parties with their statement of grounds of appeal is to be taken into account by the board, except for requests which could have been presented or were not admitted in the first-instance proceedings.

According to the minutes of the first-instance oral proceedings, page 21, and to the appealed decision, page 10, the "opposition division will not allow the proprietor to file an amended auxiliary request" and "decided not to admit any further requests" without taking prior note of the actual content of these further requests. Due to this course of action during oral proceedings before the opposition division, the patentee was unduly prevented from presenting further requests, such as the present first auxiliary request, during the first-instance proceedings.

Under these circumstances, the board sees no reason why the first auxiliary request should not be admitted into the appeal proceedings (Article 12(4) RPBA 2007).

- 2.1.2 The opponents requested that the first auxiliary request not be admitted into the proceedings for being late filed. The patentee had already sufficient occasions to overcome the objections on file by filing 32 auxiliary requests during the first-instance opposition proceedings. It was not fair to the opponents that the patentee made amendments in little slices instead of filing an auxiliary request which overcame the existing objections under Article 123(2) EPC.

The board does not see any reason why the first auxiliary request should be considered to be late filed, account being taken of the fact that it was filed with the statement of grounds of appeal and the fact that the opposition division refused to look at any further requests during the first-instance oral proceedings.

Moreover, the board notes that auxiliary requests 1 to 24 then on file were rejected by the opposition division for the same reasons as the main request, i.e. because the feature of the "intersection of the two lines" was missing in claim 1 (see appealed decision, point 3.3). Auxiliary request 25 then on file was rejected by the opposition division because *inter alia* the feature "when two lanes are present" was missing in claim 1. Auxiliary requests 26 to 32 were not admitted into the proceedings by the opposition division for the same reasons for which auxiliary request 25 was rejected. In other words, during the first-instance oral proceedings, a substantive discussion about added subject-matter took place only for two sets of claims, which is not an unreasonable number of sets of claims.

2.1.3 In conclusion, the board sees no abuse of procedure by the patentee, or any other reason, which could justify the non-admission of the first auxiliary request into the proceedings.

## 2.2 Clarity

Claim 1 lacks clarity (Article 84 EPC 1973).

2.2.1 Claim 1 as granted has been amended *inter alia* so as to include the feature "to approximate a second line on the basis of a relationship existing between the slopes of the right and left lane experimentally determined using examples of data collected when two lanes are present", supposedly based on the description as originally filed.

2.2.2 It is unclear in claim 1 what the relationship existing between the slopes of the lanes is and how it is determined. This objection was raised by opponent 1 in its letter of 5 March 2018, point II.1, against a corresponding feature of claim 1 of the first auxiliary request then on file. See also the annex to the summons to oral proceedings, point 7.3.

Even when assuming, as explained by the patentee during the oral proceedings, that the skilled person would understand, based on their own knowledge and on the information to be found in the description of the patent application, that the "slopes" of the lanes mean actually the slopes of the inclined lines corresponding to the lane markers in the image of the road (see figure 9 of the patent application), and further assuming, as submitted by the patentee, that the skilled person would also be able to interpret adequately the use of the terms "lane", "lane marker" and "line" in claim 1, it remains nevertheless obscure which relationship

exists between the two slopes. As discussed during the oral proceedings, the reasons therefor are as follows:

- The relationship between the two slopes depends on a variety of aspects, such as the width of the lane, the presence of a curve of the road and its radius, the vertical inclination of the road and its angle, the lateral offset of the camera with respect to a central position of the camera relative to the road. None of these aspects is defined in the claim. In the absence of any information about these aspects, the relationship between the slopes of the left and right lane markers is undefined in claim 1.
  
- Claim 1 defines two road situations: a first situation when two lane markers are present and a second situation when only one lane marker, or line, is found. No relationship between the two road situations is defined in claim 1. In particular, it is undefined in claim 1 whether the two road situations are comparable in terms of road width, bending, inclination or lateral camera offset. According to claim 1, the relationship between the two slopes is "experimentally determined using examples of data collected when two lanes are present". However, since claim 1 does not define any link between the two road situations, the data collected during the first situation, i.e. when the two slopes are present, is not suitable to define the relationship existing between the two slopes.

2.2.3 The patentee presented the following counter-arguments in favour of clarity of claim 1:

- According to the case law of the boards of appeal, the technical knowledge of the skilled person and the relevant information disclosed in the description were

to be used for interpreting the claim. In particular, the skilled person would understand that the two road situations had to be comparable, i.e. have a similar road width, bending, inclination and lateral camera offset. If they were not comparable, the skilled person would understand that data collected when two lanes were present could not be used for approximating the second line when only one line was found and that they had to wait until the two road situations were comparable again. For determining the actual road characteristics, the skilled person would use sensors, such as a GPS, a compass or a gyro mounted in the vehicle. Due to a kink in the image of the road, the skilled person would be able to determine whether the inclination of the road was changing. The lateral camera offset, generating a variation in the slope of the lanes, would easily be compensated by the skilled person by conventional geometrical considerations. From the description of the patent, paragraph [0021], the skilled person would know what the ideal road situation was, for instance, that the center of the two lanes should only be computed when the vehicle was traveling straight.

The board is not convinced by these arguments because claim 1 is not so limited as suggested by the patentee's arguments. For instance, claim 1 is not limited to the case where the two road situations are comparable. Claim 1 does also not define any sensors allowing the determination of the actual road characteristics. Neither general knowledge of the skilled person, nor the description of the patent application can provide the missing information about the relationship existing between the two slopes.

- Even if there were slight variations in the two road situations, this would not constitute a problem because

the apparatus of claim 1 was not about autonomous driving where high accuracy in the determination of the center of the road was required. Moreover, it was not necessary that claim 1 covered all possible road situations but it was sufficient that the apparatus of claim 1 worked in many standard situations.

The board cannot follow the patentee's arguments because the present clarity objection is not about how accurately the second line can be approximated on the basis of the relationship existing between the slopes, but about what the relationship is and how it is determined. Since the relationship is not clearly defined in claim 1, the claim lacks clarity.

2.2.4 For these reasons claim 1 lacks clarity.

3. Second auxiliary request

3.1 Admissibility

The second auxiliary request is admitted into the proceedings (Article 13(1) RPBA 2007, Article 25(3) RPBA 2020).

3.1.1 The present second auxiliary request has been filed during oral proceedings before the board. It corresponds to the sixth auxiliary request filed with the statement of grounds of appeal, wherein only certain features were deleted in order to overcome the clarity objection raised against the unclear "relationship existing between the slopes of the right and left lane" (see point 2.2 above).

The sixth auxiliary request filed with the statement of grounds of appeal would have to be admitted into the proceedings for essentially the same reasons as those given



for the present first auxiliary request (see point 2.1 above). Moreover, the deletion from claim 1 of features objected to under Article 84 EPC 1973 does neither represent an abuse of procedure by the patentee nor an amendment so complex that the request should not be admitted into the proceedings.

Therefore, the present second auxiliary request is admitted into the appeal proceedings (Article 13(1) RPBA 2007).

3.1.2 The opponents requested not to admit the second auxiliary request into the proceedings on the basis of the following arguments:

- The clarity objection against the feature comprising the relationship existing between the two slopes of the right and left lane was already raised in the letter of opponent 1 dated 5 March 2018, point II.1, and in the summons to oral proceedings, point 7.3. Therefore, deleting the unclear feature only during the oral proceedings before the board represented a late-filed amendment and should not be admitted.

The board considers that an in-depth discussion about the clarity of the feature comprising the relationship existing between the two slopes of the right and left lane took place only during the oral proceedings. Before the in-depth discussion had taken place, the amendment of present claim 1 could not necessarily have been foreseen by the patentee.

- The amendment of claim 1 raised a new objection under Article 123(2) EPC because the two road situations described in claim 1, i.e. the two situations where either one or two lanes are found, formed part of the same embodiment. Deleting one of the two situations

resulted in an embodiment not originally disclosed and, therefore, represented added subject-matter.

The board acknowledges that the deletion of the feature from claim 1 of the sixth auxiliary request, filed with the statement of grounds of appeal, may raise the question of whether added subject-matter is introduced thereby. However, also in view of the fact that the patentee was unduly prevented by the opposition division from filing further requests during the first-instance proceedings (see point 2.1 above), this potential issue of added subject-matter is not so complex as to justify denying the patentee the possibility to file this request.

- Claim 1 was not suitable to overcome all the existing clarity objections raised in writing against various features such as "an image aim calibration" or "motion of detected objects".

As submitted by the patentee, it is not always mandatory that a claim comprises amendments dealing with each and every objection raised by the opponents for being admitted into the proceedings, since the patentee may disagree on the validity of certain objections raised by the opponents.

3.1.3 In conclusion, the board sees no abuse of procedure by the patentee, or any other reason, which could justify the non-admission of the second auxiliary request into the proceedings.

3.2 Remittal of the case

3.2.1 The board decides to make use of its discretion under Article 111(1) EPC 1973 and Article 11 RPBA 2020 in

remitting the case to the opposition division for further prosecution for the following reasons:

- According to the appealed decision, point 2.2 of the grounds for the decision, claim 1 of the patent as granted did not fulfil the requirement of Article 123(2) EPC because "the combination of detecting one lane marker and establishing a position of a centre of the road is not clearly and unambiguously derivable from [0032] and [0036]".

According to the appealed decision, point 3.3 of the grounds for the decision, "the Opposition Division concluded that 'the intersection of the two lines' was also missing from the first three auxiliary requests, and consequently from all of auxiliary requests 4-24", contrary to the requirement of Article 123(2) EPC.

According to the appealed decision, point 4.2 of the grounds for the decision, the opposition division determined that certain "aspects of claim 1 of AR 25 were problematic" and that "[c]onsequently, Auxiliary Request 25 does not accord with the requirements of Art 123(2) EPC".

Present claim 1 of the second auxiliary request has been amended with respect to claim 1 of all requests underlying the appealed decision *inter alia* by deleting the features relating to the situation where only one lane marker is found in the image. The reasons provided in the appealed decision, points 2.2, 3.3 and 4.2, for infringing the requirements of Article 123(2) EPC are overcome by this amendment.

Since the patentee filed amendments overcoming the reasons of the opposition division for revoking the

patent under Article 123(2) EPC, the appealed decision must be set aside.

- According to the appealed decision, point 7, the "Opposition Division has decided not to admit a further request to overcome the problems with added subject-matter of the main request and auxiliary requests 1-25".

According to the minutes of the oral proceedings before the opposition division, after "presenting" auxiliary requests 25 to 32 (see page 6 of the minutes) and after the admission into the proceedings of auxiliary request 25 (see page 13 of the minutes), the opposition division announced that it "will not allow an extra auxiliary request" (page 20 of the minutes) and that it "will not allow the proprietor to file an amended auxiliary request" (page 21 of the minutes). Claim 1 of the so-called "extra auxiliary request" or "amended auxiliary request" would have corresponded to a claim amended with respect to claim 1 of auxiliary request 25 (see page 17 of the minutes reciting the patentee's request to amend auxiliary request 25).

From the written decision of the opposition division and the minutes of the oral proceedings, it is clear that the opposition division did not allow the patentee to physically submit any further auxiliary request. Thus, the opposition division decided not to admit an auxiliary request into the proceedings without having looked at it, contrary to the patentee's right to be heard (Article 113(1) EPC 1973). This amounts to a substantial procedural violation.

- The decision under appeal did not deal with the subject-matter as presently claimed. Therefore, essential questions regarding the basis of the amendments in the

application as originally filed, the clarity of claim 1 and the patentability of the claimed subject-matter have not yet been examined and decided by the opposition division.

3.2.2 The opponents requested that the case not be remitted to the first instance because the right to be heard of the patentee was not violated during the first-instance proceedings. In support of their request, the opponents reiterated their arguments why the second auxiliary request should not be admitted into the proceedings. These arguments, however, do not deal with the procedural violation having occurred during the oral proceedings before the opposition division and consisting in the opposition division deciding on a request which was not yet filed.

3.2.3 It follows that the case is to be remitted to the first instance for further prosecution, in accordance with Article 11 RPBA 2020.

## **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:



M. Kiehl

R. Bekkering

Decision electronically authenticated