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Datasheet for the decision
of 7 September 2017

Case Number: T 1699/13 - 3.5.03

Application Number: 06017195.6

Publication Number: 1755014

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Language of the proceedings: EN

Title of invention:
Point-sequence approximation method and apparatus

Applicant:
TOYOTA JIDOSHA KABUSHIKI KAISHA

Headword:
Point-sequence approximation method and apparatus/TOYOTA

Relevant legal provisions:
EPC Art. 84, 123(2)
RPBA Art. 13(1)

Keyword:

Decisions cited:

Catchword:

Case Number: T 1699/13 - 3.5.03

D E C I S I O N
of Technical Board of Appeal 3.5.03
of 7 September 2017

Appellant: TOYOTA JIDOSHA KABUSHIKI KAISHA
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Decision under appeal: **Decision of the Examining Division of the**
                           European Patent Office posted on 15 March 2013
                           refusing European patent application
                           No. 06017195.6 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman   F. van der Voort
Members: K. Schenkel
                 S. Fernández de Córdoba

Summary of Facts and Submissions

I.   This appeal is against the decision of the examining
        division refusing European patent application
        No. 06017195.6, publication number EP 1 755 014 A.

        The refusal was based on the grounds that claims 1 and
        7 of a main request, claims 1 and 5 of a first
        auxiliary request and claims 1 and 7 of a second
        auxiliary request were not clear (Article 84 EPC) and
        that claims 1 and 7 of a third auxiliary request and
        claims 1 and 5 of a fourth auxiliary request contained
        subject-matter that extended beyond the content of the
        application as filed (Article 123(2) EPC).

II.   In the statement of grounds of appeal, the appellant
        requested that the decision be set aside and that a
        patent be granted on the basis of the claims of a main
        request or, in the alternative, on the basis of one of
        first to fifth auxiliary requests, all requests as
        filed with the statement of grounds of appeal.

III.   In a communication following a summons to oral
        proceedings, the board, without prejudice to its final
        decision, raised objections under Article 84 EPC
        (clarity) and Article 123(2) EPC (added subject-
        matter).

IV.   In response to the communication, the appellant filed,
        together with a letter dated 16 August 2017, a
        substantive response and claims of an amended main
        request and amended the first to fifth auxiliary
        requests.

V.   Oral proceedings were held on 7 September 2017.

In the course of the oral proceedings, the appellant
submitted additional claims as a sixth auxiliary
request.

The appellant requested that the decision under appeal
be set aside and that a patent be granted on the basis
of the claims of the main request or, in the
alternative, on the basis of the claims of one of the
first to fifth auxiliary requests, all as filed with
the letter dated 16 August 2017, or on the basis of the
claims of the sixth auxiliary request as filed during
the oral proceedings.

At the end of the oral proceedings, the chairman
announced the board's decision.

VI.   Claim 1 of the main request reads as follows:

        "A point-sequence approximation method for a
parking assist system of a vehicle, the method
approximating a detected point sequence constituted of
a plurality of points by a line, said plurality of
points showing the position of a side of another
vehicle characterized by comprising:
        a determination step (S108) of determining whether
a proportion of a straight-line approximation region is
high as compared to that of a curve approximation
region;
        an evaluation step (S110) of, if it is determined
that the proportion of the straight-line approximation
region is high as compared to that of the curve
approximation region, repeatedly performing random
setting of candidates of an approximation straight
line, and evaluation of approximation accuracy of the
respective candidate of the approximation straight line
based on distances between the respective candidate of

the approximation straight line and the points
constituting the point sequence; and

    a straight-line approximation step (S110) of
performing straight-line approximation by using the
candidate of the approximation straight line with the
best result of evaluation of the approximation accuracy
as an approximation straight line."

VII.   Claim 1 of the first auxiliary request differs from
       claim 1 of the main request in that, at the end, the
       following wording has been added:

       "and a curve approximation step (S110) of detecting
       a sequence of points that have been excluded from the
       straight-line approximation using the approximation
       straight line, based on distances between the
       approximation straight line and the points constituting
       the point sequence, and then performing curve
       approximation of the sequence of points that have been
       excluded from the straight-line approximation, so as to
       separate a sequence of points within the straight-line
       approximation region and a sequence of points within
       the curve approximation region".

VIII. Claim 1 of the second auxiliary request differs from
       claim 1 of the main request in that, at the end of the
       second paragraph, the following wording has been added:

       ", a) either by determining whether the parallel-
       parking assist mode has been selected as a result of
       the operation of an assist-mode changing switch,
           b) or by
           setting candidates of an approximation straight
       line by using two points that are respectively randomly
       selected from among the points constituting the point
       sequence,

calculating distances between the respective set candidate of the approximation straight line and the points constituting the point sequence,

deriving a number of such points for which the obtained distances are within a predetermined threshold value, and

determining that the proportion of the straight-line approximation region is high, provided that there is a candidate of the approximation straight line for which a proportion of such points that *[sic]* the distances from the candidate of the approximation straight line are within the threshold value to all the points constituting the point sequence is equal to or greater than a predetermined value",

and in that in the penultimate paragraph, i.e. beginning with "an evaluation step", in the wording "approximation accuracy of the respective candidate" "respective" has been deleted.

IX.   Claim 1 of the third auxiliary request combines claims 1 of the first and second auxiliary requests.

X.   Claim 1 of the fourth auxiliary reads as follows:

"A point-sequence approximation method carried out in a parking assist system of a vehicle while a parking assist control of the vehicle is performed, the method approximating a point sequence constituted of a plurality of points by a line for determining the position of another vehicle, and comprising:

a step of determining whether a proportion of a straight-line approximation region is high as compared to that of a curve approximation region, wherein the step of determining whether a proportion of a straight-

line approximation region is high as compared to that
of a curve approximation region,

either comprises determining whether a parallel-
parking assist mode has been selected, and, if the
parallel-parking assist mode is selected, determining
that a proportion of a straight-line approximation
region is high as compared to that of a curve
approximation region,

or comprises

automatically determining whether the proportion
of the straight-line approximation region is high as
compared to that of the curve approximation region,
based on a score, wherein candidates of an
approximation straight line are randomly set, and a
proportion of the points from which the distances to
the respective candidate of the approximation straight
line are less than a predetermined threshold value to
all the points, that is, the respective score is
calculated, and, if there is a candidate of the
approximation straight line having a score equal to or
greater than a predetermined value, it is determined
that the proportion of the straight-line approximation
region is high, whereas, if there is no candidate of
the approximation straight line having a score equal to
or greater than the predetermined value, it is
determined that the proportion of the straight-line
approximation region is low,

an evaluation step (S110) of, if it is determined
that the proportion of the straight-line approximation
region is high as compared to that of the curve
approximation region, repeatedly performing setting of
a candidate of an approximation straight line by
randomly selecting two points from among the points
constituting the point sequence, and evaluation of
approximation accuracy of the candidate of the
approximation straight line based on distances between

the candidate of the approximation straight line and
the points constituting the point sequence; and

a straight-line approximation step (S110) of
performing straight-line approximation by using the
candidate of the approximation straight line with the
best result of evaluation of the approximation accuracy
as an approximation straight line."

XI.   Claim 1 of the fifth auxiliary request reads as
follows:

"A point-sequence approximation method carried out
in a parking assist system of a vehicle while a parking
assist control of the vehicle is performed, the method
approximating a point sequence constituted of a
plurality of points by a line for determining the
position of another vehicle, and comprising:

a step of determining whether a proportion of a
straight-line approximation region is high as compared
to that of a curve approximation region, said step
comprising

a step of setting a candidate of the approximation
straight line by using two points that are randomly
selected from among the points constituting the point
sequence,

a step of calculating distances between the set
candidate of the approximation straight line and the
points constituting the point sequence, and

a step of deriving a number of points of which the
obtained distances are within a predetermined threshold
value, wherein

when there is a candidate of the approximation
straight line for which a proportion of points, of
which the distances from the candidate of the
approximation straight line are within the threshold
value, to all the points constituting the point

sequence is equal to or greater than a predetermined value, it is determined that a proportion of a straight-line approximation region is high as compared to that of a curve approximation region;

an evaluation step (S110) of repeatedly performing setting of a candidate of an approximation straight line by randomly selecting two points from among the points constituting the point sequence, and evaluation of approximation accuracy of the candidate of the approximation straight line based on distances between the candidate of the approximation straight line and the points constituting the point sequence; and

a straight-line approximation step (S110) of performing straight-line approximation by using the candidate of the approximation straight line with the best result of evaluation of the approximation accuracy as an approximation straight line."

XII. Claim 1 of the sixth auxiliary request reads as follows:

"A point-sequence approximation method for a parking assist system of a vehicle, the method approximating a detected point sequence constituted of a plurality of points by a line, said plurality of points showing the position of a side of another vehicle characterized by comprising:

determining that a parallel-parking assist mode has been selected as a result of the operation of an assist-mode changing switch,

an evaluation step (S110) of repeatedly performing random setting of candidates of an approximation straight line, and evaluation of approximation accuracy of the candidate of the approximation straight line based on distances between the respective candidate of

the approximation straight line and the points
constituting the point sequence; and

a straight-line approximation step (S110) of
performing straight-line approximation by using the
candidate of the approximation straight line with the
best result of evaluation of the approximation accuracy
as an approximation straight line."

Reasons for the Decision

1.   Main request - claim 1 - clarity

1.1   Claim 1 includes the wording

"a determination step (S108) of determining
whether a proportion of a straight-line approximation
region is high as compared to that of a curve
approximation region".

The term "proportion" refers to a relationship between
two quantities. However, claim 1 does not specify to
which quantity the straight-line approximation region
and the curve approximation region are respectively
related. Hence, the meaning of "proportion" in the
context of the claim is unclear.

Further, the terms "straight-line approximation region"
and "curve approximation region" are not defined and do
not have a commonly accepted meaning. Hence, these
terms are also unclear.

The board further notes that the wording "high as
compared to" does not, unlike e.g. "higher than",
clearly specify the relationship between the two
quantities being compared.

1.2   The appellant essentially argued that a straight-line
        approximation region was a region suitable for a
        straight-line approximation. Further, the first pages
        of the description made it clear that at the
        determination step at issue, it was evaluated as to
        whether there is a region suitable for either a
        straight-line approximation or for a curve
        approximation. The first page of the description also
        made it clear that this determination was important to
        trigger the remaining steps of the claim.

1.3   The board is, however, not convinced by these
        arguments. Even if, for the sake of argument, it were
        clear that the purpose of the determination step was to
        determine whether there is a region suitable for either
        a straight-line or a curve approximation, the meaning
        of the term "proportion" and, hence, the corresponding
        determination and comparison would still be unclear. In
        this respect, the board notes that the description does
        not provide a definition of "straight-line
        approximation region" or "curve approximation region".

1.4   For the above reasons, the board concludes that claim 1
        of the main request is not clear and, consequently,
        does not comply with Article 84 EPC.

1.5   The main request is therefore not allowable.

2.   *First auxiliary request – claim 1 – clarity*

2.1   Claim 1 of the first auxiliary request includes the
        same wording as that objected to in point 1 above.

        The features added in claim 1 of the first auxiliary
        request compared to claim 1 of the main request make no

reference to a "straight-line approximation region" or
a "curve approximation region" and, hence, do not
clarify these terms.

2.2   For these reasons and the reasons given in point 1, the
        board concludes that claim 1 of the first auxiliary
        request is not clear and, consequently, does not comply
        with Article 84 EPC.

2.3   The first auxiliary request is therefore not allowable.

3.   *Second auxiliary request – claim 1 – clarity*

3.1   Claim 1 of the second auxiliary request includes the
        same wording as that objected to at point 1 above. The
        claim further adds two alternatives, a) and b), for
        carrying out the determination step (see point VIII
        above).

3.2   Using alternative a), the determination that concerns
        the proportion of the two approximation regions (first
        determination) is carried out by a second determination
        as to "whether the parallel-parking assist mode has
        been selected as a result of the operation of an
        assist-mode changing switch".

        The above wording, in the board's opinion, expresses
        that the result of the second determination is
        equivalent to the result of the first determination.
        However, the second determination does not clarify the
        first determination, which the board objected to as
        being unclear (see point 1.1 above regarding the
        meaning of the terms "proportion", "straight-line
        approximation region", "curve approximation region" and
        "high as compared to").

For the same reasons, alternative b) does not clarify the first determination either.

3.3   Further, alternative b) includes the feature of "determining that the proportion of the straight-line approximation region is high, provided that there is a candidate of the approximation straight line for which a proportion of such points *[sic]* that the distances from the candidate of the approximation straight line are within the threshold value to all the points constituting the point sequence is equal to or greater than a predetermined value".

Firstly, this feature refers to a determination that "the proportion of the straight-line approximation region <u>is high</u>". This is different from the above-mentioned first determination as to whether "a proportion of a straight-line approximation region <u>is high as compared to</u> that of a curve approximation region" and does not, therefore, clarify the first determination (underlining by the board).

Secondly, in the board's view, the condition introduced by "provided that" refers to the execution of the preceding determination "that the proportion of the straight-line approximation region is high" and only indicates when it is carried out. It does not therefore clarify what is meant by the proportion of a straight-line approximation region being "high".

3.4   The appellant argued that the condition introduced by "provided that" was not for carrying out the determination that the proportion of the straight-line approximation region is high, but for explaining it.

The board does not accept this argument. The aforementioned determination is a method step, terminated by a comma and followed by the condition in question. There is no doubt that the condition "provided that ..." is to be understood as an instruction to execute the determination step if the condition in question is met.

3.5   For the above reasons, the board concludes that claim 1 of the second auxiliary request is not clear and, consequently, does not comply with Article 84 EPC.

3.6   The second auxiliary request is therefore not allowable.

4.   *Third auxiliary request – claim 1 – clarity*

       Claim 1 of the third auxiliary request combines claims 1 of the first and second auxiliary requests. The reasoning given above in points 2 and 3 thus applies *mutatis mutandis*.

       Claim 1 of the third auxiliary request is therefore not clear either and does not comply with Article 84 EPC.

       The third auxiliary request is therefore not allowable.

5.   *Fourth auxiliary request – claim 1 – clarity*

5.1   Claim 1 of the fourth auxiliary request includes the the step of "determining whether a proportion of a straight-line approximation region is high as compared to that of a curve-approximation region". Further, claim 1 includes the feature that this determination is conditional, namely "if the parallel parking mode is selected" (see point X above).

As in claim 1 of the second auxiliary request, the determination objected to has thus been supplemented with a condition for its execution (see above, point 3.3, last paragraph), whilst what is meant by "determining whether a proportion of a straight-line approximation region is high as compared to that of a curve-approximation region" remains unclear.

5.2   The board therefore concludes that claim 1 of the fourth auxiliary request is not clear and, consequently, does not comply with Article 84 EPC.

5.3   The fourth auxiliary request is therefore not allowable.

6.   *Fifth auxiliary request – claim 1 – clarity*

6.1   Claim 1 of the fifth auxiliary request includes the step of "determining whether a proportion of a straight-line approximation region is high as compared to that of a curve-approximation region". Further, it includes the feature that this determination is subject to a condition, namely "when there is a candidate of the approximation straight line ... equal to or greater than a predetermined value" (see point XI above).

        The reasoning given above in point 5 thus applies *mutatis mutandis*.

6.2   The board therefore concludes that claim 1 of the fifth auxiliary request is not clear and, consequently, does not comply with Article 84 EPC.

6.3   The fifth auxiliary request is therefore not allowable.

7.   *Sixth auxiliary request – admissibility*

7.1   This auxiliary request was filed during the oral
        proceedings before the board. It is thus an amendment
        to the appellant's case within the meaning of Article
        13(1) RPBA, which stipulates that any amendment to a
        party's case after it has filed its grounds of appeal
        may be admitted and considered at the board's
        discretion.

7.2   A well-established criterion used by the Boards of
        Appeal for deciding whether to admit late-filed
        requests under Article 13(1) RPBA is whether the new
        claims are *prima facie* allowable.

7.3   In the present case, claim 1 (see point XII) gives
        prima facie rise to objections under Articles 84 and
        123(2) EPC:

        Claim 1 includes the feature of "determining that a
        parallel-parking assist mode has been selected as a
        result of the operation of an assist-mode changing
        switch". However, this feature is claimed in isolation,
        i.e. it is unclear (Article 84 EPC) how, if at all,
        this determination or its result is linked to any of
        the other features in the claim.

        According to the application as filed, the
        determination as to whether the proportion of the
        straight-line approximation region is high, compared to
        that of the curve approximation region, is always
        linked to either the selection of the parallel-parking
        assist mode as a result of the operation of an assist-
        mode changing switch or to a score as a result of the
        execution of a RANSAC (Random Sample Consensus)
        algorithm (see the application as published, paragraphs

[0061] to [0063], and claim 16). However, in the present claim, since the feature of determining that a parallel-parking assist mode has been selected as a result of the operation of an assist-mode changing switch is claimed in isolation, the claim defines subject-matter which constitutes an intermediate generalisation of the above disclosure. Since the application documents as filed do not *prima facie* provide a basis for this intermediate generalisation, it is an unallowable intermediate generalisation, resulting in the claimed subject-matter extending beyond the content of the application as filed (Article 123(2) EPC).

7.4   Bearing in mind that the sixth auxiliary request was filed during the oral proceedings and considering that claim 1 did not *prima facie* comply with Articles 84 and 123(2) EPC, the board did not admit the request into the appeal proceedings (Article 13(1) RPBA).

8.   *Conclusion*

        As there is no allowable request, it follows that the appeal is to be dismissed.

Order

For these reasons it is decided that:

        The appeal is dismissed.

The Registrar: The Chairman:

G. Rauh   F. van der Voort

Decision electronically authenticated