

Internal distribution code:

- (A) Publication in OJ
(B) To Chairmen and Members
(C) To Chairmen
(D) No distribution

**Datasheet for the decision
of 15 July 2009**

Case Number: T 2097/08 - 3.4.01

Application Number: 06075442.1

Publication Number: 1701289

IPC: G06K 9/00, G08B 21/06

Language of the proceedings: EN

Title of invention:
System and method of detecting eye closure based on line angles

Applicant:
Delphi Technologies, Inc.

Headword:
-

Relevant legal provisions:
-

Relevant legal provisions (EPC 1973):
EPC Art. 84

Keyword:
"Clarity"
"Support by the description"

Decisions cited:
-

Catchword:
-

Case Number: T 2097/08 - 3.4.01

**DECISION
of the Technical Board of Appeal 3.4.01
of 15 July 2009**

Appellant: Delphi Technologies, Inc.
PO Box 5052
Troy, MI 48007 (US)

Representative: Denton, Michael John
Delphi France SAS
64 Avenue de la Plaine de France
ZAC Paris Nord II
B.P. 65059, Tremblay en France
F-95972 Roissy Charles de Gaulle Cedex
(FR)

Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted 10 June 2008
refusing European application
No. 06075442.1 pursuant to Article 97(2)
EPC.**

Composition of the Board:

Chairman: B. Schachenmann
Members: P. Fontenay
H. Wolfrum

Summary of Facts and Submissions

- I. The appeal lies from the decision of the examining division, dispatched on 10 June 2008, refusing European patent application No. 06 075 442.1 on the ground of lack of clarity (Article 84 EPC 1973) of the subject-matter of independent claims 1 and 9.

More specifically, the examining division held that the expression "substantially linear" used to define lines in independent claims 1 and 9 was in contradiction with the description and rendered the subject-matter of the claims unclear.

- II. The appellant (applicant) filed an appeal against this decision by notice received on 11 July 2008 and paid the prescribed appeal fee on the same date. A written statement setting out the grounds of appeal was filed in due time on 2 October 2008. The appellant requested that the contested decision be set aside and a patent be granted on the basis of the claims on which the contested decision was based.

Oral proceedings were requested as an auxiliary measure.

- III. In the statement setting out the grounds of appeal, the appellant put forward that the term "substantially" was intended to cover slight or irrelevant variations in the linear lines which may derive from the possibility of minor imperfections in their extraction process according to the invention. The appellant cited examples of decisions of the boards of appeal in which the clarity of the word "substantially" had been considered and allowed. It was further underlined that the boards of appeal had on multiple occasions reiterated the view that a patent must be construed with a mind willing to understand, not a mind desirous of misunderstanding.

- IV. The Board issued a summons to attend oral proceedings scheduled to take place on 18 June 2009.

In a communication pursuant to Article 15(1) Rules of Procedure of the Boards of Appeal (RPBA) dated 10 February 2009, issued in view of the oral proceedings, the Board expressed its provisional opinion regarding the compliance of the claims then on file with the requirements of Article 84 EPC 1973.

- V. The preliminary assessment of the case put forward by the Board in the communication of 10 February 2009 with regard to the use of the expression "substantially linear" in independent claims 1 and 9 did not fundamentally differ from the analysis which had been carried out by the examining division in the contested decision.

Although the Board acknowledged that the term "substantially" does not lead by its mere presence in a claim to an unclear definition, it noted that in the specific circumstances of the present case according to which it is apparent from the application documents as a whole that the lines referred to in the claims are the result of algorithms relying on Hough or Radon transformations or a Least Square Analysis and therefore mere abstract mathematical entities, the lines are ideally linear in the sense of being perfectly straight.

The use of the term "substantially linear" in claims 1 and 9 appeared therefore, in the Board's opinion, to encompass alternative techniques which would indeed have relied on the identification of approximated lines, for which no support could be found in the application (Article 84 EPC 1973).

- VI. The Board further expressed, in its communication dated 10 February 2009, the view that an essential feature of the invention appeared to be missing from independent claims 1 and 9. It was noted in this respect that the independent claims then on file did not properly depict the fact that discrimination of eye closure states relies on the evaluation of the presence or absence of lines at each of the plurality of selected angles and, if lines are present at multiple select angles, further on the determination of the largest angle occurring between any two of the lines found to be present, as constantly repeated throughout the application (cf. paragraphs [0019], [0020], [0023], [0030], [0037], [0044] and [0047] of the published application).
- VII. The appellant filed on 12 May 2009, by electronic means, a modified set of claims 1 to 13 replacing the previous claims on file, as well as a modified version of description pages 2 and 2a. In the statement accompanying the modified application documents, the appellant indicated that it had dealt with all the issues raised in the Board's communication. It was further requested, in case further issues had to be resolved, to have them dealt with in writing or by phone. The request for oral proceedings was accordingly withdrawn.
- On 28 May 2009, the appellant was informed that the oral proceedings had been cancelled.
- VIII. By facsimile dated 24 June 2009, following a phone conversation between the rapporteur and the appellant's representative on the same day, the appellant filed an adapted version of pages 5, 7 and 16 of the description and clarified that the drawings to be considered in its request were those as published. During a further phone conversation with the rapporteur on 3 July 2009, the applicant's representative agreed, for reasons of consistency, to have claims 5 and 11 amended so as to depend on claims 2 and 8,

respectively, and to replace the term "an open eye threshold" in claim 8 by the term "an open threshold angle".

IX. The appellant requested that the contested decision be set aside and a patent be granted on the basis of:

- claims 1 to 13, as filed on 12 May 2009 with claims 5, 8 and 11 further amended as agreed over the phone with the applicant's representative on 3 July 2009;
- description pages:
 - 1, 3, 4, 6, 8-15, as originally filed on 28 February 2006;
 - 2, 2a, as filed on 12 May 2009;
 - 5, 7, 16, as filed on 24 June 2009;
- drawing sheets:
 - 1/9-9/9, as published in EP-A-1 701 289.

X. Independent claim 1 reads as follows:

*"1. A system (30) for monitoring an eye (22) and determining eye closure, said system comprising:
a video imaging camera (24) oriented to generate images of an eye (22); and
a video processor (32) for processing the images generated with the video imaging camera (24), said video processor (32) comprising an edge detector (54) for detecting edges (80) of the eye (22) in the image and a line selector (58) for selecting a line (72, 74, 76) representative of the detected edges (30) at any of multiple selected angles (•), said processor (32) determining a state of eye closure based on (a) the presence or absence of lines at each of the multiple selected angles, and (b) if lines are present at the multiple selected angles, on the determination of the largest angle occurring between any two of the lines found to be present, wherein each said line (72, 74, 76) is linear."*

Independent claim 7 refers to the corresponding method and reads:

*"7. A method (100) of monitoring an eye (22) and determining eye closure, said method comprising the steps of:
arranging a video imaging camera (24) to generate images of an eye (22);
generating (104) an image of the eye (22);
processing (110) the image to identify edges (80) of the eye (22) in the image;
generating (128) a line (72, 74, 76) representative of an edge (80) at any of multiple selected angles (•); and
determining (138, 142, 146) an eye closure state based on (a) the presence or absence of lines at each of the multiple selected angles, and (b) if lines are present at the multiple selected angles, on the determination of the largest angle occurring between any two of the lines found*

to be present, wherein the step of generating (128) a line (72, 74, 76) comprises generating a line that is linear."

Claims 2 to 6 and 8 to 13 depend respectively on independent claims 1 and 7.

XI. In the context of this decision, reference is made to the provisions of the EPC 2000, which entered into force as of 13 December 2007, unless the former provisions of the EPC 1973 still apply to pending applications. In this latter case, the citation of Articles or Rules is followed by the indication "1973" (cf. EPC, page 4, "citation practice").

Reasons for the Decision

1. The appeal is admissible.

2. *Amendments*

2.1 Independent claim 1 is based, in substance, on a combination of original claims 1 and 2. Similarly, independent claim 7 is based on original claims 10 and 11. The expression "substantially linear", present in original claims 2 and 11, on which the examining division based its refusal, has been replaced by the term "linear". The lines identified according to the disclosed processes constitute abstract mathematical entities which are therefore ideally linear in the sense of being perfectly straight. This finding applies to the process relying on the Hough transformation as well as to the alternative processes referred to in the description relying on the Radon transformation or a Least Square Analysis of the obtained images (cf. paragraphs [0019] and [0031]).

2.2 A further amendment results from the introduction in claims 1 and 7 of the feature according to which the determination of a state of eye closure is based on: "*(a) the presence or absence of lines at each of the multiple selected angles, and (b) if lines are present at the multiple selected angles, on the determination of the largest angle occurring between any two of the lines found to be present*", which feature the Board considered in its provisional opinion to be essential for the definition of the claimed system and method.

In this regard, the description in fact consistently points to the necessity of identifying the presence or absence of lines at each of the multiple selected angles as well as determining, in the event that such lines are present, the largest angle occurring between any two of the lines so identified. Particular reference is made to paragraphs [0020], [0023], [0030], [0037], and [0044] of the published application.

2.3 The Board is thus satisfied that the requirements of Article 123(2) are met.

3. *Clarity - Support - Article 84 EPC 1973*

3.1 The term "linear", as it appears in claims 1 and 7, is consistent with the embodiments of the invention which rely on the determination of abstract lines by means of the Hough transformation or, alternatively, the Radon transformation or a Least Square Analysis. The detailed discussion of the embodiment relying on the Hough transformation together with the reference to the two alternative algorithms constitute a sufficient support for the term "linear" in the independent claims.

3.2 Due to the introduction into the independent claims of the instruction which is necessary for the determination of the state of eye closure, the claims contain all the features which are essential for the definition of the invention.

3.3 Consequently, the objections raised by the examining division in its refusal of the application and by the Board of appeal in its preliminary opinion have been overcome by the amended set of claims.

For these reasons, the Board concludes that the claims according to the appellant's sole request meet the requirements of Article 84 EPC 1973 as to clarity and support by the description.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the examining division for further prosecution.

The Registrar:

The Chairman:

R. Schumacher

B. Schachenmann