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**Datasheet for the decision  
of 25 March 2014**

**Case Number:** T 1558/10 - 3.5.05

**Application Number:** 04804486.1

**Publication Number:** 1839110

**IPC:** G06F3/033

**Language of the proceedings:** EN

**Title of invention:**

METHOD FOR DETERMINING THE POSITION OF IMPACTS

**Applicant:**

Elo Touch Solutions, Inc.

**Headword:**

Method for determining the position of impacts/ELO

**Relevant legal provisions:**

EPC 1973 Art. 56, 84

**Keyword:**

Claims - clarity (no)

Inventive step - (no)

**Decisions cited:**

**Catchword:**



**Beschwerdekammern  
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Case Number: T 1558/10 - 3.5.05

**D E C I S I O N  
of Technical Board of Appeal 3.5.05  
of 25 March 2014**

**Appellant:** Elo Touch Solutions, Inc.  
(Applicant) 301 Constitution Drive  
Menlo Park, CA 94025 (US)

**Representative:** Cabinet Plasseraud  
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**Decision under appeal:** Decision of the Examining Division of the  
European Patent Office posted on 23 February  
2010 refusing European patent application  
No. 04804486.1 pursuant to Article 97(2) EPC.

**Composition of the Board:**

**Chair:** A. Ritzka  
**Members:** M. Höhn  
G. Weiss

## Summary of Facts and Submissions

I. This appeal is against the decision of the examining division, posted on 23 February 2010, refusing European patent application No. 04804486.1 on the ground of lack of inventive step (Article 56 EPC 1973) with regard to prior art publication:

D1: US 2005/0174338 A1.

II. The notice of appeal was received on 12 March 2010. The appeal fee was paid on the same day. The statement setting out the grounds of appeal was received on 18 June 2010. The appellant requested that the appealed decision be set aside and that a patent be granted on the basis of the sets of claims filed as main request and auxiliary request with the statement setting out the grounds of appeal. Oral proceedings were requested on an auxiliary basis.

III. With a communication dated 19 December 2013 the board summoned the appellant to oral proceedings on 25 March 2014. In an annex to the summons the board expressed its preliminary opinion that the subject-matter of independent claims according to both requests appeared to lack clarity (Article 84 EPC 1973) and appeared to be obvious (Article 56 EPC 1973) with regard to the disclosure of either D1 or D4 (US 2004/0133366 A1) or D5 (WO 03/067511 A2) in view of the skilled person's common general knowledge. Publications D4 and D5 were introduced under Article 114(1) EPC 1973 on the board's own motion.

IV. With letter dated 5 March 2014 the appellant informed the board that it would not be attending the oral proceedings.

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

1. A method for determining the position of impacts on an object, said object comprising:  
 - two acoustic sensors (SENS1, SENS2);  
 - N predetermined active areas (1a), whereby N is an integer at least equal to 1;

said method comprising the steps of:

(a) receiving two acoustic signals  $s_1(t)$  and  $s_2(t)$  originating respectively from said acoustic sensors (SENS1, SENS2) and generated by an impact received on said object;

(b) calculating a sample signature function:

$$SIG_S(\omega) = S_1(\omega) \cdot S_2(\omega)^*$$

where  $S_1(\omega)$  and  $S_2(\omega)$  are the respective Fourier transforms of  $s_1(t)$  and  $s_2(t)$ , and where \* is the complex conjugate operator;

(c) comparing  $SIG_S(\omega)$  with N predetermined reference signature functions  $SIG_{R_j}(\omega)$  each corresponding to a predetermined active area j, for j from 1 to N wherein each reference signature function equals:

$$SIG_{R_j}(\omega) = R_{1j}(\omega) \cdot R_{2j}(\omega)^*$$

where  $R_{1j}(\omega)$  and  $R_{2j}(\omega)$  are Fourier transforms of acoustic signals  $r_{1j}(t)$  and  $r_{2j}(t)$  received by each of the respective acoustic sensors when an impact occurs on the predetermined area j,

by the calculation of a similarity estimator  $\alpha_j$  representing a function of the phase  $\phi(COR_j(\omega))$  of

$$COR_j(\omega) = SIG_{R_j}(\omega) \cdot SIG_S(\omega)^*$$

(d) determining an active area (1a) in which the impact occurred, on the basis of the comparison of step (c).

Independent claim 18 is directed to a corresponding device.

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

1. A method for determining the position of impacts on an object, said object comprising:  
- two acoustic sensors (SENS1, SENS2);  
- N predetermined active areas (1a), whereby N is an integer at least equal to 1;  
said method comprising the steps of:

(a) receiving two acoustic signals  $s_1(t)$  and  $s_2(t)$  originating respectively from said acoustic sensors (SENS1, SENS2) and generated by an impact received on said object;

(b) calculating a sample signature function:

$$SIG_S(\omega) = S_1(\omega) \cdot S_2(\omega)^*$$

where  $S_1(\omega)$  and  $S_2(\omega)$  are the respective Fourier transforms of  $s_1(t)$  and  $s_2(t)$ , and where \* is the complex conjugate operator;

(c) comparing  $SIG_S(\omega)$  with N predetermined reference signature functions  $SIG_{R_j}(\omega)$  each corresponding to a predetermined active area j, for j from 1 to N wherein each reference signature function equals:

$$SIG_{R_j}(\omega) = R_{1j}(\omega) \cdot R_{2j}(\omega)^*$$

where  $R_{1j}(\omega)$  and  $R_{2j}(\omega)$  are Fourier transforms of acoustic signals  $r_{1j}(t)$  and  $r_{2j}(t)$  received by each of the respective acoustic sensors when an impact occurs on the predetermined area j,

by the calculation of a similarity estimator  $\alpha_j$  representing a function of the phase  $\varphi(COR_j(\omega))$  of

$$COR_j(\omega) = SIG_{R_j}(\omega) \cdot SIG_S(\omega)^*$$

the calculation of a function  $\delta_j(\omega)$  for  $j$  from 1 to  $N$ ,  
wherein

$\delta_j(\omega) = \varepsilon_k$ , if  $\varphi(\text{COR}_j(\omega))$  belongs to  $I_k$ ,

where  $\varepsilon_k$  is a predetermined value and  $I_k$  a  
corresponding angular interval for  $k$  from 1 to  $n$ , where  $n$   
is an integer greater than 1 ;

(d) determining an active area (1a) in which the impact  
occurred, on the basis of the comparison of step (c).

Independent claim 17 is directed to a corresponding  
device.

- VI. The appellant requested in writing that the appealed  
decision be set aside and that a patent be granted on  
the basis of the sets of claims filed as main request  
and auxiliary request with the statement setting out  
the grounds of appeal.
- VII. Oral proceedings were held on 25 March 2014 in the  
absence of the appellant. After due consideration of  
the appellant's arguments the chair announced the  
decision.

## **Reasons for the Decision**

### 1. Admissibility

The appeal complies with Articles 106 to 108 EPC (see  
Facts and Submissions, point II above). It is therefore  
admissible.

### 2. Non-attendance at oral proceedings

By letter dated 5 March 2014 the board was informed that the appellant would not be represented at the oral proceedings. The board considered it expedient to maintain the date set for oral proceedings. No-one attended on behalf of the appellant.

Article 15(3) RPBA stipulates that the board is not obliged to delay any step in the proceedings, including its decision, by reason only of the absence at the oral proceedings of any party duly summoned who may then be treated as relying only on its written case.

Hence, the board was in a position to announce a decision at the end of the oral proceedings.

3. Publications D4 and D5 were introduced under Article 114(1) EPC 1973 on the board's own motion, in reaction to the appellant's arguments with regard to the use of the phase of inter-correlation between signal and reference signals in the frequency domain, and in order to provide a basis for the skilled person's common general knowledge as argued in the decision under appeal (see e.g. point 1.3).

#### Main Request

4. Clarity - Article 84 EPC 1973

Independent claims 1 and 18 are directed to the determination of the position of impacts on an object. According to the board's understanding, this requires at least two different regions in order to be able to distinguish between different positions of an impact. However, according to claim 1, the number N of predetermined areas is "at least equal to 1" (see line 6). Therefore, the reader is left in doubt as to

how to determine a position, if there is only one area specified, i.e.  $N=1$ . In such a case the problem to be solved by the claimed subject-matter of claim 1 is not even posed.

The subject-matter of claims 1 and 18 therefore lacks clarity.

5. Novelty and inventive step - Articles 54(2) and 56 EPC 1973

5.1 The board agrees with the analysis of D1 in the decision under appeal (see points 1.1 and 1.2). The subject-matter of claim 1 is therefore novel over the disclosure of D1.

5.2 The appellant has referred to page 13, lines 16 to 23 of the application as filed (see page 4 of the statement setting out the grounds of appeal) in order to support technical effects of the alleged distinguishing features b) and c) of claim 1.

However, the board notes that the effects referred to depend on special terms of a particular mathematical formula for calculating the correlation function (see formula 10 on page 13 of the description). This particular formula, however, is not specified in claim 1, which therefore is not limited to this embodiment. The subject-matter of claim 1 is much broader and covers other ways of calculating a correlation function which do not cause the alleged effects. Since those effects are not achieved by claim 1 in the whole range claimed, they cannot be considered to support inventive step.



5.3 The board agrees with the decision under appeal that when starting from the disclosure of D1, which also hints at performing the comparison procedure in the frequency domain (see paragraph [0090] of D1), the distinguishing features are related to techniques of digital signal processing known to the skilled person in the field.

Pure mathematical calculations and formulas do not have a technical character as such (Article 52(2) (a) EPC), and the board is not convinced that the mathematical operations to be performed in steps b) and c) of claim 1 actually contribute to the technical character of claim 1 and that an inventive technical contribution over the prior art is provided by those differences in calculation.

5.4 Prior art publication D4 is also regarded as pertinent to the present application and therefore is a valid starting point for assessing inventive step.

D4 (see figure 11 and the corresponding disclosure on page 7, [0117] to [0135]) discloses a method for determining the position of impacts on an object with two acoustic sensors and receiving two acoustic signals originating respectively from the acoustic sensors and generated by an impact received on said object (see [0118] of D4). It further discloses determining an active area in which the impact occurred on the basis of a comparison (see references to a correlation function and the difference in path length which involve a comparison step).

In contrast to D1, publication D4 also discloses step b) (see intermediate function in paragraph [0119] which corresponds to the sample signature function in

the frequency domain). Furthermore, parts of step c) of claim 1 are disclosed in D4 by describing the calculation of a second intermediate function (see [0120] and [0127] to [0129] corresponding to the reference signature function). The concept of D4 is, like the claimed invention, also based on considering phase information (see e.g. [0127]) and a correlation function to reveal the difference in path length between the contact location and the sensors (see e.g. [0117] or [0134] of D4).

Another embodiment of D4 (see figure 7b and the corresponding text of the description) explicitly suggests correlating measured phase information with a reference function.

5.5 Prior art publication D5 also discloses the use of reference functions and phase difference information for analysing the location of an impact on an object (see in particular the first two paragraphs on page 22 and figures 18 and 19). The concept is also based on the principle that each location on the surface has its own unique phase difference characteristic. The location of a touch event is identified by comparing phase difference information with phase difference profiles of known locations. Hence, D5 discloses correlating location profiles with phase difference information in accordance with the claimed invention.

5.6 The board is aware of differences in the way the calculations are performed, in particular in using the phase of the intercorrelation function (see appellant's argument on page 5 of the statement setting out the grounds of appeal). Hence, the board regards the subject-matter of claim 1 as novel with regard to each of D1, D4 and D5.

- 5.7 However, those differences are merely variations in mathematical operations, the advantages and disadvantages of which have been evident and commonly known in the field of digital signal processing of audio information, and those differences over D1, D4 or D5 are still within the same concept as in the claimed invention, i.e. considering phase information and a correlation function to reveal the difference in path length between the contact location and the sensors.
- 5.8 The underlying objective problem is therefore considered to be an alternative mathematical approach within the concept disclosed in D1, D4 or D5.
- 5.9 The appellant has not provided convincing arguments that the solution of this problem according to claim 1 with differences in mathematical operations in step c) produces a technical advantage or effect which involves an inventive technical contribution over the disclosure of D1, D4 or D5 in view of the skilled person's common general knowledge of digital signal processing (Article 56 EPC 1973). The board does not see a disclosure in the application which could support such an inventive technical contribution.

The same argumentation applies *mutatis mutandis* to corresponding independent claim 18.

#### Auxiliary Request

#### 6. Amendments - Article 123(2) EPC

The amendment to independent claims 1 and 17 is supported by claims 1 to 4 and 20 to 23 as filed.

Claims 1 and 17 therefore fulfil the requirements of Article 123(2) EPC.

7. Clarity - Article 84 EPC 1973

The lack of clarity objection raised in point 4 above applies also to claims 1 and 17 of this request.

The subject-matter of claims 1 and 17 therefore lacks clarity.

8. Novelty and inventive step - Articles 54(2) and 56 EPC 1973

The subject-matter of claim 1 of this request differs from the main request in a simplification of the calculated phase of the intercorrelation function to discrete predetermined values in predetermined angular intervals (see last portion of step c) in claim 1).

8.1 The board notes that the scope of claim 1, according to particular embodiments in the description, covers conditions that render it unnecessary to compute the phase of the intercorrelation function (see step 106, e.g. on page 14, lines 24 and 25 or page 16, lines 15 to 17). Even if some technical advantages were caused by the computation of the phase of the intercorrelation function, which is not apparent to the board (see points 5.5 to 5.9 above), those advantages are not present in the whole range claimed, and therefore do not support an inventive technical contribution. At least under certain conditions the step of computing the phase of the intercorrelation function is in contradiction to the alleged problem of minimising the computation power of present claim 1 of this request

(see page 10 of the statement setting out the grounds of appeal).

8.2 In the board's judgement, the principle of reducing the computational effort by using discrete intervals was a well known principle in the art of digital signal processing before the priority date of the present application. This becomes evident, for example, by the use of Fast-Fourier-Transformation FFT disclosed e.g. in D5 (see page 29) and described as well known in the present application. The board does not see any technical hurdle to be overcome or any surprising result achieved in applying this general principle according to the additional feature in step c) of claim 1 of this request in order to solve the problem of reducing computational effort. It is rather considered to be the mere application of routine mathematical knowledge and to achieve a result which could be expected by the skilled person.

8.3 The board is therefore not convinced that the additional feature according to step c) of claim 1 of this request produces a technical advantage or effect which involves an inventive technical contribution over the disclosure of D1, D4 or D5 in view of the skilled person's common general knowledge of digital signal processing (Article 56 EPC 1973).

The same argumentation applies *mutatis mutandis* to corresponding independent claim 17.

**Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chair:



K. Götz

A. Ritzka

Decision electronically authenticated