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Case Number: T 2279/17 - 3.5.05

Application Number: 13874859.5

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Language of the proceedings: EN

Title of invention:
DRIVE CONTROL APPARATUS, ELECTRONIC DEVICE, AND DRIVE CONTROL METHOD

Applicant:
FUJITSU LIMITED

Headword:
Touch display with tactile sensation/FUJITSU

Relevant legal provisions:
EPC Art. 56
RPBA Art. 13

Keyword:
Inventive step - main request (no) - auxiliary request (no)
Late-filed auxiliary requests - admitted (no)

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Catchword:

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Case Number: T 2279/17 - 3.5.05

D E C I S I O N
of Technical Board of Appeal 3.5.05
of 25 July 2018

Appellant: (Applicant)	FUJITSU LIMITED 1-1, Kamikodanaka 4-chome Nakahara-ku Kawasaki-shi Kanagawa 211-8588 (JP)
Representative:	Haseltine Lake LLP Lincoln House, 5th Floor 300 High Holborn London WC1V 7JH (GB)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 11 May 2017 refusing European patent application No. 13874859.5 pursuant to Article 97(2) EPC**

Composition of the Board:

Chair	A. Ritzka
Members:	P. Cretaine
	D. Prietzel-Funk

Summary of Facts and Submissions

I. This appeal is against the decision of the examining division, posted on 11 May 2017, refusing European patent application No. 13874859.5 on the grounds of lack of inventive step (Article 56 EPC) having regard to the disclosure of

D1: WO 2007/111909.

II. Notice of appeal was received on 5 July 2017, and the appeal fee was paid on the same day. The statement setting out the grounds of appeal was received on 8 September 2017. The appellant requested that the decision be set aside and that a patent be granted on the basis of a main request or an auxiliary request, both as submitted with the statement setting out its grounds of appeal. As an auxiliary measure it requested oral proceedings.

III. With a letter dated 22 December 2017, the appellant requested acceleration of the appeal proceedings and provided reasons therefor.

IV. In a communication dated 18 January 2018, the board granted acceleration of the proceedings, and a summons to oral proceedings was issued on the same day.

V. In a communication pursuant to Article 15(1) RPBA issued on 9 May 2018, the board gave its preliminary opinion on the case. In its view, the subject-matter of claim 1 of the main request did not involve an inventive step (Article 56 EPC) having regard to the disclosure of D1, and the subject-matter of claim 1 of the auxiliary request did not involve an inventive step

(Article 56 EPC) having regard to the disclosure of D1 in combination with

D4: US 2009/0284485, already cited in the supplementary European search report.

VI. With a letter of response dated 25 June 2018, the appellant filed an amended main request and an amended auxiliary request to replace the previous requests.

VII. With a letter dated 24 July 2018, the appellant submitted a document comprising technical information related to the application.

VIII. Oral proceedings were held on 25 July 2018, during which the appellant submitted a new auxiliary request 2. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the main request or the auxiliary request submitted with the letter dated 25 June 2018 or of auxiliary request 2 submitted during the oral proceedings before the board. The board's decision was announced at the end of the oral proceedings.

IX. Claim 1 according to the main request reads as follows:

"A drive controlling apparatus (300) that drives a vibrating element (140) of an electronic device (100) including a display part (160), a top panel (120) disposed on a display surface side of the display part and having a manipulation input surface, a touch panel (150) integrated with or disposed below the top panel for detecting a position of a manipulation input performed on the manipulation input surface, and the vibrating element (140) for generating a vibration in

the manipulation input surface, the drive controlling apparatus comprising:
an amplitude modulator (320) configured to modulate an amplitude of a wave signal in an ultrasound-frequency-band in accordance with amplitude data, and to output the modulated wave signal as a driving signal to the vibrating element (140), the driving signal being used for driving the vibrating element (140), the wave signal generating a vibration in the ultrasound-frequency-band in the manipulation input surface which vibration is a natural vibration of the top panel (120), the amplitude data representing an amplitude of the driving signal; and
a drive controlling part (240) configured to output the amplitude data used for modulating the amplitude of the wave signal to the amplitude modulator and to drive the vibrating element (140) using the wave signal modulated by the amplitude data, the drive controlling part (240) configured to drive the vibrating element (140) by controlling the amplitude data so as to vary an intensity of the natural vibration in accordance with the position of the manipulation input performed onto the manipulation input surface and a temporal change degree of the position."

Claim 1 according to the auxiliary request is amended with respect to claim 1 of the main request by deletion of the feature defining the top panel as being "integrated with or disposed below the top panel" and by the addition at the end of the claim of the features "wherein the manipulation input surface has a rectangular shape having long sides and short sides in plan view" and "wherein the vibrating element (140) is disposed and extends along one of the short sides".

Claim 1 according to auxiliary request 2 is amended with respect to claim 1 of the auxiliary request by amendment of the last feature "wherein the vibrating element (140) is disposed and extends along one of the short sides" to "wherein the vibrating element (140) is disposed along only one of the short sides and extends along said one of the short sides".

Each request comprises a further independent claim (claim 9) directed to a corresponding drive controlling method.

Reasons for the Decision

1. Admissibility of the appeal

The appeal complies with Articles 106 to 108 EPC (cf. point II above) and is therefore admissible.

2. Prior art

D1 discloses a system comprising an aggregate planar touch surface comprising haptic devices (see page 11, lines 1 to 10; Figures 3 and 12). Each haptic device 104 comprises a touch surface 104a and a vibrating element 105. Each haptic device can further be equipped with a touch sensor for detecting a position of a user's finger on the touch surface (see page 16, second paragraph; Figures 3 and 7A). The vibrating element 105 is driven so as to generate a vibration in the touch surface 104a. The vibration is generated by a wave signal in an ultrasound frequency band (see page 3, second paragraph: "a vibrator for imparting ultrasonic vibration to the substrate") at a natural vibration of the touch surface (see page 11, third paragraph: "desirable that the system operate at resonance to

achieve high efficiency"; page 16, first paragraph: "the excitation voltage can be an amplitude-modulated sinusoid preferably with a frequency of oscillation substantially equal to the resonant frequency of the haptic device"). The wave signal is further amplitude-modulated so as to vary an intensity of the natural vibration in accordance with the position of the user's finger on the touch surface and a temporal change of this position (see page 3, second paragraph: "by modulating the amplitude of the ultrasonic vibrations in response to the sensed position and/or derivative thereof"). The vibrations imparted to the touch surface 104a and the subsequent modulation of the friction force between the touch surface and a finger touching it (see page 1, third paragraph; page 4, fifth paragraph) provide the user with virtual texture sensations as if the touch surface 104a were a surface as illustrated in Figures 10A to 10E, depending on the characteristics of the vibrations.

D4 discloses a large-scale haptic device (see Figures 1e, 1f and 2) having a touch surface and actuators placed on the sides of the device ("Piezo patch" in Figures 1e and 1f, "PP" in Figure 2) for vibrating the surface in higher resonant modes in an ultrasound frequency band in order to create a friction reduction effect on the touch surface (see the abstract; paragraphs [0003], [0030] and [0031]). The haptic device can be placed in front of a graphical display and co-operate with a fingertip position sensor for modulating the friction in response to the velocity and/or acceleration of the user's finger (see paragraphs [0011] and [0069]).

3. Main request

3.1 Admissibility

The main request was filed after the summons to oral proceedings. Since it only comprises slight amendments not involving any substantial change to the subject-matter of the claims with respect to the previous main request, the board has decided to admit it into the proceedings (Article 13(1) RPBA).

3.2 Article 56 EPC

3.2.1 The subject-matter of claim 1 differs from the arrangement disclosed in D1, comprising a single substrate 104, having a touch surface 104a, a corresponding vibrating element 105 and a position sensor shown in Figure 7A, only in that:
- a top panel having a manipulation input surface is integrated with or disposed on the substrate, and
- the vibration is a natural vibration of the top panel instead of a natural vibration of the substrate.

The board agrees with the examining division that disposing a top panel on the substrate 104 or integrating it with the substrate 104 of D1 is a straightforward way of solving the problem of protecting the touch surface of the substrate. The board also agrees with the examining division that, as the sensation perceived by the user in D1 results directly from the vibration of the surface touched by the user, the skilled person would logically further adapt the haptic device to let it vibrate at a resonance frequency (natural vibration) of the device part comprising the manipulation input surface, i.e. the top panel.

For these reasons, the board judges that the subject-matter of claim 1 does not involve an inventive step having regard to the disclosure of D1 (Article 56 EPC).

3.2.2 The appellant argued that D1 on page 11, second and third paragraphs, did not unambiguously disclose that the system vibrated at a resonance frequency. According to the appellant, this passage demonstrated that greater weight was given in D1 to the vibration being in the inaudible range, i.e. above 20kHz, than to its being at a resonance frequency. The board however holds that the feature of using a vibration at a resonance frequency is clearly anticipated not only by page 11, stating that "it is generally desirable that the system operate at resonance to achieve high efficiency", but also by page 16, lines 6 to 8, stating that "the excitation voltage can be an amplitude-modulated sinusoid preferably with a frequency of oscillation substantially equal to the resonant frequency of the haptic device".

The appellant further argued that the electronic device including a display panel, as defined in claim 1, being a smartphone, a tablet computer, an automobile touch screen or the like, a suitable haptic device based on the teaching of D1 and covering the whole of the display panel could only, due to the size of the haptic devices 104, be made of an array of haptic devices 104 as shown in Figure 12 of D1. According to the appellant, the resonance frequency defined in D1 was however the resonance frequency of an individual haptic device 104 and not the resonance frequency of the top panel covering the whole display as required by claim 1. Further according to the appellant, the skilled person would not consider increasing the size

of a haptic device 104 to fit the size of the display of the electronic device, since it was aware that the resonant frequency of a device decreased when its size increased and might thus fall within the audible frequency range, which the skilled person wanted to avoid. The board however is not convinced by these arguments. In that respect, it notes that claim 1 does not specify the size of the electronic device at all. Therefore, the device 104 with touch surface 104a disclosed in D1 falls fully within the definition of such an electronic device given in claim 1, except for the minor structural differences set out in point 3.2.1 above.

Another of the appellant's argument was that the amplitude data defined in claim 1 had to be interpreted, on the basis of Figure 7 and the associated description, as data including an amplitude value which was readable from a memory and transmitted to the amplitude modulator, which was not disclosed in D1. However, the board notes firstly that no memory is specified in claim 1 and secondly that the scaling factor V_G used in D1 for controlling the haptic device (see page 16, lines 11 to 22) is a computer-generated signal and as such *does* represent amplitude data read from a memory.

The appellant also argued during oral proceedings that it would not be obvious for the skilled person to put a protective top panel above the surface 104 of D1 and let the vibrating element vibrate it at one of its natural vibration frequencies. The reasons for this, according to the appellant, were that the vibrating element in D1 ("piezoelectric bending element"; 102 in Figure 4A) was bonded to the substrate of the touch surface ("passive support sheet or layer", 104 in

Figure 4A) and thus could not be easily separated from it in order to place it below the top panel. On the contrary, the touch panel in claim 1 being disposed below the top panel and not bonded to it, the vibrating element can be disposed between the two, as illustrated by Figure 3 of the application. The advantage of this configuration was, according to the appellant, that the touch panel with all its necessary electronic components did not have to be vibrated. The board is not convinced by this line of argument, at least because claim 1 comprises the wording "a touch panel integrated with or disposed below the top panel". In the case of the touch panel being integrated with the top panel, the advantage alleged by the appellant is not provided.

4. Auxiliary request

4.1 Admissibility

The auxiliary request was filed after the summons to oral proceedings. As it was filed in response to the introduction of new arguments based on the combination of D1 and D4 in the annex to the summons, the board has decided to admit it into the proceedings (Article 13(1) RPBA).

4.2 Article 56 EPC

4.2.1 With respect to claim 1 of the main request, claim 1 is amended by deletion of the feature:
- *the touch panel is integrated with or disposed below the top panel,*
and by addition of the features:

a) *the manipulation input surface has a rectangular shape having long sides and short sides in plan view,* and
b) *the vibrating element is disposed and extends along one of the short sides.*

Feature a) is already disclosed in D1 (see the manipulation input surface 104 in Figure 3).

As to feature b), the board considers that it means that the vibrating element has some extent in the specified direction, namely a short side of the manipulation input surface, whereas in D1 the vibrating element 105 is disposed below the centre of the manipulation input surface 104a (see Figure 3). The technical effect achieved by this distinguishing feature is that the vibration imparted to the manipulation input surface is generated from the side of the surface, not from its centre. In the board's view, since claim 1 is silent about the size of the surface, the objective technical problem can be seen merely as how to find a structural alternative to the device of D1. The skilled person would find such an alternative structure in D4 (see vibrators PP in Figure 2 and paragraph [0030]) and so would apply it, as an alternative, to the device 104 of D1 without the exercise of inventive skill.

Therefore, the subject-matter of claim 1 does not involve an inventive step having regard to the disclosure of D1 in combination with D4 (Article 56 EPC).

4.2.2 The appellant argued as follows:
Feature b) should be interpreted, on the basis of the description (see page 7, second paragraph, and Figure

2), as specifying that the vibrating element extended along all or substantially the full extent of the short side. This was contrary to the teaching of D1, where the vibrating element was positioned in the centre of the surface (Figure 4A and 4B) or several vibrating elements were used in the tile arrangement of Figure 12, and also contrary to the teaching of D4, where vibrators PP were positioned at the corners of the surface, as shown on Figure 4. As a consequence, the structure shown in Figure 2 of the application, with a single vibrating element along almost all the short side of the manipulation input surface, enabled the surface to be vibrated in one mode, the m x 1 mode as illustrated in Figure 4 of the application. In contrast, the structure of D4, with several vibrating elements PP, was dedicated to providing vibrations in an m x N mode, with m and N both greater than 1 (see paragraph [0013]), as illustrated by the nodal lines NL in Figures 2, 4 and 1e. Also in contrast, the structure of D1 was limited to providing a 1 x 1 mode, as illustrated in Figures 4A and 4B, or a m x N mode when the tile arrangement of individual surfaces of Figure 12 was used. The appellant further relied on paragraph [0052] of D4, which stated that the five acceptable m x N vibration modes, providing both an inaudible frequency and a strong friction reduction effect, were only modes having m and N both greater than 1. It argued that using a single vibrating element along one side was a cost- and energy-efficient solution to providing a wave along one dimension of the surface, i.e. the m x 1 mode. As a further argument, it disputed that D4 disclosed an amplitude modulation of the vibration based on the position and velocity of the finger touch on the surface, so that a combination of D1 with D4 would not lead, at least for that reason, to the subject-matter of claim 1.

The board is not convinced by this set of arguments. First, it considers that the wording "extends along one of the short sides" in claim 1 is clear in itself, without the need to rely on the description for interpretation, and that a vibrating element like the piezo patch shown in Figure 1e of D4 and having a length of one-third of the short side falls under this definition. Secondly, the skilled person would be incited to combine the teachings of D1 and D4, since D4 explicitly refers to D1 in paragraphs [0011] and [0030] with respect to the amplitude modulation applied to the vibrating element driving signal. Thirdly, the TABLE in paragraph [0052] of D4 teaches the skilled person that a 6 x 1 vibration mode provides a vibration amplitude as high as other m x N modes quoted as acceptable, at an inaudible vibration frequency above 20kHz. D4 further does not teach the skilled person away from taking a single vibrating element (see paragraph [0054], last sentence).

5. Auxiliary request 2

This request was filed during the oral proceedings before the board. Its claim 1 differs from claim 1 according to the auxiliary request in that the vibrating element is disposed along only one of the short sides of the manipulation surface. The appellant argued that the introduction of this feature was intended to overcome the inventive step objection raised against the auxiliary request, by clearly distinguishing the subject-matter of claim 1 from the disclosure of D1, where several vibrating elements were disposed along each short side of the tile arrangement shown in Figure 12.

The board decided in oral proceedings not to admit this request into the proceedings (Article 13 RPBA) because it was late-filed and had no substantial prospect of success. In that respect the board noted that D4 did disclose having a single vibrating element along only one of the short sides of the surface (see Figure 1f and paragraph [0024], last sentence).

6. Conclusion

The main request and the auxiliary request are not allowable under Article 56 EPC. Auxiliary request 2 is not admitted under Article 13 RPBA.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chair:

K. Götz-Wein A. Ritzka

Decision electronically authenticated