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Datasheet for the decision of 2 April 2019

Case Number: T 0576/14 - 3.5.04

Application Number: 06755938.5

Publication Number: 1883901

IPC: G06T5/00, H04N5/21

Language of the proceedings: EN

Title of invention:
Antialiasing system and method

Applicant:
ATI Technologies Inc.

Headword:

Relevant legal provisions:
EPC 1973 Art. 56
EPC Art. 123(2)

Keyword:
Amendments - added subject-matter - main and first auxiliary requests (yes)
Inventive step - second and third auxiliary requests (no)

Decisions cited:

Catchword:

Europäisches Patentamt
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Office européen des brevets

Beschwerdekammern

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Case Number: T 0576/14 - 3.5.04

D E C I S I O N
of Technical Board of Appeal 3.5.04
of 2 April 2019

Appellant: (Applicant)	ATI Technologies Inc. One Commerce Valley Drive East Markham, ON L3T 7X6 (CA)
Representative:	Robinson, David Edward Ashdown Marks & Clerk LLP 1 New York Street Manchester M1 4HD (GB)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 11 October 2013 refusing European patent application No. 06755938.5 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	C. Kunzelmann
Members:	R. Gerdes
	B. Müller

Summary of Facts and Submissions

I. The appeal is against the decision to refuse European patent application No. 06 755 938.5, published as international application WO 2006/126093 A2.

II. The examining division refused the patent application on the grounds of lack of clarity of the independent claims of the then main request and lack of inventive step of the subject-matter of these claims in view of, *inter alia*, the following document:

D4: US 2003/0158886 A1

The independent claims of the then auxiliary request were found to contravene Articles 84 and 123(2) EPC. In addition, it was held that the claimed subject-matter lacked inventive step.

III. The applicant/appellant filed notice of appeal against this decision. With its statement of grounds of appeal, it submitted claims of amended main and auxiliary requests. It also requested remittance to the department of first instance "Insofar as allowance of any set of claims to overcome the contested Decision would leave requirements of the EPC yet undecided".

IV. The board issued a summons to oral proceedings expressing its preliminary opinion on the then valid set of claims.

V. The appellant replied with a letter dated 2 March 2019 and submitted amended claims according to a main request and first to third auxiliary requests replacing the claims then on file.

VI. Oral proceedings were held before the board on 2 April 2019. The appellant requested that the decision under appeal be set aside and that a European patent be granted on the basis of the claims according to the main request or, in the alternative, the first, second or third auxiliary request, all requests filed with the letter of 2 March 2019, or that the case be remitted to the department of first instance for further prosecution.

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

"A system (100) comprising:

at least one driver (106) configurable to receive video data from a video application (102) and in response transmit commands and data;

a plurality of video processing units (VPUs) (108,110) coupled to the at least one driver, and configured to receive commands and data from the at least one driver for processing the video data from the video application, wherein the commands include different antialiasing commands issued to each of the VPUs directing each of the VPUs to perform different antialiasing operations on the video data."

VIII. Claim 1 of the first auxiliary request reads as follows (amendments to claim 1 of the main request are underlined):

"A system (100) comprising:

at least one driver (106) configurable to receive video data from a video application (102) and in response transmit commands and data;

a plurality of video processing units (VPUs) (108,110) coupled to the at least one driver, and configured to receive commands and data from the at least one driver for processing the video data from the video application in a single pass, wherein the commands include different antialiasing commands issued to each of the VPUs directing each of the VPUs to perform different antialiasing operations on a same set of the video data;

wherein each VPU includes a processing pipeline that process the video data for display on a display device, wherein the video data for display is transmitted for combination in linear space of the different antialiasing commands."

IX. Claim 1 of the second auxiliary request has the following wording:

"A system (100) comprising:

at least one driver (106) configurable to receive video data from a video application (102) and to transmit commands and data for processing the video data to a plurality of video processing units (VPUs) coupled to the at least one driver;

the plurality of video processing units (VPUs) (108,110) coupled to the at least one driver configured to receive commands and data from the at least one driver for processing the video data from the video application, wherein the commands include different antialiasing commands issued to each of the VPUs directing each of the VPUs to perform the different

antialiasing operations on a same set of the video data in parallel in a single pass;

wherein each VPU includes a processing pipeline that processes the video data for display on a display device, wherein output data of the different antialiasing operations is in a linear space and each VPU is configured to transmit to a compositor the output data for combination."

X. Claim 1 of the third auxiliary request reads as follows (amendments with respect to claim 1 of the second auxiliary request underlined and deletions indicated by strikethrough):

"A system (100) comprising:

at least one driver (106) configurable to receive video data from a video application (102) and to transmit commands and the video data ~~for processing the video data~~ to a plurality of video processing units (VPUs) coupled to the at least one driver;

the plurality of video processing units (VPUs) (108,110) coupled to the at least one driver configured to receive commands and the video data from the at least one driver for processing the video data from the video application, wherein the commands include different antialiasing commands issued to each of the VPUs directing each of the VPUs to perform the different antialiasing operations on a same set of the video data in parallel in a single pass;

wherein each VPU includes a processing pipeline that processes the video data for display on a display device, wherein output data of the different

antialiasing operations is in a linear space and each VPU is configured to transmit to a compositor the output data for combination; and

an interlink module (112) coupled to each of the plurality of VPUs (108,110), wherein the interlink module (112) comprises the compositor and is configurable to combine the output data of the different antialiasing operations performed on the video data to generate frame data to be displayed."

XI. The appellant's arguments, as far as relevant to the present decision, may be summarised as follows:

The feature "at least one driver (106) configurable to receive video data ... and in response transmit commands and data" in claim 1 of the main request and the first auxiliary request was implicitly disclosed in the application. As could be seen from figure 1 a driver 106 transmitted data to two video processing units (VPUs). The data was received by the driver 106 from the application 102 via API 104. The driver would not transmit the data to the VPUs if it had not received data from the application 102. In this sense, there was at least one driver that transmitted commands and data in response to receiving video data from a video application.

At the oral proceedings, the appellant gave the following explanations, when asked about the meaning of expressions in claim 1 of the second auxiliary request. The term "data" in lines 5 and 9 of claim 1 was to be understood as referring to video data to be processed in the VPUs or parameters determining the operation of the VPUs. The phrase "configured to receive commands and data from the at least one driver" in lines 9

and 10 of claim 1 further specified the "plurality of video processing units (VPUs) (108,110)" of line 8. In the meaning of the application, the wording "different antialiasing commands" (see line 11) included different anti-aliasing operations such as super-sampling and multi-sampling, the same anti-aliasing operations performed on different data or the same anti-aliasing operation performed on the same data with different parameters. The reference to a "same set of video data" (line 13) did not mean that the data were identical. The expression indicated that the data were coherent, which was confirmed by the subsequent feature specifying that the processed data were combined. The compositor (see line 17) could, for example, combine the video data by multiplexing or averaging.

Regarding inventive step in relation to the subject-matter of claim 1 of the second and third auxiliary requests, the appellant argued that D4 did not disclose a combination of the VPU output data "in linear space". It also did not disclose that a "degamma-operation" was carried out in the VPUs before outputting the data for combination when this operation could alternatively be carried out in the compositor. Using the VPUs for this purpose implied that the operation was carried out by multiple VPUs in parallel using dedicated processing units. Therefore, the distinguishing features resulted in speedy processing. The skilled person would not have considered performing such processing in the VPUs.

In its letter dated 2 March 2019 (see pages 2 to 4), the appellant also argued that D4 did not disclose a driver as meant in claim 1. The master pipeline of D4 was to be distinguished from a driver for a plurality of video processing units.

Reasons for the Decision

1. The appeal is admissible.

The invention

2. The present application concerns a system and method for performing graphics and video processing on video data that is to be rendered to a display. The system employs a plurality of specialised coprocessors termed "video processing units" (VPUs) to perform anti-aliasing operations on video data generated by an application such as a video game. The application interfaces with a driver, which instructs the VPUs to perform the anti-aliasing operations such as multi-sampling or super-sampling. The plurality of VPUs can be configured for generating different samples of each pixel which may be processed in parallel (see present application as filed, page 2, lines 1 to 16, and page 9, lines 2 to 18).

The video data processed by the VPUs are supplied to a compositor for combination, which in some embodiments implies averaging the multiple samples generated by the VPUs. The output data of the VPUs may be supplied "in linear space" to the compositor which means that a gamma operation carried out on the data is reversed in the VPUs prior to outputting the data (see pages 12, line 1, to page 14, line 12).

Main and first auxiliary requests

3. According to Article 123(2) EPC, a European patent application may not be amended in such a way that it contains subject-matter which extends beyond the

content of the application as filed. The relevant criterion is what the skilled person would derive directly and unambiguously, using common general knowledge, and seen objectively and relative to the date of filing, from the whole of the description, claims and drawings as filed (see Case Law of the Boards of Appeal of the European Patent Office, 8th edition, 2016, section II.E.1.2).

3.1 In the present case, upon appeal the appellant amended claim 1 of the main request and claim 1 of the first auxiliary request to specify "at least one driver (106) configurable to receive video data from a video application (102) and in response transmit commands and data" (underlining by the board).

3.2 The wording "in response" is understood to mean that the transmission of commands and data by the driver is triggered by the reception of video data, meaning that there is a direct causality between the reception of the video data and the transmission of commands and data.

3.3 The present application as originally filed discloses that commands and data are transmitted by the driver to the VPUs (see claims 2, 14 and page 10, lines 3 to 11 and 18 to 26). However, there is no explicit disclosure that the transmission is triggered by the reception of video data.

3.4 The feature is also not implicitly disclosed in the application. Figure 1 and the passage on page 17, lines 23 to 26, only disclose that the VPUs receive commands and data from the driver. However, there is no disclosure of when and in response to what the commands and data are transmitted to the VPUs.

3.5 The appellant argued that the driver would not transmit commands and data to the VPUs if it had not received video data from the application. This might be correct, but it only specifies a necessary condition for transmitting commands and data to the VPUs. There may be further conditions that need to be fulfilled before the commands and data may be transmitted to the VPUs. These further conditions could, for example, be a specific command issued by the video application or an end-of-frame identifier included in the video data.

3.6 Hence, claim 1 of the main request and claim 1 of the first auxiliary request contain subject-matter extending beyond the content of the application as filed and therefore contravene Article 123(2) EPC.

Second auxiliary request

4. It is common ground that D4 may be considered the closest prior art for the subject-matter of claim 1 of the second auxiliary request.

4.1 The board has doubts whether the broad interpretation of the wording of claim 1 made by the appellant at the oral proceedings is justified (see point XI, third paragraph). It may be questioned whether the feature of "directing each of the VPUs to perform the different anti-aliasing operations on a same set of video data in parallel in a single pass" can be interpreted such that the data only need to be "coherent" and not identical. However, for the purposes of this decision, it is irrelevant whether this broad interpretation or a narrower interpretation requiring identical data is adopted. Hence, for the assessment of inventive step and in favour of the appellant, the board will in the

following base its reasons on the narrow interpretation of claim 1.

4.2 D4 discloses a system (see figure 3) comprising:

at least one driver (see figures 5 and 6: 179, 216, 227) configurable to receive video data from a video application (figure 3: 17) and to transmit commands and data for processing the video data to a plurality of video processing units (figure 3: 56 to 59) coupled to the at least one driver (see also paragraphs [0057] to [0060]);

the plurality of video processing units coupled to the at least one driver configured to receive commands and data from the at least one driver for processing the video data from the video application, wherein the commands include different anti-aliasing commands issued to each of the VPUs directing each of the VPUs to perform the different anti-aliasing operations on a same set of the video data in parallel in a single pass (see the "jitter mode" described in paragraphs [0099] to [0114]).

D4 also discloses that each VPU includes a processing pipeline that processes the video data for display on a display device (see figure 6: 199 and paragraph [0060]), wherein each VPU is configured to transmit to a compositor (see figure 3: 76) the output data for combination (see paragraphs [0101], [0106] and [0107]).

4.3 The board accepts the appellant's argument that D4 does not specify whether the output of the VPUs is "in linear space" or "in gamma space", i.e. there is no indication whether gamma-corrected data or linear data

are output to the compositor. Consequently, D4 does also not disclose that the combination of the VPU output data is performed "in linear space".

The appellant also argued in its letter dated 2 March 2019 (see pages 2 to 4) that D4 did not disclose a driver as meant by claim 1 and "processing ... in a single pass ... different antialiasing operations on a same set of the video data". However, the board regards the device dependent layers (DDX) 179 and 216 as well as the Open GL drivers DD 227 of figures 5 and 6 of D4 as implementing the functionality of a driver (see figures 5 and 6, together with paragraphs [0057] and [0060]). In the "jitter mode", processing is also carried out in a single pass and on a same set of data (see paragraphs [0103] to [0105]).

The appellant also argued that the person skilled in the art would have considered the "super-sampling mode" of D4 instead of the "jitter mode" of the same document when contemplating the combination of anti-aliased video data. However, the "jitter mode" of D4 is a special case of anti-aliasing which the person skilled in the art would have considered since it involves averaging several data samples for one pixel (see paragraph [0107]).

4.4 The outputting of the data from the VPUs in linear space indirectly allows for a correct averaging operation in the compositor providing improved contrast when displaying the anti-aliased images. The appellant argued that, in addition, the distinguishing features resulted in a higher processing speed. Conventional VPUs normally generated gamma-corrected output data (see present application, page 12, lines 1 to 13) and

therefore a reversal of the gamma correction ("degamma operation") was necessary before the averaging of data in the compositor. According to the invention and claim 1, this reversal was carried out in the VPUs before outputting the data for combination. In the VPUs, this operation could be carried out at a higher speed than in the compositor because of their higher processing power and parallel operation.

The board accepts that the degamma operation can be carried out in the VPUs or alternatively in the compositor prior to averaging. The board also agrees that in general there may be an advantage in speed if the degamma operation is performed in parallel in the VPUs, even if this advantage depends on the circumstances such as processor load.

Hence, starting from D4, the objective technical problem is how to improve the contrast of the displayed images and how to perform the necessary operations in a speedy manner.

4.5 In the present case, the skilled person starting from D4 would inevitably have become aware of the necessity to combine pixel values in linear space when comparing the displayed frames with frames generated similarly, for example, according to the prior art example in D4, figure 1. It also was part of the skilled person's common general knowledge that an averaging operation of pixel data (as in D4, paragraph [0107]) had to be performed in linear space, which is, for example, confirmed by the present application (see page 12, lines 1 to 14). Finally, it was well known that image data had to be gamma-corrected to provide optimal contrast for display. Hence, the skilled person would have considered performing the averaging in linear

space and converting the signal to be displayed in gamma space.

4.6 The skilled person would also have considered outputting the pixel values in linear space from the VPUs because the speed advantages of parallel and dedicated processors were well known to the skilled person and are referred to in D4 (see figures 1 and 3). Hence, the person skilled in the art would have arrived at the invention without inventive skill when starting from D4.

4.7 As a consequence, the subject-matter of claim 1 of the second auxiliary request does not involve an inventive step (Article 56 EPC 1973).

Third auxiliary request

5. When compared with claim 1 of the second auxiliary request, in claim 1 of the third auxiliary request, all references to "data" have been replaced with "video data". In addition, the claim has been amended to specify an interlink module (112) which comprises the compositor and is configurable to combine the output data of the different anti-aliasing operations performed on the video data to generate frame data to be displayed.

5.1 These amendments do not change the reasoning regarding inventive step as set out in section 4 above. The specification of an "interlink module" comprising the compositor only introduces a further structural element; it does not imply any additional functionality. The combination of the video data to generate frame data to be displayed and the transmission of video data from the driver to the VPUs

were implicitly considered as being part of claim 1 of the second auxiliary request.

5.2 The appellant did not provide arguments to counter this reasoning.

5.3 Hence, the subject-matter of claim 1 of the third auxiliary request lacks an inventive step in view of D4 and the common general knowledge of the person skilled in the art (Article 56 EPC 1973).

Remittal

6. The appellant's further request that the case be remitted to the department of first instance for further prosecution has no object since all requests concerning the substance of the case have been found to be unallowable (Article 111(1) EPC 1973).

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

K. Boelicke C. Kunzelmann

Decision electronically authenticated