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Datasheet for the decision of 23 June 2020

Case Number: T 1632/15 - 3.5.04

Application Number: 06251681.0

Publication Number: 1708496

IPC: H04N5/335, H04N3/15

Language of the proceedings: EN

Title of invention:
Identifying a photoelectric sensor array size

Applicant:
Teledyne e2v (UK) Limited

Headword:

Relevant legal provisions:
EPC 1973 Art. 56, 84

Keyword:
Claims - clarity - main and auxiliary request (no)
Inventive step - main and auxiliary request (no)

Decisions cited:

Catchword:

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Beschwerdekammern

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Case Number: T 1632/15 - 3.5.04

D E C I S I O N
of Technical Board of Appeal 3.5.04
of 23 June 2020

Appellant: (Applicant)	Teledyne e2v (UK) Limited 106 Waterhouse Lane Chelmsford Essex CM1 2QU (GB)
Representative:	HGF 1 City Walk Leeds LS11 9DX (GB)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 17 March 2015 refusing European patent application No. 06251681.0 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	C. Kunzelmann
Members:	B. Willems
	B. Müller

Summary of Facts and Submissions

I. The appeal is against the decision of the examining division dated 17 March 2015 refusing European patent application No. 06 251 681.0, which was published as EP 1 708 496 A2.

II. The documents cited in the decision under appeal include the following:

D6: US 6,404,854 B1.

III. The decision under appeal was based on the ground that the subject-matter of claim 1 of the main and the auxiliary request then on file lacked inventive step over the disclosure of D6 combined with the common general knowledge of the person skilled in the art (Article 56 EPC).

IV. The applicant (hereinafter: appellant) filed notice of appeal. With the statement of grounds of appeal, the appellant submitted claims according to an auxiliary request. It requested that the decision under appeal be set aside and that a European patent be granted on the basis of the claims of the main request which formed the basis for the decision under appeal or the claims of the auxiliary request filed with the statement of grounds of appeal. The appellant indicated a basis for the claims in the application as filed and provided arguments as to why the claims met the requirements of Article 56 EPC.

V. The board issued a summons to oral proceedings. In a communication under Article 15(1) RPBA (Rules of Procedure of the Boards of Appeal, OJ 2007, 536),

annexed to the summons, the board introduced documents D9 (US 2004/0150730 A1) and D10 (US 5,367,337 A) into the proceedings and gave the following provisional opinion:

- Claim 1 of the main request and the auxiliary request did not meet the requirements of Article 84 EPC 1973, because the meanings of the essential features were not clear from the claim in itself.

- Neither claim 1 of the main request nor claim 1 of the auxiliary request met the requirements of Article 56 EPC 1973, because the claimed subject-matter lacked inventive step over the disclosure of D6 combined with the common general knowledge of the person skilled in the art.

VI. The appellant did not file amendments or comments in response to the board's communication. By letter dated 4 May 2020, the appellant withdrew its request for oral proceedings.

VII. The board notified the appellant that the oral proceedings to be held on 18 November 2020 had been cancelled.

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

"Size determining means arranged to determine a size of a sensor array by determining a number of pixels (111) in at least one dimension of a sensor array (10) of photoelectric devices, comprising:

a. readout register means (12) for receiving charge accumulated in the sensor array;

b. clock means arranged to apply clock cycle pulses to the readout register means to read out accumulated charge from the readout register for a predetermined number of clock cycles known to exceed a number of pixels in the at least one dimension of the sensor array;

characterised by:

c. discontinuity detection means arranged to determine a first discontinuity (22) in the readout charge, representing a last active pixel (111) in the at least one dimension of the sensor array; and

d. counter means to count clock cycles between a first active pixel (112) and the first discontinuity (22) to determine a number of active pixels in the at least one dimension of the sensor array."

IX. Claim 1 of the auxiliary request differs from claim 1 of the main request by the addition of the following feature at the end of the claim before the full stop:

"e. comparison means arranged to use the determined number of pixels to identify a type of the sensor array from a predetermined set of array types".

X. The examining division's objections, where relevant to the present decision, may be summarised as follows:

(a) D6 was the closest prior art for the assessment of inventive step (see decision under appeal, point 4.1).

(b) The problem to be solved might be identified as how to provide an alternative method for determining

the size of the sensor (see decision under appeal, points 4.1.4 and 4.1.5).

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

(a) The claimed apparatus differed from the disclosure of D6 in that the former comprised means applying a predetermined number of clock cycles known to exceed a number of pixels in the at least one dimension of the sensor array, discontinuity detection means and means for counting clock cycles between a first active pixel and the first discontinuity (see statement of grounds of appeal, page 3).

(b) The features identified in point XI(a) above were not technically non-functional modifications which were irrelevant to inventive step. It had not been shown that they belonged to the common general knowledge of the person skilled in the art (see statement of grounds of appeal, page 5, second complete paragraph and page 6, penultimate paragraph).

Reasons for the Decision

1. The appeal is admissible.

2. *Claim 1 of the main request and the auxiliary request - clarity (Article 84 EPC 1973)*

2.1 Claims must be clear in themselves when read by the person skilled in the art, without any reference to the content of the description. The meaning of the

essential features should be clear for the person skilled in the art from the wording of the claim alone (see Case Law of the Boards of Appeal of the European Patent Office, 9th edition 2019, II.A.3.1).

2.2 Claim 1 of both requests specifies means for determining the size of a sensor comprising a clock for applying clock pulses to a readout register "*for a predetermined number of clock cycles known to exceed a number of pixels*" in at least one dimension of the sensor array.

For an arbitrary sensor it is impossible to determine the number of clock cycles exceeding the number of pixels or the number of lines, since this presupposes that the sensor size is known.

According to the description, the sentence bridging pages 9 and 10, the "*plurality of clock cycles [...] exceeds a supposed maximum number of pixels/line for the subject CCD array, e.g. for a known dental x-ray sensor CCD family*". Thus, the means for determining the size selects a size from known sizes of CCDs of a "*family*", and the number of clock cycles exceeds the size of the largest sensor in the family.

2.3 Claim 1 of the main and the auxiliary request specifies

"*discontinuity detection means arranged to determine a first discontinuity (22) in the readout charge, representing a last active pixel (111) in the at least one dimension of the sensor array*".

In neither request does claim 1 specify any characteristics of a discontinuity representing a last active pixel in the at least one dimension of the

sensor array, i.e. the last active pixel in a line or the last active line. Therefore, it is not clear what the criteria are for determining whether the discontinuity represents the last active pixel or last active line.

According to the description, page 10, lines 2 to 8, "*virtual pixels*" gaining dark current charge during their passage through the readout register are read by applying clock cycles exceeding the maximum number of pixels. Discontinuities are detected by subtracting a moving average from the instantaneous signal (see page 10, lines 12 and 13).

Subtracting a moving average from the instantaneous signal enables detection of a transition from image pixels to blank pixels (see page 10, lines 31 to 33) but does not make it possible to distinguish between "*virtual pixels*" and defective (dark) pixels in the array.

Moreover, the phrase "*active pixel*" is not defined in the claim. It seems to denote pixels which, in contrast to run-off pixels, generate charge from illumination (see page 11, lines 18 to 20). Since run-off pixels collect dark current, further discontinuities may be detected at the end of a pixel line (see page 11, lines 20 to 22). Therefore, it is not clear how "*run-off*" pixels may be distinguished from "*virtual pixels*".

2.4 Claim 1 of both requests specifies

"*counter means to count clock cycles between a first active pixel (112) and the first discontinuity (22) to*

determine a number of active pixels in the at least one dimension of the sensor array".

The part of claim 1 preceding the part quoted above does not specify how a first active pixel is detected. According to the paragraph bridging pages 10 and 11, clock cycles are counted between a first discontinuity indicating a transition from blank elements to image elements and a second transition from image elements to blank elements. Thus, a first active pixel is determined by detecting a transition from blank elements to pixel elements.

2.5 The detection of the first active pixel and the detection of the last active pixel are essential features, since any errors in the detection of these pixels would lead to erroneous counting of clock cycles and thus to an erroneous identification of the sensor.

2.6 In view of the above, in neither request does claim 1 meet the requirements of Article 84 EPC 1973, because the meanings of the essential features are not clear from the claim.

3. *Claim 1 of the main request and the auxiliary request - inventive step (Article 56 EPC 1973)*

3.1 The board agrees with the examining division that D6 may be identified as the closest prior art for the assessment of inventive step (see point X(a) above).

3.2 It was not disputed that D6 discloses a sensor array of photoelectric devices comprising a readout register for receiving charge accumulated in the sensor array and clock means for applying clock cycle pulses to the readout register to read out accumulated charges (see

decision under appeal, point 4.1 and statement of grounds of appeal, page 3).

3.3 Document D6, column 5, lines 22 and 23 discloses that the actual size of the imaging area may be identified on the sensor capsule. D6, column 5, lines 42 to 44 discloses that for a dental application two sensors with different dimensions, specified in mm, are provided. Reading these passages in conjunction, it seems to be left open whether the size indicated on the sensor capsule is expressed in mm or - as is common for sensors - in pixels per line and lines per frame.

3.4 The board agrees with the appellant that the claimed apparatus differs from the disclosure of D6 in that the former comprises means applying a predetermined number of clock cycles known to exceed a number of pixels in the at least one dimension of the sensor array, discontinuity detection means and means for counting clock cycles between a first active pixel and the first discontinuity (see point XI(a) above).

3.5 The board shares the appellant's view that the features identified in point 3.4 above are not technically non-functional modifications which are irrelevant to inventive step (see point XI(b) above).

Rather, when interpreted (in favour of the appellant) as meaning that the counted clock cycles correspond to the actual size of the imaging area, these features achieve the technical effect that the actual size of the imaging area can be determined by counting pixels.

Therefore, the problem to be solved may be identified as how to provide an alternative method for determining the size of the sensor (see also point X(b) above).

3.6 Document D9, paragraph [0062] discloses an image sensor with effective (active) pixels and dummy pixels for light-shield (dark current) outputs. Figures 16(A) and 16(B) illustrate the fact that the length of a line in the sensor can be expressed as the number of (pixel) clock cycles between successive shift signals (see, for instance, paragraph [0111]).

Document D10 discloses a method for determining the format of a picture captured by an image sensor and output on a monitor (see column 3, lines 21 to 43). The horizontal line length is determined by constructing a histogram of all the line lengths (duration between sync pulses) and then selecting the length which is most common (see paragraph bridging columns 12 and 13). A full horizontal line length is the consecutive set of samples between the leading edges of two consecutive sync pulses (see column 13, lines 25 to 33).

Thus, documents D9 and D10 demonstrate the common general knowledge of the person skilled in the art that the length of a line in an image can be determined by measuring the number of pixel clock signals between pulses designating the beginning and the end of the line. The claimed discontinuity and first active pixel are obvious choices for marking the beginning and the end of a line.

3.7 Claim 1 of the auxiliary request further specifies comparison means using the number of pixels to identify the sensor type. The person skilled in the art would readily compare the counted clock cycles with known line sizes to determine the sensor type.

3.8 In view of the above, the board concludes that in neither request does claim 1 meet the requirements of Article 56 EPC 1973, because the claimed subject-matter lacks inventive step over the disclosure of D6 combined with the common general knowledge of the person skilled in the art.

4. Since neither of the appellant's requests is allowable, the appeal is to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

K. Boelicke C. Kunzelmann

Decision electronically authenticated