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**Datasheet for the decision
of 10 August 2017**

Case Number: T 2432/12 - 3.5.02

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Language of the proceedings: EN

Title of invention:

Particle detector, system and method

Applicant:

Xtralis Technologies Ltd

Relevant legal provisions:

EPC Art. 56, 84

Keyword:

Inventive step - (no) - main request and first to third
auxiliary requests
Claims - functional features (yes) - first and second auxiliary
requests



Beschwerdekammern
Boards of Appeal
Chambres de recours

European Patent Office
D-80298 MUNICH
GERMANY
Tel. +49 (0) 89 2399-0
Fax +49 (0) 89 2399-4465

Case Number: T 2432/12 - 3.5.02

D E C I S I O N
of Technical Board of Appeal 3.5.02
of 10 August 2017

Appellant: Xtralis Technologies Ltd
(Applicant) 2nd Floor
One Montague Place
Nassau (BS)

Representative: McGlashan, Graham
Marks & Clerk LLP
Atholl Exchange
6 Canning Street
Edinburgh EH3 8EG (GB)

Decision under appeal: **Decision of the Examining Division of the European Patent Office posted on 28 June 2012 refusing European patent application No. 05803201.2 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman R. Lord
Members: H. Bronold
J. Hoppe

Summary of Facts and Submissions

- I. The appeal lies from the decision of the examining division refusing European patent application No. 05 803 201.2 *inter alia* for lack of inventive step and lack of clarity.
- II. Oral proceedings were held before the board on 10 August 2017. The appellant requested that the impugned decision be set aside and that a patent be granted on the basis of the claims of the main request, filed with the statement setting out the grounds of appeal, or if that was not possible, on the basis of the claims of the first auxiliary request, filed with the statement setting out the grounds of appeal, or on the basis of the claims of the second auxiliary request, filed as fourth auxiliary request with the statement setting out the grounds of appeal, or on the basis of the claims of the third auxiliary request, filed with letter dated 10 July 2017.
- III. The following document cited by the examining division is relevant for this decision:

D1: JP H11-339150 A
- IV. In a communication under Article 15(1) RPBA the board had informed the appellant that it had doubts whether the subject-matter of claim 1 according to the main request involved an inventive step with regard to the disclosure of document D1 in combination with the common general knowledge of the person skilled in the art. The communication further set out the preliminary opinion of the board that the first and fourth

(currently second) auxiliary requests were not clear in the sense of Article 84 EPC. A human-made translation of document D1 into English was annexed to that communication.

V. Independent claim 1 of the main request reads:

"A method of detecting particles (30) comprising: emitting a modulated beam (29) of radiation into a monitored region (12), and; capturing a plurality of images of the region (12) with image capturing means (14); detecting a variation in the images of the region (12) such that the variation in images indicates the presence of particles (30); said method being characterised in that the steps of emitting and capturing comprise: reducing an "ON" period of the modulated beam (29) of radiation in which the beam is emitted by a factor of N, and decreasing an exposure period of the image capturing means (14) during which an image is captured by a factor of N in accordance with an increase in power level of the emitted beam by a factor of N (29) to suit an increase in ambient lighting level by N times."

Independent claim 15 relates to a corresponding system for detecting particles.

VI. Independent claim 1 of the first auxiliary request differs from claim 1 of the main request in the following additional feature:

" so that particle detection sensitivity stays the same."

Independent claim 15 relates to a corresponding system for detecting particles.

VII. Independent claim 1 of the second auxiliary request differs from claim 1 of the first auxiliary request essentially in the following additional features:

"...determining an "ON" period of the modulated beam (29) of radiation in which the beam is emitted, and an exposure period of the image capturing means (14) during which an image is captured in accordance with a relationship with the varying power level of the emitted beam (29) to suit ambient lighting conditions".

Independent claim 15 relates to a corresponding system for detecting particles.

VIII. Independent claim 1 of the third auxiliary request differs from claim 1 of the main request in the following additional features:

" and wherein the detected variation is an increase in scattered radiation intensity, and the increase in scattered radiation intensity is assessed with reference to a threshold value."

Independent claim 15 relates to a corresponding system for detecting particles.

IX. The arguments of the appellant relevant for this decision can be summarised as follows:

Main request

The subject-matter of claim 1 differed from the disclosure of document D1 in the following features "reducing an "ON" period of the modulated beam (29) of

radiation in which the beam is emitted by a factor of N, and decreasing an exposure period of the image capturing means (14) during which an image is captured by a factor of N in accordance with an increase in power level of the emitted beam by a factor of N (29) to suit an increase in ambient lighting level by N times." These features were interlinked and provided synergistic effects, namely to adapt to an increase of the ambient lighting level and at the same time to avoid saturation of the image capturing means, thereby providing improved uniformity of detection. Moreover, the system according to document D1 was completely different from the claimed method and system. According to D1 beam patterns in images were to be detected. In contrast to this, the application related to the detection of scattered light. The application was further not concerned with photographic aspects such as contrast or aperture. The same applied to independent system claim 15.

First and second auxiliary requests

The additional features of claims 1 and 15 according to the first and second auxiliary requests indicated the technical effect provided by the four identified different technical features over the disclosure of document D1 and specified the synergistic effect of those features.

Third auxiliary request

Document D1 related to a beam shape detector, as was clear from figures 3, 4, 7 and 8. The detected pattern was an arrangement of straight beams or intersections of beams, respectively. Thus, D1 did not teach to

detect an increase of scattered light. Further, D1 disclosed no threshold for scattered light.

Reasons for the Decision

1. The appeal is admissible.

2. Main request (Article 56 EPC)

The subject-matter of claims 1 and 15 according to the main request does not involve an inventive step in the sense of Article 56 EPC.

Document D1 discloses in paragraph [0005] according to the English translation annexed to the board's communication under Article 15(1) RPBA "a projector 3 for illuminating a specific part of a space 1; an imager 2 for imaging the space 1; and an image processor 4 for processing a captured image by using information on a positional relation between the imager 2 and the projector 3 and the angle of a beam of the projector 3 and the angle of a beam from the projector 3, and is characterized in that a fire can be detected together with the position according to the image change state due to smoke caused by the fire." Thus, paragraph [0005] of D1 discloses a method according to the preamble of claim 1 of the main request.

The characterising portion of claim 1 is directed to the adaption of the power level and ON period of the modulated beam as well as the exposure period of the

image capturing means to compensate for an increase in ambient lighting level.

Paragraph [0006] of document D1 discloses that when "the flashing of the beam is in conjunction with the image processing, ... the influence of light from the outside is excluded, so that the precision can be improved." The person skilled in the art is therefore provided with the information that flashing of the emitted beam, i.e. controlling the ON period and OFF period of the emitted beam, is correlated with image processing to exclude influence of light from the outside. Since image capturing inevitably precedes image processing, D1 also teaches to correlate controlling the ON and OFF periods of the emitted beam with image capturing, as defined in claim 1 according to the main request.

According to the boards assessment of claim 1, the only measure which actually compensates for an increase in ambient lighting level is the increase in power level of the emitted beam, which leads to an increased signal to noise ratio, i.e. increased contrast in the captured image. The remaining two measures of reduction of the ON period of the beam and reduction of the exposure period of the image capturing means do not influence the contrast in the scene since they merely relate to the period for which the scene having the increased contrast level achieved by the emitted beam is visible and to the corresponding adjustment of the exposure period of the image capturing means to that period.

The appellant argued in this respect that the remaining two measures of reduction of the ON period of the beam and reduction of the exposure period of the image capturing means provide the technical effect of

avoiding saturation of the image capturing means. However, saturation of the image capturing means depends purely on the specifications of the image capturing means. Since the wording of claim 1 does not include a single technical feature of the image capturing means apart from its functional definition, the board is not convinced by the appellant's argument that avoiding saturation of the image capturing means can be assumed to be a technical effect of the subject-matter of claim 1. To the contrary, the board is convinced that neither the reduction of the ON period of the beam nor the reduction of the exposure period of the image capturing means have any technical effect with respect to the subject-matter of claim 1, which is directed at detecting particles and not at operating an image capturing means. In this respect the appellant argued also that the claimed invention provided improved "uniformity". However, it is not clear to the board what was meant by this expression, and the passages in the application to which the appellant referred in this context concern either uniformity of scattering by the particles (page 33, lines 10 to 15) or uniformity of coverage resulting from the use of a pair of laser-camera pairs (page 35, lines 26 to 27), neither of which is relevant in the context of the present claim 1.

Further, the appellant argued that the system of document D1 was completely different from the claimed system and method and did not react to differences in scattered light. Instead, D1 was directed to detecting beam patterns. The board is not convinced by these arguments either. According to paragraph [0008] of D1 "by irradiating the smoke ... scattered light is generated, [the smoke image] is easily distinguished from the background image". Thus, the system of D1

explicitly reacts to scattered light. Only in the following step, the system of D1 generates "an image of the beam shape" which is thereafter processed. This however does not undo the first step, in which scattered light is detected. Thus, the system according to document D1 reacts to scattered light, as does the claimed method and system.

As a consequence, the only difference providing a technical effect over the disclosure of document D1 is the increase in power level of the emitted beam.

The technical effect of this measure may be regarded as increasing the signal to noise ratio in a given scene. Therefore, the objective technical problem underlying the subject-matter of claim 1 may be regarded as providing a method and a system for detecting particles with increased signal to noise ratio. The solution according to claim 1, i.e. to increase the power level of the emitted beam is, however, trivial.

Therefore, the subject-matter of claim 1 of the main request is rendered obvious by a combination of the disclosure of document D1 with the common general knowledge of the person skilled in the art. The same applies *mutatis mutandis* to the independent apparatus claim 15.

Consequently, the board has arrived at the conclusion that the subject-matter of claims 1 and 15 of the main request does not involve an inventive step in the sense of Article 56 EPC.

Therefore, the main request is not allowable.

3. First and second auxiliary requests (Articles 84 and 56 EPC)

Claims 1 and 15 of the first and second auxiliary requests are not clear in the sense of Article 84 EPC.

Claims 1 and 15 include the functional feature "so that particle detection sensitivity stays the same."

This feature merely defines the result to be achieved without providing the technical means required and thus does not meet the requirement of Article 84 EPC with respect to clarity.

Claims 1 and 15 according to the first and second auxiliary requests therefore do not fulfil the requirements of Article 84 EPC.

Claim 1 of the second auxiliary request in addition merely defines the same subject-matter as that of the first auxiliary request, but in different words. It is, however, unclear how the redundant, more general definition of the operation of the modulated beam according to which the claimed method is "determining an "ON" period of the modulated beam (29) of radiation in which the beam is emitted, and an exposure period of the image capturing means (14) during which an image is captured in accordance with a relationship with the varying power level of the emitted beam (29) to suit ambient lighting conditions" interacts with the following more specific definition of the operation of the emitter beam according to which "an "ON" period is reduced by a factor of N, and exposure period of the image capturing means (14) during which an image is captured is reduced by a factor of N in accordance with an increase in power level of the emitted beam by a

factor of N to suit an increase in ambient lighting level of N times so that particle detection sensitivity stays the same."

The above discussed unclear features added to the claims of the first and second auxiliary requests further do not lead to a limitation of the subject-matter of the independent claims 1 and 15 of those requests. Therefore, the above assessment of inventive step of the subject-matter of the main request applies *mutatis mutandis* to the subject-matter of the first and second auxiliary requests.

Consequently, the board has arrived at the conclusion that the subject-matter of claims 1 and 15 of the first and second auxiliary requests is not clear in the sense of Article 84 EPC and, to the extent that it can be considered to be clear, does not involve an inventive step in the sense of Article 56 EPC.

Thus, the first and second auxiliary requests are not allowable.

4. Third auxiliary request

The subject-matter of Claims 1 and 15 of the third auxiliary request does not involve an inventive step in the sense of Article 56 EPC since the additional features of claims 1 and 15 are already known from the disclosure of document D1.

According to paragraph [0008] of the English translation of D1 "by irradiating the smoke ... scattered light is generated" and "when [the processed image] is different from a normal image, it can be

judged that a fire has occurred". Thus, document D1 discloses both additional features of claim 1 according to the third auxiliary request, namely that the detected variation is an increase in scattered light and that this increase is assessed with reference to a threshold value. In this respect the board notes that the appellant is correct in stating that D1 does not explicitly disclose assessment with respect to a threshold value. However, in the opinion of the board this is implicit in the second of the passages cited above, since there must be a level of "difference" above which it is to be "judged that a fire has occurred".

Thus, the subject-matter of claim 1 according to the third auxiliary request differs from the disclosure of document D1 in the same features as claim 1 according to the main request. Therefore, the reasoning set out above with respect to claim 1 according to the main request applies *mutatis mutandis* to the subject-matter of claim 1 according to the third auxiliary request.

Independent claim 15 relates to a corresponding system for detecting particles. Thus, the above arguments with respect to claim 1 apply *mutatis mutandis* to the subject-matter of claim 15.

Consequently, the board has arrived at the conclusion that the subject-matter of claims 1 and 15 according to the third auxiliary request does not involve an inventive step in the sense of Article 56 EPC.

Therefore, the third auxiliary request is also not allowable.

5. Since there is no allowable request on file the appeal has to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



U. Bultmann

R. Lord

Decision electronically authenticated