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Datasheet for the decision of 25 March 2021

Case Number: T 2271/18 - 3.5.03

Application Number: 12787518.5

Publication Number: 2764710

IPC: H04R25/00, H04R3/02

Language of the proceedings: EN

Title of invention:
Method and device for reducing acoustic feedback

Applicant:
Sivantos Pte. Ltd.

Headword:
Acoustic-feedback reduction/SIVANTOS

Relevant legal provisions:
EPC Art. 84
EPC R. 137(3)
RPBA Art. 12(4)
RPBA 2020 Art. 13(2), 15(1)

Keyword:
Clarity - main and auxiliary requests 5 to 9 (no)
Admittance of requests filed after notification of summons - auxiliary requests 1 to 4 (no): no exceptional circumstances and no clear allowability
Admittance of request not admitted by examining division - auxiliary request 10 (no): no incorrect exercise of discretion

Decisions cited:
G 0010/93, T 2065/10, T 1459/11, T 0752/16, T 0862/16

Catchword:
A clear and detailed preliminary opinion provided by a board - rather than merely "drawing attention to matters that seem to be of particular significance for the decision to be taken" (cf. Article 15(1), fourth sentence, RPBA 2020) - is predominantly intended to give the party(ies) an opportunity to thoroughly prepare their arguments in response to it but not to file new submissions, such as new sets of claims, and to thereby arguably shift the focus regarding the issues on file to be decided in appeal proceedings. In particular, amendments submitted in response to such a preliminary opinion cannot give rise to "exceptional circumstances" within the meaning of Article 13(2) RPBA 2020 (see point 3.3 of the Reasons).

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Case Number: T 2271/18 - 3.5.03

D E C I S I O N
of Technical Board of Appeal 3.5.03
of 25 March 2021

Appellant: (Applicant)	Sivantos Pte. Ltd. 18 Tai Seng Street No. 08-08 18 Tai Seng Singapore 539775 (SG)
Representative:	FDST Patentanwälte Nordostpark 16 90411 Nürnberg (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 7 May 2018 refusing European patent application No. 12787518.5 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chair	K. Bengi-Akyürek
Members:	K. Peirs
	R. Winkelhofer

Summary of Facts and Submissions

I. The appeal is against the decision of the examining division refusing the present European patent application for lack of novelty and inventive step (Articles 54 and 56 EPC).

II. Oral proceedings before the board were held on 25 March 2021 by videoconference.

III. The appellant requests that

- the decision under appeal be set aside and
- a patent be granted according to the claims of a **main request**;
- in the alternative, a patent be granted according to the claims of one of **ten auxiliary requests**.

The main request, the ninth auxiliary request and the tenth auxiliary request correspond, respectively, to the main request, the first auxiliary request and the second auxiliary request underlying the decision under appeal. The first to fourth auxiliary requests were filed for the first time on appeal after notification of the summons to oral proceedings before the board. The fifth to eighth auxiliary requests were filed for the first time with the statement of grounds of appeal.

At the end of the oral proceedings, the board's decision was announced.

IV. Claim 1 of the **main request** reads as follows:

"A method for reducing acoustic feedback of an audio device by a feedback compensator (14), said

feedback compensator (14) having at least one adaptive filter, comprising the steps of:

setting a step-size parameter μ of said adaptive filter at a high level to eliminate acoustic feedback; and

decreasing said parameter μ when a critical excitation signal is detected."

V. Claim 1 of the **first auxiliary request** reads as follows (amendments vis-à-vis claim 1 of the main request underlined by the board):

"A method for reducing acoustic feedback of an audio device by a feedback compensator (14), the audio device comprises the feedback-compensator (14), a receiver (10), a signal processing device (11), and is configured such, that

- the receiver (10) outputs a signal (m),
- the signal (m) is then processed by the signal processing device (11),
- the signal processing device (11) comprises the feedback compensator (14) for reducing acoustic feedback, a feedback detector (16) and a step-size controller (17),
- the feedback detector (16) is placed to detect the signal (m),
- the signal output from the feedback detector (16) is emitted to the step-size controller (17), which is connected with the feedback compensator (14) and controls a step-size parameter μ of an adaptive filter within the feedback compensator (14), wherein the step-size parameter μ controls the adaptation speed of the adaptive filter,

comprising the steps of:

- setting the step-size parameter μ of said adaptive filter at a high level, to eliminate acoustic

feedback of the audio device, and in this case using the feedback detector (16) to detect a critical excitation signal as feedback, wherein the critical excitation signal is a required signal, for authentic representation of the respective sound environment, and,

- consequently, decreasing the step-size parameter μ, to not suppress said required signal and to avoid artifacts from erroneous adaptations."

VI. Claim 1 of the **second auxiliary request** includes all the features of claim 1 of the first auxiliary request and further comprises the following expression between the expression "at a high level" and the phrase ", to eliminate acoustic feedback" in the step of "setting the step-size parameter μ":

"of 0.6 or more".

VII. Claim 1 of the **third auxiliary request** reads as follows (amendments vis-à-vis claim 1 of the second auxiliary request underlined by the board):

"A method for reducing acoustic feedback of an audio device by a feedback compensator (14), the audio device comprises the feedback-compensator (14), a receiver (10), an audio output (13), a signal processing device (11), and is configured such, that

- the receiver (10) receives a feedback sound (f) which is fed back via an acoustic feedback path (15) from the audio output (13) to the receiver (10), as well as a required sound (s), which is a useful environmental sound, and outputs a signal (m),

- the signal (m) is then processed by the signal processing device (11), which is located between the receiver (10) and the audio output (13),
- the signal processing device (11) comprises the feedback compensator (14) for reducing acoustic feedback, a feedback detector (16) and a step-size controller (17),
- the feedback detector (16) is placed to detect the signal (m),
- the signal output from the feedback detector (16) is emitted to the step-size controller (17), which is connected with the feedback compensator (14) and controls a step-size parameter μ of an adaptive filter within the feedback compensator (14), wherein the step-size parameter μ controls the adaptation speed of the adaptive filter,

comprising the steps of:

- setting the step-size parameter μ of said adaptive filter at a high level of 0.06 or more, to eliminate acoustic feedback of the audio device, and in this case using the feedback detector (16) to detect a critical excitation signal,
  which is a required signal, for authentic representation of the respective sound environment,and which is similar to feedback whistling,
  as feedback, which is a misdetection, and,
- consequently, decreasing the step-size parameter μ, to not suppress said required signal and to avoid artifacts from erroneous adaptations."

VIII. Claim 1 of the **fourth auxiliary request** reads as follows (amendments vis-à-vis claim 1 of the third auxiliary request highlighted by the board):

"A method for reducing acoustic feedback of a

hearing device by a feedback compensator (14), the hearing device comprises the feedback-compensator (14), a receiver (10), an audio output (13), a signal processing device (11), and is configured such, that

- the receiver (10) receives a feedback sound which is fed back via an acoustic feedback path (15) from the audio output (13) to the receiver (10), as well as a required sound (s) which is a useful environmental sound, and outputs a signal (m),
- the signal (m) is then processed by the signal processing device (11), which is located between the receiver (10) and the audio output (13),
- the signal processing device (11) comprises a core signal processing unit (12), the feedback compensator (14) ~~for reducing acoustic feedback~~, a subtractor, a feedback detector (16) and a step-size controller (17),
- the feedback compensator (14) outputs a feedback compensation signal (c), which is subtracted from the signal (m) in the subtractor, so an error signal (e) is obtained,
- the error signal (e) further enters the core signal processing unit (12), which outputs a signal (x),
- the output signal (x) is fed to the audio output (13) and to the feedback compensator (14),
- the feedback detector (16) is placed to detect the signal (m),
- the signal output from the feedback detector (16) is emitted to the step-size controller (17), which is connected with the feedback compensator (14) and controls a step-size parameter μ of an adaptive filter within the feedback compensator (14), wherein the step-size parameter μ controls the adaptation speed of the adaptive filter,
- in addition, the feedback compensator (14) is also controlled by the error signal (e),

comprising the steps of:

- setting the step-size parameter μ of said adaptive filter at a high level of 0.06 or more, to eliminate acoustic feedback of the hearing device, and in this case using the feedback detector (16) to detect a critical excitation signal ~~which is a required signal, for authentic representation of the respective sound environment, and which is similar to feedback whistling~~ as feedback, which is a misdetection, and, consequently, decreasing the step-size parameter μ, ~~to not suppress said required signal and~~ to avoid artifacts from erroneous adaptations,
- wherein the critical signal is a correlated, tonal or impulsive signal from the environment."

IX. Claim 1 of the **fifth auxiliary request** includes all the features of claim 1 of the main request and further comprises the following phrase at the end:

"as feedback by a feedback detector (16) and keeping said parameter μ at said high level in other times".

X. Claim 1 of the **sixth auxiliary request** reads as follows (amendments vis-à-vis claim 1 of the main request underlined by the board):

"A method for reducing acoustic feedback of an audio device by a feedback compensator (14), said feedback compensator (14) having at least one adaptive filter, comprising the steps of:

setting a step-size parameter μ of said adaptive filter at a high level to eliminate acoustic feedback; and

setting said parameter μ at said high level in a normal mode,
decreasing said parameter μ when a critical excitation signal is detected as a feedback in said normal mode and keeping said parameter μ at said high level at other times."

XI. Claim 1 of the **seventh auxiliary request** includes all the features of claim 1 of the main request and further comprises the following phrase at the end:

"by a feedback detector (16) and without distinguishing between feedback whistling and a required strongly correlated excitation signal from the environment".

XII. Claim 1 of the **eighth auxiliary request** reads as follows (amendments vis-à-vis claim 1 of the main request underlined by the board):

"A method for reducing acoustic feedback of an audio device by a feedback compensator (14), said feedback compensator (14) having at least one adaptive filter, comprising the steps of:
setting a step-size parameter μ of said adaptive filter at a high level in a normal mode and to eliminate acoustic feedback; and
decreasing said parameter μ when a critical excitation signal is detected in said normal mode, by assuming that feedback whistling cannot occur and by not distinguishing between feedback whistling and needed strongly correlated excitation signals."

XIII. Claim 1 of the **ninth auxiliary request** reads as follows (amendments vis-à-vis claim 1 of the main request underlined by the board):

"A method for reducing acoustic feedback of an audio device by a feedback compensator (14), said feedback compensator (14) having at least one adaptive filter, comprising the steps of:
setting a step-size parameter μ of said adaptive filter at a high level to eliminate acoustic feedback, wherein said step-size parameter μ is set at 0.06 or more to eliminate acoustic feedback, wherein said step-size parameter μ controls the adaptation speed of said adaptive filter; and
decreasing said parameter μ when a critical excitation signal is detected as feedback by a feedback detector (16) and keeping said parameter μ at said high level in other times, wherein the critical signal is a correlated, tonal or impulsive signal."

XIV. Claim 1 of the **tenth auxiliary request** includes all the features of claim 1 of the ninth auxiliary request and further comprises the following phrase between the expression "as feedback by a feedback detector (16)" and the phrase "and keeping said parameter μ at said high level in other times" in the step of "decreasing said parameter μ":

"and without distinguishing between feedback whistling and a required strongly correlated excitation signal from environment".

Reasons for the Decision

1. *The present application*

The present invention concerns feedback suppression by

means of an adaptive filter in an audio device. The adaptive filter is controlled via a step-size parameter μ, which is described in the present application in the context of the well-known *normalised least mean square* (NLMS) algorithm. Feedback in the audio device is eliminated completely by setting the step-size parameter to a high value such as "0.06". Under these high step-size parameter conditions, an input signal from the environment which is strongly correlated can, in the configuration of the invention, still lead to an erroneous detection of feedback. If such an erroneous detection occurs, the high value of the step-size parameter is reduced in order to avoid artefacts.

1. *Main request: claim 1 - features*

Claim 1 of the **main request** comprises the following limiting features (with the board's labelling):

(a) A method for reducing acoustic feedback of an audio device by a feedback compensator, said feedback compensator having at least one adaptive filter, comprising the steps of:
(b) setting a step-size parameter μ of said adaptive filter at a high level to eliminate acoustic feedback;
(c) decreasing said parameter μ when a critical excitation signal is detected.

2. *Main request: claim 1 - clarity*

Claim 1 of the main request is unclear, for the following reasons:

2.1 As regards **feature (a)**, the structural relationship between the "feedback compensator" and the "audio device" is unclear. In fact, the claimed "feedback compensator" represents a "black box", specifying only an input parameter and the result that should be achieved, rather than being specified in terms of structural features actually solving the technical problem posed in the passage on page 6, lines 7 to 9 of the description as filed ("subjective problem"), i.e. "combining the reduction or even elimination of acoustic feedback reduction with an efficient avoidance of artifacts". The board refers in this respect to T 2065/10 (Reasons 2.2.1) and notes in particular that the name given to a particular black box, which in this case may express the *aim* of compensating feedback, does not provide details on how the black box operates, in the current case on how feedback is compensated.

2.2 As regards **feature (b)**, the technical meaning of the "step-size parameter μ" and the so-called "high level" in the context of reduction or elimination of acoustic feedback is entirely unclear. While the skilled reader may be aware, based on their common general knowledge, of the gain being a critical parameter in relation to feedback and the adaptation rate of an adaptive filter being important to strike a balance between a quick response and a stable adaptation, the same is not valid for the size of a step which relates in an *unspecified* way to the adaptive filter of a general feedback compensator. Moreover, the appellant's allegation that the term "step-size parameter of an adaptive filter" would be readily understood by the skilled reader, in particular in connection with the problem of feedback and the explicit denomination of the step-size parameter as "μ" is not convincing. This is because it belongs to the skilled reader's common general

knowledge that adaptive filters require the solution of a computational optimisation problem involving a series of steps to choose the parameters of their transfer function appropriately. While each step in this series is typically characterised by a particular parameter, which may be used to define an adaptation rate (e.g. a rate of convergence "μ" or the change of an error tolerance "ε" over the iterations), it is by no means implicit that this parameter *always* involves a particular step size. Hence, the "step-size parameter" is not inherently defined by the general "adaptive filter". Furthermore, as regards the term "high level", it is unclear to a skilled reader which numerical value to attribute to that relative term for setting this parameter as required by feature (b). The argument that the skilled reader would simply choose a "sufficiently large value" that efficiently prevents feedback is not persuasive because feature (c) requires that the step size be reduced again: the step-size parameter must therefore be set higher than this "sufficiently large value", leaving the skilled reader in doubt as to which value would be high enough.

2.3 As regards **feature (c)**, the term "critical excitation signal" is unclear because claim 1 does not allow the skilled reader to distinguish such an arbitrary "critical signal" from "uncritical" trigger signals in a meaningful way.

2.4 In conclusion, claim 1 of the main request does not comply with Article 84 EPC.

3. *First to fourth auxiliary requests: admittance*

3.1 The **first to fourth auxiliary requests** were filed *after* notification of the summons to oral proceedings (cf.

point III above). In accordance with Article 13(2) RPBA 2020, such an amendment to the party's appeal case shall, in principle, not be taken into account unless there are exceptional circumstances, which have been justified with cogent reasons by the party concerned. In the application of the exercise under Article 13(2) RPBA 2020, the criteria mentioned in Article 13(1) RPBA 2020 may be used. One such criterion concerns whether the party has demonstrated that the amendments to its appeal case, *prima facie*, overcome the issues raised by the board and do not give rise to new objections.

3.2 The appellant justified the amendments underlying the first to fourth auxiliary requests by

(i) referring to the introduction, in the board's communication pursuant to Article 15(1) RPBA 2020, of a lack of clarity as a new objection in the appeal proceedings;

(ii) highlighting that the newly found lack of clarity was motivated by a list of multiple clarity objections;

(iii) indicating that the board had implied that the list of clarity objections was not exhaustive.

3.3 While arguments (i) to (iii) may in principle constitute "cogent reasons" (cf. the third paragraph of the explanatory remarks to Article 13(2) RPBA 2020), it is within the board's power to raise new objections during the appeal proceedings (cf. G 10/93; T 862/16, Reasons 8.3.1). In particular, in order to help concentration on essentials during the oral proceedings, a board's communication pursuant to Article 15(1) RPBA 2020 is based on a thorough analysis

of the case and is meant to draw attention to matters that may be of particular significance for the decision to be taken, while the board "may" also provide a preliminary opinion (cf. Article 15(1), fifth sentence, RPBA 2020). The level of detail with which this analysis is reflected in the communication, in particular the extent to which a preliminary opinion is provided, is, however, up to the particular board's discretion, in view of the circumstances of the case. Accordingly, even a high level of detail provided in a communication issued under Article 15(1) RPBA 2020 can by no means be interpreted as an "invitation" for a party to amend its appeal case by filing amended claims (cf. for instance T 1459/11, Reasons 3.2; T 752/16, Reasons 3.4).

In other words, a clear and detailed preliminary opinion provided by a board - rather than merely "drawing attention to matters that seem to be of particular significance for the decision to be taken" (cf. Article 15(1), fourth sentence, RPBA 2020) - is predominantly intended to give the party(ies) an opportunity to thoroughly prepare their arguments in response to it but **not** to file new submissions, such as new sets of claims, and to thereby arguably shift the focus on the issues on file to be decided in appeal proceedings. In particular, amendments submitted in response to such a preliminary opinion cannot give rise to "exceptional circumstances" within the meaning of Article 13(2) RPBA 2020.

3.4 Even if it was accepted that there were cogent reasons justifying the presence of "exceptional circumstances" here, the board concludes that the above auxiliary requests are not clearly allowable for the following reasons:

3.4.1 None of the four versions of claim 1 of those auxiliary requests overcomes *all* of the objections raised in point 2 above as to claim 1 of the main request. For instance, all four versions of claim 1 attempt to overcome the issue of the poorly defined step-size parameter (cf. point 2.2 above) *solely* by the insertion of the phrase "wherein the step-size parameter μ controls the adaptation speed of the adaptive filter". However, not all adaptive filters rely on an iterative scheme involving one or more steps that are characterised by a (variable) step size. Accordingly, not all adaptive filters allow to define a particular adaptation speed, which must, due to its implied movement, relate to a particular step-size change over time. Rather, iterative schemes are often characterised by a more general adaptation rate. The inserted phrase therefore does not, *prima facie*, resolve the issue with respect to the poorly defined step-size parameter.

3.4.2 Furthermore, the amendments underlying the versions of claim 1 of the first to fourth auxiliary requests give even rise to *new* objections. As a mere example, the phrase "in this case using the feedback detector (16) to detect a critical excitation signal" (emphasis added), which is present in all of these four versions of claim 1, would confuse the skilled reader in that it suggests to use the feedback detector only in particular cases, whereas the feedback detector in the circuit of Figure 3 as originally filed is manifestly always active. This is because the circuit does not involve any switch designed to take the feedback detector out of the processing path under predetermined conditions. This phrase therefore further aggravates the lack of clarity of claim 1 of the main request.

3.5 Hence, the first to fourth auxiliary requests were not taken into account in these appeal proceedings (Article 13(2) RPBA 2020).

4. *Fifth to ninth auxiliary requests: claim 1 - clarity*

4.1 None of the five versions of claim 1 in accordance with the **fifth to ninth auxiliary requests** remedies the clarity deficiencies of claim 1 of the main request.

In particular, the version of claim 1 of the **ninth auxiliary request** is the *only* one of these five versions that tries to address the issue of the poorly defined step-size parameter (cf. point 2.2 above), namely by the insertion of a phrase which is, apart from the term "step-size parameter" being preceded by the word "said" instead of by the definite article, *identical* to the one mentioned in point 3.4.1 above for claim 1 of the first to fourth auxiliary requests. For the reasons set out in point 3.4.1 above, this phrase does, consequently, not resolve the clarity issue of point 2.2 above.

4.2 As a consequence, claim 1 of the fifth to ninth auxiliary requests does not comply with Article 84 EPC either.

5. *Tenth auxiliary request: admittance*

5.1 The **tenth auxiliary request** is identical to the second auxiliary request underlying the decision under appeal, which was not admitted into the proceedings by the examining division.

5.2 It is generally accepted that, for the purpose of reviewing first-instance discretionary decisions, it is

not for the board to review all the facts and circumstances of a case as if it were in the place of the department of first instance and decide whether or not it would have exercised discretion in the same way.

5.3 In the present case, there are no indications that the examining division did not exercise their discretion under Rule 137(3) EPC in a proper manner and following the right principles. The appellant did not provide any arguments to contest this. Rather, only arguments in support of compliance with Article 123(2) EPC were submitted.

5.4 Moreover, the board sees no other reasons to admit the tenth auxiliary request into the proceedings.

5.5 As a result, the board does not consider it justified to overrule the discretionary decision of the examining division, and to exercise its own discretion under Article 12(4) RPBA 2007 (cf. Article 25(2) RPBA 2020) to admit the tenth auxiliary request into the appeal proceedings.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chair:

B. Brückner K. Bengi-Akyürek

Decision electronically authenticated