

Internal distribution code:

- (A) [-] Publication in OJ
- (B) [-] To Chairmen and Members
- (C) [-] To Chairmen
- (D) [X] No distribution

**Datasheet for the decision
of 28 April 2026**

Case Number: T 0488/25 - 3.5.04

Application Number: 09807397.6

Publication Number: 2327061

IPC: G06T17/00

Language of the proceedings: EN

Title of invention:

METHOD AND APPARATUS FOR ESTIMATING BODY SHAPE

Applicant:

Brown University

Headword:

Relevant legal provisions:

EPC Art. 56

Keyword:

Main request and auxiliary requests 1 to 4 - inventive step
(no)

Decisions cited:

Catchword:



Beschwerdekammern
Boards of Appeal
Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0

Case Number: T 0488/25 - 3.5.04

D E C I S I O N
of Technical Board of Appeal 3.5.04
of 28 April 2026

Appellant: Brown University
(Applicant) 1 Prospect Street
Providence, RI 02912 (US)

Representative: Torggler & Hofmann Patentanwälte - Innsbruck
Torggler & Hofmann Patentanwälte GmbH & Co KG
Postfach 85
6020 Innsbruck (AT)

Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted/electronically
transmitted on 15 October 2024 refusing European
patent application No. 09807397.6 pursuant to
Article 97(2) EPC.**

Composition of the Board:

Chair M. Paci
Members: B. Le Guen
B. Müller

Summary of Facts and Submissions

- I. The appeal is against the decision to refuse European patent application No. 09 807 397.6, published as international patent application WO 2010/019925 A1.
- II. The documents cited in the decision under appeal included the following:
- D12 A. O. Bălan and M. J. Black, "*The Naked Truth: Estimating Body Shape Under Clothing*", in Proceedings of the 10th European Conference on Computer Vision (ECCV 2008), Part II, Marseille, France, 12-18 October 2008, pp. 15-29, doi: 10.1007/978-3-540-88688-4_2, XP047448753
- III. The decision under appeal was based on the grounds that claim 1 of the main request and of auxiliary requests 1 to 3 then on file did not meet the requirements of Article 84 EPC. In a section called "*Obiter Dictum*", the examining division also questioned the validity of the claimed priorities and expressed its view that the subject-matter of claim 1 of all the requests lacked an inventive step in view of the disclosure of document D12 and the skilled person's common general knowledge.
- IV. The applicant (appellant) filed notice of appeal. With the statement of grounds of appeal, the appellant refiled the claims of the main request and of auxiliary requests 1 to 3 underlying the decision under appeal. It requested that that decision be set aside and that a

European patent be granted on the basis of the claims of the main request filed with the statement of grounds of appeal or, alternatively, on the basis of the claims of one of auxiliary requests 1 to 3 filed with the statement of grounds of appeal. In the alternative, the appellant requested that the case be remitted to the department of first instance for further prosecution.

The appellant further requested that the following question be referred to the Enlarged Board of Appeal if the decision in the present appeal depended on it:

"Can Article 84 EPC and in particular the prescription of the claims being supported by the description be used to force an applicant to cut down the scope of a claim?".

V. The appellant was summoned to oral proceedings. In a communication under Article 15(1) RPBA the board noted that the following document was cited on page 128 of the description of the application at hand:

D19 B. Allen et al., *"The space of human body shapes: reconstruction and parameterization from range scans"*, ACM Transactions on Graphics (TOG), vol. 22, Issue 3, pp. 587-594, XP055051403

The board, pursuant to Article 114(1) EPC, introduced D19 into the appeal proceedings and gave *inter alia* the following preliminary opinion.

- The examining division's reasoning under Article 84 EPC was not convincing.
- None of the claimed priorities was valid for the subject-matter of the claims of the requests at

hand. Therefore document D12 was part of the state of the art pursuant to Article 54(2) EPC.

- Even on the assumption that the distinguishing features credibly saved calculation resources or resulted in a more accurate body model, the subject-matter of claim 1 of the main request lacked an inventive step starting from the disclosure of D12 combined with the skilled person's common general knowledge, or combined with D19 and the skilled person's common general knowledge (Article 56 EPC).
- The subject-matter of claim 1 of the auxiliary requests lacked an inventive step for the reasons provided with respect to claim 1 of the main request (Article 56 EPC).
- The question of whether the requirement that the claims be supported by the description could also be used to force an applicant to cut down the scope of a claim did not seem decisive in the present appeal case. Therefore the board was not minded to grant the appellant's request that a question be referred to the Enlarged Board of Appeal.

VI. With its reply dated 12 February 2026 and filed on 13 February 2026, the appellant filed amended claims of auxiliary request 4 and argued why this request should be admitted into the proceedings. It indicated a basis for the amendments in the application as filed and submitted arguments to support its opinion that the subject-matter of claim 1 of auxiliary request 4 involved an inventive step. The appellant clarified that it had requested that the case be remitted to the examining division if the board found a potential lack of inventive step.

VII. With a further letter dated 12 February 2026 and filed on 18 February 2026, the appellant filed a corrected version of the claims of auxiliary request 4.

VIII. The oral proceedings before the board were held on 28 April 2026.

During the oral proceedings, the appellant withdrew its conditional requests that the case be remitted to the examining division and that a question be referred to the Enlarged Board of Appeal.

The appellant's final requests were 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 filed with the statement of grounds of appeal or, alternatively, of any of auxiliary requests 1 to 3 filed with the statement of grounds of appeal, or auxiliary request 4 submitted with the letter dated 12 February 2026 and filed on 18 February 2026.

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

IX. Claim 1 of the requests at hand reads as follows.

Main request

"A computer implemented method comprising:

- obtaining input data representing a body of an individual in a plurality of poses, wherein the input data comprises one of image data of the body captured via a camera and depth information of the body captured via a range sensor; and
- estimating the shape of the body of the individual by fitting a parametric body model of the body to

the input data to generate multiple sets of pose parameters and a set of shape parameters, the set of shape parameters being consistent with the plurality of poses, and the parametric body model comprising a statistical polygonal mesh 3D model of triangles; and

- imposing a constraint on the fitting of the parametric body model to the input data, the constraint being based on knowledge about the body regarding at least one of height, weight, and age."

Auxiliary request 1

As claim 1 of the main request, except for the following additions shown by underlining:

"imposing a mathematical constraint on the fitting of the parametric body model to the input data, the mathematical constraint being based on knowledge about the body regarding at least one of height, weight, and age."

Auxiliary request 2

As claim 1 of the main request, except for the following additions and deletions shown by underlining and ~~strikethrough~~, respectively:

"imposing a constraint on the fitting of the parametric body model to the input data, ~~the constraint being based on knowledge about the body regarding~~ wherein the constraint is in the form of at least one of height, weight, and age."

Auxiliary request 3

As claim 1 of the main request, except for the following additions and deletions:

"imposing a mathematical constraint on the fitting of the parametric body model to the input data, ~~the constraint being based on knowledge about the body regarding~~ wherein the mathematical constraint is in the form of at least one of height, weight, and age."

Auxiliary request 4

As claim 1 of the main request, except for the addition of the following features at the end of the second and third bullet points, respectively:

"wherein the fitting of the parametric body model to the input data comprises optimizing an objective function defined at least in part by the sets of pose parameters and the set of shape parameters,"

", wherein the constraint comprises limiting a search space of an optimization to those values that satisfy the constraint and/or the constraint comprises penalizing deviations from the constraints in the objective function"

Reasons for the Decision

1. The appeal is admissible.

All requests - validity of the claimed priorities

2. The patent application at hand claims priority from the following three previous applications.

P1: US 61/189,070 (filing date: 15 August 2008)

P2: US 61/189,118 (filing date: 15 August 2008)

P3: US 61/107,119 (filing date: 21 October 2008)

3. Pursuant to Article 87(1) EPC and established case law, priority of a previous application in respect of a claim is to be acknowledged only if the skilled person can derive the subject-matter of the claim directly and unambiguously, using common general knowledge, from the previous application as a whole (see Article 87(1) EPC: "*the same invention*" and Case Law of the Boards of Appeal of the European Patent Office, 11th edition, 2025 ("Case Law"), II.D.4.1).

4. Claim 1 of the main request and auxiliary requests 1 and 4 specifies a step of imposing a (mathematical) constraint on a fitting of a parametric body model based on knowledge about the body regarding at least one of height, weight and age. Claim 1 of auxiliary requests 2 and 3 specifies a step of imposing a (mathematical) constraint on a fitting of a parametric body model in the form of at least one of height, weight and age. It is undisputed that none of the previous applications P1 to P3 discloses such steps. For this reason alone, none of the claimed priorities is valid for the subject-matter of the claims of the requests at hand.

5. This means that the effective date of claim 1 of all requests for the purpose of defining the state of the art pursuant to Article 54(2) EPC is the filing date of the application at hand, i.e. 14 August 2009.

6. Documents D12 and D19 were published before that date and thus form part of the state of the art pursuant to Article 54(2) EPC.

Main request - inventive step (Articles 52(1), 56 EPC)

7. To be patentable, an invention must involve an inventive step (Article 52(1) EPC), i.e. must not be obvious to the person skilled in the art having regard to the state of the art (Article 56 EPC).
8. Document D12 discloses a computer implemented method comprising:
 - obtaining input data representing a body of an individual in a plurality of poses, wherein the input data comprises one of image data of the body captured via a camera and depth information of the body captured via a range sensor (see section 1, first sentence: *"We address the problem of reliably estimating a person's body shape from images of that person wearing clothing."*; page 16, first paragraph: *"natural (ie. standard CCD) images"*; page 21, penultimate paragraph: *"camera views"*; section 4, first paragraph: *"we take a different approach and integrate information about body shape over multiple poses"*); and
 - estimating the shape of the body of the individual by fitting a parametric body model of the body to the input data to generate multiple sets of pose parameters and a set of shape parameters, the set of shape parameters being consistent with the plurality of poses, and the parametric body model comprising a statistical polygonal mesh 3D model of triangles (see section 1, last paragraph: *"a shape optimization method that exploits shape constancy*

across pose"; page 20: "*Parametric Body Model: SCAPE ... Given a mesh x we deform it into a mesh y that has a different body shape and different pose ...*"; page 21: "*Objective Function. Our model is parameterized by a set of joint angles θ , including global position and orientation, and shape parameters β The objective function uses a symmetric distance to match the estimated and observed silhouettes over the K camera views*"; page 22: "*Optimization Method. Unlike previous work we minimize $E(\beta, \theta)$ using a gradient-free direct search simplex method.*"; section 4, first sentence: "*we take a different approach and integrate information about body shape over multiple poses*"; and

- imposing a constraint on the fitting of the parametric body model to the input data (see page 24, second full paragraph: "*we define priors on shape parameters ... We also enforce a prior ... on body pose ...*").

9. In the method disclosed in document D12, the shape parameters are the linear coefficients β to be applied to a set of principal components obtained by performing principal component analysis (PCA) on a data set of shapes (see section "*Parametric Body Model: SCAPE.*" on pages 20 and 21 of D12).

10. It is undisputed that the method specified in claim 1 of the main request differs from the method disclosed in document D12 in that a constraint based on knowledge about the body regarding at least one of height, weight and age is imposed on the fitting of the parametric body model to the input data ("distinguishing feature").

11. The board agrees with the appellant that the skilled person would have understood that the knowledge about the body is specific to the body of the individual (see page 4 of the statement of grounds of appeal, last full paragraph).
12. In the paragraph bridging pages 4 and 5 of its statement of grounds of appeal, the appellant submitted that "*penalised parameter combinations will much faster approach the computation cut-off (e.g. the value of the objective function for the current candidate for the minimum) than parameter combinations which have not been penalised or have been penalised less. Very clearly, there is therefore also an improvement on the computational resources in the case of soft constraints.*"
13. In the following, the board assumes for the sake of argument that the distinguishing feature credibly saves calculation resources, as alleged by the appellant.
14. At the oral proceedings before the board, the appellant did not dispute that accelerating an optimisation process using a hard constraint or a soft constraint was part of the skilled person's common general knowledge.

A *hard constraint* is a condition that restricts the feasible solution set, and any violation makes a solution infeasible.

A *soft constraint* is a condition incorporated into the objective function as a penalty, allowing violations but discouraging them.

15. Therefore the skilled person would have wanted to modify the optimisation process disclosed in document D12 based on such constraints in order to accelerate the search for the shape parameters that best match the body of the individual. Thus the skilled person would have looked for attributes that can characterise the shapes in the search space and be constrained to information that is known to be true.
16. Page 22 of document D12 (section "Evaluation Measures") discloses that the accuracy of the 3D body models resulting from the optimisation process is quantitatively evaluated "*using a variety of derived biometric measurements such as height, waist size, chest size, etc.*". Thus it would have been clear to the skilled person that a shape in the search space can be characterised by *inter alia* its height and be compared with the true height of the individual. Hence it would have been obvious to the skilled person to formulate a hard or soft constraint based on this attribute.
17. Modifying the optimisation process disclosed in document D12 using hard or soft constraints based on the height would not have posed any technical difficulties for the skilled person because the height of any shape in the search space can be measured directly on the mesh representing a shape and can be compared with the true height of the individual.
18. Claim 1 does not rule out that the constraint is based on the height only (see "*at least one of height, weight, and age*"). Thus the above reasons suffice to conclude that the subject-matter of claim 1 of the main request would have been obvious to the skilled person in view of the disclosure of document D12 and the skilled person's common general knowledge.

19. For the sake of completeness, the board notes that its conclusion that the subject-matter of claim 1 of the main request lacks an inventive step would have been the same if claim 1 had required that the constraint be based on weight and/or age (additionally to being based on height or not). The reasons are as follows.
- 19.1 Document D19 discloses a method of creating a dataset of 3D meshes representing various body shapes. A set of whole-body 3D laser range scans of subjects is collected, together with demographic data such as age, weight and ethnic group (see D19, section "1.1 Data set"). A template surface is fitted to each of the scans to generate body shapes (see D19, section 3 and Figure 5). As in the method of document D12 (see D12, paragraph bridging pages 20 and 21), PCA may be used to analyse common features of the shapes and synthesise new random individuals (see D19, paragraph 4.2). Furthermore, paragraph 4.3 of D19 discloses that PCA *"helps to characterize the space of human body variation, but it does not provide a direct way to explore the range of bodies with intuitive controls, such as height, weight, age, and sex"*, and teaches learning a mapping between these intuitive controls and the PCA weights by drawing feature information from the demographic data associated with each scan.
- 19.2 Document D19 would have taught the skilled person that each shape in the search space can be associated with a height, a weight, an age and a sex by learning a mapping between the PCA weights and these attributes. Implementing a hard or soft constraint by comparing the height, weight, age or sex of a shape with the true height, weight, age or sex of the individual would not

have posed any technical difficulties for the skilled person.

19.3 In view of the above, even if claim 1 had required that the constraint be based on weight and/or age, the subject-matter of claim 1 of the main request would have been obvious to the skilled person in view of the disclosure of document D12 combined with the disclosure of document D19 and the skilled person's common general knowledge.

20. The appellant's arguments, mostly provided at the oral proceedings before the board, can be summarised as follows.

(a) According to the case law of the Boards of Appeal, the relevant question was not whether the skilled person would have had technical difficulties carrying out the invention but whether they would have carried it out at all. The prior art at hand did not contain any incentives to modify the method of document D12 to arrive at the subject-matter of claim 1.

(b) Document D12, page 22, second paragraph disclosed that the accuracy of the 3D body models determined was quantitatively evaluated using biometric measurements such as height. The skilled person would not have constrained the optimisation process based on the height of the individual since the height was to be used afterwards in the evaluation.

(c) The second full paragraph on page 24 of document D12 taught using "*very weak priors designed to prevent wildly unnatural shapes but which do not bias the estimates for 'normal' body shapes*". This constituted a clear teaching away from the distinguishing feature.

(d) The PCA described in section 4.2 of document D19 was carried out after the optimisation process described in section 3 of that document. There was no reason to change that order.

21. These arguments are not persuasive, for the following reasons.

21.1 Re argument (a)

Argument (a) presumably relies on the "could-would approach" developed by the case law. This approach means asking not whether the skilled person *could* have carried out the invention, but whether they *would* have done so in the expectation of solving the underlying technical problem or of some improvement or advantage (see Case Law, I.D.5).

In the case at hand, this question has been implicitly answered in the positive in the board's reasoning above. The skilled person would have wanted to add hard or soft constraints to the optimisation process disclosed in document D12 because common general knowledge would have taught them that doing so could accelerate the optimisation process. The incentive for formulating such constraints based specifically on the height, the weight or the age of the individual would have come from document D12 itself or from document D19.

21.2 Re argument (b)

If the height of the individual is used as a *hard constraint* in the optimisation process, then by definition the shape resulting from that process must comply with that height. In that case, there is no

reason to check in the evaluation step whether that constraint is met. However, the evaluation step may still be carried out using other biometric measurements.

If the height of the individual is used as a *soft constraint* in the optimisation process, then by definition the shape resulting from that process may or may not satisfy that height. In that case, the evaluation step may be carried out without any change.

In view of the above facts, argument (b) does not invalidate the board's reasoning above.

21.3 Re argument (c)

As indicated by the appellant, the very weak priors specified in equation (6) on page 24 of document D12 are meant to prevent wildly unnatural shapes. This is compatible with formulating additional constraints to bias the optimisation process towards shapes corresponding to the height, the weight or the age of the individual. Therefore there is no reason to consider the very weak priors specified in equation (6) of D12 as teaching away from the distinguishing feature.

21.4 Re argument (d)

The board's reasoning above does not rely on modifying the method disclosed in document D19 such that the PCA disclosed in D19 is carried out after the optimisation process disclosed therein. In the board's reasoning, document D19 is used to show that the implementation of a constraint based on weight and/or age to accelerate

the optimisation process disclosed in document D12 would have been obvious to the skilled person.

22. For the above reasons, the board concludes that the subject-matter of claim 1 of the main request does not meet the requirements of Article 52(1) EPC in combination with Article 56 EPC.

Auxiliary requests 1 to 3 - inventive step (Articles 52(1), 56 EPC)

23. Compared with claim 1 of the main request, claim 1 of auxiliary request 1 specifies that the constraint is a mathematical constraint.

Compared with claim 1 of the main request (or claim 1 of auxiliary request 1), claim 1 of auxiliary request 2 (or claim 1 of auxiliary request 3) specifies that the constraint "*is in the form of*" (instead of "*being based on knowledge about the body regarding*") at least one of height, weight and age.

24. All these amendments are implicitly taken into account in the reasoning provided with respect to claim 1 of the main request.

25. Therefore the board concludes that the subject-matter of claim 1 of auxiliary requests 1 to 3 does not meet the requirements of Article 52(1) EPC in combination with Article 56 EPC.

Auxiliary request 4 - inventive step (Articles 52(1), 56 EPC)

26. Compared with claim 1 of the main request, claim 1 of auxiliary request 4 further specifies that

- the fitting of the parametric body model to the input data comprises optimizing an objective function defined at least in part by the sets of pose parameters and the set of shape parameters, and
 - the constraint comprises limiting a search space of an optimization to those values that satisfy the constraint and/or the constraint comprises penalizing deviations from the constraints in the objective function.
27. The first feature is not a further distinguishing feature (see document D12, page 21, last paragraph and page 22, first paragraph).
28. The second feature essentially specifies that the constraint is either a hard constraint or a soft constraint. This was already found to be obvious in the reasoning provided with respect to claim 1 of the main request.
29. During the oral proceedings before the board, the appellant argued that the claimed subject-matter was inventive because the prior-art documents at hand did not provide any incentive for constraining the *fitting* of the parametric body model using information about the height, weight and/or age.
30. The board does not find this argument persuasive because the incentive would have come from the skilled person's common general knowledge and from the disclosure of either document D12 or document D19. The reasons are given in points 14. to 16. and 19. above.
31. For the above reasons, the board concludes that the subject-matter of claim 1 of auxiliary request 4 does

not meet the requirements of Article 52(1) EPC in combination with Article 56 EPC.

Conclusion on the appeal

32. Since none of the claim requests at hand is allowable, the appeal must be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chair:



K. Boelicke

M. Paci

Decision electronically authenticated