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**Datasheet for the decision
of 28 October 2016**

Case Number: T 1406/12 - 3.5.03

Application Number: 08869139.9

Publication Number: 2225620

IPC: G05B19/414

Language of the proceedings: EN

Title of invention:

Methods and systems for synchronizing a control signal of a slave follower with a master source

Applicant:

GE Intelligent Platforms, Inc.

Headword:

Synchronizing a control signal of a slave follower with a master source/GE

Relevant legal provisions:

EPC Art. 56, 84

Keyword:

Inventive step - main and first auxiliary requests (no)
Clarity - first and second auxiliary requests (no)



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Case Number: T 1406/12 - 3.5.03

D E C I S I O N
of Technical Board of Appeal 3.5.03
of 28 October 2016

Appellant: GE Intelligent Platforms, Inc.
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Charlottesville, VA 22911 (US)

Representative: Fischer, Jens Peter
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted on 27 December
2011 refusing European patent application
No. 08869139.9 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman F. van der Voort
Members: A. Madenach
O. Loizou

Summary of Facts and Submissions

I. The present appeal is against the decision of the examining division refusing European patent application No. 08869139.9, published as WO 2009/085422 A1, on the ground that the subject-matter of claims 1 to 13 did not involve an inventive step (Articles 52(1) and 56 EPC) having regard to

D1: US 2002/0022905 A1

and taking into account the common general knowledge of the person skilled in the art.

The decision also referred *inter alia* to

D2: US 6 591 158 B1, and

D5: D.L. FINN, "MA 323 Geometric Modelling Course Notes: Day 09 Quintic Hermite Interpolation", pages 1-8, Internet citation (13 December 2004).

II. The board understands the appellant to be requesting in writing that the decision under appeal be set aside and that a patent be granted on the basis of the set of claims of a main request - including claims 1 to 3 and 4 (part 1) as filed with the letter dated 7 November 2011 supplemented by claim 4 (part 2) and claims 5 to 13 as filed with the letter dated 27 May 2011) - or, in the alternative, on the basis of claims of a first or a second auxiliary request, both requests filed with the statement of grounds of appeal.

III. In a communication pursuant to Article 15(1) RPBA accompanying a summons to oral proceedings, the board gave its preliminary opinion, raising *inter alia*

objections under Article 52(1) EPC in combination with Article 56 EPC (lack of inventive step) in respect of the subject-matter of claim 1 of the main request and of claim 1 of the first auxiliary request, referring *inter alia* to documents D1, D2 and D5, and under Article 84 EPC (clarity) in respect of claim 1 of the first and second auxiliary requests.

IV. With a letter received on 24 October 2016, the appellant requested to "reimburse a share of the appeal fees". If no reimbursement was allowed, a decision on the basis of the requests on file was requested. The appellant also informed the board that it would not be attending the oral proceedings. No substantive response was filed.

V. Oral proceedings were held on 28 October 2016 in the absence of the appellant (*cf.* Rule 115(2) EPC and Article 15(3) RPBA). After deliberation, the chairman announced the board's decision.

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

"A method for synchronizing a slave follower with a master source, said method comprising:

defining a relationship between the master source (104) and the slave follower (108);

inputting a first position of the master source and the slave follower at the time the slave follower (108) is instructed to synchronize with the master source (104);

defining a second position where the slave follower is configured to synchronize with the master source; and

fitting a curve between the first position of the slave follower and the second position, the curve fit based on the relationship between the master source and the slave follower, the first position of the slave follower, the first position of the master source, and the second position, the curve fit to synchronize the slave follower and the master source without exceeding pre-determined boundaries of the slave follower, wherein fitting the curve further comprises applying a quintic-hermite spline to fit the curve."

In claim 1 of the first auxiliary request, the last paragraph of claim 1 of the main request has been amended to read:

"fitting a curve between the first position of the slave follower and the second position, the curve fit based on the relationship between the master source and the slave follower, the first position of the slave follower, the first position of the master source, and the second position, the curve fit to synchronize a control signal of the slave follower with a profile of the master source using a position-to-position relationship without exceeding pre-determined boundaries of the slave follower, wherein fitting the curve further comprises applying a quintic-hermite spline to fit the curve."

Claim 1 of the second auxiliary request comprises, compared to claim 1 of the first auxiliary request, the following additional feature:

"and the control signal being synchronised with the master profile within a time-frame that facilitates maintaining a performance by attempting to self-correct

if the slave follower approaches or exceeds a constraint".

Reasons for the Decision

1. *Claim 1 of the main request: Inventive step (Articles 52(1) and 56 EPC)*
- 1.1 The appellant appears to agree, and indeed did not object, to the examining division's finding that the subject-matter of independent claim 1 differs from the method known from D1 in that the fitting of the curve (for the slave) is performed by applying a quintic-hermite spline, whereas in D1 the method used for generating the curve in the increasing synchronisation phase SP1 is not specified.
- 1.2 The objective technical problem solved by the claimed subject-matter when starting out from D1 may therefore be seen in providing a concrete implementation, for the method known from D1 with respect to the curve-fitting for the slave follower during the synchronisation phase SP1 (left hatched area of Figure 3) such that the physical limits of the slave follower are not exceeded (D1, paragraph [0023]).
- 1.3 The board considers this problem to be in line with the problem stated in the application according to which jerks in the slave follower's movements are to be avoided, wherein "jerk" is understood to mean a sudden increase or decrease in velocity and/or acceleration and as represented as the third derivative of a position over time curve (*cf.* application as published, paragraph [0038], last three sentences), since a sudden increase or decrease in velocity and/or acceleration is

likely to push the slave follower beyond its physical limits.

- 1.4 The board notes that according to D1 the physical limits of each axis are respected (paragraph [0023]). To this end, first, second and third derivatives of a path-time curve are displayed, which, as indicated in the application in suit (*cf.* paragraph [0038], last three sentences), are important indicators of jerk. There is however no indication of how to produce a fit of a slave follower's trajectory, on the basis of the derivatives, which avoids jerks.
- 1.5 Planning of motions and movement control to avoid jerks (*i.e.* discontinuous third derivatives of the slave follower's trajectory) is advantageously based on quintic splines (D5, last paragraph on page 7). A similar teaching is known from D2 (column 1, lines 47-56 and column 13, lines 20-36).
- 1.6 Hence, the skilled person starting out from D1 would without the exercise of inventive skill implement the slave follower's trajectory on the basis of quintic splines as suggested by D5 or D2 in order to achieve a motion without jerks.
- 1.7 The board does not accept the appellant's argument that D2 and D5 relate to a single cutting tool or robot arm and do not disclose or suggest applying quintic splines to a curve fit based on a relationship between a master source and a slave follower.

The relationship between a master source and a slave follower as being such that it avoids extension beyond physical limits is known from D1 (see above, points 1.1 to 1.4). The curve fitting in question is concerned

with the positioning of the slave as such, in which the predetermined boundaries related to the slave are not to be exceeded. It is, therefore, irrelevant that D2 and D5 relate to devices with a single tool or arm.

1.8 For the above reasons, the subject-matter of claim 1 of the main request does not involve an inventive step (Articles 52(1) and 56 EPC).

2. *Claim 1 of the first auxiliary request: Clarity (Article 84 EPC) and inventive step (Articles 52(1) and 56 EPC)*

2.1 Independent claim 1 of the first auxiliary request includes the amended feature (amendments in bold):

"the curve fit to synchronize **a control signal of** the slave follower **with a profile of and** the master source **using a position-to-position relationship** without exceeding pre-determined boundaries of the slave follower".

The board understands "control signal of the slave follower" to represent a position of the slave follower (*cf.* paragraph [0034]). Similarly, "a profile of the master source" is understood to represent a position of the master source (*loc. cit.*).

The term "using a position-to-position relationship" is not clear (Article 84 EPC), since it remains open whether it relates to *e.g.* the relationship between two positions at different times of the slave follower or of the master source or between a position of the slave follower and a position of the master source at the same or at different times.

- 2.2 The claim therefore does not fulfil the requirements of Article 84 EPC (clarity).
- 2.3 For the sake of argument, it will be assumed that, as in paragraph [0002] of the application, the "position-to-position relationship" is intended to mean the relationship between a position of the slave follower and a position of the master source at the same time. On the basis of this interpretation, the curve fit, *i.e.* the fitted position of the slave follower, uses a relationship between positions of the slave follower and the master source.
- 2.4 Such a relationship is, however, implicit in the method of D1, since, in a system with two axes having a master-slave relationship as shown in Figure 3, synchronisation between the two axes is achieved at point P1 (paragraph [0050]). In order to establish that synchronisation is achieved, it is necessary to sample the position-to-position relationship between the two axes prior to achieving synchronisation, *i.e.* in the phase during which the slave follows a fitted curve. Hence, the fitted position of the slave follower uses a relationship between positions of the slave follower and the master source.
- 2.5 Therefore, the subject-matter of claim 1 of the first auxiliary request does not involve an inventive step (Articles 52(1) and 56 EPC).
- 2.6 For the above reasons, the first auxiliary request is not allowable.

3. *Second auxiliary request: Clarity (Article 84 EPC)*

3.1 The feature "the control being synchronised with the master profile within a time-frame that facilitates maintaining a performance by attempting to self-correct if the slave follower approaches or exceeds a constraint" in claim 1 is unclear, since the terms "facilitate" and "a performance" are undefined and, hence, cannot serve to define the matter for which protection is sought (Article 84 EPC).

3.2 For the above reasons, the second auxiliary request is not allowable.

4. Since none of the appellant's requests is allowable, the appeal is to be dismissed.

5. *Request for reimbursement of a "share of the appeal fees"*

5.1 The board sees no reason for a reimbursement of the appeal fee. Nor did the appellant offer one. The board notes in this respect that Rule 103(2)(a) EPC provides for the possibility of a reimbursement of half of the appeal fee where an appeal is withdrawn at least four weeks before the date of the oral proceedings. Since the appeal has not been withdrawn and this request was, in any case, filed only four days before the scheduled oral proceedings, this provision does not apply.

5.2 The request for reimbursement of a "share of the appeal fees" is therefore rejected.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



G. Rauh

F. van der Voort

Decision electronically authenticated