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

Datasheet for the decision of 6 February 2013

Case Number: T 1350/10 - 3.2.07

Application Number: 98310305.2

Publication Number: 924034

IPC: B25J 9/16

Language of the proceedings: EN

Title of invention:
Robot devices and driving control methods

Applicant:
Sony Corporation

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - no (main and auxiliary requests)"

Decisions cited:
-

Catchword:
-

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 1350/10 - 3.2.07

D E C I S I O N
of the Technical Board of Appeal 3.2.07
of 6 February 2013

Appellant: (Applicant)
Sony Corporation
6-7-35 Kitashinagawa
Shinagawa-ku
Tokyo 141 (JP)

Representative:
Robinson, Nigel Alexander Julian
D Young & Co LLP
120 Holborn
London EC1N 2DY (GB)

Decision under appeal:
Decision of the Examining Division of the European Patent Office posted 18 December 2009 refusing European patent application No. 98310305.2 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman: H. Meinders
Members: G. Patton
I. Beckedorf

Summary of Facts and Submissions

I. The applicant (appellant) lodged an appeal against the decision of the Examining Division to refuse the European patent application No. 98 310 305.2.

II. The following document considered in the impugned decision is referred to:

D5: M. Fujita and K. Kageyama: "An Open Architecture for Robot Entertainment" Proceedings of the First International Conference on Autonomous Agents (5 February 1997, Marina del Rey, CA, USA), pages 435-442

III. According to the impugned decision, the claimed subject-matter of the then main request and the then first auxiliary request was lacking an inventive step on the basis of D5 combined with the common general knowledge and ordinary practice of the skilled person (Article 56 EPC).

IV. With the statement of grounds of appeal the appellant maintained the above mentioned requests and filed a second auxiliary request.

V. With a communication dated 22 October 2012 and annexed to the summons to oral proceedings the Board presented its preliminary non-binding opinion with respect to the requests on file that the subject-matter of claims 1 and 6 of all the requests was regarded as lacking an inventive step starting from D5 combined with the common general knowledge of the skilled person

(Article 56 EPC). Additional objections were raised on the basis of Articles 123(2) and 84 EPC.

VI. The appellant filed on 4 January 2013 a new main request and a new first and second auxiliary request to replace the ones on file, together with arguments on inventive step.

VII. Oral proceedings took place on 6 February 2013. The issue of inventive step in respect of claim 1 according to the main request and the first and second auxiliary requests was discussed in view of D5 and the general technical knowledge and practice.

The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of one of the sets of claims filed as main request and as first and second auxiliary requests with the letter of 4 January 2013.

At the end of the oral proceedings the Board announced its decision.

VIII. Independent claims 1 and 6 of the main request read as follows (amendments as compared to the independent claims 1 and 6 of the main request underlying the impugned decision are in bold with deletions in strikethrough; emphasis added by the Board):

"1. A robot device (1) constructed by connecting plural component units together (2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12), comprising

control means (15) having a memory (33) wherein an operating system is stored, said control means being

detachably mounted on a prescribed component unit (2), for driving and controlling each of said component units in a prescribed state;

first storing means (19), which is held in one of said component units, for storing configuration information which represents a configuration of said robot, with unit information inherent in each of said component units;

second storing means (19), ~~**which is held in said one of said component units or another of said component units,**~~ for storing a prescribed operation program for making the robot device perform an action; and

third storing means (16) which is detachably mounted on said prescribed component unit, for storing desired behaviour type information; wherein:

said stored configuration information, said operation program and said behaviour type information are read out **by said control means (15)** from said first (19), second (19) and third (16) storing means respectively; and

each of said component units is driven and controlled in a prescribed states in accordance with the read configuration information, operation program and behaviour type information."

"6. A robot driving control method for driving and controlling a robot (1) constructed by connecting plural component units (2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12), comprising the steps of:

detachably mounting on a prescribed component unit control means (15) having a memory (33) wherein an operating system is stored;

storing, in first storing means (19) held in one of said component units, configuration information which represents a configuration of said robot, with unit information inherent in each of said component units

storing, in second storing means (19) ~~**held in said one of said component units or another of said component units**~~, a prescribed operation program for making the robot device perform an action;

storing desired behaviour type information in third storing means (16) detachably mounted on said prescribed component unit;

reading out **by said control means (15)** said stored configuration information, said stored operation program and said behaviour type information from said first (19), second (19), and third (16) storing means respectively; and

driving and controlling each of said component units in a prescribed state using said control means in accordance with said read configuration information, operation program and behaviour type information."

IX. Independent claims 1 and 6 of the first auxiliary request read as follows (amendments as compared to the independent claims 1 and 6 of the first auxiliary request underlying the impugned decision are in bold with deletions in strikethrough; emphasis added by the Board):

"1. A robot device (1) constructed by connecting plural component units together (2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12), comprising

control means (15) having a memory (33) wherein an operating system is stored, said control means being

detachably mounted on a prescribed component unit (2), for driving and controlling each of said component units in a prescribed state;

first storing means (19), which is held in one of said component units ~~other than said prescribed component unit~~, for storing configuration information which represents a configuration of said robot, with unit information inherent in each of said component units;

second storing means (19), ~~which is held in said one of said component units or another of said component units,~~ for storing a ~~prescribed~~ **basic** operation program for making the robot device perform an action; and

third storing means (16) which is detachably mounted on said prescribed component unit, for storing desired behaviour type information; wherein:

said stored configuration information, said **basic** operation program and said behaviour type information are read out **by said control means (15)** from said first (19), second (19) and third (16) storing means respectively; and

each of said component units is driven and controlled in a prescribed states in accordance with the read configuration information, **basic** operation program and behaviour type information, **and wherein said first storing means (19) and said second storing means (19) are located other than on said detachably mounted control means.**"

"6. A robot driving control method for driving and controlling a robot (1) constructed by connecting plural component units (2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12), comprising the steps of:

detachably mounting on a prescribed component unit control means (15) having a memory (33) wherein an operating system is stored;

storing, in first storing means (19) held in one of said component units ~~**other than said prescribed component unit**~~, configuration information which represents a configuration of said robot, with unit information inherent in each of said component units

storing, in second storing means (19) ~~**held in said one of said component units or another of said component units,**~~ a ~~**prescribed**~~ **basic** operation program for making the robot device perform an action;

storing desired behaviour type information in third storing means (16) detachably mounted on said prescribed component unit;

reading out **by said control means (15)** said stored configuration information, said stored **basic** operation program and said behaviour type information from said first (19), second (19), and third (16) storing means respectively; and

driving and controlling each of said component units in a prescribed state using said control means in accordance with said read configuration information, operation program and behaviour type information, **and wherein said first storing means (19) and said second storing means (19) are located other than on said detachably mounted control means.**"

X. Independent claims 1 and 6 of the second auxiliary request read as follows (in bold the added features with respect of the corresponding claims of the first auxiliary request; emphasis added by the Board):

"1. A robot device (1) constructed by connecting plural component units together (2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12), comprising

control means (15) having a memory (33) wherein an operating system is stored, said control means being detachably mounted on a prescribed component unit (2), for driving and controlling each of said component units in a prescribed state;

first storing means (19), which is held in one of said component units, for storing configuration information which represents a configuration of said robot, with unit information inherent in each of said component units;

second storing means (19), **which is held in said one of said component units or another of said component units** for storing a basic operation program for making the robot device perform an action **said second storing means (19) being electrically connected to said control means (15)**; and

third storing means (16) which is detachably mounted on said prescribed component unit, for storing desired behaviour type information; wherein:

said stored configuration information, said basic operation program and said behaviour type information are read out by said control means (15) from said first (19), second (19) and third (16) storing means respectively; and

each of said component units is driven and controlled in a prescribed states in accordance with the read configuration information, basic operation program and behaviour type information, and wherein said first storing means (19) and said second storing means (19) **and said third storing means (16)** are

located other than on said detachably mounted control means."

"6. A robot driving control method for driving and controlling a robot (1) constructed by connecting plural component units (2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12), comprising the steps of:

detachably mounting on a prescribed component unit control means (15) having a memory (33) wherein an operating system is stored;

storing, in first storing means (19) held in one of said component units, configuration information which represents a configuration of said robot, with unit information inherent in each of said component units

storing, in second storing means (19) **which is held in said one of said component units or another of said component units**, a basic operation program for making the robot device perform an action, **said second storing means (19) being electrically connected to said control means (15);**

storing desired behaviour type information in third storing means (16) detachably mounted on said prescribed component unit;

reading out by said control means (15) said stored configuration information, said stored basic operation program and said behaviour type information from said first (19), second (19), and third (16) storing means respectively; and

driving and controlling each of said component units in a prescribed state using said control means in accordance with said read configuration information, operation program and behaviour type information, and wherein said first storing means (19) and said second

storing means (19) **and said third storing means (16)** are located other than on said detachably mounted control means."

XI. The submissions of the appellant are essentially as follows:

D5 does not point towards the problem of upgrading the robot device with a faster CPU nor towards the claimed solution of having the control means detachably mounted with a memory wherein the operating system is stored (features (i) and (ii), see point 2.3 below); D5 even teaches away from it.

In fact, should the skilled person be interested in improving the CPU performance in the robot device of D5, he would already be provided with a solution different from the claimed one, namely adding a CPU via the extension system mentioned on page 436.

In case the skilled person would still envisage to upgrade the CPU in the robot device of D5, the appellant considers that he would then simply replace the complete system core component by a new one, and thus not come to the claimed solution of a detachably mounted control means. Alternatively, he would re-design a complete new robot device with an upgraded CPU mounted in a new system core since the robot device of D5 is built around such a system core.

Furthermore, since CPUs are not plug-and-play capable there would be a prejudice against detachably mounting the control processing circuitry of the system.

In any case, the skilled person would not separate the operating system from the configuration information, the operation program and the behaviour type information in the robot device of D5 since the operating system used is an OpenR system architecture based on Apertos, a fully object-oriented real-time distributed operating system, which enables to construct customized robots from off-the-shelf components with standardized interfaces. Since the operating system of D5 is part of the standard it is necessarily mounted in the robot device. Consequently, D5 clearly teaches against the operating system to be stored on a memory detachably mounted on the robot device.

Regarding the auxiliary requests, the appellant argues that the upgrade of the operating system is facilitated since only the operating system is stored on the control means, the other storing means being separate therefrom. The added features also solve the technical problem of improving the general purpose of the control unit.

Reasons for the Decision

1. *Allowability of the amendments made in the requests (Articles 84 and 123(2) EPC)*

Since the Board considers that the independent claims 1 and 6 of the main request and the first and second auxiliary requests lack an inventive step (see points 2.1 to 2.18 below) there is no need to discuss

in this decision whether or not the amendments made in these requests comply with Articles 84 and 123(2) EPC.

2. *Inventive step (Article 56 EPC)*

Main request

2.1 Document D5 is in the same technical field of the present application of robot devices having plural component units connected together via the robot body and, hence, is regarded as being the closest prior art.

2.2 D5 discloses a robot device constructed by connecting plural component units to a robot body (figure 4; P1 to P10), which comprises control means for driving and controlling each of said component units in a prescribed state (page 436, 1st paragraph, right-hand column; page 437, 2nd paragraph, right-hand column; figure 1; "CPU board", "System core"). The known robot device therefore necessarily comprises a memory wherein an operating system is stored in order to operate said CPU.

The robot device of D5 further comprises a storing means ("CPC host", "Virtual robot"), which is held in one of said component units, for storing configuration information which represents a configuration of said robot, with unit information inherent in each of said component units. Reference is made to page 438, right-hand column, section "CPCs in APL", in particular to the 3rd paragraph in which it is explicitly stated that the *"Virtual Robot knows the information of primitive functions of CPCs and its physical configuration*".

Furthermore, the robot device of D5 comprises a storing means ("Designed Robot"), which is held in one of said prescribed component units, for storing a prescribed operation program for making the device perform an action (D5, page 438, right-hand column, section "CPCs in APL", 4th paragraph).

The robot device of D5 also comprises a storing means which is detachably mounted for storing desired behaviour type information (MPS or "Media for Program Storage", page 437, section "Basic System"; figure 1).

The stored configuration information, operation program and behaviour type information are necessarily read out by the control means and each of said component units is driven and controlled in a prescribed state in accordance with the read configuration information, operation program and behaviour type information.

2.3 As a consequence, according to the Board, claim 1 differs from D5 only by the following distinguishing features:

(i) the control means is detachably mounted on a prescribed component unit;

(ii) the operating system is stored on the control means;

(v) the behaviour type information is stored on said prescribed component unit i.e. on the same component unit as the one for the control means.

Distinguishing features (i) and (ii) have the synergetic technical effect of enabling a straightforward upgrading of the control means.

Distinguishing feature (v) does not appear, however, from the whole application, to have any synergetic effect with the other distinguishing features (i) and (ii) nor to provide any technical effect on its own.

2.4 Distinguishing features (i) and (ii) therefore aim at solving the technical problem of a more straightforward upgrading of the control means.

Distinguishing feature (v) does not appear to solve any particular technical problem and, hence, cannot justify an inventive step.

In the oral proceedings, also the appellant concentrated only on features (i) and (ii). See further points 2.13 and 2.14 for this issue.

2.5 With respect to feature (i) the skilled person facing the problem of upgrading the control means by a faster CPU would immediately think of a detachably mounted CPU board since detachably mounting components in the field of electronic controls, in order to replace them when obsolete or worn out, was already usual practice at the priority date of the present application. An example of this is the use of embedded systems in the control of industrial processes, as argued in the decision under appeal (see point 3.2 of the reasons). The skilled person would therefore immediately think of applying this common general knowledge to the robot device of D5.

Concerning feature (ii), the skilled person would immediately think of storing the operating system on the CPU board in view of a possible mandatory

update/exchange of the operating system to be compatible with the new CPU.

2.6 In view of the above, the subject-matter of claim 1 of the main request does not involve an inventive step (Article 56 EPC).

The above reasoning with the same conclusion of lack of inventive step also applies *mutatis mutandis* to claim 6 of the main request (Article 56 EPC).

2.7 The appellant considers that the Board's analysis is based on hindsight since there is nothing in D5 pointing towards the problem of upgrading the robot device with a faster/different CPU nor the claimed solution (features (i) and (ii)), D5 even teaching away from having the control means detachably mounted. The control means ("system core") in the robot device of D5 is fixed as a fundamental component and all customisation of the robot involves plugging in additional off-the-shelf components to the basic system with a fixed CPU board (page 436, right-hand column, "Basic System"; page 437, second paragraph, right-hand column; figure 1).

Furthermore, the robot device of D5 is implemented using a high cost performance hardware implementation which allows no changing of the higher layers and the re-use of software components in the higher layers so that it is designed to avoid the need to upgrade the hardware and even teaches against doing so (page 437, left-hand column, "Hardware Adaptation Layer").

Finally, according to the appellant, CPUs are not plug-and-play capable so that there would be a prejudice against detachably mounting the control processing circuitry of the system.

2.8 The Board cannot share the appellant's view.
When assessing inventive step, the problem-solution approach should be applied. D5 is in the same technical field as that of the present application and taking into consideration the features in common with claims 1 and 6 of the main request it is regarded as being the closest prior art among the available documents. As a result of the analysis of the disclosure of D5, features (i) and (ii) are clearly distinguishing features (see point 2.3 above). By determining the technical effects of these features, which is clearly an objective exercise, the objective technical problem given under point 2.4 above is derived from these technical effects, also in view of the description of present application, page 3, line 9 to page 4, line 8; page 14, lines 7-9; page 15, lines 9-12. To this end the problem does not need to be mentioned in D5. Therefore, having the technical problem not mentioned in D5 does not prevent from selecting D5 as the closest prior art, nor from determining the problem as above.

In addition, the Board cannot agree with the appellant that the skilled reader would find in D5 some "teaching away" or some "prejudice" towards the adoption of feature (i).
Having the control means fixed in the robot device of D5 leads merely to distinguishing feature (i), not to a "teaching away" or a "prejudice". In addition, the passage of D5 the appellant refers to (page 437, left-

hand column, "Hardware Adaptation Layer"), teaches the skilled reader that hardware components might need to be changed following the latest technology developments. This does not teach away nor go against the idea of changing the CPU for a faster one or having it detachably mounted. The passage seems only to suggest to follow technological progress.
In fact, the appellant has only alleged a prejudice without providing any evidence of it.

There is therefore no prejudice for the skilled person to mount the control processing circuitry as a detachable system in view of his knowledge at the priority date of the present application of embedded systems in industrial applications (point 3.2 of the reasons of the impugned decision).

2.9 For the appellant, should the skilled person be interested in improving the CPU performance in the robot device of D5, he would already be provided with a solution different from the claimed one, namely adding/updating a CPU via an extension system (page 436, right-hand column, second paragraph; figure 1).

The Board is of the opinion that the use of the extension system and the use of a separate embedded system with CPU and operating system are both equal solutions, both not requiring the exercise of inventive skills. In one situation it may be commercially more interesting to provide an update of the CPU via the extension system, in another it "sells better" to provide the control as a separate unit, which needs to be bought to stay up-to-date.

2.10 In case the skilled person would envisage to upgrade the CPU in the robot device of D5, the appellant argues that he would then simply replace the complete system core by a new one, and thus not come to the claimed solution of a detachably mounted control means (page 437, 2nd paragraph, right hand column). Alternatively, he would re-design the complete robot device with an upgraded CPU mounted in a new system core since the robot device of D5 is built around the system core.

The Board considers, however, even though contested by the appellant, that the skilled person would be aware at the priority date of the present application of the embedded control systems used in industrial applications. The appellant has not provided any evidence to contradict what is stated in the impugned decision, point 3.2 of the reasons.
Therefore, the skilled person would simply use this known technology and apply it to the robot device of D5 without any inventive step. Contrary to the appellant's view, he would not come up with the replacement of the complete system core nor a complete re-design of the robot device, as these are not practical solutions, especially when commercial interests play a role (points 3.1 and 3.2 of the reasons of the impugned decision).

2.11 The appellant further holds the view that, in case the skilled person would think of a detachably mounted control means, he would not separate the operating system from the configuration information, the operation program and the behaviour type information in the robot device of D5 (feature (ii)). In fact, the

operating system used in D5 is an OpenR system architecture based on Apertos, a fully object-oriented real-time distributed operating system. The operating system of D5 enables to construct customized robots from off-the-shelf components comprising standardized interfaces. Since the operating system of D5 is part of the "standard" it has to stay fixed in the robot device (page 435, Abstract and right-hand column, last paragraph; page 436, left-hand column, section "Overview of the OpenR Architecture"). Consequently, D5 clearly teaches against the operating system to be stored on a memory detachably mounted on the robot device.

The Board is of the opinion that, when following the development of CPU technology, the operating system would also need, at least at some point, an upgrade/exchange since new CPUs do not necessarily function with the old operating system. The skilled person, still having commercial application in mind, would then think of performing the operating system upgrade/exchange simultaneously when changing to a faster CPU. By doing so he would come to the solution of having the operating system stored in a memory on the detachably mounted CPU board. This is in fact also the solution of the known embedded control systems in industrial applications the skilled person is aware of at the priority date of the present application (point 3.2 of the reasons in the impugned decision).

2.12 As a consequence, the appellant's arguments to the contrary cannot hold.

2.13 For the appellant, other distinguishing features than features (i) and (ii) discussed above deal with side issues not related to the main purpose of the present application of enabling a more straightforward upgrading of the robot control means.

2.14 The appellant considered, however, in the written proceedings that, as a result of distinguishing feature (v) (see point 2.3 above), the component unit bearing the detachably mounted storing means with the behaviour type information together with the detachably mounted control means would become the "central control component unit". The control means and the behaviour type information would thus be updatable independently. Therefore, a detachable central control unit with an operating system storage means could be developed independently for use in many different robot configurations.

This line of argument cannot be followed by the Board since a technical effect of making a single "central control component unit", i.e. both detachable control means and detachable storing means with the behaviour type of information mounted on the same component, is not derivable from the whole application. In particular, it does not seem to make any difference when compared with having them detachably mounted on two separate components. It is emphasized again that D5 discloses in any case a storing means which is detachably mounted for storing desired behaviour type information (MPS or "Media for Program Storage", page 437, section "Basic System"; figure 1). The behaviour type information in D5 is therefore already updatable independently from the control means.

As a consequence, distinguishing feature (v) cannot justify an inventive step (Article 56 EPC).

2.15 The appellant also contested in the written proceedings that D5 discloses, page 438, last paragraph of section "CPCs in APL" the following feature:

(iv) a storing means for storing a prescribed operation program for making the robot device perform an action

The appellant has, however, not provided any interpretation of the passage different from the one given by the Board. As a result, the Board still holds the view that the very same passage as cited by the appellant indeed discloses feature (iv) (see point 2.2 above).

2.16 For the above mentioned reasons the Board considers that the subject-matter of claims 1 and 6 of the main request does not involve an inventive step starting from D5 combined with the common general knowledge of the skilled person (Article 56 EPC).

First and second auxiliary requests

2.17 Claims 1 and 6 of the first auxiliary request further include with respect to the main request that:
- the first storing means and second storing means **"are located other than on said detachably mounted control means"**; and
- the operation program is the **basic** operation program.

Claims 1 and 6 of the second auxiliary request further include with respect to the main request that:
- the second storing means is **"held in said one of said component units or another of said component units"** and is **"electrically connected to said control means"**;
- the first, second and third storing means **"are located other than on said detachably mounted control means"**; and
- the operation program is the **basic** operation program.

The appellant argues that the additional features in combination with distinguishing features (i) and (ii) make clear that the upgrade of the operating system is facilitated since only the operating system is stored on the control means. They also solve the additional technical problem of improving the general purpose of the control unit (see description of present application, page 13, line 25 to page 14, line 13; page 19, line 25 to page 20, line 17).

2.18 In fact, the appellant's arguments with respect to the auxiliary requests, do not contradict the above reasoning and arguments put forward by the Board against independent claims 1 and 6 of the main request which still apply even with the additional features of the auxiliary requests.

Indeed, it is clear for the Board that the skilled person wishing to upgrade the CPU would avoid to further impose any memories with software components on the control means which would not actually relate to and be mandatory for the control means upgrade itself.

In addition, the concept of distributed software located close to its associated hardware component has been widespread in the field of industrial systems for a long time before the priority date of the present application (see point 3.3 of the reasons in the impugned decision). Consequently, the skilled person would store the configuration information and the basic operation program where needed, i.e. not on the control means, so that the additional features cannot justify an inventive step (Article 56 EPC).

Consequently, the subject-matter of claims 1 and 6 of the auxiliary requests lacks an inventive step (Article 56 EPC).

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

G. Nachtigall H. Meinders