Appeal decision

Appeal No. 2016-13587

Tokyo, Japan
Appellant MITSUBISHI HEAVY INDUSTRIES LTD.

Tokyo, Japan
Patent Attorney SAKAI INTERNATIONAL PATENT OFFICE

The case of appeal against the examiner's decision of refusal of Japanese Patent Application No. 2011-278778, entitled "Industrial Robot" (the application published on July 4, 2013, Japanese Unexamined Patent Application Publication No. 2013-129003) has resulted in the following appeal decision.

Conclusion
The appeal of the case was groundless.

Reason
No. 1 History of the procedures
The application was filed on December 20, 2011, and the history of the procedures is as follows.

Dated November 17, 2015 : Notice of reasons for refusal
January 21, 2016 : Submission of a written opinion and written amendment
Dated June 6, 2016 : Examiner's decision of refusal
September 9, 2016 : Submission of written amendment simultaneously with written demand for trial
Dated November 7, 2017 : Notice of reasons for refusal
January 12, 2018 : Submission of a written opinion and written amendment

No. 2 The Invention
The invention according to Claim 1 of the case (hereinafter, referred to as "the Invention") is acknowledged as follows, as specified by the matters described in Claim 1 according to the scope of claims for the written amendment dated January 12, 2018.

"An industrial robot comprising:
an operation part;
an operation side control part connected to the operation part;
a power supply part connected to the operation side control part;
a robot arm disposed at a predetermined position on a movable vehicle body;
an end effector which can be installed at a tip end portion of the robot arm;
a robot side control part which is provided on the end effector side and can control the end effector;
a power supply cable which directly connects the power supply part and the robot side control part; and
a control signal transmission/receipt line which has a network for transmitting/receiving

a control signal between the operation side control part and the robot side control part,
wherein the control signal transmission/receipt line has a radio network for transmitting/receiving a control signal between the operation side control part and the robot side control part or a power line communication network for transmitting/receiving a control signal between the operation side control part and the robot side control part, and
wherein the power supply part is an AC/DC power supply device which converts an alternating current into a direct current of different voltage to supply the same and the robot side control part has another power supply part which converts the direct current from the power supply part into a direct current of different voltage and supplies the same to a function/mechanism part of the end effector."

No. 3 Cited Documents and Cited Invention
1 Described matters in Cited Document 1 and Cited Invention
(1) Descriptions and illustrated matters

Japanese Unexamined Patent Application Publication No. 2008-207294 (published on September 11, 2008, hereinafter referred to as "Cited Document 1"), which was distributed prior to the filing date of the present application and was cited in reasons for refusal of the body, contains the following descriptions together with related drawings.

A "[0002]

Currently, it is attached to a production machine in a factory, and a hand using an air cylinder, or an electric hand which controls a motor to perform work, or a servo gun may be used in a carrying process or a welding process using a robot."

B "[0017]
At a tip end of the robot 7, a robot side exchange device 1 is fixed, and the robot side exchange device 1 and a tool side exchange device 2 are detachably coupled. Tools 8 suitable for respective purposes such as an electric hand and a welding gun are fixed to a plurality of the tool side exchange devices 2."

C "[0020]
At that time, concerning the tool 8 which is necessary to transmit/receive a control signal of the electric hand or the servo gun, a power line communication unit 10 and a conversion unit 11 are fixed between the tool 8 and the tool side exchange device 2. An electric signal line of the tool 8 is connected to the power line communication unit 10, and a power supply line of the power line communication unit 10 is wired to a power coupling part 5 of the tool side exchange device 2."

D "[0022]
A controller 9 controlling the tool 8 is generally fixed or movably installed outside of a work range of the robot 7. In this embodiment, a control signal issued from the controller 9 can be put in the power line communication unit 10, which is wired to a powerline 12 wired to the power coupling part 5."

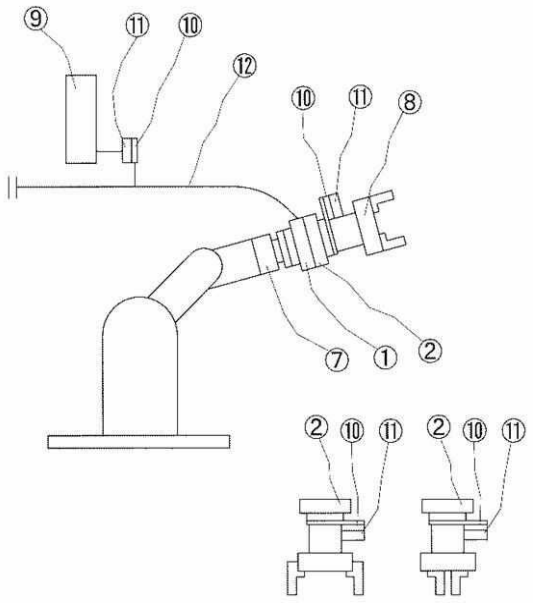
E "[0023]

The respective power line communication units 10 are connected to the powerlines 12 of the same system, and the tool 8 and the controller 9 for the tool transmit/receive the control signals through the power line communication unit 10."

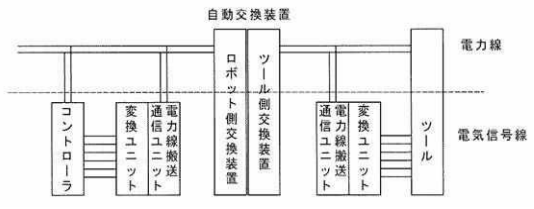
F "[0025]
Fig. 5 is an explanatory view simplifying and showing a wiring image of this embodiment, and although Fig. 6 is an explanatory view showing a conventional example under the same condition, it simplifies and shows a case in which two power lines and six electric signal lines are wired on an automatic tool exchange device."

G "[0027]
However, in this embodiment, as shown in Fig. 5, although the two power coupling parts 5 are provided, the electric signal line superimposes an electric signal on the power line through the power line communication unit to perform communication between the controller 9 and the tool 8, so that an electric signal coupling part 6 of the automatic tool exchange device is not necessary."

H According to the illustration of Fig. 1, it can be seen that the robot 7 has a robot arm disposed at a predetermined position, and a robot side exchange device 1 existing at a tip end portion of the robot arm.



I According to the illustration of Fig. 5, it can be seen that the powerline 12 is connected to a tool; namely, the tool 8.



自動交換装置　Automatic exchange device
コントローラ　Controller
変換ユニット　Conversion unit
電力線配送通信ユニット　Power line communication unit
ロボット側交換装置　Robot side exchange device
ツール側交換装置　Tool side exchange device
ツール　Tool
電力線　Powerline
電気信号線　Electric signal line

(2) The invention described in Cited Document 1
A　In view of the descriptions B and D, Cited Document 1 describes that the robot 7 has "the controller 9."

B　In view of the descriptions A and B, and the illustrated matter H, Cited Document 1 describes that the robot 7 has "the robot arm attached to the production machine in the factory and the robot side exchange device 1 fixed to the tip end portion of the robot arm."

C　In view of the e descriptions B and C, and the illustrated matter H, Cited Document 1 describes that the robot 7 has "the tool side exchange device 2 detachably coupled to the robot side exchange device 1 fixed to the tip end portion of the robot arm, and the tool 8 such as the electric hand fixed to the tool side exchange device 2."

D　In view of the description B and the illustrated matter I, although it is obvious that the powerline 12 supplies power to the tool 8 such as the electric hand, such supply is possible because the powerline 12 is directly connected to the tool 8.

Based on this, according to the descriptions C, E to G, and the illustrated matter I, it can be said that Cited Document 1 describes that the robot 7 has "the powerline 12 which is connected to the controller 9, is directly connected to the tool 8, and transmits/receives a control signal through the power line communication unit 10 and a conversion unit 11 between the controller 9 and the tool 8."

E　Collectively considering A to D above, it is acknowledged that Cited Document 1 describes the following invention (hereinafter, referred to as the "Cited Invention").

"A robot 7 comprising:
a controller 9;
a robot arm attached to a production machine in a factory and a robot side exchange device 1 fixed to a tip end portion of the robot arm;
a tool side exchange device 2 detachably coupled to the robot side exchange device 1 fixed to the tip end portion of the robot arm and a tool 8 such as an electric hand fixed to the tool side exchange device 2; and
a powerline 12 which is connected to the controller 9, is directly connected to the tool 8, and transmits/receives a control signal through a power line communication unit 10 on

the tool 8 side and a conversion unit 11 between the controller 9 and the tool 8."

2 Described matters in Cited Document 2
(1) Descriptions

Japanese Unexamined Patent Application Publication No. 2010-124645 (hereinafter referred to as "Cited Document 2"), which was distributed prior to the filing date of the present application and was cited in reasons for refusal of the body, contains the following descriptions together with related drawings.

A "[0010]

Hereinafter, one embodiment of the present invention will be explained by reference to the drawings.

Fig. 2 shows a system configuration of a general industrial robot. A robot system 1 (corresponding to a robot) shown in Fig. 2 is composed of a robot body 2; a controller 3 which controls the robot body 2; and a teaching pendant 4 connected to the controller 3."

B "[0012]

Fig. 1 is a block diagraph showing an electric configuration of a part relating to the present invention in the robot system 1. In Fig. 1, the robot body 2 is provided with a motor 11 and an encoder 12. The motor 11 is an AC servo motor. The controller 3 is provided with a direct current power supply device 22 which rectifies and smooths an alternating current supplied from an alternating current power supply 21 to output, a voltage detection circuit 23 which detects direct current voltage Vd outputted from the direct current power supply device 22, an inverter device 24 which drives the motor 11, and a first control circuit 25 performing the monitoring action of the direct current voltage Vd and a second control circuit 26 controlling the respective devices and the respective circuits."

C "[0013]

The direct current power supply device 22 is composed of a rectifier circuit 27 and a smoothing capacitor 28. The rectifier circuit 27 has a well-known configuration in which diodes are connected in a bridge form. For example, each phase output of the alternating current power supply 21 of a single-phase 100V is connected to an alternating current input terminal of the rectifier circuit 27. Direct current output terminals of the rectifier circuit 27 are respectively connected to direct current power supply lines 29 and 30. The capacitor 28 is connected between these direct current power supply lines 29 and 30."

D "[0015]

An inverter device 24 is equipped with an inverter main circuit configured by a three-phase full bridge connecting six switching elements, such as IGBTs (only two are shown in Fig. 1) between the direct current power supply lines 29 and 30, and a drive circuit thereof. A free wheeling diode is connected between collector and emitter of the IGBT. Also, at a gate of the IGBT, a gate signal is given from the drive circuit. The drive circuit outputs the gate signal modulated in pulse width based on a command signal Sa given from a second control circuit 26 to drive the respective IGBT."

E "[0016]

The first control circuit 25 and the second control circuit 26 are mainly composed of a microcomputer equipped with a CPU, a ROM, a RAM, I/O and A/D converters, and the like. The first control circuit 25 and the second control circuit 26 are operated by receiving the supply of power supply voltage (for example +5V) from direct current power supply lines 33 and 30. Therefore, the reference potential (ground) of the first control circuit 25 and the second control circuit 26 are common to the electric potential of the direct current power supply line 30. Also, the power supply voltage (+5V) is generated by stepping down the direct current voltage Vd of the direct current power supply lines 29 and 30 with a power supply circuit not shown."

F "[0018]

The encoder 12 outputs a pulse signal Sc (feedback value) according to a rotary position of the motor 11. In the second control circuit 26, the pulse signal Sc and a rotary position command value θr of the motor 11 given from the outside are inputted. The second control circuit 26 is configured to detect the present rotary position θ of the motor 11 based on the pulse signal Sc. The second control circuit 26 computes a deviation Δθ of the present rotary position θ to the rotary position command value θr of the motor 11, and outputs a command signal Sa so as to bring the deviation Δθ close to zero, thereby feedback controlling the drive of the motor 11 by the inverter device 24."

(2) Technical matters described in Cited document 2

From the description mentioned above, Cited Document 2 describes the following technical matters.

"An industrial robot having: a motor 11; an encoder 12; a direct current power supply device 22 which smooths and rectifies an alternating current supplied from an alternating current power supply 21 to output; an inverter device 24 on which the direct current is applied and which controls a number of rotations of the motor 11; a first control circuit 25 which performs a monitoring action of the voltage Vd of the direct current; a second control circuit 26 in which a pulse signal from the encoder 12 is inputted, and which performs the control and the like of the first control circuit 25; and a power supply circuit which steps down the direct current voltage Vd from the direct current power supply device 22 to supply the same to the first control circuit 25 and the second control circuit 26."

No. 4 Comparison / Judgment with the Cited Invention

1 The Invention and the Cited Invention are compared.

(1) "A powerline 12" of the Cited Invention corresponds to "a power supply cable" of the Invention.

(2) Since it is technically obvious that "a controller 9" of the Cited Invention is for controlling "a tool 8" and is equipped with an operation part for performing input for controlling, the fact that a robot 7 has "a controller 9" in the Cited Invention corresponds to the fact that an industrial robot has "an operation part" and "an operation

side control part connected to the operation part" in the Invention.

(3) Since "a robot arm" and "a robot side exchange device 1 fixed to a tip end portion of the robot arm" of the Cited Invention are fixed to each other and can be expressed as "a robot arm" as a whole, "a robot arm attached to a production machine in a factory and a robot side exchange device 1 fixed to a tip end portion of the robot arm" of the Cited Invention and "a robot arm disposed at a predetermined position on a movable vehicle body" of the Invention are in correspondence in the point that each of them is "a robot arm disposed at a predetermined position."

(4) Since "a tool side exchange device 2" and "a tool 8 such as an electric hand fixed to the tool side exchange device 2" of the Cited Invention are fixed to each other and can be expressed as "a tool" as a whole, and furthermore "the tool" is "detachably coupled to the robot side exchange device 1 fixed to the tip end portion of the robot arm", "a tool side exchange device 2 and a tool 8 such as an electric hand fixed to the tool side exchange device 2" of the Cited Invention correspond to "an end effector" of the Invention.

Therefore, "a tool side exchange device 2 detachably coupled to the robot side exchange device 1 fixed to the tip end portion of the robot arm and a tool 8 such as an electric hand fixed to the tool side exchange device 2" of the Cited Invention corresponds to "an end effector which can be installed at a tip end portion of the robot arm" of the Invention.

(5) Since it is technically obvious that "a powerline 12" of the Cited Invention is connected to a power supply part, it is also obvious that the fact that "a powerline 12" of the Cited Invention is "connected to the controller 9" means that "a robot" is equipped with "a power supply part which is connected to the controller 9."

Therefore, the fact that "a robot" of the Cited Invention is equipped with "a powerline 12" "which is connected to the controller 9" corresponds to the fact that "a robot" of the Invention is equipped with "a power supply part connected to the operation side control part."

(6) As described above, since it is technically obvious that "a powerline 12" of the Cited Invention is connected to the power supply part and it is technically obvious that "a powerline 12" is a line itself which transmits/receives a control signal and functions as a network for transmitting/receiving the control signal, the fact that "comprising: " "a powerline 12 which is connected to the controller 9, is directly connected to the tool 8, and transmits/receives a control signal through a power line communication unit 10 on the tool 8 side and a conversion unit 11 between the controller 9 and the tool 8" of the Cited Invention and the fact that "comprising: " " a power supply cable which directly connects the power supply part and the robot side control part; and a control signal transmit/receive line which has a network for transmitting/receiving a control signal between the operation side control part and the robot side control part, wherein the control signal transmit/receive line has a radio network for transmitting/receiving a control signal between the operation side control part and the robot side control part or a power line communication network for transmitting/receiving a control signal between the operation side control part and the robot side control part" of the Invention are in

correspondence in the point that each of them "comprises: " "a power supply cable which directly connects to the power supply part; and a control signal transmission/receipt line which has a network for transmitting/receiving" a control signal from "the operation side control part" and "a control signal" to the operation side control part, wherein the control signal transmission/receipt line has "a power line communication network for transmitting/receiving" a control signal from "the operation side control part" and "a control signal" to the operation side control part.

(7) "A robot" of the Cited Invention is equipped with "a tool 8," and thus corresponds to "an industrial robot" of the Invention.

(8) As described above, Corresponding features and Different features of the Invention and the Cited Invention are as follows.

<Corresponding features>
"An industrial robot comprising:
an operation part;
an operation side control part connected to the operation part;
a power supply part connected to the operation side control part
a robot arm disposed at a predetermined position;
an end effector which can be installed at a tip end portion of the robot arm;
a power supply cable which directly connects to the power supply part; and
a control signal transmission/receipt line which has a network for transmitting/receiving a control signal from the operation side control part and a control signal to the operation side control part;
wherein the control signal transmission/receipt line has a power line communication network for transmitting/receiving a control signal from the operation side control part and a control signal to the operation side control part."

<Different feature 1>
The robot arm is "disposed at a predetermined position on a movable vehicle body" in the Invention, whereas it is "attached to a production machine in a factory" in the Cited Invention

<Different feature 2>
In the Invention, the power supply cable is connected to the power supply part which is "an AC/DC power supply device which converts an alternating current into a direct current of different voltage to supply the same," whereas, in the Cited Invention, since it is not clearly indicated to what type of a power supply part the powerline 12 is connected, it is not obvious how power is supplied to the powerline 12.

<Different feature 3>
The Invention has "a robot side control part which is provided on the end effector side and can control the end effector," "the robot side control part" is connected to "a power supply cable," and "a control signal transmission/receipt line" "transmits/receives a control signal between the operation side control part and the robot side control part", whereas, it is not clear whether or not the Cited Invention has a robot

side control part which is provided on "a tool 8 such as an electric hand" side and can control "the tool 8."

<Different feature 4>

In the Invention, "the robot side control part has another power supply part which converts the direct current from the power supply part into a direct current of different voltage and supplies the same to a function/mechanism part of the end effector," whereas, in the Cited Invention, it is not clear whether or not "a power line communication unit," "a conversion unit," and "a tool 8 such as an electric hand " have another power supply part.

2 Judgment

Hereinafter, each of Different features will be examined.

(1) Regarding Different feature 1

Although in the Cited Invention, "a robot arm" that detachably couples "a tool 8" at a tip end portion is "attached to a production machine in a factory", in view of the descriptions of Japanese Unexamined Patent Application Publication No. S60-34282 (refer to Page 1, Right Column, Lines 8 to 10, Page 2, Lower Left Column, Lines 4 to 7, Page 6, Upper Left Column, Lines 3 from the bottom to Upper Right Column, Line 1), Japanese Unexamined Patent Application Publication No. 2001-62762 (refer to Paragraphs [0009] and [0021]), and Japanese Unexamined Patent Application Publication No. 2000-326880 (refer to Paragraph [0013]), since a technology in which an industrial robot used in a factory and the like is made to be in a form in which a robot arm exchangeably installed with a tool at a tip end portion is mounted on a movable vehicle body has been conventionally well-known, it could have been easily conceived by a person skilled in the art that the robot arm is made to be in the form in which it is mounted on the movable vehicle body by applying the conventionally well-known technology mentioned above for the Cited Invention, according to necessity in the factory.

Hence, the constitution of the Invention regarding Different feature 1 could have been easily conceived by a person skilled in the art, based on the Cited Invention and the conventionally well-known technical matter.

(2) Regarding Different feature 2

As shown in Cited Document 2, it is common to make power supply for driving a motor become direct current voltage, and it is merely a matter which could be sufficiently conceived by a person skilled in the art to supply direct current voltage to the powerline 12 when trying to embody the Cited Invention.

Then, it is also common to supply alternating current voltage to a factory and convert that into direct current voltage for use, and if the movable vehicle body has an alternating current power supply, it is merely a matter of course to use a power supply part for converting that into the direct current voltage.

Hence, the constitution of the Invention regarding Different feature 2 could have been easily conceived by a person skilled in the art, based on the Cited Invention.

(3) Regarding Different feature 3

Although in Paragraph [0025] of Cited Document 1, as a specific form of connection between the powerline 12 and the tool 8 fixed on the tip end side of the robot arm in the Cited Invention, the form in which two powerlines and six electric signal lines are connected to the tool 8 such as the electric hand is described, it is self-evident for a person skilled in the art that the electric hand is provided with a control device such as a motor driver since the motor is used as a drive source of the electric hand and positioning with high accuracy is required for the electric hand.

Then, as an installation place of the motor driver, as described in Cited Document 2, in addition to a means provided separately from the motor (a means provided near the control device on the robot side), a means provided near the motor (a means provided on the arm of the robot or the end effector) is conventionally well-known (refer to Paragraph [0121] of Japanese Unexamined Patent Application Publication No. 2010-36286, Paragraphs [0009] and [0011] of Japanese Unexamined Patent Application Publication No. 2009-25879, and Paragraph [0098] of Japanese Unexamined Patent Application Publication No. H08-19985).

Although it is self-evident for a person skilled in the art that the motor driver is a device which controls a current of three-phase to supply the same to the motor and three electric wires are required between the motor driver and the motor, in Cited Document 1, since it is clearly described that the number of the electric wires connected to the tool 8 is two, it is only necessary to understand that the motor driver is provided near the motor of the tool 8.

Then, it is merely the matter which could have been easily conceived by a person skilled in the art to provide the robot side control part such as a so-called motor driver on the tool 8 side when the person skilled in the art contacting with the Cited Invention controls the motor for driving the tool 8 such as the electric hand, and if the robot side control part is provided on the end effecter, the powerline 12 of the Cited Invention transmits/receives a control signal between the operation side control part and the robot side control part.

(4) Regarding Different feature 4

As described in the technical matters described in Cited Document 2 mentioned above, it is usually carried out to make the direct current voltage for driving the control circuit be further lower than the direct current voltage with respect to the direct current voltage for driving the motor.

Therefore, it is merely a matter which could be sufficiently conceived by a person skilled in the art to make the voltage of the powerline 12 be sufficient voltage for driving the motor and the like while the power line communication unit and the like is made to be driven by a voltage for driving an ordinary control circuit; for example, about 5V in the Cited Invention.

Therefore, it cannot be recognized that there was difficulty in providing another power supply part which converts the direct current from the power supply part into the direct current of different voltage and supplying that to the function/mechanism part of the end effector.

Hence, the constitution of the Invention regarding Different feature 4 could have been easily conceived by a person skilled in the art, based on the Cited Invention and the technical matters described in Cited Document 2.

3 Appellant's allegation

(1) The appellant alleges on Page 2, Lines 21 to 25 of the written opinion that "an industrial robot of the Invention (Claim 1) has a robot arm disposed at a predetermined position of a movable vehicle body, and moves to the inside of a basement of a building to perform disaster prevention support activities and the like. On the other hand, Cited Document 1 relates to a robot attached to a production machine in a factory to perform a carrying process or a welding process, and the technical fields thereof are quite different from each other."

However, in the Invention, the usage of the robot is not specified to disaster prevention support activities, and is just mentioned as being for industrial use, so that the robot described in Cited Document 1 relates to the production of a factory, and this corresponds to a more specific concept. Thus, it cannot be said that the technical fields thereof are quite different from each other.

Then, the constitution in which the robot arm of the Invention is disposed at a predetermined position on a movable vehicle body ,as described in 2(1),could have been easily conceived by a person skilled in the art, based on the Cited Invention and conventionally well-known technical matters.

Therefore, the allegation described above cannot be accepted.

(2) The appellant alleges on Page 2, Lines 1 to 3 from the bottom of the written opinion that "that is, in Cited Document 2, there is provided a power supply part at only one place, and it cannot be said that those are provided at both of the operation side control part and the robot side control part like the Invention. Thus, the Invention and Cited Document 2 are different in this constitution."

However, the constitution of the Invention regarding the different point, as described in 2(4) above, could have been easily conceived by a person skilled in the art, based on the Cited Invention and the technical matters described in Cited Document 2.

Therefore, the allegation described above cannot be accepted.

4 Summary

Accordingly, the Invention could have been easily invented by a person skilled in the art, based on the Cited Invention, the technical matters described in Cited Document 2, and conventionally well-known matters, and thus the appellant should not be granted a patent for the Invention under the provision of Article 29(2) of the Patent Act.

No. 5 Closing

As described above, the appellant should not be granted a patent for the Invention under the provision of Article 29(2) of the Patent Act, and, therefore, the present application should be rejected without examining inventions according to other claims.

Therefore, the appeal decision shall be made as described in the conclusion.

April 28, 2018

Chief administrative judge: KARIMA, Hironobu

Administrative judge: KASHIWABARA, Kuniaki
Administrative judge: HIRAIWA, Shoichi