Title: SYSTEM AND METHOD FOR REMOTE AND JOINT DIAGNOSIS, AND UNIT CHAIR WITH VOICE AND VIDEO RECORDING FUNCTION

Abstract: Disclosed is a system for remote joint diagnosis in which treatment records of a patient are shared with dentists at remote places to jointly treat the patient in real time. The system for remote joint diagnosis is characterized in that a plurality of PCs provided in a plurality of dental clinics are connected with one another through Internet, wherein each PC includes a server serving to intermediate communication with another PC, a camera connected to the PC, a mike, a controller controlling other treatment unit, and a database storing treatment records of the patient therein. Also, a unit chair having a video and voice recording function includes a camera unit provided in a light-emitting lamp of the unit chair to obtain oral video and voice signals of a patient sitting down on the unit chair, a lamp sensor sensing lighting of the light-emitting lamp, a main controller driving the camera unit if the lamp sensor senses lighting of the light-emitting lamp and receiving the video and voice signals from the camera unit to store them in a designated area of a memory and read them from the memory, and a memory connected to the main controller, storing the video and voice signals applied from the main controller under the control of the main controller.
Published:
— with international search report
— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.
Description
SYSTEM AND METHOD FOR REMOTE AND JOINT DIAGNOSIS, AND UNIT CHAIR WITH VOICE AND VIDEO RECORDING FUNCTION

Technical Field

[1] The present invention relates to a system and method for remote and joint diagnosis using Internet, and more particularly, to a system and method for remote and joint diagnosis in which treatment records of a patient stored in a computer of a main dental clinic are shared with dentists at remote places to jointly treat the patient in real time.

[2] Also, the present invention relates to a unit chair for dental treatment, and more particularly to a unit chair with a voice and video recording function in which the whole medical treatment such as treatment or surgical operation can automatically be recorded.

Background Art

[3] Generally, most of people visit a local dental clinic near their homes to receive dental treatment or visit a pharmacy to take a medicine when something is wrong with their teeth.

[4] However, if a patient has serious symptoms, the local dental clinic may have no treatment machine that treats such serious symptoms. Also, if a dentist of the local dental clinic is not specialized in treatment of such symptoms, the patient should receive treatment at another dental clinic such as a general hospital. Such treatment at another dental clinic causes time delay. If another dental clinic is a medical center similar to a general hospital, a prior appointment is necessarily required. This could cause the patient inconvenience. Particularly, such time delay may adversely affect treatment of the patient considering that most of patients have a toothache.

[5] Meanwhile, a dispute between a patient and a dentist may occur after treatment due to miscommunication between the patient and the dentist before treatment or during treatment. In this case, since no corroborative facts remain, the dispute may become worse.

[6] To solve such a problem, a dental clinic recently equips a camcorder to record the procedure of treatment when there is an important treatment. To this end, the camcorder may be provided on an upper portion of an operating table. Alternatively, the dental clinic may employ a cameraman to directly take the procedure of treatment. However, the above methods for recording the procedure of treatment have a problem in that it is difficult to exactly focus a treating part intended by a surgical operator. Also, a problem occurs in that it is difficult for the operator to concentrate the surgical
operation due to such additional picture-taking.

Therefore, the Korean Utility Model No. 20-0352439 discloses a medical headlight camera used by being worn on a head of an operator, in which an image camera 20 is connected to a headlight body 10 through a cable 30 to record a surgical operation or facilitate medical education.

However, since the medical headlight camera is worn on the head of the operator, its focus moves along motion of the head of the operator, thereby making an image of an important part unclear or missing an opportunity to take the image of the important part. Also, other devices may get caught in the cable of the camera to disturb the operator's concentration.

**Disclosure of Invention**

**Technical Problem**

The present invention is to solve the above problems.

**Technical Solution**

An object of the present invention is to provide a system for remote and joint diagnosis in which treatment records of a patient stored in a computer of a main dental clinic are shared with dentists at remote places through Internet to jointly treat the patient, thereby reducing time and cost to visit a dental clinic suitable for treatment of the patient.

Another object of the present invention is to provide a unit chair with a voice and video recording function in which the whole medical treatment such as treatment or surgical operation can clearly be recorded without disturbance and the recorded data can automatically be stored in a server, thereby avoiding a medical dispute after treatment.

**Advantageous Effects**

If a dental clinic where a patient has visited has no special dental machine or treatment of a dental specialist at another dental clinic is required, a patient can quickly receive treatment through a remote and joint diagnosis system without visiting another dental clinic.

Also, a communication network is provided between a patient living in an area difficult of access, such as a snowy area and a mountainous area, and a remote dental clinic, so that dental treatment is performed through the network. Thus, people who live in an area lack of medical facilities can receive excellent medical service.

Moreover, since a voice and video recorder is fixed to a dental unit chair so that the whole medical treatment such as treatment or surgical operation can automatically be recorded, it is possible to avoid in advance a medical dispute that may occur after treatment. Further, the recorded data can be used for other treatment later, thereby
making a contribution to joint use of information between dentists.

[15] Finally, a camera unit is provided on a front surface of a light-emitting lamp of a unit chair to illuminate an inner portion of the oral cavity. In this case, it is possible to clearly take the inner portion of the oral cavity invisible to the naked eye without an additional flash light. Therefore, a dental clinic does not need to separately employ a cameraman to take the inner portion of the oral cavity. Also, it is not necessary to adjust the position of the camera every time.

[16] It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the spirit or scope of the inventions.

**Brief Description of the Drawings**

[17] FIG. 1 is a block diagram illustrating a construction of a system for remote and joint diagnosis according to the present invention;

[18] FIG. 2 is a block diagram illustrating a PC connected to Internet;

[19] FIG. 3 is a flow chart illustrating a method for remote and joint diagnosis according to the present invention;

[20] FIG. 4 illustrates the state that a medical headlight camera for taking the procedure of treatment is conventionally used;

[21] FIG. 5 is a perspective view illustrating a unit chair according to the present invention; and

[22] FIG. 6 is a block diagram illustrating a construction of a voice and video recording system according to the present invention.

[23] 10: dental treatment chair, 2: PC for unit chair

[24] 3: display, 4: stand for spitoon reservoir

[25] 5: bracket table, 6: light-emitting lamp

[26] 7: camera unit, 8: lamp sensor

[27] 21: main controller, 22: memory

[28] 71: lens, 72: mike

[29] 73: video recorder, 74: voice recorder

**Best Mode for Carrying Out the Invention**

[30] To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described, in a system for remote and joint diagnosis in which treatment records of a patient are shared with dentists at remote places to jointly treat the patient in real time, the system for remote and joint diagnosis is characterized in that a plurality of PCs provided in a plurality of dental clinics are connected with one another through Internet, wherein each PC includes a server serving to intermediate communication with another PC, a camera connected to the
PC, a mike, a controller controlling other treatment unit, and a database storing treatment records of the patient therein.

[31] The system for remote and joint diagnosis further includes a main server that transmits and receives data among the PCs.

[32] In another aspect of the present invention, a method for remote and joint diagnosis includes the steps of receiving basic treatment by allowing a patient to visit a dental clinic near home, recording treatment results of the patient in a PC of the dental clinic where the patient has visited, retrieving dentists who can jointly treat the patient, connecting PCs of the retrieved dentists with the PC of the dental clinic where the patient has visited, transmitting the treatment results stored in the PC of the dental clinic where the patient has visited to the PCs of the dentists for joint treatment, and jointly treating the patient using moving images through Internet.

[33] In the present invention, a light-emitting lamp of a unit chair is provided with a camera unit having a video and voice recording function to automatically record the procedure of treatment, light of the light-emitting lamp being used as light for the camera unit.

[34] In other aspect of the present invention, a unit chair having a video and voice recording function includes a camera unit provided in a light-emitting lamp of the unit chair to obtain oral video and voice signals of a patient sitting down on the unit chair, a lamp sensor sensing lighting of the light-emitting lamp, a main controller driving the camera unit if the lamp sensor senses lighting of the light-emitting lamp and receiving the video and voice signals from the camera unit to store them in a designated area of a memory and read them from the memory, and a memory connected to the main controller, storing the video and voice signals applied from the main controller under the control of the main controller.

Mode for the Invention

[35] The embodiments of the present invention will be described in detail with reference to the drawings. It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the spirit or scope of the inventions.

[36] FIG. 1 is a block diagram illustrating a construction of a system for remote and joint diagnosis using Internet according to the present invention. The system for remote and joint diagnosis diagnoses and treats a remote patient using communication systems.

[37] Referring to FIG. 1, a plurality of personal computers (PCs) which dentists use at dental clinics are connected with one another through Internet 100. For example, a PC 102 may be a small dental clinic near a patient's home, and PCs 104a, 104b, , 104n may be dental clinics at another areas or general hospitals. Such PCs 102, 104a, 104b, ,
104n are connected with one another through the Internet 100. Various types of a
network line such as exclusive line, xDSL line, cable, and ISDN line may be used as
the Internet 100.

[38] FIG. 2 is a block diagram illustrating PCs connected to the Internet.
[39] A PC 200, which a dentist uses, includes a server 202, a controller 204, and a
database 206. The PC 200 is connected with a camera 208, a mike 210, and other
treatment unit 212.

[40] The database 206 stores treatment records of patients therein. The treatment records
include personal data of patients, such as name, telephone number, date of birth, and
membership number, and can be retrieved using name and so on. The treatment
records are transmitted to a PC of a remote dentist to allow the remote dentist to
understand the treatment results when joint treatment with the remote dentist is
required.

[41] The server 202 is connected to the Internet to intermediate communication with
another PC. The controller 204 controls communication among the camera 28, the
mike 210, and the other treatment unit 212, and controls the operation of the whole
PCs. The camera 208 and the mike 210 are to record the status of a patient in a moving
image, thereby enabling remote and joint treatment with a dentist at another area. The
other treatment unit 212 includes an X-ray, a unit for identifying heart beat of the
patient, and a thermometer.

[42] Therefore, the treatment records are transmitted to the PC of the remote dentists for
joint treatment. Alternatively, the treatment records are shared with the remote dentists
or the remote dental clinics for joint treatment. Also, it is possible to enable joint
treatment with the remote dentist while providing treatment details of the present
dental clinic through a moving image in real time. The present treatment details can be
provided in real time using the camera 208, i.e., web camera.

[43] Such remote and joint diagnosis can be made through a main server provided
outside the PC of the dental clinic where the patient has visited. The main server serves
to control remote joint treatment among the PCs. In other words, the treatment details
and diagnosis details of the patient are processed on a program of the PC at the dental
clinic where the patient has visited, and are transmitted to the main server at user's
desired time. If the PCs 104a, 104b, ,104n of the remote areas are on standby, the
treatment details and the diagnosis details are downloaded from the main server and
displayed on a monitor.

[44] A method for remote and joint diagnosis, which is performed in the aforementioned
system for remote and joint diagnosis using the Internet according to the present
invention, will now be described.

[45] FIG. 3 is a flow chart illustrating the method for remote and joint diagnosis
Referring to FIG. 3, the patient visits a dental clinic near his/her home to receive basic treatment in step S300. Examples of the basic treatment include X-ray photographing and examination of dental caries.

Subsequently, treatment results of the patient are stored in the PC of the dental clinic where the patient has visited in step S302. The PC of the dental clinic has treatment details of the patient including previous treatment and present treatment in a type of text, image, or multimedia in the database 206 (see FIG. 2). The treatment results are stored in the PC along with personal data such as name and age. At this time, the dentist determines whether to perform remote and joint treatment or independent treatment depending on the treatment results.

If the dentist determines to perform remote and joint treatment, the dentist retrieves dentists who can perform joint treatment in step S304. At this time, the dentist selects the dentists for joint treatment from the dentists connected to the Internet considering specialized fields of the dentists and units what their dental clinics have.

If the dentists for joint treatment are determined, PCs of the dentists for joint treatment are connected to the database of the PC at the dental clinic where the patient has visited in step S306. At this time, as described above, the PCs 104a, 104b, 104n (see FIG. 1) of the dentists for joint treatment are connected to the PC 102 of the dental clinic through the Internet using the exclusive line, xDSL line, cable or ISDN line.

Afterwards, the treatment results stored in the PC of the dental clinic where the patient has visited are transmitted to the PCs of the dentists for joint treatment in step S308. Alternatively, if the PCs of the dentists for joint treatment are in common connected to the main server, the treatment details and diagnosis details of the patient are processed on the program of the PC of the dental clinic where the patient has visited, and are transmitted to the main server at user's desired time. If the PCs of the remote areas are on standby, the treatment details and the diagnosis details are downloaded from the main server and displayed on the monitor.

Subsequently, joint treatment is carried out using the camera in step S310. In other words, a moving image display window is displayed on the monitor along with the treatment records of the patient. The image taken by the dental clinic where the patient has visited is displayed on the moving image display window to allow the dentists at the remote areas to jointly treat the patient. Such moving images can be transmitted to a TCP/IP UDP through the web camera. Also, the moving images can be provided to the remote areas through streaming service.

The aforementioned system for remote and joint diagnosis can be provided to general homes, which use a home network, as well as local dental clinics of mountainous areas, remote islands, and snowy areas. The home network means that
home appliances for home use are provided with a communication function to connect
communication network such as Internet, thereby allowing the PCs of the remote
areas to control the home appliances and obtain various kinds of information provided
from home appliance companies. If medical equipments are connected to the home
network, the patient can provide treatment data to remote dentists at home without
visiting the dental clinic. Also, the patient can check the dental status by receiving the
treatment results and prescription from the remote dentists.

Another embodiment of the present invention will be described with reference to
Fig. 5.

Fig. 5 is a perspective view illustrating a unit chair according to the present
invention, and Fig. 6 is a block diagram illustrating a construction of a voice and
video recording system according to the present invention.

As shown in Fig. 5, the unit chair according to the present invention includes a
dental chair 1, a PC 2 for a unit chair, a liquid crystal monitor 3, a stand 4 for spittoon
reservoir, a bracket table 5, a light-emitting lamp 6, and a camera unit 7 provided on a
front surface of the light-emitting lamp 6.

The light-emitting lamp 6 illuminates an affected part of the patient in a state that it
is rotatably supported by a support 62 and an arm 62 formed above the PC 2. A lamp
sensor 8 sensing lighting of a lamp and the camera unit 7 are provided in the light-
emitting lamp 6.

The camera unit 7 is provided on the front surface of the light-emitting lamp 6 and
uses light of the light-emitting lamp 6 as light for picture-taking. Also, the camera unit
7 has an auto zoom function automatically performing image-magnifying/image
downscaling, an auto focus function, an accommodation function of a subject, and a
function for automatically adjusting a camera angle of the subject. The camera unit 7 is
provided with a mike to which voice data are input. A digital camera or a PC camera is
used as the camera unit 7. The camera unit 7 may further be provided with a bracket
(not shown) to be detachably fixed to the light-emitting lamp 6 as the case may be.

Fig. 6 is a block diagram illustrating a construction of a voice and video recording
system according to the present invention. The voice and video recording system of the
present invention includes the camera unit 7 having a video recorder 73 and a voice
recorder 74, and the PC 2 for a unit chair controlling the camera unit 7 and analyzing
signals transmitted from the camera unit 7 to store the analyzed signals in a memory 22
and output them to a display 3.

The PC 2 will now be described in more detail. The PC 2 includes the memory 22
and a main controller 21. The memory 22 stores a management program and video/
voice data therein. The main controller 21 reads the management program from the
memory 22 to perform a basic function of the PC, controls the video recorder 73 and
the voice recorder 74 of the camera unit 7 depending on an output signal of the lamp sensor 8, and analyzes various types of received data to store the analyzed data in a database of the memory 22 and output them to the display 3.

[60] The video recorder 73 converts incident light of a lens 71 into electrical signals and performs balance adjustment and gamma correction of the converted electrical signals to transmit them to the PC 2 through an output cable 75. A general USB port is used as the output cable. The USB port supports communication of data in accordance with the set communication standard. Although not shown, the cable 75 is provided in the arm 61 and the support 62 and is connected with the PC 2.

[61] The voice recorder 74 is connected with the mike 72. The voice recorder 74 captures voice signals input through the mike 72, converts the captured signals into electrical signals, processes the electrical signals in a signal processing way such as digital compression, and transmits the processed signals to the PC 2. The detailed construction of the voice recorder 74 is well known in the art and thus will be omitted.

[62] The main controller 21 in the unit chair drives the camera unit 7 if the lamp sensor 80 senses lighting of the light-emitting lamp 6. The main controller 21 receives various data applied from the camera unit 7, stores the data in a corresponding database area of the memory 22, and performs a basic function of the PC depending on command of a user. Specifically, the main controller 21 receives video and voice data from the camera unit 7 and stores the received data in the memory 22. If there is external command from an operator, the main controller 21 restores and converts the data stored in the memory 22 through a predetermined reproducing program and outputs the data to the display 3.

[63] It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the spirit or scope of the inventions. Thus, it is intended that the present invention covers the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

**Industrial Applicability**

[64] As described above, the present invention is efficiently used for dental treatment and diagnosis.
Claims

[1] A system for remote and joint diagnosis in which treatment records of a patient are shared with dentists at remote places to jointly treat the patient in real time, the system for remote and joint diagnosis characterized in that a plurality of PCs provided in a plurality of dental clinics are connected with one another through Internet, wherein each PC includes a server serving to intermediate communication with another PC, a camera connected to the PC, a mike, a controller controlling other treatment unit, and a database storing treatment records of the patient therein.

[2] The system for remote and joint diagnosis according to claim 1, further comprising a main server that transmits and receives data among the PCs.

[3] A method for remote and joint diagnosis comprising the steps of: receiving basic treatment by allowing a patient to visit a dental clinic near home; recording treatment results of the patient in a PC of the dental clinic where the patient has visited; retrieving dentists who can jointly treat the patient; connecting PCs of the retrieved dentists with the PC of the dental clinic where the patient has visited; transmitting the treatment results stored in the PC of the dental clinic where the patient has visited to the PCs of the dentists for joint treatment; and jointly treating the patient using moving images through Internet.

[4] A unit chair having a video and voice recording function comprising: a camera unit provided in a light-emitting lamp of the unit chair to obtain oral video and voice signals of a patient sitting down on the unit chair; a lamp sensor sensing lighting of the light-emitting lamp; a main controller driving the camera unit if the lamp sensor senses lighting of the light-emitting lamp and receiving the video and voice signals from the camera unit to store them in a designated area of a memory and read them from the memory; and a memory connected to the main controller, storing the video and voice signals applied from the main controller under the control of the main controller.

[5] The unit chair according to claim 4, wherein the camera unit includes a video recorder taking a subject through a video sensor and outputting video data of the taken subject, and a voice recorder capturing and recording voice data using a mike and outputting the recorded voice data.

[6] The unit chair according to claim 4, further comprising a display connected to the main controller, displaying the video data transmitted from the main
controller.
START

PATIENT VISITS DENTAL CLINIC TO RECEIVE BASIC TREATMENT

RECORD TREATMENT RESULT OF PATIENT IN PC OF VISITED DENTAL CLINIC

RETRIEVE DENTISTS AVAILABLE FOR JOINT TREATMENT

PC OF DENTISTS AVAILABLE FOR JOINT TREATMENT CONNECTS WITH PC OF DENTAL CLINIC WHERE PATIENT VISITS

TRANSMIT TREATMENT RESULT STORED IN PC OF DENTAL CLINIC WHERE PATIENT HAS VISITED TO PC OF DENTAL CLINIC FOR JOINT TREATMENT

JOINTLY TREAT PATIENT USING INTERNET

END
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 G06F 17/60

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC7 A63B, A63C, G06F17/60, G06F19/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
KR, JP as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PAJ, FPD, USPAT, eKIPASS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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FURTHER DOCUMENTS ARE LISTED IN THE CONTINUATION OF BOX C.

See patent family annex.

DATE OF ACTUAL COMPLETION OF THE INTERNATIONAL SEARCH

25 OCTOBER 2005 (25.10.2005)

DATE OF MAILING OF THE INTERNATIONAL SEARCH REPORT

25 OCTOBER 2005 (25.10.2005)

Authorized officer
LEE, Dong Young
Telephone No.  82-42-481-5784

Name and mailing address of the ISA/KR
Korean Intellectual Property Office
920 Dunsan-dong, Seo-gu, Daejeon 302-701, Republic of Korea
Facsimile No.  82-42-472-7140

Form PCT/ISA/210 (second sheet) (April 2005)
This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
   because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
   because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
   because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

This International Searching Authority found multiple inventions in this international application, as follows:

Claims 1-3 of the present invention relate to a system and method for remote and joint diagnosis comprising a a plurality of PC, main server, camera, controller and a database.

Claims 4-6 relate to a unit chair composed of a photographing unit, sensor, main controller and a memory unit.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☑ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

**Remark on Protest**

☐ The additional search fees were accompanied by the applicant’s protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant’s protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.
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