FORM 2

THE PATENTS ACT, 1970

(39 of 1970)

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The Patent Rules, 2003

COMPLETE SPECIFICATION

(See sections 10 & rule 13)

1. TITLE OF THE INVENTION

DEVICE AND METHOD FOR DETECTING THE INFECTION STATE OF HAIR

2. APPLICANT (S)

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3. PREAMBLE TO THE DESCRIPTION

COMPLETE SPECIFICATION

The following specification particularly describes the invention and the manner in which it is to be performed.

TECHNICAL FIELD

[0001] The present disclosure relates, in general, to smart hair detectors, and more specifically, relates to a device and method for detecting the infection state of the hair.

BACKGROUND

[0002] Hair loss or Alopecia in its various forms is a global widespread problem for both men and women. Hair loss may affect up to 70% of men and 40% of women at some point in their lifetime. While men typically present with a distinctive alopecia pattern involving hairline recession and vertex balding, women normally exhibit diffuse hair thinning over the top of their scalps. The treatment standard in dermatology clinics continues to be minoxidil and finasteride with hair transplantation as a surgical option.

[0003] Hair problems have plagued many people and affected everyone's normal life. Hair loss, baldness, dry, and white hair are common problems. With the continuous improvement of people's living standards, people have put forward higher requirements for their external image. Most of the symptoms are not visible in the early stages, however, when the problem increases it becomes worse and the treatment is expensive. At present, hair loss, alopecia, and the like are often treated using an internal or external application.

[0004] A few existing solutions to hair problems are the lab machines to test the scalp or hair problem but only at the lab level. Also, the testing and treatment are so expensive. The size of the lab machines is very large they are not portable. Therefore, it is desired to overcome the drawbacks, shortcomings, and limitations associated with existing solutions and develop a compact, cost-efficient device that accurately detects hair and other scalp problems.

OBJECTS OF THE PRESENT DISCLOSURE

[0005] An object of the present disclosure relates, in general, smart hair detectors, and more specifically, relates to a device and method for detecting the infection state of the hair.

[0006] Another object of the present disclosure is to provide a device that accurately detects hair and other scalp problems.

[0007] Another object of the present disclosure is to provide a device that reduces the cost incurred for tests and treatment.

[0008] Another object of the present disclosure is to provide a portable device.

[0009] Yet another object of the present disclosure is to provide a compact and cost-efficient device.

SUMMARY

[0010] The present disclosure relates, in general, to smart hair detectors, and more specifically, relates to a device and method for detecting the infection state of the hair. The main objective of the present disclosure is to overcome the drawback, limitations, and shortcomings of the existing device and solution, by providing a device for detecting the infection state of the head part of the subject.

[0011] The present disclosure relates to a device for detecting the infection state of the head part of the subject, the device includes a first set of sensors configured on the surface of the device, the first set of sensors adapted to capture one or more images of the head part of the subject, the one or more images pertaining to scalp and hair of the subject. The second set of sensors is configured on the edge surface of the device, and the second set of sensors is adapted to detect the accurate placement of the device in the head part and test the quality of the hair. A controller operatively coupled to the first set of sensors and the second set of sensors, the controller configured to receive the captured images of the head part of the subject, receive the detected placement of the device and determine the quality of the hair of the subject and extract a set of attributes from the one or more images and compare the extracted set of attributes based on matching of the extracted set of attributes with a reference set of attributes. The set of attributes pertains to baldness, rash, scaly areas of skin and any combination thereof. Based on a combination of comparison of the extracted attributes, the controller is configured

to determine a diagnosis for the head part of the subject, the diagnosis pertaining to the infection state of the hair.

[0012] In an aspect, the first set of sensors is a high-end microscopic camera and the second set of sensors is the tactile sensor. The device can include a light source that produces red light onto the head part of the subject and treats falling of the hair. The device comprises a power source to provide a power supply to the device, where the power source is a battery. The infection state of the hair pertaining to Alopecia areata, Tinea Alopecia which makes the quality of hair weak and generates other diseases related to scalps like dandruff, ringworm, and any combination thereof.

[0013] Further, the device is of circular configuration and the diagnosis for the head part of the subject is conveyed to an electronic device associated with the subject. Thus, the proposed device is portable and accurately detects hair and other scalp problems, thereby reducing the cost incurred for tests and treatment.

[0014] Various objects, features, aspects, and advantages of the inventive subject matter will become more apparent from the following detailed description of preferred embodiments, along with the accompanying drawing figures in which like numerals represent like components.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] The following drawings form part of the present specification and are included to further illustrate aspects of the present disclosure. The disclosure may be better understood by reference to the drawings in combination with the detailed description of the specific embodiments presented herein.

[0016] FIG. 1 illustrates an exemplary view of the proposed smart hair detector, in accordance with an embodiment of the present disclosure.

[0017] FIG. 2 illustrates an exemplary functional component of the device, in accordance with an embodiment of the present disclosure.

[0018] FIG. 3 illustrates an exemplary view of the device, in accordance with an embodiment of the present disclosure.

[0019] FIG. 4 illustrates an exemplary flow chart of a method for detecting the infection state of the head part of the subject, in accordance with an embodiment of the present disclosure.

DETAILED DESCRIPTION

[0020] The following is a detailed description of embodiments of the disclosure depicted in the accompanying drawings. The embodiments are in such detail as to clearly communicate the disclosure. If the specification states a component or feature "may", "can", "could", or "might" be included or have a characteristic, that particular component or feature is not required to be included or have the characteristic.

[0021] As used in the description herein and throughout the claims that follow, the meaning of "a," "an," and "the" includes plural reference unless the context clearly dictates otherwise. Also, as used in the description herein, the meaning of "in" includes "in" and "on" unless the context clearly dictates otherwise.

[0022] The proposed device disclosed in the present disclosure overcomes the drawbacks, shortcomings, and limitations associated with the conventional device by providing a device for detecting the infection state of the head part of the subject. The present disclosure relates to a device for detecting the infection state of the head part of the subject, the device includes a first set of sensors configured on the surface of the device, the first set of sensors adapted to capture one or more images of the head part of the subject, the one or more images pertaining to scape and hair of the subject. The second set of sensors is configured on the edge surface of the device, and the second set of sensors is adapted to detect the accurate placement of the device in the head and test the quality of the hair. A controller operatively coupled to the first set of sensors and the second set of sensors, the controller configured to receive the captured images of the head part of the subject, receive the detected placement of the device and determine the quality of hair of the subject and extract a set of attributes from the one or more images and compare the extracted set of attributes based on matching of the extracted set of attributes with a reference set

of attributes, wherein based on a combination of comparison of the extracted attributes, the controller is configured to determine a diagnosis for the head part of the subject, the diagnosis pertaining to infection state of the hair.

[0023] In an aspect, the first set of sensors is a high-end microscopic camera and the second set of sensors is the tactile sensor. The device can include a light source that produces red light onto the head part of the subject and treats falling of the hair. The device comprises a power source to provide a power supply to the device, where the power source is a battery. The infection state of the hair pertaining to Alopecia areata, Tinea Alopecia which makes the quality of hair weak and generates other diseases related to scalps like dandruff, ringworm, and any combination thereof. The device is of circular configuration and the diagnosis for the head part of the subject is conveyed to an electronic device associated with the subject. The present disclosure can be described in enabling detail in the following examples, which may represent more than one embodiment of the present disclosure.

[0024] The advantages achieved by the device of the present disclosure can be clear from the embodiments provided herein. The present disclosure provides a compact, cost-effective device that detects hair and other scalp problems accurately and reduces the cost incurred for tests and treatment. The description of terms and features related to the present disclosure shall be clear from the embodiments that are illustrated and described; however, the invention is not limited to these embodiments only. Numerous modifications, changes, variations, substitutions, and equivalents of the embodiments are possible within the scope of the present disclosure. Additionally, the invention can include other embodiments that are within the scope of the claims but are not described in detail with respect to the following description.

[0025] FIG. 1 illustrates an exemplary view of the proposed smart hair detector, in accordance with an embodiment of the present disclosure.

[0026] Referring to FIG. 1, smart hair detector 100 (also referred to as device 100, herein) is configured for detecting the infection state of the head part of the subject. The device 100 can include a first set of sensors 102-1, a second set of

sensors 102-2, a controller 104, a database 106 and an electronic device 108. The components are linked in such a manner that their location can be changed during the arrangement and all the sensors (102-1, 102-2) are integrated in the proposed device. The infection state of hair pertaining to Alopecia areata, Tinea Alopecia and the like makes the quality of hair weak and generates other diseases related to scalps like dandruff, ringworm, and the like.

[0027] In an exemplary embodiment, device 100 as presented in the example can be comb and is of circular shape configuration. The device 100 can include the first set of sensors 102-1 configured on the surface of the device 100, and the first set of sensors 102-1 adapted to capture one or more images of the head part of the subject. The one or more images pertaining to scape and hair. In an exemplary embodiment, the first set of sensors 102-1 can be high-end microscopic cameras having 1.3 M – 12.3 M Complementary Metal Oxide Semiconductor (CMOS) with frames per second (FPS) up to 165.5. The high-end microscopic cameras are very small in size and can easily fit inside the device 100.

[0028] In another embodiment, the second set of sensors 102-2 is configured on the edge surface of device 100. The second set of sensors 102-2 is adapted to detect the location of the device in the head part of the subject/user and test the quality of the hair in the head part of the subject. In an exemplary embodiment, the second set of sensors 102-2 can be tactile sensors. The device 100 can include a light source that may produce red light onto the head part and may treat the falling of hair.

[0029] In an embodiment, the controller 104 is operatively coupled to the first set of sensors 102-1 and the second set of sensors 102-2. The controller 104 is configured to capture one or more images of the head part of the subject. The controller 104 is configured to receive the detected placement of the device and determine the quality of the hair of the subject.

[0030] The controller 104 is configured to extract a set of attributes from the one or more images and compare the extracted set of attributes based on matching the extracted set of attributes with a reference set of attributes. The set of attributes

pertains to baldness, rash, scaly areas of skin and the like. The reference set of attributes pertains to previously stored images.

[0031] Based on a combination of comparisons of the extracted attributes, the processor is configured to determine a diagnosis for the head part of the subject, the diagnosis pertaining to the infection state of the hair. Further, device 100 may include a power source 112 shown in FIG. 3 to provide a power supply to device 100. The power source may include either individually or in a combination of, any of the following solar or photoelectric power, disposable or rechargeable batteries, adaptors etc. Energy from the power source 112 can be used to provide operating power to the device 100.

[0032] For example, the device 100 can sense the scalp and hair quality, detect the problem, and simultaneously inform the patient about the problem. The device 100 shape is circular and contains some high-end microscopic cameras that are very small in size and can easily fit inside the device 100. The cameras can capture pictures of the scalp and hair to match them with already uploaded pictures of the scalp, and analyze the data and inform the person about the disease he/she is suffering from. The touch sensors on the edges of the device detect whether the device is placed on the head correctly or not. The touch sensors would also help in testing the quality of the hair by their touch. The device 100 also contains a battery so that it can be portable. The light source produces red light onto the head which may treat hair fall problems.

[0033] Thus, the present invention overcomes the drawbacks, shortcomings, and limitations associated with existing solutions, and provides a compact, cost-effective device that detects hair and other scalp problems accurately and reduces the cost incurred for tests and treatment.

[0034] FIG. 2 illustrates an exemplary functional component 200 of the device, in accordance with an embodiment of the present disclosure.

[0035] Referring to FIG. 2, device 100 can include the first set of sensors 102-1 adapted to capture one or more images of the head part of the subject. The one or more images pertaining to the scape and hair of the subject. The second set of

sensors 102-2 is adapted to detect the location of the device in the head part of the subject and test the quality of hair in the head part of the subject.

[0036] The controller 104 is operatively coupled to the first set of sensors 102-1 and the second set of sensors 102-2. The controller 104 is configured to capture one or more images of the head part of the subject. Controller 104 is configured to receive the detected location of the device and determine the quality of hair of the subject.

[0037] The controller 104 can be in communication with each database 106. The controller 104 may include a microprocessor or other devices capable of being programmed or configured to perform computations and instruction processing by the disclosure. Such other devices may include microcontrollers, digital signal processors (DSP), a complex programmable logic device (CPLD), field programmable gate arrays (FPGA), application-specific assimilated circuits (ASIC), discrete gate logic, and/or other assimilated circuits, hardware or firmware instead of or in addition to a microprocessor.

[0038] Database 106 can include programmable software instructions that are executed by the processor. Controller 104 may be embodied as a single processor or several processors. The controller 104 and database 106 may each be, for example, located entirely within a single computer or another computing device. The database, which enables the storage of data and programs, may include random-access memory (RAM), read-only memory (ROM), flash memory and any other form of readable and writable storage medium.

[0039] The diagnosis for the head part of the subject is conveyed to an electronic device 108 associated with the subject. The electronic device 108 is selected from cell phones, pagers, Personal Digital assistants (PDAs) and the like.

[0040] FIG. 3 illustrates an exemplary view of the device, in accordance with an embodiment of the present disclosure. The device 100 can include a charging port 110 accommodated at the side portion of the frame of the device, the charging port 110 adapted to charge the device 100. The device 100 can include the power source 112 to provide the power supply to the device, where the power source is the battery.

[0041] FIG. 4 illustrates an exemplary flow chart of a method for detecting the infection state of the head part of the subject, in accordance with an embodiment of the present disclosure.

[0042] Referring to FIG. 4, method 400 includes block 402, the controller can receive the captured images of the head part of the subject. The first set of sensors is configured on the surface of the device, the first set of sensors is adapted to capture one or more images of the head part of the subject. One or more images pertaining to scape and the hair of the subject.

[0043] At block 404, the controller can receive the detected placement of the device and determine the quality of the hair of the subject. The second set of sensors is configured on the edge surface of the device and the second set of sensors is adapted to detect the accurate placement of the device in the head part and test the quality of the hair.

[0044] At block 406, the controller can extract the set of attributes from the one or more images and compare the extracted set of attributes based on matching the extracted set of attributes with a reference set of attributes, wherein based on a combination of comparisons of the extracted attributes, the controller is configured to determine a diagnosis for the head part of the subject, the diagnosis pertaining to infection state of the hair.

[0045] It will be apparent to those skilled in the art that the device 100 of the disclosure may be provided using some or all of the mentioned features and components without departing from the scope of the present disclosure. While various embodiments of the present disclosure have been illustrated and described herein, it will be clear that the disclosure is not limited to these embodiments only. Numerous modifications, changes, variations, substitutions, and equivalents will be apparent to those skilled in the art, without departing from the spirit and scope of the disclosure, as described in the claims.

ADVANTAGES OF THE PRESENT DISCLOSURE

[0046] The present disclosure provides a device that accurately detects hair and other scalp problems.

[0047] The present disclosure provides a device that reduces the cost incurred for tests and treatment.

[0048] The present disclosure provides a compact and cost-efficient device.

[0049] The present disclosure provides a portable device.

We Claim:

1. A device (100) for detecting the infection state of head part of subject, the device comprising:

a first set of sensors (102-1) configured on the surface of the device, the first set of sensors adapted to capture one or more images of the head part of the subject, the one or more images pertaining to the scape and hair of the subject;

a second set of sensors (102-2) configured on the edge surface of the device, the second set of sensors adapted to detect accurate placement of the device in the head part and test the quality of the hair; and

a controller (104) operatively coupled to the first set of sensors and the second set of sensors, the controller configured to:

receive the captured images of the head part of the subject;

receive the detected placement of the device and determine the quality of the hair of the subject; and

extract a set of attributes from the one or more images and compare the extracted set of attributes based on matching the extracted set of attributes with a reference set of attributes, wherein based on a combination of comparison of the extracted attributes, the controller is configured to determine a diagnosis for the head part of the subject, the diagnosis pertaining to infection state of the hair.

2. The device as claimed in claim 1, wherein the set of attributes pertains to baldness, rash, scaly areas of skin and any combination thereof.

3. The device as claimed in claim 1, wherein the first set of sensors (102-1) is a high-end microscopic camera.

4. The device as claimed in claim 1, wherein the second set of sensors (102-2) is tactile sensors.

5. The device as claimed in claim 1, wherein the device (100) comprises a light source that generates red light onto the head part of the subject and treats falling of the hair.

6. The device as claimed in claim 1, wherein the device comprises a power source (112) to supply power to the device.

7. The device as claimed in claim 1, wherein the infection state of the hair pertaining to Alopecia areata, Tinea Alopecia which makes the quality of the hair weak and generates diseases.

8. The device as claimed in claim 1, wherein the device is of circular configuration.

9. The device as claimed in claim 1, wherein the diagnosis for the head part of the subject is conveyed to an electronic device associated with the subject.

10. A method (400) for detecting the infection state of head part of subject, the method comprising:

receiving (402), at a controller, the captured images of the head part of the subject, a first set of sensors configured on the surface of the device, the first set of sensors adapted to capture one or more images of the head part of the subject, the one or more images pertaining to scape and hair of the subject;

receiving (404), at the controller, the detected placement of the device and determining the quality of the hair of the subject, a second set of sensors configured on the edge surface of the device, and the second set of sensors adapted to detect accurate placement of the device in the head part and test the quality of the hair; and

extracting, at the controller, a set of attributes from the one or more images and comparing the extracted set of attributes based on matching the extracted set of attributes with a reference set of attributes, wherein based on a combination of comparison of the extracted attributes, the controller is configured to determine a diagnosis for the head part of the subject, the diagnosis pertaining to infection state of the hair.

For Chitkara University and
Chitkara Innovation Incubator Foundation

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ABSTRACT

DEVICE AND METHOD FOR DETECTING THE INFECTION STATE OF HAIR

The present disclosure relates to a device (100) for detecting the infection state of the head part of the subject, the device includes a first set of sensors (102-1) to capture images of the head part. The second set of sensors (102-2) detects the accurate placement of the device in the head part and tests the quality of hair. A controller (104) is configured to receive the captured images of the head part of the subject, receive the detected placement of the device and determine the quality of the hair of the subject, extract a set of attributes and compare the extracted set of attributes with reference set of attributes, where based on a combination of comparison, the controller is configured to determine a diagnosis for the head part of the subject.

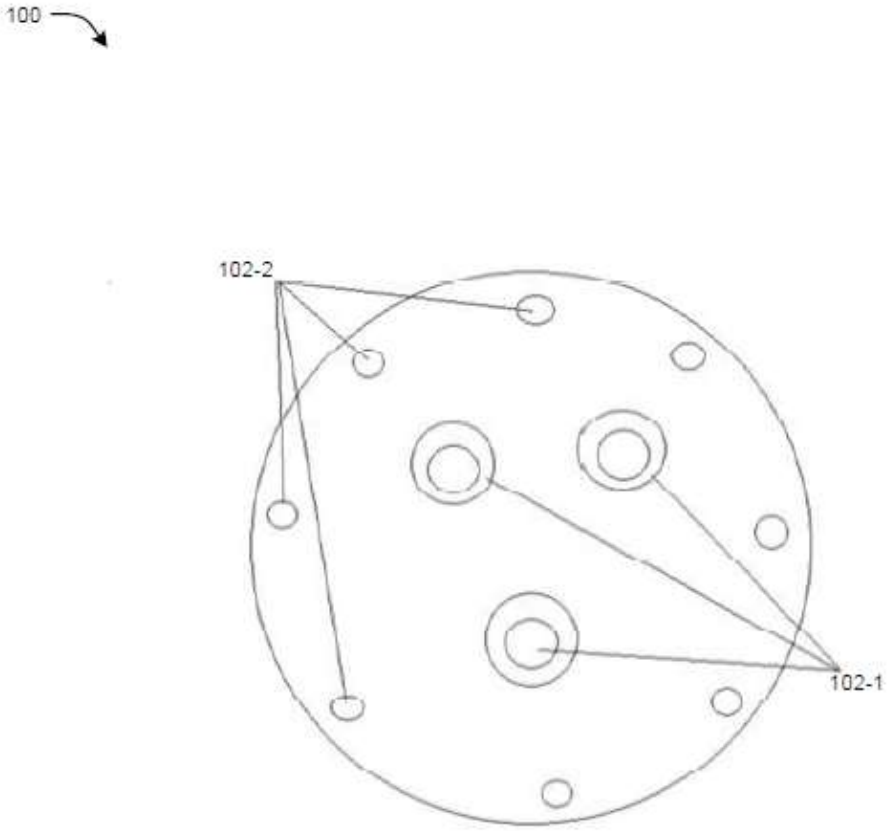

FIG. 1

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