SYSTEM AND METHOD FOR A NAIL MANIPULATION

TECHNICAL FIELD OF THE INVENTION

The invention relates to a method and system for a nail manipulation, such as decorating nails.

BACKGROUND OF THE INVENTION

There are known treatments in the beauty industry for more than fifty centuries, which are related to the nails treatment: so called "manicure" for fingernails and hands, as well as "pedicure" for toenails treatment. The nail manipulation, such as manicure, pedicure, and nail decorations as well as artificial nails is very common nowadays, and they are performed for example both in beauty salons and home mainly by handwork. Few tools or devices are known from prior art for nail manipulation, such as manually operated grinding tools and spraying devices.

There are however some disadvantages relating to the known prior art, such as that the nail manipulation is time consuming and making of decorations to quite small areas of the nail are very accurate procedure. In addition some manipulations, e.g. treatments of artificial nails, such as for example gel nails or acrylic nails, are quite complex and requires knowledge and using of special chemical agents, like lacquer and treatment liquids, such as acrylic, acetone, which are typically harmful to health. In addition the processes cause also odours. Quite often there is also a need to use an external specialist for the treatments, due to the complexity of certain procedures, e.g. such as gel or acrylic nails. Furthermore there is often a need for the number of specialized equipment, such as UV curing lamp (ultraviolet) and mechanical removal equipment, which increases the cost of the treatment procedures. Additionally there is a need to frequently perform maintenance for the gel nails or acrylic nails, often periodically after some weeks.

SUMMARY OF THE INVENTION

Embodiments of the invention alleviate and eliminate the problems relating to the known prior art. Embodiments of the invention provide a system for performing nail manipulation easily, accurately and fast and in safe manner so that possible odours and radiation dosages due to UV radiators, as well as dosages due to chemical treatments and agents can be minimized. Embodiments of the invention offer a nail manipulation system, where

everyone can easily make different kinds of decorations or artificial nails or other members onto the nails.

According to a first aspect of the present invention, there is provided a system for a nail manipulation, wherein the system comprises: shape information providing means for providing nail information of a shape and/or position of the nail to be manipulated, whereupon the system is configured to provide first controlling data based on said nail information, object providing means for providing object data related to an object to be produced onto the nail, whereupon the system is configured to provide second controlling data based on said object data, a manipulation means, wherein said manipulation means is configured for producing said object onto the nail to be manipulated, and a controlling means for controlling the operation of the manipulation means based on said first and second controlling data in order to produce said desired object onto the nail to be manipulated, wherein the manipulation means is a dispenser, which is configured to provide nail manipulating medium according to the controlling instruction of the controlling means.

According to a second aspect of the present invention, there is provided a method for a nail manipulation, wherein the method comprises steps of: providing nail information of a shape and/or position of the nail to be manipulated, and providing first controlling data based on said nail information, providing object data related to an object to be produced onto the nail, and providing second controlling data based on said object data, producing said object onto the nail to be manipulated by using a manipulation means, and controlling the operation of the manipulation means based on said first and second controlling data by a controlling means in order to produce said desired object onto the nail to be manipulated, wherein the manipulation means is a dispenser, which is configured to provide nail manipulating medium according to the controlling instruction of the controlling means.

According to an embodiment of the invention, the system for nail manipulation, such as producing an object onto the nail or performing other treatments (decorative, curing or medical treatment, or natural nail reconstruction with biomaterial) to the nail, comprises object providing means for providing object data related to the object to be produced onto the nail and a manipulation means for producing said object onto the nail to be manipulated. The object data may be e.g. vector graphics or bitmap data, colours and dimension or other data, which can be used for manufacturing said object. The system advantageously comprises also shape information providing means for

providing nail information of a shape and/or position of the nail or area of the nail to be manipulated, whereupon the system is configured to provide first controlling data based on said nail information for controlling the operation of the manipulation means. In addition the system is also configured to provide second controlling data based on said object data of the object providing means, for additionally controlling the operation of the manipulation means.

The manipulation may comprises for example printing, painting, cleaning, removing of artificial nails, application of primary layer or transparent, translucent or single-colour of multi-colours paints and lacquers, including UV lacquers, oiling, mechanical cleaning, grinding, brushing, greasing and finger massaging, as an example. The system advantageously comprises corresponding manipulation means, such as printer, nail brush and/or spray coater, dispenser, cleaner, remover, UV radiator as well as mechanical devices, like grinding, brushing, greasing and finger massaging devices, as an example. In addition it is to be noted that also medical or chemical agents can be applied by an embodiment of the system of the invention for example medically treating or cure the nail, such as curing any fungi, or encapsulating a certain portion of the nail by a chemical or medical curing medium, or natural nail reconstruction with 3D biomaterial, for example. According to an example the manipulation means may comprise also cutting means, such as a laser or mechanical cutting means for cutting the nail or artificial nail or object material to be provided onto the nail.

According to an embodiment, the shape information providing means is an imaging means, such as a camera or scanner, e.g. laser scanner, which determined the position and shape of the nail surface to be manipulated. For manipulation, such as providing detailed decoration or artificial nails, it is very important to know both the shape and especially the position of the nail in order to achieve accurate results without overflows (especially to the skin tissue areas). The shape information providing means may also be implemented by numbers of cameras in order to achieve / reconstruct 3D profile or shape information. Also mechanical tip type members can be used for detecting e.g. depth or curvature of the nail (at least on z-direction or 3D reconstruction). For a certain embodiment only few measuring points are needed to get sufficient curvature information. As an example the shape information providing means may also comprise capacitive, RF, ultrasound or microwave scanning means or combination of the above configured to scan at least the 2D or 3D shape and/or position or area of the nail to be manipulated.

According to an embodiment, also masks, such as tape or label type means can be used around the nail so to expose only the desired area for nail manipulation, such as for the dispenser. In this example the shape information providing means may detect the edge of the mask and thereby the uncovered area of the nail and thereby provide position or area information of the nail to be manipulated. The mask may comprise conductive or optically detectable (colour or the like) material in order to facilitate the determination of the area. According to an additional embodiment, an image of the nail may be displayed via display means in real time to the user, whereupon the user can select the desired area of the nail to be manipulated. The selection can be advantageously done by any suitable user interface means, such as using a joystick or mouse or electrical pen or by gesture based commands (finger command in a touch screen, whereupon the shape information providing means may provide position or area information of the nail to be manipulated. It is to be noted that according to an exemplary embodiment the accurate shape information is not needed (if there is no need for an accurate manipulation), whereupon the manipulation can be done without accurate shape information of the shape of the nail to be manipulated or alternatively a standard model or other guess can be used as a surrogate of the real shape of the current nail (however, this is only an example).

According to an embodiment, the shape information providing means comprises or is in data connection with a database, which comprises shape information of the nails. The shape information may be individual shape information related to a certain user, or the database may also comprise an exemplary nail library, where the user can select a similar nail, the shape of which corresponds with the shape of the nail to be manipulated. According to an embodiment the system may comprises a separate scanner for individual nail identification purpose (for example a finger prints scanner) in order to authenticate the user (or finger) and thereby selected the shape of the nail of the individual finger in question from the database, if the nail information has been stored and/or imported to the database earlier. In addition the authentication may also be used for other purposes in the system, such as allowing or opening an access to a certain database, cloud server pages, related social media pages or user interface.

According to an embodiment, the object providing means comprises a database having a number of objects to be selected, and object data related to said object, such as artwork, graphical, 2D/3D object, design, or manufacturing information of the object (e.g. vector graphics or bitmap information). The database may be offered via a shop like application in the

data network or the database may also be at least partially internal part of the system. Object data may also comprise e.g. information about colours, dyes, chemical agents, viscosities to be used, or building material for artificial portions for producing the object, or coordinate or modelling information about the object, which can be used for controlling the operation of the manipulation means or for modelling or providing controlling data for said controlling.

According to an embodiment, the object providing means comprises a receiving means for receiving a concrete object, such as a physical artificial nail to be attached to the nail. In this case the manufacturing information may be related to orientation of the object for attaching as well as possibly also information about the use of chemical agent(s), such as glue or lacquer in order to attach said artificial nail onto the real nail of the user. The receiving means may be configured for receiving also building materials suitable for the object, as well as manufacturing information to compose the desired object about the building materials received.

According to an embodiment, the building materials may be received in a kit, where the kit may comprise said object data or manufacturing information for the system in a readable form, whereupon the object providing means advantageously comprises reading means, such as RFID, 2D tag, and/or other machine/human readable means, for reading said manufacturing information from the kit. The manufacturing information of the kit may also comprise a link to a certain address, such as web address or the like, where the user or system may gather the manufacturing information, such as how to fix or handle said building materials of the kit in order to provide said object. Advantageously, an embodiment of the system is configured to form controlling signals for the controlling means at least partially based on said manufacturing information.

According to an embodiment, the object providing means comprises a user interface means or application, via which the object can be designed. The designs or objects can be created e.g. by feeding an image (in an electronic format) from which the application produces corresponding object data and again the object data so that the controlling means can control the operation of the manipulation means correspondingly to produce said object onto the nail. It is to be noted that the image can be created by any known methods and devices, such as by a camera or scanner and that the image may represent any imaged object. For example the image may be taken from clothes worn by the user, whereupon the overall style of the user, including also the style of the nails, is consistent and uniform.

According to an embodiment, the application may be configured to share said designs or objects (data) created by the user to a data communication server, such as to a certain forum, or social media, in the internet or cloud based service. The application is according to an embodiment a digitally implemented shop in the data communication network, via which the object or designs or the like data for the nail manipulation can be selected, bought, shared, downloaded or produced.

In addition, according to an embodiment, the system may be configured to provide said object data by imaging or scanning an earlier object e.g. directly from the nail of the user. For example the system may focus a camera or the like of the system and take an image of the user's nail, whereupon said image is used as the object data. The system may be configured to model said object data into any suitable form for controlling said system to manufacture a new object corresponding said imaged one. The suitable form may be e.g. instruction data, such as said second controlling data or at least portion or basement of said second controlling data. Thus the system is can be configured to function as a copy type machine for multiplying said objects. It is to be noted that according to an example at least two or more systems may be functionally connected so (e.g. via a wireless or wired data communication link or via an application on the network) that the object of the first nail is scanned by the scanner of the first system for providing object data of said first nail's object, whereupon the said object data is communicated to at least one second system, which is then configured to produce said object to at least one second nail.

An embodiment of the system advantageously comprises controlling means for controlling the operation of the manipulation means based on said first and second controlling data in order to produce said desired object onto the nail to be manipulated. The first data may comprise e.g. shape and position information of the nail, whereupon the controlling means may control for example the movements of the manipulation means, such as 2D/3D printer, dispenser, scanning or imaging means, or the like, to follow the shape of the nail being positioned to a determined position. The second data may comprise e.g. object data for manufacturing the object, such as data about the colours, dyes, chemical agents, building material for artificial portions, as described above. An embodiment of the system is advantageously configured to provide controlling data for said controlling means to control the operation of the manipulation means, such as operational parameter, e.g. coordinated movements, size or amount of the dose of different material, timing for certain operations, like UV radiators, pressure and/ or size of a nozzle of an airbrush

and selection of material and tools to be used for object production, as an example.

According to an embodiment, the system also comprises an ergonomically designed holder for the fingers and/or armrest. In addition in case of building a gel extension, the system may also comprise an extension support for the portion or object to be manipulated, such as built.

According to an embodiment of the invention, the object to be provided may be for example an image, design, 2D or 3D object, implantation, insulating, conducting or semiconducting layer (for example for enhancing conductivity for physiological signal measurement from the finger), RFIF tag, mechanical structure, electronic component, such as a watch or LED or a display, such as an electrophoretic ink paper display structures, as an example. The laser cutting means of the system may be used for example cutting display or other structures to be provided onto the nail.

The nail manipulation according to the embodiments of the invention may comprise e.g. following:

- cleaning of the nails and fingers,
- indirect manufacturing of the gel nails, acrylic nails or similar artificial nails by means of 3D printer,
- direct manufacturing of the artificial nail on the human nail surface by means of low temperature 3D printing method,
- application of the indirectly manufactured artificial nails onto the human nail surface and/or finger using for example adhesives,
- maintenance operations for artificial nails,
- application of the primary layer,
- application of transparent, translucent or single-colour or multi-colour paints and lacquers, and/or
- application of specific biomaterial for natural nail reconstructions.

The system may be implemented as a manual, semi-automated or fully automated manicure and pedicure manipulation system. In addition the system may be configured to offer as a manipulation: a) treatment for one finger at one time, b) treatment for two or more fingers at one time, c) treatment for the whole hand/ leg fingers at one time or d) treatment for more than one hand/ leg fingers at one time.

According to an embodiment of the invention, nail designs (object data) are advantageously made, stored and transferred in digital (computer) format, which makes it easier to design, store, perform, editing and/or manipulation

(such as scaling, addition of a new design 2D and/or 3D elements), repeat the design (e.g. in other positions and/or use it for the reworking of damaged nail design), and/or share with other people or store for future use.

Embodiments of the present invention offer advantages over the known prior art, such as simplifies the treatment procedures, bringing a certain level of automation and consequently reduce the treatment time, cost and the need of the specialist. Embodiments of the invention also offer completely new possibilities of implementing e.g. 3D shapes for the artificial nails, which can be created based on the real-time scanning method for the nail surface of a particular person (nail 3D pattern recognition can be utilized). By implementing the accurate scanning techniques for the nails, an embodiment of the invention is also targeting to extend the maintenance period for the artificial nails. In addition an embodiment of the invention also reduces health risks related to UV or microwave radiation on the skin and as result potential risk of cancer, namely due to accurate scanning or imaging methods (shape information providing means) the radiator can be introduced very close to the nail area to be operated resulting thus the very limited exposed skin area and thereby also reduced radiation dose. Furthermore an embodiment of the system of the invention reduces or completely eliminates the disturbing odours, which is part of the present treatments, by using a specific type of ventilation and filtering, as discussed in this document.

BRIEF DESCRIPTION OF THE DRAWINGS

Next the invention will be described in greater detail with reference to exemplary embodiments in accordance with the accompanying drawings, in which:

Figure 1 illustrates a principle of an exemplary system for nail manipulation according to an advantageous embodiment of the invention,

Claims

1. A system for a nail manipulation, wherein the system comprises:
- shape information providing means for providing nail information of a shape and/or position of the nail to be manipulated, whereupon the system is configured to provide first controlling data based on said nail information,
- object providing means for providing object data related to an object to be produced onto the nail, whereupon the system is configured to provide second controlling data based on said object data,
- a manipulation means, wherein said manipulation means is configured for producing said object onto the nail to be manipulated, and
- a controlling means for controlling the operation of the manipulation means based on said first and second controlling data in order to produce said desired object onto the nail to be manipulated,
- wherein the manipulation means is a dispenser, which is configured to provide nail manipulating medium according to the controlling instruction of the controlling means.

2. A system of claim 1, wherein the shape information providing means comprises a scannerconfigured to scan at least the 2D or 3D shape and/or position of the nail to be manipulated and produce said nail information; or wherein the shape information providing means comprises a database comprising shape information of the nail, or similar nail selected from an exemplary nail library, to be manipulated; whereupon the system is configured to form at least portion of said nail information.

3. A system of claim 2, wherein the scanner is selected from the group consisting of 2D scanner, 3D scanner, laser scanner, camera, RF scanning means, capacitive scanning means, and mechanical tip-like scanning means.

4. A system of any of previous claims, wherein the system is configured for modelling the shape of the nail, and/or wherein the system is configured for modelling said object data so that the shape of the object according to said modelled object data corresponds with the shape data of the nail to be manipulated.

5. A system of any of previous claims, wherein the object providing means comprises a database having a number of objects to be selected, and object data related to said object, where said object data comprises artwork, graphic, 2D/3D, object, shape, design information or manufacturing information of said object; whereupon the system is configured to form said second controlling data based said manufacturing information of said object.

6. A system of any of previous claims, wherein the dispenser comprises a number of dispenser syringes and is implemented by compressed air or screw type of dispensing means.

7. A system of any of previous claims , wherein the system additionally comprises:
- a 3D printer configured to produce 3D object onto the nail to be manipulated according to the controlling instruction of the controlling means,
- a tampo printing device configured to produce 2D image and transfer it into the nail to be manipulated according to the controlling instruction of the controlling means, or
- configured to provide a coating for the nail with chemical and/or medical biological agent in order for medically curing the nail or for nail construction.

8. A system of any of previous claims, wherein the system is configured to perform at least one step related to the object production onto an artificial nail; or wherein system is configured to perform at least one step related to the object production directly onto the user's nail.

9. A system of claim 8, wherein the system comprises transferring means for transferring said artificial nail produced onto the user's nail; or transferring means for transferring additional particles onto the nail, and wherein the transferring means comprises a vacuum pick and place head operated according to the controlling instruction of the controlling means.

10. A system of any of previous claims, wherein the manipulation means comprises additionally mechanical cleaning, grinding, brushing, greasing, oiling or finger massaging, or removal means for removing artificial nails, paints, lacquers and other artificial layers/objects applied onto the nails

surface and operated according to the controlling instruction of the controlling means.

11. A system of any of previous claims, wherein the system comprises a holder for the finger and/ or armrest, wherein the holder is configured to move the finger of the nail in questions according to the controlling instruction of the controlling means.

12. A system of any of previous claims, wherein the system comprises an odour removing means for removing odour produced during the manipulation according to the controlling instruction of the controlling means.

13. A system of claim 12, wherein the odour removing means is selected from the group consisting of a fan with filter, an ionisation means, an UV source configured to provide UV radiation into the area of the nail to be manipulated, a microwave source configured to provide microwave radiation into the area of the nail to be manipulated, and hot air blow configured to provide hot air blow into the area of the nail to be manipulated.

14. A system of any of previous claims, wherein the controlling means is configured to perform X, Y and Z directional and/or rotational movements and thereby to move said manipulation means, as well as said shape information providing means for accurate scanning or imaging the physical properties of the nail.

15. A system of any of previous claims, wherein the system comprises a display for displaying real-time image or video image of the manipulation process.

16. A system of any of previous claims, wherein the object to be provided is an image, design, 3D object, conducting or semiconducting layer, RFID tag, mechanical structure or an electronic component.

17. A system of claim 16, wherein the electronic component is selected from the group conisting of a watch, an LED, and an electrophoretic ink paper display.

18. Method for a nail manipulation, wherein the method comprises steps of:

- providing nail information of a shape and/or position of the nail to be manipulated, and providing first controlling data based on said nail information,
- providing object data related to an object to be produced onto the nail, and providing second controlling data based on said object data,
- producing said object onto the nail to be manipulated by using a manipulation means, and
- controlling the operation of the manipulation means based on said first and second controlling data by a controlling means in order to produce said desired object onto the nail to be manipulated,
- wherein the manipulation means is a dispenser, which is configured to provide nail manipulating medium according to the controlling instruction of the controlling means.

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