

SYSTEM, APPARATUS, AND METHOD FOR DISPENSING DIFFERENT FLUIDS, POWDERS, OR MIXTURES THEREOF

FIELD OF THE INVENTION

- 5 **[0001]** The present disclosure relates to a system, an apparatus, and a method for dispensing different fluids, powders, or mixtures thereof.

BACKGROUND ART

- [0002]** The following discussion of the background to the disclosure is intended to facilitate an understanding of the present disclosure only. It should be appreciated
10 that the discussion is not an acknowledgement or admission that any of the material referred to was published, known or part of the common general knowledge of the person skilled in the art in any jurisdiction as at the priority date of the disclosure.

- [0003]** Some apparatus for dispensing deliverables (e.g. makeup product, hair product) made from different fluids, powders, or mixtures thereof have been
15 proposed. Such apparatus include a plurality of tubes used to dispense the different fluids, powders, or mixtures thereof and arranged to have same configurations. In this regard, in the case where the different fluids, powders, or mixtures thereof have different viscosities, each amount of fluids dispensed from the corresponding tube per unit time may differ. As such, even though each amount of fluids to be mixed is
20 accurately controlled, undesirable deliverables may be obtained due to the different viscosities. There exists a need to alleviate at least one of the aforementioned problems.

SUMMARY

- [0004]** The present disclosure seeks to address and/or ameliorate the problem in
25 the prior art by providing a system, an apparatus, and a method for dispensing different fluids, powders, or mixtures thereof.

- [0005]** Throughout this document, unless otherwise indicated to the contrary, the terms 'comprising', 'consisting of', 'having' and the like, are to be construed as non-exhaustive, or in other words, as meaning 'including, but not limited to'.

[0006] Furthermore, throughout the document, unless the context requires otherwise, the word 'include' or variations such as 'includes' or 'including' will be understood to imply the inclusion of a stated integer or group of integers but not the exclusion of any other integer or group of integers.

- 5 **[0007]** In one aspect, there is a system for dispensing different fluids, powders, or mixtures thereof comprising an apparatus, a controller arranged in data communication with the apparatus, the controller arranged to determine an amount for each of the different fluids, powders, or mixtures thereof to be dispensed separately from the apparatus, and a sensor arranged to detect amount of the
10 different fluids, powders, or mixtures thereof dispensed from the apparatus, wherein the apparatus is arranged to dispense the different fluids, powders, or mixtures thereof based on an issued instruction from the controller.

[0008] In some embodiments, the controller is arranged in data communication with the apparatus over the internet or the intranet.

- 15 **[0009]** In some embodiments, the apparatus includes a housing, and wherein the housing has a first connection terminal and a second connection terminal.

[0010] In some embodiments, the system further comprising: a device including the controller and arranged to receive an input from a user, wherein the controller is arranged to determine each amount of the different fluids, powders, or mixtures
20 thereof based on the input.

[0011] In some embodiments, each amount of the different fluids, powders, or mixtures thereof is pre-determined.

[0012] In some embodiments, the device includes an output module and is arranged to output data on the different fluids, powders, or mixtures thereof on the
25 output module.

[0013] In some embodiments, the controller is configured to include a database storing authentication data, wherein the server is arranged to authenticate a user based on the authentication data and data sent from the device.

[0014] In some embodiments, the system further comprises a Backend As A Service (BAAS) provider configured to send a push notification to the apparatus provided from the controller, wherein push notification is the issued instruction.

5 **[0015]** In some embodiments, the apparatus comprises a first module comprising a receiver to configure to receive data from the controller.

[0016] In some embodiments, the apparatus comprises a second module comprising an output module configured to output a control signal to determine the amount for each of the different fluids, powders, or mixtures thereof to be dispensed, based on the received data from the first module.

10 **[0017]** In some embodiments, an apparatus for dispensing different fluids, powders, or mixtures thereof, the apparatus comprising: a plurality of tubes for passing the different fluids, powders, or mixtures thereof therethrough and arranged to have different dimensions; and a dispenser arranged to adjust an amount of the different fluids, powders, or mixtures thereof dispensed from the corresponding tube.

15 **[0018]** In some embodiments, each of the plurality of tubes has a pre-determined diameter.

[0019] In some embodiments, the plurality of nozzles for passing the different fluids, powders, or mixtures thereof therethrough and arranged to have different dimensions, wherein each of the plurality of nozzles is disposed at an end of the
20 corresponding tube.

[0020] In some embodiments, the apparatus further comprises a plurality of containers, each of the plurality of containers for containing the corresponding fluid of the different fluids, powders, or mixtures thereof.

25 **[0021]** In some embodiments, the apparatus further comprises at least one cover, each of the at least one cover arranged to prevent a photosensitive material from being exposed to light, wherein the photosensitive material is in a container of the plurality of containers.

[0022] In some embodiments, the apparatus further comprises a weight measurement device arranged to measure weight of the different fluids, powders, or mixtures thereof.

5 **[0023]** In some embodiments, the apparatus further comprises a cleaning module arranged to clean at least one of the plurality of tubes.

[0024] In some embodiments, the apparatus further comprises a heating device to heat the different fluids, powders, or mixtures thereof and/or a cooling device to cool the different fluids, powders, or mixtures thereof.

10 **[0025]** In some embodiments, the apparatus further comprises a mixing device arranged to stir the different fluids, powders, or mixtures thereof, wherein each of the different fluids, powders, or mixtures thereof is provided from the corresponding second tube of the plurality of second tubes.

[0026] In some embodiments, the apparatus further comprises at least one indicator configured to indicate a condition of the apparatus.

15 **[0027]** In some embodiments, the apparatus further comprises a receiver configured to receive at least one control signal used to activate and/or deactivate the apparatus.

20 **[0028]** In some embodiments, the apparatus further comprises a detector configured to detect and indicate a pH value for each of the different fluids, powders, or mixtures thereof.

25 **[0029]** In another aspect, a method of a system for dispensing different fluids, powders, or mixtures thereof, the method comprising the steps of: preparing an apparatus; and determining, by a controller arranged in data communication with the apparatus, each amount of the different fluids, powders, or mixtures thereof, the controller disposed separately from the apparatus, wherein the apparatus is arranged to dispense the different fluids, powders, or mixtures thereof based on the data communication with the controller.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] Various embodiments are described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 illustrates a schematic diagram of a system 1000 according to some
5 embodiments of the present disclosure.

Figure 2 illustrates a block diagram of a system 1000 according to some embodiments of the present disclosure.

Figure 3 illustrates an apparatus 200 according to some embodiments of the present disclosure.

10 DETAILED DESCRIPTION

[0031] The present disclosure may be suited for an apparatus, a system and a method for dispensing different fluids, powders, or mixtures thereof.

[0032] Unless defined otherwise, all other technical and scientific terms used herein have the same meaning as is commonly understood by a skilled person to
15 which the subject matter herein belongs.

[0033] System 1000

[0034] As shown in figures 1 and 2, a system 1000 may comprise a first device 100 and an apparatus 200. The system 1000 may further comprise a server 400, a first system 450, a second system 460, an application server 500, a frontend module
20 600, and a backend module 700.

[0035] First device 100

[0036] As shown in figure 2, the first device 100 may comprise an input module 110, a controller 120, a transmitter 130, and an output module 140. The first device 100 may be a computing device, such as, but not limited to, a personal computer, a
25 mobile phone, a tablet, or the like. In some embodiments, at least one function of the first device 100 may be embedded in the first system 450.

[0037] The first device 100 may be used to specify each amount of different fluids, powders, or mixtures thereof. The first device 100 may be arranged to communicate with the apparatus 200, the server 400, the application server 500, the frontend module 600, and the backend module 700 via communication means such as, but
5 not limited to, a wireless communication or a wired communication.

[0038] The input module 110 may be a mouse, a keyboard, voice recognition means or the like. In general, the input module 110 include any user interface for input of a user input. The user may input a pre-determined amount of different fluids, powders, or mixtures thereof to the input module 110 in order to obtain a mixture of
10 different fluids, powders, or mixtures thereof. Hereinafter, the mixture of different fluids, powders, or mixtures thereof to be provided may be referred to as deliverables.

[0039] The controller 120 may generate control signal for controlling the apparatus 200. The control signal may include one or more data packets for controlling the apparatus 200 based on the input from the input module 110, and may
15 subsequently output the generated data packets to transmitter 130 and the output module 140. The controller 120 may be disposed separately from the first device 100.

[0040] The transmitter 130 may be arranged to transmit data to other node (e.g. the apparatus 200, server 400) upon receiving the generated data from the controller 120. The output module 140 may be arranged to output data to inform the user of the
20 data upon receiving the generated data from the controller 120. The output module 140 may be a display, a speaker, or the like. In the case where the output module 140 is configured to be a display, the output module 140 may display the output data on the web browser 140a (figure 1).

[0041] It is to be appreciated that the output module 140 may inform the user of
25 the current condition of the apparatus 200. By referring to the current condition of the apparatus 200, the user may be informed of availability of each of the different fluids, powders, or mixtures thereof. Examples of current condition(s) of the apparatus 200 may include residue of each of the different fluids, powders, or mixtures thereof.

[0042] It is to be appreciated that the wireless communication protocols or
30 standards may include Wireless Fidelity (WiFi)TM such as IEEE 802.11

a/b/g/n/ax/ba/EHT, Bluetooth™, Near Field Communication (NFC), radio frequency identifier (RFID), or cellular communication (e.g., Long Term Evolution (LTE), LTE-Advanced (LTE-A), 5th Generation (5G)). The wired communication may be implemented by, for example, Universal Serial Bus (USB), High Definition Multimedia Interface (HDMI), or Recommended Standard 232 (RS-232).

[0043] It is to be appreciated that the first device 100 can communicate with the apparatus 200 via the intranet. In the case where the first device 100 communicates with the apparatus 200 via the intranet, the first device 100 may be configured to communicate with other node (e.g. an application server (not shown) and a web server (not shown) and other node) within the intranet.

[0044] It is to be appreciated that the transmitter 130 may transmit pre-determined data to the apparatus 200 instead of specifying each amount of the different fluids, powders, or mixtures thereof using the input module 110. The pre-determined data may indicate each particular amount of the different fluids, powders, or mixtures thereof stored in the first device 100.

[0045] It is to be appreciated that the first device 100 may comprise a receiver that receives data transmitted from other node (e.g. the server 400, the application server 500, the frontend module 600, and the backend module 700).

[0046] Apparatus 200

[0047] As shown in figures 2 and 3, the apparatus 200 may include a housing 201, a plurality of suction tubes 202a, a plurality of delivery tubes 202b, and a controller 210, wherein the housing 201 may include a plurality of dispensers 201A. It is to be appreciated that hereinafter the plurality of suction tubes 202a and the plurality of delivery tubes 202b may be collectively referred to as tubes 202. It is to be appreciated that in some embodiments, each of the suction tubes 202a and the corresponding delivery tube 202b may be integrally configured. The apparatus 200 may further include a plurality of containers 290. The plurality of containers 290 may contain different fluids, powders, or mixtures thereof. The container 290 may be shaped and dimensioned to aid in smoother and easier dispensation of semi solid materials such as gel, cream, lotion and the like with compression and/or

gravitational force. In some embodiments, the container 290 may include one or more spring loaded mechanism. The container 290 may be referred to as special design concertina type collapsible bottle. The special design concertina type bottle may be collapsible and may be configured to be cylindrical in shape. The special design concertina type bottle may further comprise two magnets at both ends thereof in the axis direction. Assuming that the container 290 is the special design concertina type bottle and is disposed above the corresponding dispenser 201A, once the fluid in the container 290 is dispensed toward the corresponding dispenser 201A, volume in the container 290 gradually decreases, thus allowing the bottle to collapse and each of the magnets is thereafter drawn to be closer each other. As such, the fluid in the container 290, even though having high viscosity, may be squeezed gradually as the amount of the fluid in the container 290 decreases, thus facilitating mixture of different fluids, powders, or mixtures thereof accurately.

[0048] The apparatus 200 may comprise a first module 200a and a second module 200b. The first module 200a may be a Single Board Computer (SBC) with an Android-based operating system. The first module 200a may include an dedicated software application, such as, but not limited to, an Android App, wherein the Android App having functions such as (i) displaying menu, (ii) sending and retrieving data from the backend module 700 or local storage, (iii) sending parameters to the second module 200b to execute task, (iv) receiving response code from second module 200b, (v) sending location (latitude and longitude) to the backend module 700, (vi) loading offline version when there is no internet connection, (vii) automatically connecting to WIFI when internet is available and/or (viii) receiving a push notification from a BAAS provider 550 such as a Firebase Cloud Messaging (FCM) and executing command from end-user app. The second module 200b may be configured to a microcontroller board with customized firmware to control attached components (e.g. pumps, weighing scale). The second module 200b may read parameters and execute tasks sent from the first module 200a. The second module 200b may be configured to start and stop pumps, change LED color, read weighing scale value, stop a pump by timer or when fluid with predetermine weight is dispensed, return response code back to the first module 200a after completing task. The first module 200a may comprise a receiver configured to receive data from other node, and the second module 200b may comprise an output module configured to output a control

signal to determine the amount for each of the different fluids, powders, or mixtures thereof to be dispensed, based on the received data from the first module 200a.

[0049] It is to be appreciated that at least one circuit board other than the first module 200a and the second module 200b may be connected to the first module 200a and/or the second module 200b for additional functionality. The first module 200a may be connected to the second module 200b, by way of example, USB. The first module 200a and/or the second module 200b may be connected to at least one device, such as at least one of a HDMI monitor, a wireless mouse, a keyboard, a microphone, a speaker, and a camera. Other devices may be attached to the SBC for additional functionality.

[0050] The suction tubes 202a have different configurations and the delivery tube 202b have different configurations. For instance, the suction tubes 202a have different diameter and the delivery tube 202b have different diameter. Each shape (e.g. diameter) of the suction tubes 202a and the delivery tube 202b may be determined based on a viscosity of corresponding fluid. It is to be appreciated that a plurality of nozzles may be disposed at an end of the delivery tubes 202b. The plurality of nozzles may be for passing the different fluids, powders, or mixtures thereof therethrough and arranged to have different dimensions.

[0051] Each of the plurality of dispensers 201A may include a suction port 201a (a first connection terminal) and a delivery port 201b (a second connection terminal). The plurality of tubes 202 are configured to be a hollow shape to pass fluid(s) therethrough.

[0052] Each of one end of the each of the plurality of suction tubes 202a may be connected to the corresponding suction port 201a and each of the other end of the plurality of suction tubes 202a may be directed to the corresponding the container 290.

[0053] Each of one end of the each of the plurality of delivery tubes 202b may be connected to the corresponding delivery port 201b and each of the other end of the each of the plurality of delivery tubes 202b may be fastened one another by a fasten means such as cable tie.

[0054] The apparatus 200 may be configured to dispense deliverables (i.e. a mixture of different fluids, powders, or mixtures thereof) provided from the delivery tubes 202b. Ingredients such as powder may be dispensed through a funnel and/or a tube. Each of the different fluids, powders, or mixtures thereof may include fluid for
5 generating (i) a makeup/cosmetic, skincare and personal care product (e.g. foundation, eyeliner, mascara, lipstick, gloss, nail varnish, blusher), (ii) a hair product (e.g. oxidation dye, direct dye), or (iii) a food product. Each of the different fluids, powders, or mixtures thereof may be in the form of liquid or liquid obtained by heating the semi-solid (e.g. lotion, cream, gel, paste). To generate at least one of (i) the
10 makeup/cosmetic, skincare and personal care product, (ii) the hair product, and (iii) the food product, powder may be used as an active ingredient used to make a final product (deliverables). The apparatus 200 can therefore also dispense powder and also be applied for food industry, health supplement, food and drinks, ink, and laboratories use.

[0055] Each of the tubes 202 may include therein a flow rate adjusting means such as a valve (not shown). The valve may be controlled by the controller 210. The controller 210 may adjust the amount of fluids to be dispensed from the delivery tubes 202b per unit time based on data transmitted from another node (e.g. the first device 100). The data transmitted from the other node may indicate each amount of the
20 different fluids, powders, or mixtures thereof to be mixed.

[0056] It is to be appreciated that the containers 290 may be disposed below the housing 201. That is, the containers 290 are disposed along a direction of arrow shown in figure 3 in relation to the housing 201. It is to be appreciated that a container other than the containers 290 may be provided to receive the deliverables provided
25 from the delivery tubes 202b.

[0057] It is to be appreciated that the number of the plurality of dispensers 201A, the number of the plurality of tubes 202, and the number of the containers 290 are not limited to a particular number shown in figure 3.

[0058] It is to be appreciated the apparatus 200 may include a mixing device (not shown). The mixing device may be powered by an electric motor or the like. The
30 mixing device may receive the different fluids, powders, or mixtures thereof from the

delivery tubes 202b and subsequently mix the different fluids, powders, or mixtures thereof, by way of, for example, stirring. Upon mixing the different fluids, powders, or mixtures thereof for a determined period, the mixing device may output the deliverables to an exit port (not shown) of the mixing device. It is to be appreciated that the mixing device may be disposed separately from the apparatus 200.

[0059] It is to be appreciated that each of the plurality of dispensers 201A may be configured to be removably attached to the apparatus 200 so that each of the plurality of dispensers 201A can be replaced with a new dispenser easily.

[0060] It is to be appreciated that each of the dispensers 201A may include the controller 210 arranged to discharge pre-determined amounts of the corresponding fluid from the corresponding tube. It is to be appreciated that one of the dispensers 201A may include the controller 210 arranged to discharge each amount of the different fluids, powders, or mixtures thereof from the corresponding tube.

[0061] It is to be appreciated that a printer may be provided. The printer may print out details of the deliverables based on information obtained from the first device 100. The details of the deliverables may include, but is not limited to, name of each of the different fluids, powders, or mixtures thereof and/or the amount of each of the different fluids, powders, or mixtures thereof, thus allowing the user to manage the detailed information of the deliverables easily.

[0062] Server 400

[0063] The server 400 may be configured to have a web-based system (control panel) 400A, a web server 400B, and a database 400a, and may be used for storing data and/or for authenticating the user. The web server 400 may host the web-based system 400A. The web-based system 400A may be connected to the database 400a. The database 400a may store (i) first data transmitted from at least one other node (e.g. the apparatus 200), and/or (ii) second data used to authenticate the user. The server 400 may be a personal computer, a mobile phone, a tablet, or the like.

[0064] The first data may include historical data, wherein the historical data may relate to data previously used for generating deliverables and may be used for an analysis. The historical data may include (i) time required to complete dispensing

different fluids, powders, or mixtures thereof and (ii) each amount of the different fluids, powders, or mixtures thereof which has been dispensed.

[0065] The second data may include data required for authentication of the user. The data required for authentication may include, but is not limited to, (i) user's name, 5 (ii) user's account, (iii) user's password, and (iv) an identifier for identifying the first device 100. Upon receiving data required for authentication from the first device 100, the server 400 may authenticate the user by comparing the received data with the corresponding data stored in the database 400a. Upon comparing the received data with the corresponding data stored in the database 400a, the server 400 may 10 determine whether the user has an authority to operate the first device 100.

[0066] It is to be appreciated that the user may specify one of deliverables among a list of deliverables, thus enabling the user to easily obtain desired deliverable without specifying each amount of different fluids, powders, or mixtures thereof. It is to be appreciated that the list of amounts may be stored in the database 400a.

15 **[0067]** First system 450

[0068] The first system 450 may be used for administrator login to a system to manage the apparatus 200 and users. The first system 450 may include the functionality to: (i) store login credentials and authenticate user, (ii) assign permission (e.g. for technician, end-user, administrator, sales staff) to users, (iii) configure one 20 or more dispenser 201A, (iv) store calibration values of individual pump for each dispenser 201A, (v) create and set values for products, (vi) automatically calculate pump timer value based on amount (ml) of the ingredient, (vii) generate parameters for dispenser 201A to execute task for producing finished product, (viii) retrieve coordinate of dispenser and plot on map, (ix) send command to the dispenser 201A 25 (the apparatus 200) to retrieve data (e.g. usage data), (x) send command to dispenser 201A (the apparatus 200) to execute pumps or other components.

[0069] Second system 460

[0070] The second system 460 may be used for user login to a system to control the apparatus 200. A user can access the system (the second system 460) by web 30 browser, Android App or IOS App.

[0071] Application server 500

[0072] The application server 500 may comprise a server. The application server 500 may communicate with other node (e.g. device 200) via a Backend As A Service (BAAS) provider 550 and the internet. The application server 500 may be a personal
5 computer, a mobile phone, a tablet, or the like.

[0073] BAAS provider 550

[0074] The BAAS provider 550 may be used to send a push notification to the apparatus 200 provided from a controller (e.g. controller included in the first system 450) and may be implemented by, for example, FCM. The BAAS provider 550 is a
10 database product that is a platform for storing and syncing data in a particular database in real time. The BAAS provider 550 may have a push notification service.

[0075] The first module 200a may use the BAAS provider 550. The first system 450 or the second system 460 may send a request to the application server 500 to initiate a push notification to the apparatus 200 via the BAAS provider 550. Android
15 and IOS app may use the BAAS provider 550 for sending message to Android app installed in the first module 200a. When the Android App in the first module 200a receives the message, the Android App may send the parameters to the second module 200b. In a fresh install of the Android app in the first module 200a, the BAAS provider 550 may send the unique token to the first system 450 or the second system
20 460. The token may be stored in a database and may be used when sending message to the apparatus 200.

[0076] Frontend module 600

[0077] The frontend module 600 may be used for a frontend website and/or a web application, and may be used to inform the user of information on the apparatus 200.
25 The information on the apparatus 200 may include a website comprising a plurality of webpages, wherein the plurality of webpages may describe detailed configuration of the apparatus 200 and may include webpages such as a top page, introduction of the website, inquiry for a user, or the like. The frontend module 600 may be a personal computer, a mobile phone, a tablet, or the like.

[0078] Backend module 700

[0079] The backend module 700 may be used for a management of the apparatus 200, and may be used to inform the user of information on a condition of the apparatus 200. The backend module 700 may be a personal computer, a mobile
5 phone, a tablet, or the like. It is to be appreciated that the backend module 700 may store therein the first data included in the database 400a.

[0080] The data may include (i) a location where the apparatus is installed, and (ii) user(s) who currently uses the apparatus 200. The backend module 700 can facilitate managing the plurality of apparatus 200 installed in various places. In
10 manage user and usage data machine location.

[0081] Advantageous effect

[0082] According to the present disclosure, the system 1000 is for dispensing different fluids, powders, or mixtures thereof and comprises a controller arranged to determine an amount for each of the different fluids, powders, or mixtures thereof to
15 be dispensed separately from an apparatus, a sensor arranged to detect amount of the different fluids, powders, or mixtures thereof dispensed from the apparatus, wherein the apparatus is arranged to dispense the different fluids, powders, or mixtures thereof based on an issued instruction from the controller, thus facilitating accurate dispense of different fluids, powders, or mixtures thereof even though the
20 different fluids, powders, or mixtures thereof have different viscosities.

[0083] According to the present disclosure, the controller 120 used for arrangement of amount of the different fluids, powders, or mixtures thereof is disposed separately from the apparatus 200. As such, there is no need to install a controller used for arrangement of amount of the different fluids, powders, or mixtures
25 thereof in the apparatus 200. As such, the apparatus 200 can be configured to be compact.

[0084] According to the present disclosure, the first device 100 can communicate with the apparatus 200 via the internet or the intranet, thus enabling to arrange each of the amount of different fluids, powders, or mixtures thereof remotely to obtain
30 desired deliverables.

[0085] According to the present disclosure, the first device 100 may communicate with the apparatus 200 via the intranet, thus simply designing a network between the first device 100 and the apparatus 200.

5 **[0086]** According to the present disclosure, the transmitter 130 may transmit data to the apparatus 200 to indicate that each amount of the different fluids, powders, or mixtures thereof to obtain deliverables is pre-determined, thus enabling to obtain deliverables accurately and precisely.

10 **[0087]** According to the present disclosure, the server 400 includes the database 400a that stores the first data transmitted from at least one other node (e.g. the apparatus 200), wherein the first data include historical information that has been used for generating deliverables and user-specific information. As such, by, the user may easily arrange each amount of the different fluids, powders, or mixtures thereof by referring to the first data.

15 **[0088]** According to the present disclosure, the server 400 includes the database 400a that include the second data used to authenticate the user. As such, only authorized users are allowed to arrange the different fluids, powders, or mixtures thereof to obtain deliverables, thus securely designing the system 1000.

20 **[0089]** According to the present disclosure, the apparatus 200 includes a cleaning module arranged to clean at least one of the plurality of tubes, thus enabling to maintain cleanliness of the apparatus 200.

25 **[0090]** According to the present disclosure, the robust and flexible dispensing apparatus 200 may give rise to different possibilities and permutations in hair color choices with blending and mixing even in small (and minute) quantities, as compared with manual dispensing. This may remove the complexities and guess work in achieving the desired hair color products required by customers and colorists. Basically, hair colors dyes are derived from few primary colors (e.g. red, yellow and blue). However, creation of a myriad of colors will only require minute variations of one or more of the few primary colors.

30 **[0091]** According to the present disclosure, the dispensing apparatus reduces the tedious and complex work of blending and production of customized personal care

products in salons or retail outlets. The type of work may include measuring, dispensing of minute doses and computation of active ingredients such as extracts, actives ingredients and bases of cream, gel, lotion, and fluid for salon treatments and retail products.

- 5 **[0092]** According to the present disclosure, the dispensing apparatus provides for flexible customization of personal care and treatments products to empower customers with personal preferences and enable more efficacies of products.

- 10 **[0093]** According to the present disclosure, the first system 450 may allow for increased range of choices, selections and achieving higher standardization of professionalism in the hair and beauty industry.

[0094] According to the present disclosure, precise and accurate dosing actives and bases to personal care products may allow to give more quality and standard in retail and treatment personal care products

- 15 **[0095]** According to the present disclosure, the first system 450 may allow to achieve greater economy of scale for factories in producing standardized bases such as gel, lotion, cream and fluid without having to produce individual formula types causing great inefficiency for every single item.

- 20 **[0096]** According to the present disclosure, cost required for the system 1000 can be saved in all aspect of business, which Include logistic, manpower, inventories, commercial, industrial and administrative spaces. The present disclosure may allow to increase the competitiveness and profitability of the beauty industry with more efficiency, the savings of which can be passed back to consumers and channel more surplus to investors, staff and R&D.

- 25 **[0097]** According to the present disclosure, savings of products costs can be achieved by eliminating redundancy of product packaging such as jars, bottles, boxes, cartons and labels. As products are produced as and when required by staff and customers, almost immediately with App of mobile device at a touch on the screen.

[0098] According to the present disclosure, reduction of Physical inventories and stock keeping unit (SKU) in turn enable huge saving on commercial outlets' spaces, warehousing spaces, administrative spaces and production spaces.

5 **[0099]** According to the present disclosure, it may help in reducing wastage of over dispensing and eliminate the problems of having to stock for slack which ultimately become expired products.

[00100] According to the present disclosure, greater control on stock pilferage and wastage as every dispensing will be tracked and recorded by the system.

[00101] Possible Variant

10 **[00102]** It is to be appreciated that in the case where at least one of different fluids, powders, or mixtures thereof to be mixed is a photosensitive material that includes a silver salt compound (such as, for example, silver halide), the apparatus 200 may comprise a configuration that the photosensitive material is prevented from being exposed to light, thus helping to perform inherent effect of the photosensitive material
15 during use. The configuration may be a cover that is attached to outer surface of the container 290, wherein the container 290 contains the photosensitive material. The configuration may be a cover that includes a coating material, wherein the coating material surrounds the photosensitive material.

[00103] It is to be appreciated that the apparatus 200 may have a weight
20 measurement device including a sensor to detect weight of the container 290 (i) if the container 290 is placed at a determined position so that different fluids, powders, or mixtures thereof from the corresponding suction tubes are received in the container 290 and (ii) if the determined amounts of different fluids, powders, or mixtures thereof are received in the container 290.. Data regarding a result of the
25 measurement by the weight measurement device may be transmitted to the first device 100 to inform the user of weight of the container 290. In the case where the weight of the deliverables is less than a determined amount, the user may input the amount of at least one fluid to the input module 110 to add the amount of at least one fluid into the existing deliverables. As such, the weight measurement device can
30 facilitate obtaining exact amount of deliverables. It is to be appreciated that the weight

measurement device may be configured to measure each of the different fluids, powders, or mixtures thereof.

5 **[00104]** It is to be appreciated that the apparatus 200 may include a cleaning module to clean at least one element (e.g. the tubes 202) of the apparatus 200. The apparatus 200 may clean the at least one element every determined time interval. The apparatus 200 may clean the at least one element each time the deliverables is dispensed. The apparatus 200 may clean the at least one element for a designated period of time, wherein the designated period of time may be determined based on data from the first device 100.

10 **[00105]** It is to be appreciated that the apparatus 200 may include a cooling device and/or a heating device. The cooling device and/or the heating device may be used to change a temperature of the deliverables. The heating device may be used to enhance a fluidity of the deliverables. It is to be appreciated that the cooling device and/or the heating device may be disposed separately from the apparatus 200.

15 **[00106]** The heating device may comprise semi-conductor or a compressor and may liquify semi solid or solid materials such as wax, petroleum, gel, cream, lotion and alike in or out of the containers 290 by heating for easier flow for dispensing through Pods.

20 **[00107]** The cooling device may comprise semi-conductor or a heating element and may solidify volatile fluid materials such as alcohol, silicone, essential oil and alike in or out of the containers 290 by cooling or freezing for easier flow for dispensing through Pods. Supporting cold, cool, warm and hot serve of products are added as required.

25 **[00108]** It is to be appreciated that the first device 100 have an authentication means so that only authorized users can determine each amount of the different fluids, powders, or mixtures thereof. The authentication means may be implemented as follows:

- (i) a face authentication by a camera (not shown)
- (ii) a password authentication to by inputting password

- (iii) a fingerprint authentication using a fingerprint reader (not shown),
 - (iv) an iris authentication using an IRIS camera (not shown),
 - (v) voiceprint authentication,
 - (vi) vein authentication, or
- 5 - (vii) a combination thereof

[00109] It is to be appreciated that an operating system used for the system 1000 may include an Android-based operating system (OS). It is to be appreciated that a mobile application which can be installed on a device (e.g. the first device 100) may be determined based on the corresponding operating system used for the device.

- 10 **[00110]** It is to be appreciated that the first device 100 may receive feedback data from the user upon completion of dispensing of different fluids, powders, or mixtures thereof, wherein the feedback data may include feedback from the user. In the case where the amount of the dispensed different fluids, powders, or mixtures thereof is not exact amount, the user may input the feedback that indicates a difference
- 15 between the amount of dispensed different fluids, powders, or mixtures thereof and the amount of provided from the user, thus facilitating dispensing more accurate amounts of different fluids, powders, or mixtures thereof. The feedback data may be transmitted to the server 400 and may be stored in the database 400a for use of later dispensing process.

- 20 **[00111]** It is to be appreciated that the apparatus 200 may include at least one liquid level detection module (not shown) including a sensor to detect liquid level, wherein each of the at least one liquid level detection module may detect liquid level of the corresponding container 290 of the plurality of the containers 290. The at least one liquid level detection module may include a capacitive liquid level sensor. In the
- 25 case where one of the at least one liquid level detection module detects that a liquid level of the corresponding container 290 is below a determined level, the apparatus 200 may inform other node (e.g. the first device 100) of the fact that the liquid level of the corresponding container 290 is below the determined level. As such, the user

using the first device 100 can know a timing to replace the corresponding container 290 with a new container or to add fluid into the corresponding container 290.

[00112] It is to be appreciated that after the apparatus 200 commences the dispensing process to obtain deliverables based on determined amounts for different fluids, powders, or mixtures thereof under the control of the controller 120, the sensor (e.g. a sensor included in the liquid level detection module and/or a sensor included in the weight measurement device) may be used to assess whether the determined amounts for different fluids, powders, or mixtures thereof are properly provided from the suction port of the delivery tubes. At least one amount detected by the sensor may be outputted to the controller 120. Thereafter, the controller 120 may arrange, based on the detected amount by the sensor, at least one parameter (e.g. speed at which at least one fluid is dispensed and/or an amount of which at least one fluid is dispensed) so that the deliverables are provided with a more accurate amount of the different fluids, powders, or mixtures thereof being obtained. For instance, in the case where the detected amount is less than the determined amount, the controller 120 may adjust an amount of at least one of the fluids to be dispensed from the delivery tubes.

[00113] It is to be appreciated that the deliverables may be contained in a container (hereinafter referred to as 'a second container'). The sensor stated above may detect the amount contained in the container 290 and in the second container.

[00114] In some embodiments, the system 1000 may have at least one component including a robot arm to move a final product (the deliverables) from one area to another. Alternatively, the final product may be transported using a conveyor belt (not shown). The system 1000 may work singly or as a group of machines, where the final product is moved from one machine to another for dispensation of different product, using a conveyor belt.

[00115] It is to be appreciated that at least one indicator may be provided to provide current condition of the apparatus 200. The at least one indicator may be configured to be LED lights and may be provided to provide information on operations status such as Standby Mode, Dispensing Mode, and/or Error Mode of the apparatus 200. The Standby Mode may be indicated by multicolor light flashing. The Dispensing

Mode may be indicated by green light indication. Malfunction and the Error Mode may be indicated by red light indication. It is to be appreciated that the speaker may be a voice indicator to provide welcome message and information on operations status such as Standby mode, Dispensing mode, malfunction, and/or Error mode of the apparatus 200. It is to be appreciated that a pH detector and/or a pH indicator may be provided. The pH detector may be configured to detect pH of a product. The pH indicator may be configured to be a pH probe to provide pH test on a product to check pH with parameter. It is to be appreciated that a microphone may be provided to enable voice command to activate and/or deactivate the apparatus 200 and simple functions of dispensing. In this case, the receiver may be configured to receive at least one control signal including the voice command to activate and/or deactivate the apparatus 200. It is to be appreciated that a touch screen monitor with a keyboard, a mouse, and/or a remote control device may be provided. The touch screen monitor with the keyboard, the mouse, and/or the remote control device may be connected with the apparatus 200 by a HDMI, USB and alike port for direct communication in the event of internet network failure. It is to be appreciated that maintenance App with diagnostic function may be used to check an operation status of at least one element (e.g. the apparatus 200) of the system 1000 with, for example, USB, HDMI or other port for diagnosis. It is to be appreciated that a forward and reverse option may be available for the apparatus 200 to do easy maintenance sucking back all ingredients and materials from the tubes 202 back to the containers 290.

[00116] It is to be appreciated collect data, analytics on customer end to support existing ERP may include (i) an E-Commerce function with regard to custom e-commerce web solutions, direct email marketing, comprehensive reports, and SSL secure checkout (HTTPS), (ii) an accounting function with regard to basic cost accounting, budget management, banking and reconciliation, and multicurrency support, (iii) a fixed asset function with regard to managing fixed asset, user defined depreciation rate, capture non-depreciation assets, and auto depreciation calculation, (iv) a Customer Relationship Management (CRM) function with regard to opportunities and pipeline, contracts and activities, warranty and service contracts, and service calls, (v) a Human Resource Management System (HRMS) function with regard to HR management, payroll management, leave management, shift

management, (vi) a project management function with regard to planning and managing projects, organizing and managing teams, elimination of emails and meetings, and tracking and recording time, (vii) a production function with regard to bills of materials, production orders, forecasting and MRP, (viii) a sales function with regard to quotation and order processing, invoicing, payment and delivery, returns and crediting, sales and pipeline forecasting, (ix) a warehousing function with regard to stock transfers, inventory valuation, picking, packing, and delivery, and serial and lot management, (x) a purchasing function with regard to quotation and order processing, invoicing, payment and delivery, returns and crediting, and purchasing forecasting, and (xi) a Business Intelligence (BI) function with regard to interactive data visualizations, reports, queries and analytics, precise layout across any medium, and unified business analytics.

[00117] Use of the system above may allow (i) marketing management, (ii) helping to provide up to date information on trending products, feedback from a user that can give live up to date information with regard to the efficacies and types products on demand as well as timely promotion offer, (iii) ecommerce web site which may include at least one of promotion information, discount information, and deals information, (iv) products descriptions, ingredients labeling, uses, shopping cart, and order payment gateway, and (v) machine learning and Artificial Intelligence (AI) which may be incorporated into the system 1000 with analytics and algorithms inbuilt.

[00118] Industrial Internet of Things (IOT) may be an integration of robotic dispensers, shipments, infrastructure with networked sensors and software. In the case where some nodes constituting the system 1000 are connected each other, a user such as an administrator, a manager may access to all production environment data in real time, thus allowing swift changes as needed. This data can be used to make accurate predictions and results in a more efficient process allowing manufactures to find new revenue streams. The apparatus 200 may make a shop floor safer because manual operation is not much required. In addition to the foregoing, the industrial IOT may facilitate as follows.

[00119] Deliverables that are dispensed from the apparatus 200 may be automatically updated to a server such as the server 400. This may provide a user with up to date and/or real time reports and information of sales, inventories, outlets

and location sales performance, trending products, customer's data, thus removing the complex job of staff and management in projecting the sales and stock levels. With the timely information from the App, it may help management make precise and accurate analysis of information and decisions. Marketing information on products and/or services (e.g. trending products and poor performing products and services with regard to a dispenser) may help to design and formulate new products, as well as offering timely promotions for services and products that are poor in performance. Feedback collected from customers also can help a user reformulate and upgrade products' benefits. In view of logistic aspect, the software may automatically trigger reorder level and may prompt management and staff to take prompt action in delivery of supplies to the relevant outlets cutting out loss in sales opportunities and manpower on deliveries. In view of an administration aspect, the software may take care of invoicing, preparing delivery order, arranging efficient delivery routing. In view of support of resource planning. The software may be integrated with Enterprise Resource Planning (ERP) software to provide timely and more precise data to facilitate management operations in procurements, sourcing and logistic projections. In view of support of Customer Relationship Management (CRM), the software may be integrated with CRM software to provide timely and more precise data to smooth out customer relation management in customer data updating, preferences, feedbacks and trends. In view of asset tracking, locality with GPS system can help update management, giving more control and pilferage prevention and also help assets management and easing expansion monitoring problem.

[00120] It is to be appreciated that at least one of the present disclosure (e.g. the controller 120, the controller 210) is configured with a hardware by way of example, but the disclosure may also be provided by software in concert with hardware.

[00121] In addition, the functional blocks (not shown) used for the hardware are typically implemented as LSI devices, which are integrated circuits. The functional blocks may be formed as individual chips, or a part or all of the functional blocks may be integrated into a single chip.

[00122] It is to be appreciated by the person skilled in the art that variations and combinations of features described above, not being alternatives or substitutes, may

be combined to form yet further embodiments falling within the intended scope of the disclosure.

[00123] As would be understood by a person skilled in the art, each embodiment, may be used in combination with other embodiment or several embodiments.

- 5 **[00124]** This disclosure can be applicable for used to enable the exchange of management frames between multiple wireless devices in an efficient manner.

Reference numerals

- 100: first device
- 10 110: input module
- 120: controller
- 130: transmitter
- 140: output module
- 140a: web browser
- 15 200: apparatus
- 200a: first module
- 200b: second module
- 201: housing
- 201A: dispenser
- 20 201a: suction port
- 201b: delivery port
- 202: tube
- 202a: suction tubes
- 202b: delivery tubes
- 25 210: controller
- 290: container
- 400: web server
- 400a: database
- 450: first system

- 460: second system
- 500: application server
- 550: BAAS provider
- 600: frontend module
- 5 700: backend module
- 1000: system