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DEVICE FOR PAINLESS INJECTION

[1] The present application relates to a medical device for reduction of pain or a device for painless injection. More particularly, the present application is a device for simulating skin for painless introduction and removal of a needle. The device helps to create a near painless experience to all the processes which require needle penetration in the skin or removal from the skin, which is practically occurs all the time in the clinical setting. Also, this device can be applied in the domestic setting (non-clinical) where patients can administer the device independently during finger prick for glucose analysis or subcutaneous injection of medication. The present invention is meant to make the processes involving needle penetration into the skin, such as, but not limited to, taking injections, vaccines, skin pricking for blood glucose, insulin shots and drawing blood, completely painless and without any discomfort to the patient. The device further helps in painless removal of the needle from the skin.

[2] Nevertheless, most people endure the painful experience of blood taking, insertion of intravenous cannula because of the discomfort caused by the insertion and removal of needles. There are also people who have a phobia against needles, the phobia called trypanophobia.

[3] Therefore, the subject application proposes a medical device for simulating the mechano-receptors of the skin due constant brushing (touch) by one or more rotatable brushes or belts for painless introduction and removal of a needle. The medical device may be worn on a portion of a body part of a patient such as finger, arm, leg, etc. It should be noted that the effect is immediate and also immediately reversible once the soft touch stops.

[4] The device of the present application simply alleviates the pain sensation during introduction and removal of the needle.

[5] The device has many advantages. The device is flexible to be used on multiple body parts such as abdomen, finger, arm, leg etc. The medical device is meant for making the processes such as, but not limited to, taking injections, vaccines, skin pricking for blood glucose, insulin shots and drawing blood, completely painless and without any discomfort to the patient.

[6] The present application is described hereinafter by various embodiments. This application may, however, be embodied in many different forms and should not be construed as limited to the embodiment set forth herein.

[7] Principle behind the invention is that the neural processing and pain perception of a body can be minimized or eliminated by competing tactile sensations in the vicinity of the pain area (or potential pain). Additionally, it is well understood that mechanoreceptors of the skin detect stimuli such as touch, pressure, vibration, and sound from the external and internal environments. They contain primary sensory neurons that respond to changes in mechanical displacement, usually in a localized region at the tip of a sensory dendrite. So, the present invention aims to stimulate the mechanoreceptor which augments the pain pathways in the skin that in turn minimises the sensation of pain felt. The present invention proposes a device that use the gate control theory of pain.

[8] According to an aspect of the present application, a device for simulating skin for painless introduction and removal of a needle is provided. The device comprises an enclosure adapted to be worn on a body part of a user, one or more rotatable brushes disposed on a periphery of the enclosure, adapted to touch a part of skin of the user after the device is worn, one or more motors disposed in the enclosure and

connected with the one or more rotatable brushes, and a button disposed on the enclosure connected with the one or more motors to actuate the device. Further, on actuation of the button, the one or more motors are configured to rotate the one or more rotatable brushes against the skin. Furthermore, the rotation of one or more rotatable brushes against the skin is configured to stimulate mechano-receptors of the skin to modulate a sensation of pain when a needle is introduced or removed at the skin.

[9] In accordance with an embodiment of the present application, the body includes an opening for receiving the body part of the user. A shape of the opening is selected from a circular opening, a semi-circular opening, a V-shaped opening, and a U-shaped opening.

[10] In accordance with an embodiment of the present application, the device comprises a rotational belt or a gear provided at the opening and connected with one or more motors. The rotational belt or gear may be adapted to mount onto one or more brushes. Further, the rotational belt is configured to enable rotation of one or more brushes upon actuation of the button, using one or more motors.

[11] In accordance with an optional additional embodiment of the present application, the device comprises one or more vibration motors connected with the battery, and configured to impart high frequency vibrations targeting nerve fibre of the body, to further alleviate pain when the needle is introduced into the skin. The vibrations herein are configured to distract the pain. Also, the vibrations may help in painless removal of the needle from the skin.

[12] In accordance with an embodiment of the present application, the needle is selected from a pricking needle of a diabetic lancet, a syringe, or an injection depending on the purpose of usage.

[13] In accordance with an embodiment of the present application, the device is worn on a finger, an arm, a leg or placed on a portion of skin wherever application is required.

[14] In accordance with an embodiment of the present application, the one or more motors are coupled with a battery.

[15] In accordance with an embodiment of the present application, the one or more motors are powered by the battery and actuated by the button.

[16] The accompanying Figures (Figs.) illustrate embodiments and serve to explain principles of the disclosed embodiments. It is to be understood, however, that these Figures are presented for purposes of illustration only, and not for defining limits of relevant applications. It is to be noted, however, that the appended drawings illustrate only typical embodiments of this application and are therefore not to be considered limiting of its scope, for the application may admit to other equally effective embodiments.

[17] These and other features, benefits, and advantages of the present application will become apparent by reference to the following text Figure, with like reference numbers referring to like structures across the views, wherein:

[18] Figure 1 illustrates a device for simulating skin on a finger for painless introduction of a needle, in accordance with an embodiment of the present application;

[19] Figure 2 illustrates implementation of a first embodiment of the device as shown in figure 1, in accordance with an embodiment of the present application;

[20] Figure 3 illustrates a second embodiment of the device having one or more brushes arranged in a first V shape for simulating skin on a body part for painless

introduction and removal of a needle, in accordance with an embodiment of the present application;

[21] Figure 3A illustrates a third embodiment of the device having continuous track arranged in a second V shape for simulating skin on a body part, in accordance with an embodiment of the present invention;

[22] Figure 4 illustrates a fourth embodiment of the device having one or more brushes arranged in a U shape for simulating skin on a body part for painless introduction and removal of a needle, in accordance with an embodiment of the present application;

[23] Figure 5 illustrates a fifth embodiment of the device for simulating a part of skin on a body for painless introduction and removal of a needle, in accordance with an embodiment of the present application;

[24] Figure 6 illustrates an implementation of the fifth embodiment as shown in figure 5, in accordance with an embodiment of the present application; and

[25] Figure 7 illustrates a sixth embodiment for simulating a part of skin, in accordance with an embodiment of the present application.

[26] The present application is described hereinafter by various embodiments with reference to the accompanying drawing, wherein reference numerals used in the accompanying drawing correspond to the like elements throughout the description.

[27] While the present application is described herein by way of example using embodiments and illustrative drawings, those skilled in the art will recognize that the application is not limited to the embodiments of drawing or drawings described and are not intended to represent the scale of the various components. Further, some components that may form a part of the application may not be illustrated in certain Figures, for ease of illustration, and such omissions do not limit the embodiments

outlined in any way. It should be understood that the drawings and detailed description thereto are not intended to limit the application to the particular form disclosed, but on the contrary, the application is to cover all modifications, equivalents, and alternatives falling within the scope of the present application as defined by the appended claim. As used throughout this description, the word "may" is used in a permissive sense (i.e., meaning having the potential to), rather than the mandatory sense, (i.e., meaning must). Further, the words "a" or "an" mean "at least one" and the word “plurality” means “one or more” unless otherwise mentioned. Furthermore, the terminology and phraseology used herein is solely used for descriptive purposes and should not be construed as limiting in scope. Language such as "including," "comprising," "having," "containing," or "involving," and variations thereof, is intended to be broad and encompass the subject matter listed thereafter, equivalents, and additional subject matter not recited, and is not intended to exclude other additives, components, integers or steps. Likewise, the term "comprising" is considered synonymous with the terms "including" or "containing" for applicable legal purposes.

[28] Figure 1 illustrates a device 100 for simulating skin on a finger (not shown in figure 1) for painless introduction or removal of a needle finger (not shown in figure 1), in accordance with an embodiment of the present application. As shown in figure 1, the device 100 comprises an enclosure 101 having an opening 103, one or more rotatable brushes 102, one or more motors (not shown), and a button (not shown).

[29] In accordance with an embodiment of the present invention, as shown in figure 1, the one or more rotatable brushes 102 disposed on a periphery of the enclosure 101 at the opening 103. The one or more rotatable brushes 102 may contain a type of fibres selected from a group comprising, but not limited to, nylon fibres, silicone

fibre, coir fibres, other natural fibre which is skin friendly, fiberglass fibres, polypropylene fibres, any other suitable polymer fibres or foam fibres or any synthetic or non-synthetic fibres.

[30] Further, inside the enclosure 101, the one or more motors (not shown, as the one or more motors may be placed in the device 100 inside dotted portion shown in figure 1) may be disposed and connected with the one or more rotatable brushes 102. The one or more motors may be selected from a group comprising Brushless DC Motors, Permanent Magnet DC Brush Motors, or Stepper Motors. In an additional or alternative embodiment, the one or more motors may include integrated motor drives, linear actuators.

[31] In accordance with an embodiment of the present invention, the device 100 comprises a rotational belt or a gear 104 provided at an opening 103 of the enclosure 101 and connecting the one or more brushes 102 with the one or more motors. The rotational belt 104 may be connected with the one or more brushes 102 and the one or more motors using pulleys. The rotational belt 104 may be made of, but not limited to, rubber, plastic, fabric material, steel cables or a combination thereof. Further, in case of the gear connecting the one or more brushes 102 with the one or more motors, the gear may be connected using gear trains or transmission system dispose between the one or more brushes 102 and the one or more motors. The rotational belt or the gear 104 is configured to enable rotation of one or more brushes 102 upon actuation of the button, using the one or more motors.

[32] In accordance with an optional additional embodiment of the present invention, the device 100 may further comprise one or more vibration motors 106. The one or more vibration motors 106 may be disposed around the enclosure 101. The one or more vibration motors 106 may be eccentric rotating mass (ERM)

vibration motors 106. Further the battery may be connected with the one or more vibration motors 106 and one or more motors. The battery may be a lithium-based battery, an alkaline battery, a carbon battery, a zinc battery, or a silver oxide battery.

[33] In accordance with an embodiment of the present invention, on surface of the enclosure 101, a button may be disposed which is connected with the one or more motors to actuate the device 100. The button may be a push button, a selector switch, a joystick, a limit switch, a proximity switch, a speed regulator switch, or a pressure switch. In an optional additional embodiment, the device 100 may comprise a regulator to control and regulate the vibrations at motors 106.

[34] In accordance with an embodiment of the present invention, one or more brushes 102, one or more motors, one or more vibrational motors, the battery, the rotational belt or the gear 104, may be disposed inside a casing 108, as shown in figure 1, of the device 100. The casing 108 may be made of, but not limited to, metal, composites, polymer or any suitable material capable of bearing vibrations and is durable. The button and or the regulator may be disposed on the casing 108 to control the actuation and the regulation of the one or more brushes 102 and one or more vibration motors 106.

[35] In accordance with an embodiment of the present invention, the device 100 is worn on a finger.

[36] Figure 2 illustrates an implementation 150 of a first embodiment of the device 100 as shown in figure 1, in accordance with an embodiment of the present application. As shown in figure 2, a finger 152 is placed inside the enclosure 101, only exposing tip of the finger 152 which is to be numbed. After insertion of the finger 152 in the enclosure 101 of the device 100, fibres of the one or more rotatable brushes 102 disposed on the periphery of the enclosure 101 are adapted to touch a

part of skin, the tip of the finger 152 of the user in this case, after the device 100 is worn. Next, on actuation of the button, the one or more motors are configured to rotate the one or more rotatable brushes 102 against the skin of the tip of the finger. The rotation of the one or more rotatable brushes 102 is configured to flare out fibres in the one or more rotatable brushes 102. As shown in figure 2, the fibres in the one or more rotatable brushes 102 are flared out on the fingertip 154 of the finger 152.

[37] In accordance with an embodiment of the present invention, the rotation of the brushes against the skin is configured to stimulate mechano-receptors of the skin of the fingertip 154 to modulate a sensation of pain when a needle 156 is introduced into the skin and further when the needle is removed from the skin. It is well understood in the art that the mechanoreceptors of the skin detect stimuli such as touch, pressure, vibration, and sound from the external and internal environments. They contain primary sensory neurons that respond to changes in mechanical displacement, usually in a localized region at the tip of a sensory dendrite. So, the present invention aims to stimulate mechanoreceptor which augments the pain pathways in the skin that in turn minimises the sensation of pain felt. Accordingly, the needle 156 may then be painless introduced into the skin as shown in figure 2. The needle 156 may be selected from, but not limited to, a pricking needle of a diabetic lancet, a syringe, or an injection depending on the purpose of usage. For example: a pricking needle of diabetic lancet is being used/shown in figure 2 while the rotatable brushes 102 modulate/eliminate the sensation of pain felt in the fingertip 154, wearing the medical device 100. Similarly, the rotation of the rotatable brushes 102 also modulate/eliminate the sensation of pain felt in the fingertip 154 during removal of the needle.

[38] In an additional or alternative embodiment, the one or more vibration motors 106 disposed inside the device 100 may be configured to impart high frequency vibrations targeting the nerve fibre to further alleviate pain when the needle is introduced into the skin or removed from the skin. As previously explained, the sensation of the finger tip 154 is already modulated by the stimulation of mechanoreceptor via soft touch of the rotating fibres/bristles of the one or more rotatable brushes 102. Then, the optional additional vibrations provided by the one or more vibration motors 106 further distracts the sensation of pain. The implementation of vibration motors 106 in the device 100 is optional, and only the device 100 has adopted the vibration motors 106.

[39] Figure 3 illustrates a second embodiment 200 of the device 100 having one or more brushes 102 arranged in a first V shape for simulating skin on a body part for painless introduction or removal of a needle, in accordance with an embodiment of the present application. As shown in figure 3, the one or more brushes 102 may be contained in a first V-shaped casing 204. The dotted portion 202 shown in the figure 3 may contain, but not limited to, one or more motors, the rotational belt or the gear 104, and the battery to enable a single or multi directional motion of the one or more brushes 102. These are all hidden components inside the device and are therefore denoted by the dotted lines.

[40] The one or more brushes 102 as shown in figure 3 may be connected with a common motor of the one or more motors. The motor may be connected with the one or more brushes 102 using the rotational belt 104 or gear trains. In an embodiment, each brush 102 of the one or more brushes 102 may be connected with a respective dedicated motor of the one or more motors. As shown in figure 3, the one or more brushes 102 may move in any direction (clockwise or anti-clockwise) or a common

direction to induce anaesthetic effect on a body part. The first V-shaped casing 204 of embodiment 200 of the device 100 may provide a second enclosure (not shown) with a second opening 203 as shown in figure 3, to enable painless introduction or removal of a needle on a larger part of body such as, but not limited to, arm, neck, back, chest, hips etc. The part of the body may be contained in the second opening 203 as shown in figure 3.

[41] In one embodiment, a tourniquet 208 may be provided with the second embodiment 200 of the device 100. In general, tourniquets may be understood as ties or elastic bands, may be used by injectors to help identify veins and make them easier to hit. The tourniquet 208 are most commonly made of Latex or non-latex. Usually, latex tourniquets are stronger than non-latex tourniquets, however people with latex allergies may need alternatives. Herein, as can be seen from the figure 3, the tourniquet 208 helps to secure the device 100 in position on the arm 206 as well as to identify vein 210 for drawing blood. As shown in figure 3, the skin comes in contact with the device 100 in the second opening 203. The one or more brushes 102, as shown in figure 3 are adapted to rub against the skin. The rubbing of the one or more brushes 102 against the skin results in stimulation of the mechanoreceptors present within the area of skin in contact in the second opening 203, that will in-turn provide a painless experience throughout an entire blood drawing process. The blood drawing process includes, but not limited to, introduction of a needle, drawing of blood using a needle and syringe, and removal of the needle from the human body. Further, the stimulation of the mechanoreceptors by rubbing against the skin by the one or more brushes 102 causes mitigation of pain during introduction or removal of the needle for drawing of the blood.

[42] In accordance with an embodiment of the present invention, the one or more brushes 102 as shown in figure 3 may be replaced with one or more continuous tracks (not shown in figure 3). Figure 3A illustrates a third embodiment 250 of the device 100 having continuous tracks 260 arranged in a second V shape for simulating skin on a body part, in accordance with an embodiment of the present invention. Each continuous track of the one or more continuous tracks may comprise a belt disposed on axles or wheels configured to rotate the belt. The belt may be made of, but not limited to, cloth, silicon, rubber, plastic, or metal. The one or more continuous tracks 260 may be driven by motors, gears or axles.

[43] As shown in figure 3A, a second V-shaped casing 254 of embodiment 250 of the device 100 may provide a third enclosure (not shown) with a third opening 253 as shown in figure 3A. The third opening 253 may be adapted to receive a body part such as the arm 206 as shown in figure 3A. In an alternative embodiment, dotted portion 252 shown in the figure 3A may contain, but not limited to, one or more motors, rotational belt or gears, and the battery to enable a single or multi directional motion of the one or more continuous tracks 260. Similar to the second embodiment 200, a tourniquet 208 may be provided with the third embodiment 250 of the device 100 shown in figure 3A. As previously explained, the tourniquet 208 helps to secure the device 100 in position on the arm 206.

[44] Further, as shown in figure 3A, the third opening 253 is adapted to receive a body part. The skin in the body part comes in contact with the device 100 in the third opening 253. The one or more continuous tracks 260, as shown in figure 3A are adapted to rub against the skin. The rubbing of the one or more continuous tracks 260 against the skin results in stimulation of the mechanoreceptors present within the area of skin in contact in the third opening 253, that will in-turn provide a painless

experience in blood drawing process as elaborated above. The stimulation of the mechanoreceptors caused due to the rubbing by the one or more continuous tracks 260 causes painless operation of the needle on the skin. The operation such as, but not limited to, drawing of blood or administration of a drug by needle injection.

[45] Figure 4 illustrates a fourth embodiment 300 of the device 100 having one or more brushes 102 arranged in a U-shaped casing 304 for simulating skin on a body part for painless introduction or removal of a needle, in accordance with an embodiment of the present application. As shown in figure 4, the one or more brushes 102 may be contained in the U-shaped casing 304 in the fourth embodiment 300 of the device 100. In accordance with an embodiment of the present invention, dotted portion 302 shown in the figure 4 may contain one or more motors, rotational belt or the gear 104, and the battery to enable motion of a multi directional motion or single directional motion of the one or more brushes 102. These are all hidden components inside the device and are therefore denoted by the dotted lines. The motion of one or more brushes 102 is similar to previously explained motion of the one or more brushes 102. The U shape arrangement of the one or more brushes 102 inside the U-shaped casing 304 may provide a fourth enclosure (not shown) with a fourth opening 303 as shown in figure 4. The fourth opening 303 may be adapted to receive body part such as, but not limited to, arm, calf, leg, thigh, wrist, ankle etc. The fourth embodiment 300 of the device 100 may enable the one or more brushes 102 to provide anaesthetic effect on the body part in contact. Similar to the second embodiment 200, a tourniquet 208 may be provided with the fourth embodiment 300 of the device 100 shown in figure 4. As previously explained, the tourniquet 208 helps to secure the device 100 in position on the arm 206 as well as to identify vein 210 for drawing blood. Alternately, it can be used for intramuscular injection as shown in

figure 4, where the tourniquet may be used to secure the device 100 on a shoulder of the user around the deltoid muscles.

[46] Figure 5 illustrates a fifth embodiment 400 of the device 100 for simulating a part of skin on a body for painless introduction or removal of a needle, in accordance with an embodiment of the present application. As shown in figure 5, the fifth embodiment 400 of the device 100 comprises a single permeable arrangement of a brush 102 of the one or more brushes 102. The brush 102 may be rotated using a rotational belt 104 connected with a motor of the one or more motors. The motor may rotate the brush 102 in a single direction (clockwise or anti-clockwise) or randomly/periodically in multiple directions (clockwise and anti-clockwise). The brush 102, the rotational belt 104, and the motor may be enclosed in a first cuboidal casing 402 as shown in figure 5.

[47] The button disposed on the fifth embodiment 400 of the device 100 may actuate the battery inside the fifth embodiment 400 to power the motor that drives the rotational belt.

[48] Figure 6 illustrates implementation 450 of the fifth embodiment 400 of the device 100 as shown in figure 5, in accordance with an embodiment of the present application. As shown in figure 6, the fifth embodiment 400 of the device 100 is placed on a body part (an arm 454) of a patient. However, a skilled addressee would appreciate that the fifth embodiment 400 may be used over any small or large body part such as abdomen, spine, back, chest, hips etc. On actuating the button, the brush 102 is rotated. The rotation of the brush 102 results in flaring out of the fibres of the brush 102. Since the brush 102 is arranged in a periphery, a fifth enclosure (not shown) having a fifth opening 403 is left there between. Rotation of the brush

102 over the skin of the arm 454 causes stimulation of mechano-receptors of the skin.

[49] Once the mechanoreceptors are stimulated, a pricking needle or an injection 456 may be introduced through the fifth opening 403 there between by a health practitioner 452 or by the patient himself/herself. The rotating brush 102 may modulate a sensation of pain when the needle or the injection 456 is introduced into the skin and further when the needle is removed from the skin. It is important to understand that the present invention does not provide anaesthetic effect or localised numbing of a portion of a skin but, instead augments/modulates the pain sensation a point where the subject (patient/user) cannot feel the pain at all. All that the subject feel is the soft touch of the rotating bristles/fibres of the one or more rotatable brushes, constantly brushing against the skin, thereby making the process of needle introduction and removal completely painless. This is a unique feature of the present invention.

[50] In an alternative or additional embodiment, the device 100, instead of one or more rotatable brushes 102, use a continuous track (not shown in previous figures). Figure 7 illustrates a sixth embodiment 500 for simulating a part of skin, in accordance with an embodiment of the present application. As shown in sixth embodiment 500, the one or more brushes 102 are replaced with a continuous track 504. As shown in figure 7, the continuous track 504 may be mounted on axles 5061, 5062. The continuous track 504 is rotated using may be, but not limited to, motors, gears, or gear box connected with the axles 5061, 5062. The continuous track 504, the axles 5061, 5062, and the motor may be enclosed in a second cuboidal casing 502 as shown in figure 7. In an alternative or additional embodiment, dotted portion 508 shown in the figure 7 may contain, but not limited to, one or more motors,

rotational belt or gears, and the battery to enable a single or multi directional motion of the continuous track 504.

[51] In accordance with an embodiment of the present invention, the continuous track 504 for simulating a part of skin, comes in contact with the skin that is in close proximity (within may be, but not limited to, 3cm) to the site of venepuncture for blood taking. The motion of the continuous track 504 against the skin results in stimulation of the mechanoreceptors, that will in-turn provide a painless experience when a needle is introduced or when blood is being taken or when needle is removed.

[52] The present application offers a number of advantages. The present application provides a device that makes the processes such as, but not limited to, taking injections, vaccines, skin pricking for blood glucose, insulin shots and drawing blood, completely painless and without causing any discomfort to the patient. It eliminates the need to provide local or vibrational anaesthesia for processes involving needle penetration into the skin or its removal. The device will be very useful for painless drawing of blood or injection of a drug. The device will be useful during intra-muscular or subcutaneous injection of vaccines. The device is helpful especially for children i.e., in paediatrics due to sensitivity of children towards the usage of needles. Further, the device causes stimulation of the mechanoreceptors, which is useful during finger prick for blood glucose testing. The device is flexible with its utility and can be used at any part of the body. Furthermore, since the stimulation of mechanoreceptor occur via soft touch of the skin, the effect is immediately reversible. So, the moment the soft touch stops stimulating the mechanoreceptor then the sensation of the skin returns back to the original state. Therefore, there is no almost possibility of causing any harm or injury to the skin.

[53] Using this device, a patient himself/herself can perform pricking for diabetics or glucose analysis in blood. This device can be applied in the domestic setting (non-clinical) where patients can administer the device independently during finger prick for glucose analysis. Further, this device would be useful for people who prefer injections to be painless and those who have a phobia of needles.

[54] In the application, unless specified otherwise, the terms "comprising", "comprise", and grammatical variants thereof, intended to represent "open" or "inclusive" language such that they include recited elements but also permit inclusion of additional, non-explicitly recited elements.

[55] Various modifications to these embodiments are apparent to those skilled in the art from the description and the accompanying drawings. The principles associated with the various embodiments described herein may be applied to other embodiments. Therefore, the description is not intended to be limited to the embodiments shown along with the accompanying drawings but is to be providing broadest scope consistent with the principles and the novel and inventive features disclosed or suggested herein. Accordingly, the application is anticipated to hold on to all other such alternatives, modifications, and variations that fall within the scope of the present application and the appended claims.

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Reference Numerals

100 – Device

101 – Enclosure

102 – One or more rotatable brushes

103 – Opening

104 – Rotational belt or a gear

106 – One or more vibration motors

108 – Casing

150 – Implementation of the device

152 – Finger

154 – Fingertip

156 – Needle

200 – Second embodiment of the device

202 – Dotted portion of the second embodiment

203 – Second opening

204 – First V–shaped casing

206 – Arm

208 – Tourniquet

210 – Vein

250 – Third embodiment of the device

252 – Dotted portion of the third embodiment

253 – Third opening

254 – Second V–shaped casing

260 – One or more continuous tracks

300 – Fourth embodiment of the device

302 – Dotted portion of the fourth embodiment

303 – Fourth opening

304 – U–shaped casing

400 – Fifth embodiment of the device

402 – First cuboidal casing

403 – Fifth opening

450 – Implementation of fifth embodiment

452 – Health practitioner

454 – Arm of patient

500 – Sixth embodiment of the device

502– Second Cuboidal casing

504– A continuous track

5061, 5062– Axles

508– Dotted portion of the fifth embodiment

Claims

1. A device for simulating skin for painless introduction or removal of a needle, the device comprising:

an enclosure adapted to be worn on a body part of a user;

one or more rotatable brushes disposed on a periphery of the enclosure, adapted to touch a part of skin of the user after the device is worn;

one or more motors disposed in the enclosure and connected with the one or more rotatable brushes; and

a button disposed on the enclosure connected with the one or more motors to actuate the device;

wherein on actuation of the button, the one or more motors are configured to rotate the one or more rotatable brushes against the skin;

wherein the rotation of one or more rotatable brushes against the skin is configured to stimulate mechano-receptors of the skin to modulate a sensation of pain when a needle is introduced into the skin or removed from the skin.

2. The device as claimed in claim 1, wherein the body includes an opening for receiving the body part of the user, wherein a shape of the opening is selected from a circular opening, a semi-circular opening, a V-shaped opening, and a U-shaped opening.

3. The device as claimed in claim 2, further comprising a rotational belt or a gear provided at the opening and connected with the one or more motors, wherein the rotational belt is adapted to mount the one or more brushes, and;

wherein the rotational belt or the gear is configured to enable rotation of one or more brushes upon actuation of the button, using the one or more motors.

4. The device as claimed in claim 1, further comprising one or more vibration motors connected with the battery, and configured to impart high frequency vibrations targeting the nerve fibre to further alleviate pain when the needle is introduced into the skin or removed from the skin.

5. The device as claimed in claim 1, wherein the needle is selected from a pricking needle of a diabetic lancet, a syringe, or an injection depending on the purpose of usage.

6. The device as claimed in claim 1, wherein the device is worn on a finger, an arm, a leg or placed on a portion of skin wherever application of anaesthesia is required.

7. The device as claimed in claim 1, wherein the one or more motors are coupled with a battery.

8. The device as claimed in claim 7, wherein the one or more motors are powered by the battery and actuated by the button.