CLAIMS

1. A handheld device for applying a composition to a skin of a face of user, comprising:

an end effector comprising a base portion and a protruding portion extending distally from the base portion, the protruding portion having a distal opening and further comprises a plurality of grating bars extending across the distal opening;

a detector arrangement configured to obtain image data corresponding to an image of an area of the skin through the distal opening of the end effector, wherein the image data corresponds to an image of the area of skin overlaid with the plurality of grating bars;

an applicator arrangement configured to apply the composition to a location within the area of the skin; and

a processing arrangement configured to

receive the image data from the detector arrangement,

analyze the image data to determine whether the applicator arrangement is aimed to safely dispense the composition to the area of skin and whether a frexel within the area of skin corresponds to a skin artifact, wherein the processing arrangement analyzes the image data and determines the applicator arrangement to be aimed to safely dispense the composition to the area of skin when the image data corresponds to a region on the face of the user located at least a predetermined distance away from at least one of eyes, nostrils and mouth of the face of the user,

direct the applicator arrangement to apply the composition to the frexel when the processing arrangement determines the applicator arrangement is aimed to safely dispense the composition to the area of skin and the skin artifact is detected from the frexel, and

direct the applicator arrangement to withhold from application of the composition to the skin when the applicator arrangement is determined to be not safely aimed to dispense the composition to the area of skin.

2. The device of claim 1, wherein the processing arrangement analyzes the image data to determine a tilt of the device.

3. The device of claim 2, wherein the processing arrangement determines the applicator arrangement to be aimed to safely dispense the composition to the area of skin when a magnitude of the tilt of the device is below a predetermined threshold, and determines the applicator arrangement as not safely aimed to dispense the composition to the area of skin when magnitude of the tilt of the device is above the predetermined threshold.

4. The device of claim 1, wherein the processing arrangement is configured to analyze the image data to identify a shadow of at least one of the grating bars in the image and determining a length of the shadow based on the image data.

5. The device of claim 4, wherein the processing arrangement is further configured to determine the applicator arrangement to be aimed to safely dispense the composition to the area of skin when the length of the shadow is below a predetermined threshold, and determine the applicator arrangement as not safely aimed to dispense the composition to the area of skin when the length of the shadow is above the predetermined threshold.

6. The device of any one of claims 1 or 4-5, wherein the processing arrangement is configured to adjust the image data to substitute data for portions of the image corresponding to the grating bars with data generated by the processing arrangement that approximate for skin underlying the grating bars, and to analyze the adjusted image data to identify locations within the area of skin that correspond to skin artifacts.

7. The device of any one of claims 1 or 2-6, wherein the processing arrangement determines whether the skin artifact is detected from the frexel based on a reflectance of the area of skin detected in the image.

8. The device of claim 7, wherein the applicator arrangement comprises a nozzle configured to dispense a pressurized pulse of the composition from a reservoir to form a thin layer of the composition on the skin.

9. The device of claim 8, wherein the composition is a cosmetic composition comprising particles of a reflectance modifying agent in a liquid suspension.

10. The device of claim 9, wherein the reflectance modifying agent is titanium dioxide.

11. A method for application of a composition to a skin of a face a user, comprising:

obtaining, by a detector arrangement, image data corresponding to an image of an area of the skin over which a device is placed overlaid with a plurality of grating bars of an end effector of the device;

analyzing, by a processing arrangement, the image data to determine a tilt of the device as compared to the area of the skin by analyzing the image data to identify a shadow of at least one of the grating bars in the image and analyzing the shadow to determine a three-dimensional vector corresponding to the tilt;

analyzing, by the processing arrangement, the image data to identify locations within the area of skin that correspond to skin artifacts;

determining, by the processing arrangement, whether an applicator arrangement is aimed to safely dispense the composition to the area of skin based on the tilt of the device, wherein the processing arrangement determines the applicator arrangement to be aimed to safely dispense the composition to the area of skin when a magnitude of the tilt of the device is below a predetermined threshold, and determines the applicator arrangement as not safely aimed to dispense the composition to the area of skin when magnitude of the tilt of the device is above the predetermined threshold;

applying, by the applicator arrangement, the composition to the identified locations only when the applicator arrangement is determined to be aimed to safely dispense the composition to the area of skin; and

withholding from application of the composition to the skin when the applicator arrangement is determined to be not safely aimed to dispense the composition to the area of skin.

12. The method of claim 11, wherein the processing arrangement adjusts the image data to substitute data for portions of the image corresponding to the grating bars with data generated by the processing arrangement that approximate for skin underlying the grating bars and analyzes the adjusted image data to identify locations within the area of skin that correspond to skin artifacts.

13. The method of any one of claims 11 or 12, wherein the processing arrangement identifies locations within the area of skin that correspond to skin artifacts based on a reflectance of the area of skin detected in the image.