

What is claimed is:

1. A method for preventing access to a secure system based on determining a captured image to be of an alternative representation of a live person, the method comprising:

capturing an image of a subject illuminated by an infrared (IR) illumination source;

extracting, from the image, a portion representative of an iris of the subject;

generating, from the portion, a frequency domain representation;

determining based on the frequency domain representation, that an amount of high-frequency features in the portion of the image satisfies a threshold condition indicative of the image being of an alternative representation of a live person;

determining that an amount of energy in a high frequency region of the frequency domain representation is less than a threshold amount associated with images of live persons;

responsive to determining that (i) the amount of high-frequency features in the portion of the image satisfies the threshold condition and (ii) the amount of energy in the high frequency region of the frequency domain representation is less than the threshold amount, identifying the subject in the image to be an alternative representation of a live person; and

responsive to identifying the subject in the image to be an alternative representation of a live person, preventing access to the secure system.

2. The method of claim 1, wherein determining that the amount of high frequency features in the portion of the image satisfies the threshold condition includes determining that the amount of high frequency features is less than a threshold amount associated with images of live persons.

~~3.—The method of claim 1, further comprising:~~

~~generating, from the portion, a frequency domain representation; and~~

~~determining, from the frequency domain representation, that the amount of high frequency features in the portion of the image satisfies the threshold condition.~~

~~4. The method of claim 3, comprising:~~

~~determining that an amount of energy in a high frequency region of the frequency domain representation is less than a threshold amount associated with images of live persons; and~~

~~responsive to determining that the amount of energy in the high frequency region of the frequency domain representation is less than a threshold amount associated with images of live persons, identifying the subject in the image to be an alternative representation of a live person.~~

~~5.3.~~ The method of claim 1, wherein the alternative representation of a live person comprises a photograph of the live person.

~~6.4.~~ The method of claim ~~53~~, wherein the photograph is printed on paper.

~~7.5.~~ The method of claim ~~53~~, wherein the photograph is presented on a display device.

~~8.6.~~ The method of claim 1, wherein determining that the amount of high frequency features in the portion of the image satisfies the threshold condition comprises processing the image using a machine learning process trained to discriminate between images of live persons and corresponding alternative representations of the live persons.

~~9.7.~~ The method of claim ~~31~~, wherein the frequency domain representation comprises a two-dimensional Fast Fourier Transform (2D-FFT) of the portion of the image.

~~10.8.~~ The method of claim 1, further comprising:

determining that the amount of high frequency features in the portion of the image fails to satisfy the threshold condition;

responsive to determining that the amount of high frequency features in the portion of the image fails to satisfy the threshold condition, identifying the subject in the image to be a live person; and

responsive to identifying the subject in the image to be a live person, initiating an authentication process for determining if the live person is authorized to access the secure system.

[11.9.](#) The method of claim 1, wherein the secure system comprises a user-interface disposed in a kiosk.

[12.10.](#) The method of claim [11.9](#), wherein the IR illumination source is disposed on the kiosk.

~~13. A method for preventing access to a secure system based on determining a captured image to be of an alternative representation of a live person, the method comprising:~~

~~capturing a first image of a subject illuminated by an infrared (IR) illumination source;~~

~~capturing a second image of the subject without using the IR illumination source;~~

~~extracting, from each of the first image and the second image, corresponding portions representative of an iris of the subject;~~

~~determining, for the first image and the second image, a first metric and a second metric, respectively, the first and second metrics being indicative of a sharpness of the corresponding images.~~

~~determining that a difference between the first metric and the second metric satisfies a threshold condition indicative of the image being of an alternative representation of a live person;~~

~~responsive to determining that the difference between the first metric and the second metric satisfies the threshold condition, identifying the subject in the image to be an alternative representation of a live person; and~~

~~responsive to identifying the subject in the image to be an alternative representation of a live person, preventing access to the secure system.~~

14.11. A system comprising:

an image acquisition device configured to capture an image of a subject illuminated by an infrared (IR) illumination source; and

an image analysis engine comprising one or more processing devices, the image analysis engine configured to:

extract, from the image, a portion representative of an iris of the subject,

generate, from the portion, a frequency domain representation,

determine, based on the frequency domain representation, that an amount of high-frequency features in the portion of the image satisfies a threshold condition indicative of the image being of an alternative representation of a live person,

determine that an amount of energy in a high frequency region of the frequency domain representation is less than a threshold amount associated with images of live persons,

responsive to determining that (i) the amount of high-frequency features in the portion of the image satisfies the threshold condition and (ii) the amount of energy in the high frequency region of the frequency domain representation is less than the threshold amount, identify the subject in the image to be an alternative representation of a live person, and

responsive to identifying the subject in the image to be an alternative representation of a live person, prevent access to a secure system.

15.12. The system of claim 14.11, wherein determining that the amount of high frequency features in the portion of the image satisfies the threshold condition includes determining that the amount of high frequency features is less than a threshold amount associated with images of live persons.

~~16. The system of claim 14, wherein the image analysis engine is configured to:~~

~~generate, from the portion, a frequency domain representation; and~~

~~determine, from the frequency domain representation, that the amount of high frequency features in the portion of the image satisfies the threshold condition.~~

17.13. The system of claim ~~16~~11, wherein the frequency domain representation comprises a two-dimensional Fast Fourier Transform (2D-FFT) of the portion of the image.

~~18. The system of claim 16, wherein the image analysis engine is configured to:~~
~~determine that an amount of energy in a high frequency region of the frequency domain representation is less than a threshold amount associated with images of live persons; and~~
~~responsive to determining that the amount of energy in the high frequency region of the frequency domain representation is less than a threshold amount associated with images of live persons, identify the subject in the image to be an alternative representation of a live person.~~

19.14. The system of claim ~~14~~11, wherein the alternative representation of a live person comprises a photograph of the live person.

20.15. The system of claim ~~19~~14, wherein the photograph is printed on paper, or presented on a display device.

21.16. The system of claim ~~14~~11, wherein determining that the amount of high frequency features in the portion of the image satisfies the threshold condition comprises processing the image using a machine learning process trained to discriminate between images of live persons and corresponding alternative representations of the live persons.

22.17. The system of claim ~~14~~11, wherein the image analysis engine is configured to:

determine that the amount of high frequency features in the portion of the image fails to satisfy the threshold condition;

responsive to determining that the amount of high frequency features in the portion of the image fails to satisfy the threshold condition, identify the subject in the image to be a live person; and

responsive to identifying the subject in the image to be a live person, initiate an authentication process for determining if the live person is authorized to access the secure system.

~~23.18.~~ The system of claim ~~14~~11, wherein the secure system comprises a user-interface disposed in a kiosk.

~~24.19.~~ The system of claim ~~23~~18, wherein the IR illumination source is disposed on the kiosk.

~~25.20.~~ One or more machine-readable storage devices comprising machine-readable instructions configured to cause one or more processing devices to execute operations comprising:

capturing an image of a subject illuminated by an infrared (IR) illumination source;

extracting, from the image, a portion representative of an iris of the subject;

generating, from the portion, a frequency domain representation;

determining, based on the frequency domain representation, that an amount of high-frequency features in the portion of the image satisfies a threshold condition indicative of the image being of an alternative representation of a live person;

determining that an amount of energy in a high frequency region of the frequency domain representation is less than a threshold amount associated with images of live persons;

responsive to determining that (i) the amount of high-frequency features in the portion of the image satisfies the threshold condition and (ii) the amount of energy in the high frequency region of the frequency domain representation is less than the threshold amount, identifying the subject in the image to be an alternative representation of a live person; and

responsive to identifying the subject in the image to be an alternative representation of a live person, preventing access to a secure system.