

METHODS AND SYSTEMS FOR GENERATING IMAGE DATA FOR AN INTERACTIVE DISPLAY

FIELD OF THE INVENTION

This invention is directed to methods and systems for generating modified image data of a user for an interactive display.

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BACKGROUND OF THE INVENTION

Integrated systems for both capturing images of a user and displaying those images to the user are known. In particular, such systems for use in retail and marketing are known. In a previously considered system, an image capture
10 device, such as a video camera, is mounted with a display device, so that video images of a user in front of the system can be shown on the display device. Additional images can be overlaid on the display device. In a clothing retail environment, the system uses one or more garment images from a garment
15 image library overlaid on the video images of the user, to attempt to illustrate how a garment might appear once worn by the user.

Such systems have various disadvantages. The further images may be still images which are not capable of movement, thereby not matching the video
20 images of the user. The overlaid images may be limited to single images of, for example, a garment, therefore not permitting alternative viewing angles of the image (garment).

The images may in general lack interactive qualities for engagement of the user,
25 such as movement and sufficient viewing alternatives. In the case of moving overlaid images, any movement may not be synchronised with the captured images of the user. The previously considered systems may have no interactive means for modifying the images overlaid. Such systems may require manual user input in order to modify images, to retrieve certain types of images, or to
30 browse images.

The present invention aims to address these problems and provide improvements upon the known devices and methods.

5 STATEMENT OF INVENTION

Aspects and embodiments of the invention are set out in the accompanying claims.

10 In general terms, one embodiment of a first aspect of the invention can provide a method for generating modified image data of a user for an interactive display, the method comprising: using an imaging device, imaging the user to obtain user image data; detecting a user attribute for the user; and selecting, based on the
15 detected user attribute, stock image data for association with the obtained user image data.

This allows for modification of the user image data specific to the user currently using the interactive display. This in turn provides a more efficient interactive display system, which can reduce computational loads and reduce manual
20 interaction which may cause wear and user-introduced errors.

Furthermore, the use of the user attribute to source relevant stock image data provides a much improved interactive experience for the user, allowing for increased customer engagement.

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The imaging device may be configured to capture images only when a user is in range or proximal to the imaging device. The imaging device may comprise a motion tracking device. A motion tracking device may be provided separately from the imaging device. Motion tracking may be performed by analysis of image
30 data from the imaging device.

Preferably, the method further comprises the step of combining the selected stock image data with the obtained user image data, for display to the user. This provides the modification of the user image data by the image based on the detected attribute, which in turns provides greater interactivity.

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More preferably, the stock image data comprises image data for a garment, and the step of combining comprises combining the image data for the garment with an associated garment area of the user image data.

10 Suitably, the step of detecting a user attribute for the user comprises using a sensor device to detect the user attribute. In an embodiment, the step of detecting a user attribute for the user comprises processing the obtained user image data to detect the user attribute.

15 In one embodiment, the user attribute is a physical attribute for the user. Preferably, the user attribute is a demographic attribute for the user. Alternatively, the user attribute is a feature of a garment worn by the user. Suitably, the user attribute comprises one or more of: an age, gender, or ethnicity of the user; a gesture or expression of the user; or a detected garment or fabric
20 type worn by the user.

In an embodiment, the method further comprises: detecting movement of the user; and modifying the stock image data to match the detected movement of the user.

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This provides greater possibilities for arrangement of the stock image data with the captured user image data. For example, the stock image data can be modified to move as the user moves, more effectively demonstrating, for example, the behaviour or appearance of a garment being shown to the user.

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One embodiment of a second aspect of the invention can provide a system for generating modified image data of a user for an interactive display, the system comprising: an imaging device configured to image the user to obtain user image data; a detector configured to detect a user attribute for the user; and a processor
5 configured to select, based on the detected user attribute, stock image data for association with the obtained user image data.

One embodiment of a third aspect of the invention can provide a server system comprising: a memory storing stock image data; a communications interface
10 configured to communicate with a local user system; and a processor module, the system configured to: obtain user image data from an imaging device of the local user system; by a processor module: process the user image data to detect a user attribute for the user: select, based on the detected user attribute, stock image data for association with the obtained user image data; and transmit from
15 the communications interface to the local user system the obtained user image data and associated stock image data for display to the local user.

Further aspects of the invention comprise computer programs, computer program applications or computer program code which, when loaded into or run on a
20 computer or processor, cause the computer or processor to become a system, or to carry out methods, according to the aspects described above.

The above aspects and embodiments may be combined to provide further aspects and embodiments of the invention.

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BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described by way of example with reference to the accompanying drawings, in which:

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Figure 1 is diagram illustrating an example of a system architecture according to an embodiment of the invention;

Figure 2 is a diagram illustrating a user imaging and interaction system according to an embodiment of the invention;

5 Figures 3 to 8 are screenshots illustrating an embodiment of the invention in use; and

Figure 9 is a perspective view illustrating an embodiment of the invention in use.

DETAILED DESCRIPTION OF EMBODIMENTS

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In general, embodiments of the invention provide methods and systems for more efficient interaction between a user and an image capture and display system.

This is done by detecting attributes of the user, for example so that the interaction can be more efficiently personalised for the user. In an example,

15 where the system is used for demonstration of retail clothing items to a user, the system can provide a more effective demonstration of how a garment would actually appear when worn by the user.

It may be noted that current systems also have disadvantages that the object
20 image to be overlaid on the user image may be viewed unsatisfactorily. For example, the image overlaid may not be able to move (as the user image moves), and there may be no alternative views or viewing angles for the object image, which the user may require during interaction.

25 One method of addressing such a problem may track motion of the user, and use the tracked motion to modify the image to be overlaid. For example, a method of generating an interactive image of a user for display, or a modified image of a user for an interactive display, may comprise imaging the user; detecting and/or tracking movement of the user; and modifying a stock (object) image to match
30 the detected or tracked movement of the user. The method may then combine the modified image with the image of the user, for display to the user.

This allows the movement of the user to prompt movement of the overlaid image, preferably tracking the movement of the user, so that interactivity is maintained.

5 In particular embodiments, the methods and systems described herein can provide a system hereafter known as the DigiQuin™, an innovative 3D projection of fashion outfits on shoppers instead of using a mannequin, which allows a retailer/designer to ‘tailor’ its fashion outfit specifically to the right shopper based on, for example, their gender and age group. They also give the shopper “real-
10 life” experience by trying out the fashion outfit and interacting with it instead of just looking at the dummy mannequin or at digital signage.

An example of components of a system providing these features is illustrated in Figure 1. The system 100 comprises an admin manager component (102), in
15 communication with an FTP server (106). This connection can be managed by a backup process, such as Syncback (104). The FTP server is in turn in communication with several retail manager components (108). These are local devices/systems for each site where one or more interactive displays are situated. Each retail manager system (108) is connected to one or more
20 interactive image capture and display systems (112). Again, these communications can be backed-up (110) as necessary.

Certain specific embodiments for these features are described below:

25 DigiQuin™ Cloud Solution

The DigiQuin™ Admin Manager and DigiQuin™ Retail Manager can be implemented as web portals to manage DigiQuin™ that will be hosted in the Cloud. The DigiQuin™ Admin Manager can upload 3D clothes or garments (i.e.
30 image data for those clothes/fabrics/garments which can be processed by the

systems, and which can be overlaid onto user image data in the display devices), which will auto-synchronize to local DigiQuin™ systems.

5 The DigiQuin™ Admin Manager is a web application that can be used by a management company to manage all the retail shops that subscribe to the DigiQuin™ system. It can control all the 3D clothes uploaded to the FTP server. The DigiQuin™ Admin Manager can create log in accounts for DigiQuin™ Retail Managers for retail shops' owners to manage their own DigiQuin™ systems. A DigiQuin™ Admin Manager can upload 3D clothes for specific retail shops and, 10 for example, set gender and age group of those 3D clothes.

Key Features

15 User Account Creation: The DigiQuin™ Admin Manager can create log in accounts for DigiQuin™ retail manager portals and FTP access accounts for each DigiQuin™ system/location. All the uploaded 3D clothes can be uploaded to the management company FTP file server.

20 Clothes Uploading: The DigiQuin™ Admin Manager can upload 2D images and 3D object clothes to the FTP server and the FTP server can auto synchronize to DigiQuin™ software implementations.

25 Clothes Properties Setting: The system can set gender, age group, QR code information, description and active/inactive properties to specific clothes stored/provided on the systems.

Digital Signage Video Setting: The system can upload and select digital signage videos to display in DigiQuin™ software, for display on the local display devices. The system may accept jpeg or flash video, for example.

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DigiQuin™ Retail Manager

The DigiQuin™ Retail Manager is a web application used in retail shops to manage clothes in DigiQuin software. The DigiQuin™ Retail Manager can set 2D/3D clothes properties.

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Key Features

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For this embodiment, an example of components of the local capture and display DigiQuin™ system is illustrated in Figure 2.

The DigiQuin™ (112) consists of a portrait LCD panel (204), equipped with intelligent gesture detection and human profile technology (such as an image capture device (202), and sensors and processing to implement these features), housed together with a computer (not shown) at the retail window display. Figure 2 illustrates an image of a user (206) currently being captured by the image capture device 202, and displayed on the LCD panel 204. A garment from the library (208) has been overlaid on the user, for example by combining image data from that clothing data set in the library with the video images being captured in real time.

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The device 202 may alternatively be a motion detection and/or tracking device, to track the movements of the user for overlaying variable garment images as described herein. The image capture device may be provided separately, or

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elsewhere on the apparatus. Alternatively, the motion capture and image capture devices may be incorporated in the same device 202. In another alternative, motion detection may be provided by processing and analysis of the image data from the image capture device, for example by previously considered motion
5 detection algorithms.

DigiQuin™ software is an application that integrates a digital signage mannequin cloud solution with a detection application and “virtual try” application.

10 The detection application includes the following features:

- i) Identification of person
- ii) Identification of age group
- iii) Identification of facial expression

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Other identifications of characteristics of the current user, such as ethnicity, or a facial or bodily/hand gesture, can be detected. Image processing algorithms for these types of detection and recognition features have been previously considered. For example, gesture recognition techniques can measure the
20 motion of parts of an image identified as, for example, hands. Facial recognition and measurement can determine expressions, age and the like.

Once an attribute or characteristic has been identified or measured, this can be used to select a subset of the library of images to be associated with the
25 captured imagery. For example, a certain age of user can be used to narrow down the types of garments which might be worn. A combination of detected attributes can be used to remove further items and sets from the possible library, to create a very specific subset of garments for display. These can also be ranked by probability of suitability for the user, so that in selecting a subset the
30 highest likelihood garments are provided first in a scrolling list of garments overlaid.

“Virtual Try” can be considered to be any one of a number of applications available in the marketplace, including the following features:

- 5 i) Project 3D clothes or accessories to a person (an image of a person) – this can be done by detecting the motion of the user, and modifying overlay image data to match the detected motion. For example, previously considered motion detection algorithms can be used, and others for detecting (apparent) hiding/revealing of parts of an image resulting from turning or crossing motions.

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Key Features of DigiQuin™

The DigiQuin™ can identify the shopper’s characteristics or attributes such as gender , age, expression when they walk near the window display, immediately
15 interacting with him/her, and presenting a recommended 3D outfit to him/her.

Shopper can also select other promotion outfits to try on further. These will further entice the shoppers to get into the shop and explore further the retail items.

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The DigiQuin™ provides great marketing equipment to attract more customers to the shop and improves the retailer’s sales.

The DigiQuin™ provides QR codes for all clothes to browse detailed information
25 of clothes in the shopper’s mobile device.

The DigiQuin™ provides camera features for shoppers to take photos while trying clothes on DigiQuin™.

30 Shoppers can get their photo in their mobile by scanning a QR code on the photo.

The DigiQuin™ provides social media features to share user's photos.

5 The DigiQuin™ provides digital signage video at first screen that will play on the DigiQuin™ screen while no user is interacting with the system.

DigiWear

10 The DigiWear application is software that integrates to DigiQuin software that can detect physical cloth information from a sensor camera and search in the 3D clothes library. The DigiWear application will retrieve matching clothes from the 3D clothes Library and project the clothes on the shopper. The sensor camera can be added to or incorporated in the imaging device 202.

15 DigiAnalyst

The DigiAnalyst is analysis software that will generate shoppers' usage and preference statistics by using data collected from DigiQuin™ systems such as age group, gender, time spent and emotion/expression.

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In general terms, a DigiQuin™ system can comprise:

- 1) Cloud IT infrastructure for expandability,
- 25 2) Human Identity technology for reading Gender and Age profiles
- 3) 3D Augmented Reality technology.

The DigiQuin™ solution package can comprise:

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1. DigiQuin™ Software

2. DigiQuin™ Cloud Manager and Reporting

3. DigiQuin™ Database

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2. Virtual 3D outfits

3. Large LED Display

10 4. Computer with Wifi

5. Display Stand

6. Motion sensor, Camera and Interactive devices

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The DigiQuin™ consists of a Large Display panel in either portrait or landscape, equipped with intelligent gesture detection and human detection technology, housed together with a computer at the retail window display.

20 The DigiQuin™ can identify shoppers that walk near the DigiQuin™, immediately act like a mirror, with technology able to identify the gender, age, expression and other human profiles/attributes of the shopper.

It then processes the recommended fashion outfits, virtually projected on him/her.

25 He/She can move in different dimensions, like a mirror; the DigiQuin™ will ensure the fashion outfit and accessories are project in 3D appropriately onto him/her. The DigiQuin™ also allows the shopper to select various colours or other promotional items using its gesture detection to interact with the DigiQuin™.

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Figures 3 to 8 are screenshots illustrating an embodiment of the invention in use. Figures 3 to 5 illustrate selections of clothing for and by a male user. Image data of the user is captured and displayed, as shown. The current clothing selection is overlaid on the user. Also overlaid are possible clothing items for selection. The clothing items displayed may have been selected by the system based on attributes of this user, for example his age.

The user can then select the desired garments to be virtually tried on, Figures 3 to 5 showing three examples. The system used to detect gestures of the user for determining attributes of the user, can also be used to detect gestures of the user for selecting items in the menus given. As shown in Figures 3 to 8, the user can gesture towards (in the displayed image with possible clothing selections overlaid) the desired item, which the system will note as being in the region of the produced image designated for that item.

Figure 9 is a perspective view of an embodiment of the invention in use. This illustrates the DigiQuin™ on its stand, with an openable rear cover.

It will be appreciated by those skilled in the art that the invention has been described by way of example only, and that a variety of alternative approaches may be adopted without departing from the scope of the invention, as defined by the appended claims.

For example, the processing of the image data may be done locally on the local computer system, or on a server system. For example, the captured images may be relayed to a server for processing to determine attributes, and corresponding library garments determined at the server, for transmission to the local system. In other implementations, it may be more efficient for all processing to be done locally.

CLAIMS

1. A method for generating modified image data of a user for an interactive display, the method comprising:
5 using an imaging device, imaging the user to obtain user image data;
detecting a user attribute for the user; and
selecting, based on the detected user attribute, stock image data for association with the obtained user image data.
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2. A method according to Claim 1, further comprising the step of combining the selected stock image data with the obtained user image data, for display to the user.
- 15 3. A method according to Claim 2, wherein the stock image data comprises image data for a garment, and wherein the step of combining comprises combining the image data for the garment with an associated garment area of the user image data.
- 20 4. A method according to any preceding claim, wherein the step of detecting a user attribute for the user comprises using a sensor device to detect the user attribute.
- 25 5. A method according to any preceding claim, wherein the step of detecting a user attribute for the user comprises processing the obtained user image data to detect the user attribute.
6. A method according to any preceding claim, wherein the user attribute is a physical attribute for the user.

7. A method according to Claim 6, wherein the user attribute is a demographic attribute for the user.

8. A method according to Claim 6, wherein the user attribute is a feature of a garment worn by the user.

9. A method according to Claims 6 to 8, wherein the user attribute comprises one or more of: an age, gender, or ethnicity of the user; a gesture or expression of the user; or a detected garment or fabric type worn by the user.

10. A method according to any preceding claim, further comprising:
detecting movement of the user; and
modifying the stock image data to match the detected movement of the user.

11. A system for generating modified image data of a user for an interactive display, the system comprising:
an imaging device configured to image the user to obtain user image data;
a detector configured to detect a user attribute for the user; and
a processor configured to select, based on the detected user attribute, stock image data for association with the obtained user image data.

12. A server system comprising:
a memory storing stock image data;
a communications interface configured to communicate with a local user system; and
a processor module,
the system configured to:

obtain user image data from an imaging device of the local user system;

by a processor module: process the user image data to detect a user attribute for the user: select, based on the detected user attribute, stock image data for association with the obtained user image data; and

transmit from the communications interface to the local user system the obtained user image data and associated stock image data for display to the local user.

13. A computer program application comprising computer program code adapted, when loaded into or run on a computer or processor, to cause the computer or processor to become a system, or to carry out a method, according to any preceding claim.