

USER IMAGING SYSTEM

Background of the Invention

[0001] The present invention relates to a method and system for imaging users participating in a skydiving activity, and in one particular example to a method and system for imaging users in an indoor skydiving venue.

Description of the Prior Art

[0002] The reference in this specification to any prior publication (or reader data derived from it), or to any matter which is known, is not, and should not be taken as an acknowledgment or admission or any form of suggestion that the prior publication (or reader data derived from it) or known matter forms part of the common general knowledge in the field of endeavour to which this specification relates.

[0003] Indoor skydiving is performed in a venue having a flight chamber including a vertical wind tunnel which acts to simulate a skydiving experience. It is typical for users to want images of them performing the activity. Whilst this can be performed manually by having a photographer present, this is costly and can interfere with the activity. A further problem is that even if images are captured of a user, the user must be identified to ensure the image is presented to the correct individual, which is difficult given the safety gear that is worn during the activity, including the flight suit, goggles and helmet, which can make the users difficult to differentiate.

[0004] As a result, individuals are often offered video/photo of an entire session including multiple participants, instead of just of their own activity. This is undesirable for privacy reasons, and leads to unnecessary expense, and often results in individuals not proceeding with a purchase, meaning revenue for the venue is lost.

Summary of the Present Invention

[0005] In one broad form, an aspect of the present invention seeks to provide a system for imaging an individual performing a skydiving activity, the system including: a number of imaging devices configured to capture images of a flying region, the cameras being

controllable to capture images of different parts of the flying region; one or more processing devices in communication with the number of imaging devices, the one or more processing devices being configured to: receive image data from the imaging devices, the image data being indicative of one or more images captured by the imaging devices; and, analyse the one or more images to track the individual within the flying region.

[0006] In one embodiment the one or more processing devices are configured to analyse the image data using a tracking computational model, the tracking computational model being trained using multiple sample images of one or more reference individuals performing skydiving activities.

[0007] In one embodiment the one or more processing devices are configured to analyse images captured by imaging devices having different fields of view of the imaging region.

[0008] In one embodiment the one or more processing devices are configured to analyse the image data by detecting one or more image regions having a defined colour.

[0009] In one embodiment the defined colour corresponds to the colour of at least one of: a helmet worn by the individual; and, a flight suit worn by the individual.

[0010] In one embodiment the one or more processing devices are configured to: determine an identity of the individual; and, determine the defined colour in accordance with the identity of the individual.

[0011] In one embodiment the one or more processing devices are configured to: determine an identity of the individual; and, associate the images with the identity of the individual.

[0012] In one embodiment the one or more processing devices are configured to control the imaging devices to capture images of the individual as they move within the flying region.

[0013] In one embodiment the imaging devices are PZT cameras.

[0014] In one embodiment the one or more processing devices are configured to analyse the image data to at least one of: detect a pose of the individual; determine an identity of the

individual; subtract background image regions from the one or more images; and, generate images of the individual with a substituted background.

[0015] In one embodiment the one or more processing devices are configured to use an identity of the individual to at least one of: track user participation in the skydiving activity; causes a payment to be requested at least partially in accordance with the user participation; associate at least one image of the user with user data, thereby allowing the image to be provided to the respective user.

[0016] In one embodiment the one or more processing devices are configured to: acquire registration images of individuals, the registration images being captured without the individual wearing safety equipment and each registration image being associated with an identity of the respective individual; derive a registration feature vector for each registration image; acquiring an image an individual performing a skydiving activity, the individual wearing safety equipment; derive an activity feature vector from the image; compare the activity feature vector to a plurality of registration feature vectors to determine an identity of the individual.

[0017] In one embodiment the one or more processing devices are configured to retrieve the plurality of feature vectors based on a time of image acquisition.

[0018] In one embodiment the one or more processing devices are configured to determine feature vectors in accordance with landmarks identified within the images.

[0019] In one embodiment the one or more processing devices are configured to determine the identity of the individual at least in part using an identification computational model, the identification computational model being trained using multiple reference images of one or more reference individuals, the multiple reference images including, for each reference individual: at least one reference image of the reference individual without performing skydiving activities wearing safety equipment; and, at least one reference image of the reference individual without the individual wearing safety equipment.

[0020] In one embodiment the one or more processing devices are configured to: analyse image data to detect a face of the user wearing goggles and a helmet; extract key landmark

features from the face of the user using the landmark model; convert the extracted landmark features into a feature vector; and, compare feature vectors captured during flying and registration to identify the individual.

[0021] In one broad form, an aspect of the present invention seeks to provide a method for imaging an individual performing a skydiving activity, the method including: providing a number of imaging devices configured to capture images of a flying region, the cameras being controllable to capture images of different parts of the flying region; in one or more processing devices in communication with the number of imaging devices: receiving image data from the imaging devices, the image data being indicative of one or more images captured by the imaging devices; and, analysing the one or more images to track the individual within the flying region.

[0022] It will be appreciated that the broad forms of the invention and their respective features can be used in conjunction and/or independently, and reference to separate broad forms is not intended to be limiting. Furthermore, it will be appreciated that features of the method can be performed using the system or apparatus and that features of the system or apparatus can be implemented using the method.

Brief Description of the Drawings

[0023] An example of the present invention will now be described with reference to the accompanying drawings, in which: -

[0024] Figure 1 is a schematic diagram of an example of a system for imaging users during a skydiving activity;

[0025] Figure 2 is a flow chart of an example of a process for imaging users during a skydiving activity;

[0026] Figure 3 is a schematic diagram of a further example of apparatus for imaging users during a skydiving activity; and,

[0027] Figures 4A to 4C are a flow chart of a specific example of a process imaging users during a skydiving activity.

Detailed Description of the Preferred Embodiments

[0028] An example of a system and method for imaging users during a skydiving activity will now be described with reference to Figures 1 and 2.

[0029] For the purpose of this example, it is assumed that the activity is indoor skydiving held at a venue including a vertical wind tunnel 101, including a fan 102, that drives air vertically upwards to allow a user (not shown) to fly in a flying region 103 within the tunnel. Such arrangements are known and will not therefore be described in further detail.

[0030] In this example, the system includes a number of imaging devices 111 configured to capture images of the flying region 113. The imaging devices could be of any appropriate form, but typically include cameras, and in one example, include controllable cameras, such as PZT (Pan, Tilt, Zoom) cameras. The cameras can be arranged so that each camera captures the entire flying region, although more typically each camera would have a respective field of view covering part of the flying region, with multiple cameras being arranged to ensure the entire flying region can be imaged from one or more different angles. This can be used to ensure suitable images of the user are captured.

[0031] Additionally, the system includes an electronic processing devices 121, forming part of a processing system 120, which is used to analyse images captured by the imaging devices 111. In this example a single processing system 120 including a single processing device is shown, although it will be appreciated that multiple processing devices and/or processing systems can be used, with processing performed by one or more of the devices and/or systems as needed. For the purpose of ease of illustration, the following examples will therefore generally refer to a processing single device, but it will be appreciated that reference to a singular processing device should be understood to encompass multiple processing devices and *vice versa*, with processing being distributed between the devices as appropriate.

[0032] In this example, the processing device 121 could be a microprocessor, microchip processor, logic gate configuration, firmware optionally associated with implementing logic such as an FPGA (Field Programmable Gate Array), or the like. The processing system 120 can also include a memory 122, that stores applications software, which when executed by the processing device 121 cause the device to perform required tasks, as well as an interface 122

can be provided to allow connection to the cameras 111, and/or other peripheral devices, such as a database (not shown), computer network or similar, via wired and/or wireless connections. It will therefore be appreciated that the processing system could include a personal computer, computer server, or any other form of processing system, depending on the preferred implementation.

[0033] Operation of the system will now be described with reference to Figure 2.

[0034] In this example, at step 200, images while a user is participating in the flying activity are captured by the imaging devices 111. Resulting image data is acquired by the processing system 120, either by receiving the image data directly from the imaging devices 111, or by retrieving the image data from an intervening data store, such as a memory, database, or the like, depending on whether images are being analysed in real-time or at a later time.

[0035] At step 220, the images are analysed. The manner in which the analysis is performed will vary depending on how the images are to be used, and the preferred implementation. In one example, the images are analysed in order to identify the location of the user within the images at step 230. This could be achieved using any suitable technique, such as by performing colour recognition to detect a flight suit worn by the user, performing edge detection to detect an outline of the user against the background, or using depth information derived from images, to detect the user against a more distant background. In one specific example, this process can involve using a computational model, such as a machine learning derived model, to more accurately identify the user location.

[0036] Once a user has been located this can be used for different purposes. For example, at step 240 this information could be used to control the imaging devices, and in one particular example, control PZT cameras so that these track the user, ensuring images and/or video of the user can be captured as the user moves around within the flying region. Additionally and/or alternatively, this can be used to modify the images, for example, extracting the individual from the user, and allowing an image of them to be superimposed on a different background image, for example to show them skydiving in a different environment.

[0037] In another example, additional image analysis can be performed in order to identify the user. This could be performed in a variety of manners depending on the preferred implementation. For example, clothing and/or safety equipment worn by the user could include identifying information that could be detected and used to identify the user. For example, different users could be assigned different colours of flight suits, goggles and/or helmets, with particular colours and/or colour combinations being used to distinguish between different users. However, this requires users are assigned to particular outfits, and that this is tracked, which creates an additional burden. Accordingly, in another preferred example, facial recognition techniques can be used. The system can recognise the user or individual via facial recognition and automatically track the user from one image or frame to the next image or frame by locating the face of the user in a sequence of images, such as consecutive frames in a video feed. Standard facial recognition techniques may be used to recognise the face of the user either with or without wearing safety equipment. Alternatively, the system may identify and track other unique attributes of a user or their clothing – e.g. helmet colour or footwear colour, or size relative to other participants in the skydiving activity. Also, a pan, tilt, zoom (PTZ) camera, or multiple such cameras, can be used, to ensure consistent visibility of the user. As the accuracy of standard techniques can be hampered by the presence of safety equipment, which limits visibility of facial cues typically used in identifying individuals, a number of approaches can be used to improve accuracy, for example through the use of a machine learning derived model, as will be described in more detail below.

[0038] In any event, it will be appreciated that the above described arrangements can be used to automatically locate and/or identify users performing skydiving activities. This in turn allows the location of the user to be tracked so that images, including video, of the users can be more effectively captured, as well as allowing the images to be tied to the user, so that the user can be presented with the user for purchase at their end of their experience.

[0039] A number of additional benefits can also be achieved, such as allowing identification of users to be used in tracking details of performed activities, charging the user, and performing image manipulation, or similar.

[0040] A number of further features will now be described.

[0041] In one example, the processing device is configured to analyse the image data using a tracking computational model. The tracking computational model is used to help analyse the images so as to identify the location of the individual within the images and hence tracking the location of the individual within the flying region. The tracking computational model is typically trained using machine learning on multiple sample images of one or more individuals performing skydiving activities.

[0042] The nature of the machine learning approach will vary depending on the preferred implementation and this could include any one or more of decision tree learning, random forest, logistic regression, association rule learning, artificial neural networks, deep learning, inductive logic programming, support vector machines, clustering, Bayesian networks, reinforcement learning, representation learning, similarity and metric learning, genetic algorithms, rule-based machine learning, learning classifier systems, or the like. As such schemes are known, these will not be described in any further detail.

[0043] In general, images are provided to the machine learning algorithm together with an indication of the location and pose of the user, allowing the machine learning algorithm to progressively learn how to identify the location and optionally pose, of the individual performing the skydiving activity. The trained model can then be used to locate individuals within subsequently captured images, and optionally, identify the pose of the user, to help with tracking and/or image manipulation.

[0044] In general, the processing device is configured to analyse images captured by imaging devices having different fields of view of the imaging region, as this helps localise the individual in three dimensions, as well as ensuring images suitable for analysis are captured, regardless of the pose of the user, and/or the presence of intervening objects, such as the presence of a trainer or other individual.

[0045] In this regard, it will be appreciated that suitable training can be used to distinguish between a skydiving user and a trainer, based on the pose of the user. It will be appreciated that suitable training could also be used in order to identify scenarios in which there are multiple fliers, for example those involved in performing synchronised flights.

[0046] In one example, the analysis is performed by detecting one or more image regions having a defined colour, which typically works well as users typically wear flight suits having a limited range of distinctive bright colours. For example, the analysis algorithm could be configured to identify regions of specific colours, such as red, yellow or blue colours, which corresponding to colours of a helmet and/or flight suit worn by the individual.

[0047] In one particular example, the processing system can be configured to determine an identity of the user and then determine the defined colour in accordance with the identity of the individual, so that the image analysis is facilitated by knowledge of the colour of outfit worn by the user.

[0048] Additionally, knowledge of the identity of the individual can be used to associate the images with the individual, for example by storing the image together with user data associated with the individual. Knowledge of the identity can also be used in other ways, such as tracking participation in the skydiving activity, causing a payment to be requested at least partially in accordance with the participation, or the like.

[0049] The manner in which the identity of the individual is determined will vary depending on the preferred implementation. For example, this could be achieved using a tracking system, such as the tracking system described in WO2018/044225, the contents of which are incorporated here by cross reference. However, this requires that the individual wear a tracking device, such as a RFID watch, or other similar device. This not only requires specific hardware, but can also lead to hazards while flying, for example, if the tracking device becomes dislodged, which can lead to injury or damage to equipment.

[0050] Accordingly, in one example, a user is identified by performing recognition techniques on the captured images. Given the user is typically wearing safety gear, and additionally often has wind induced facial distortions, then standard facial recognition techniques would not necessarily be suitable to identify individuals performing skydiving activities.

[0051] In one example, the image recognition process is performed using registration images of individuals that are captured during a registration process, with these being used to define a registration feature vector that is associated with the identity of the individual. Images captured

during skydiving are then used to derive feature vectors, which are compared to the registration feature vectors, with matches being used to identify the individual that is performing the skydiving activity.

[0052] Accordingly, in this example, the processing device is configured to acquire registration images of individuals, the registration images being captured without the individual wearing safety equipment and each registration image being associated with an identity of the respective individual. A registration feature vector is then derived for each registration image, allowing this to be associated with the individual's identity. Following this, during the skydiving activity an image of the individual is acquired, with this occurring when the individual is wearing the safety equipment, with this being used to derive an activity feature vector from the image. The activity feature vector is then compared to a plurality of registration feature vectors to determine an identity of the individual.

[0053] To facilitate this process, the processing device can be configured to retrieve the plurality of feature vectors based on a time of image acquisition. In this regard, it will be appreciated that only a few individuals are skydiving during any given time period, so limiting the comparison to registration feature vectors of individuals expected to be flying increases the chance of a correct match being identified.

[0054] In one example, the process involves generating the feature vectors using landmarks identified within the images. Specifically, the landmarks can be identified to assist in matching an image of an individual wearing safety equipment with a registration image of the individual without the equipment, for example by identifying landmarks present in both images.

[0055] In one example, this recognition process is performed in part using an identification computational model that is generated by machine learning, and specifically by training the model using multiple reference images of one or more reference individuals, including for each reference individual, at least one reference image of the reference individual without performing skydiving activities wearing safety equipment and at least one reference image of the reference individual without the individual wearing safety equipment. Thus, the model can be trained using multiple images, to identify those landmarks that are best able to assist in

identifying individuals, and also how these landmarks should be combined in order to form a feature vector.

[0056] The identification computational model is trained by machine learning using any one or more of decision tree learning, random forest, logistic regression, association rule learning, artificial neural networks, deep learning, inductive logic programming, support vector machines, clustering, Bayesian networks, reinforcement learning, representation learning, similarity and metric learning, genetic algorithms, rule-based machine learning, learning classifier systems, or the like. As such schemes are known, these will not be described in any further detail.

[0057] It will be appreciated that using a machine learning approach in this fashion helps identify landmarks that can identify individuals irrespective of interference from safety equipment and facial distortion. This could include facial features that are relatively invariant, such as a head size or shape, or eye separation, as well as facial features that might be interfered with consistently. Conversely, this might omit features that are obscured by safety equipment, such as hair and eye colour, which might otherwise be used in facial recognition techniques.

[0058] In one specific example this approach is achieved by having the processing device analyse image data to detect a face of the user wearing goggles and a helmet, extract key landmark features from the face of the user based on landmarks identified using the landmark model. Following this, values associated with the extracted landmark features, are converted into a feature vector, allowing this to be used in the identification process by comparing feature vectors captured during flying and registration to identify the individual.

[0059] Whilst the above describes identifying individuals within images captured during the skydiving activity, it will be appreciated that the techniques can be used to recognise individuals dressed in safety equipment, such as a flight suit, even when not flying. This can be useful for example to track individuals as they move around within a facility, without requiring the use of separately tracking systems, as described for example in WO2018/044225.

[0060] The above described process can be performed using a distributed architecture, and an example of this will now be described with reference to Figure 3.

[0061] In this example, the system includes a server 330, which can be used to host software for performing the image analysis processes. A number of client devices 350 may be provided in communication with the server 330, for example to allow users to review the result of image analysis, whilst processing systems 320 can be used to acquire image data from imaging devices 311, with the processing systems 320, client devices 350 and server 330 communicating via one or more communications networks 340.

[0062] It will be appreciated that the configuration of the networks 340 are for the purpose of example only, and in practice the client devices 350, the processing systems 320 and server 330 can communicate via any appropriate mechanism, such as via wired or wireless connections, including, but not limited to mobile networks, private networks, such as an 802.11 networks, the Internet, LANs, WANs, or the like, as well as via direct or point-to-point connections, such as Bluetooth, or the like.

[0063] Whilst the server 330 is shown as a single entity, it will be appreciated that in practice the server 330 can be distributed over a number of geographically separate locations, for example as part of a cloud-based environment. However, the above described arrangement is not essential and other suitable configurations could be used.

[0064] For the purpose of the following examples, it is assumed that one or more processing systems 320 collect images from the cameras 311 and upload these to the server 330 for analysis, with results of the analysis being made available via the client devices 350. The servers 330 typically include one or more electronic processing devices such as a microprocessor, microchip processor, logic gate configuration, firmware optionally associated with implementing logic such as an FPGA (Field Programmable Gate Array), or any other electronic device, system or arrangement, that executes applications software for performing required tasks including storing, searching and processing of data, with actions performed by the servers 330 being performed by the processing device in accordance with instructions stored as applications software in a memory and/or input commands received from a user via an I/O device, or commands received from the client device 350.

[0065] It will also be assumed that the user interacts with the client device 350 via a GUI (Graphical User Interface), or the like presented on a display of the client device 350, and in

one particular example via a browser application that displays webpages, or an App that displays relevant information. The client device 350 is typically a computer, smartphone, tablet or other similar device, that includes one or more electronic processing devices such as a microprocessor, microchip processor, logic gate configuration, firmware optionally associated with implementing logic such as an FPGA (Field Programmable Gate Array), or any other electronic device, system or arrangement, that executes applications software for performing required tasks including storing, searching and processing of data. Actions performed by the client device 350 being performed by the processing device in accordance with instructions stored as applications software in a memory and/or input commands received from a user via an I/O device.

[0066] However, it will be appreciated that the above described configuration assumed for the purpose of the following examples is not essential, and numerous other configurations may be used. It will also be appreciated that the partitioning of functionality between the client devices 350, and the servers 330 and processing system 320 may vary, depending on the particular implementation.

[0067] A specific example process for use in imaging an individual performing a skydiving activity will now be described with reference to Figures 4A to 4D.

[0068] In this example, at step 400 a user registers to perform an activity, typically by presenting at an indoor skydiving venue, although alternatively this could be performed online prior to attending the venue. At step 402 the server 330 creates user data, which is used to track user participation in the activity, for example to track flights purchased and/or performed by the user, information regarding user preferences or the like. At step 404 an image, and in particular a facial image, of the user is captured, using an imaging device such as a camera or similar. In the case of an online registration, this could include an image captured using a webcam, or other similar device, or could include an imaging uploaded by the individual. It will also be appreciated that an image of the individual could be captured from identification documents, such as passports, driver's licences, or similar.

[0069] At step 406, one or more landmark features are identified within the image, with these being used to generate a registration feature vector at step 408. These steps are performed

based on an identification computational model generated using machine learning, which has been trained to generate feature vectors based on the landmark features that provide the highest discriminatory performance for distinguishing between different individuals wearing safety equipment.

[0070] In general, the feature vector is an n-dimensional vector, typically between 128 and 4096 bits long, which is extracted from a cropped version of the facial image. The landmarks used in generating the feature typically include contours of the face, eye, nose and mouth position and spacing, and the like. The computational model used in generating the feature vectors is trained using a variety of reference images of individuals both without and without safety gear, and operates to identify landmark features that can be identified in both the images with and without safety gear.

[0071] Having generated the registration feature vector, this is then saved as part of the user data at step 410.

[0072] Following this, at step 412 the individual commences the skydiving activity. During this, images are captured by the cameras 311 surrounding the flying region at step 414. The processing systems 320 analyse the image data at step 416, using a tracking computational model to identify the location of the individual within the images at step 418. This will typically involve examining the images to identify regions of the images corresponding to the colours of flight suits and helmets. The computational model uses these regions in order to recognise the individual and particularly the flying pose of the individual, such as whether the individual is bellyflying, sitflying, standflying, diving, or the like. At step 420, this allows the processing system 320 to control the cameras 311, and specifically to control the pan, tilt and zoom of the cameras, to thereby ensure the cameras track the individual within the flying region, and preferably maintain the individual roughly centred within each captured image, to the extent possible given any constraints over movement of the cameras. The system may be configured to capture or store images of the user when the user is positioned as desired in the image – e.g. centred. The system may also use gesture recognition models to determine trigger image capture – e.g. when the user waves their hand, smiles, or otherwise makes a gesture to initiate image capture and storage.

[0073] To achieve this, the processing systems 320 can use a tracking computational model, which is a machine learning model trained using images of different individuals flying with different poses. This allows the processing systems 320 to rapidly and easily recognise the pose and position of individuals within the flying region based on the detected colours of the flight suit and/or helmets, in turn allowing the cameras to be automatically controlled to thereby best image the individual. This process can also involve predictive analysis depending on the flying pose of the individual, for example predicting that an individual in a diving pose will move downwardly within the flying region, and hence move the cameras accordingly, to thereby more accurately track movement of the individual.

[0074] At step 422 captured images can be reviewed by the server 330 and/or processing system 320 allowing one or more images to be selected at step 424, for example to select images in which the individual, and particularly their face, is viewable.

[0075] At step 426, a selected image is analysed by the server 330, to locate the face within the image at step 428. The image is then optionally cropped removing parts of the image that exclude the face, with the cropped image being parsed to identify landmarks and generate the feature vector at steps 430 and 432. It will be appreciated that this can be performed in a manner similar to steps 406 and 408, and therefore will typically involve using an identification computational model to generate the feature vector based on identified landmarks.

[0076] At step 434, the feature vector is compared to registration feature vectors stored in user data for multiple individuals, and more typically individuals that are known to be flying on that day, thereby allowing a matching process to identify the individual at step 436. This typically involves a nearest neighbour matching process, so that the feature vector is compared to each of the registration feature vectors in an n-dimensional space, and the most similar registration feature vector being used to identify the individual. At step 438, the user data can be updated to record participation in the activity, which can then be used for tracking and billing purposes, as described for example, in WO2018/044225.

[0077] Simultaneously with this process, at step 440 the server 330 can select one or more of the images and optionally modify the image, for example by removing and/or replacing the background of the image, to thereby generate the appearance of the individual skydiving in

another environment. The image(s) can then be saved with the user data using the determined identity of the user, allowing the image to be subsequently made available to the individual, for example to sell the image to the user.

[0078] Accordingly, the above described processes perform image analysis to locate the individual within images of the flying region, for example allowing PZT cameras to be controlled to track the user as they move around within the flying region and/or to allow facial analysis to be performed in order to identify the individual. In one example, these approaches are performed using machine learning providing a greater accuracy when tracking and/or identifying the individual.

[0079] Throughout this specification and claims which follow, unless the context requires otherwise, the word “comprise”, and variations such as “comprises” or “comprising”, will be understood to imply the inclusion of a stated integer or group of integers or steps but not the exclusion of any other integer or group of integers.

[0080] Persons skilled in the art will appreciate that numerous variations and modifications will become apparent. All such variations and modifications which become apparent to persons skilled in the art, should be considered to fall within the spirit and scope that the invention broadly appearing before described.

CLAIMS

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

- 1) A system for imaging an individual performing a skydiving activity, the system including:
 - a) a number of imaging devices configured to capture images of a flying region, the cameras being controllable to capture images of different parts of the flying region;
 - b) one or more processing devices in communication with the number of imaging devices, the one or more processing devices being configured to:
 - i) receive image data from the imaging devices, the image data being indicative of one or more images captured by the imaging devices; and,
 - ii) analyse the one or more images to track the individual within the flying region.
- 2) A system according to claim 1 wherein the one or more processing devices are configured to analyse the image data using a tracking computational model, the tracking computational model being trained using multiple sample images of one or more reference individuals performing skydiving activities.
- 3) A system according to claim 1 or claim 2, wherein the one or more processing devices are configured to analyse images captured by imaging devices having different fields of view of the imaging region.
- 4) A system according to any one of the claims 1 to 3, wherein the one or more processing devices are configured to analyse the image data by detecting one or more image regions having a defined colour.
- 5) A system according to claim 4, wherein the defined colour corresponds to the colour of at least one of:
 - a) a helmet worn by the individual; and,
 - b) a flight suit worn by the individual.
- 6) A system according to any one of the claims 1 to 5, wherein the one or more processing devices are configured to:
 - a) determine an identity of the individual; and,
 - b) determine the defined colour in accordance with the identity of the individual.
- 7) A system according to any one of the claims 1 to 6, wherein the one or more processing devices are configured to:
 - a) determine an identity of the individual; and,
 - b) associate the images with the identity of the individual.

- 8) A system according to any one of the claims 1 to 7, wherein the one or more processing devices are configured to control the imaging devices to capture images of the individual as they move within the flying region.
- 9) A system according to claim 8, wherein the imaging devices are PZT cameras.
- 10) A system according to any one of the claims 1 to 9, wherein the one or more processing devices are configured to analyse the image data to at least one of:
- a) detect a pose of the individual;
 - b) determine an identity of the individual;
 - c) subtract background image regions from the one or more images; and,
 - d) generate images of the individual with a substituted background.
- 11) A system according to any one of the claims 1 to 10, wherein the one or more processing devices are configured to use an identity of the individual to at least one of:
- a) track user participation in the skydiving activity;
 - b) causes a payment to be requested at least partially in accordance with the user participation;
 - c) associate at least one image of the user with user data, thereby allowing the image to be provided to the respective user.
- 12) A system according to any one of the claims 1 to 11, wherein the one or more processing devices are configured to:
- a) acquire registration images of individuals, the registration images being captured without the individual wearing safety equipment and each registration image being associated with an identity of the respective individual;
 - b) derive a registration feature vector for each registration image;
 - c) acquiring an image an individual performing a skydiving activity, the individual wearing safety equipment;
 - d) derive an activity feature vector from the image;
 - e) compare the activity feature vector to a plurality of registration feature vectors to determine an identity of the individual.
- 13) A system according to claim 12, wherein the one or more processing devices are configured to retrieve the plurality of feature vectors based on a time of image acquisition.

- 14) A system according to claim 12 or claim 13, wherein the one or more processing devices are configured to determine feature vectors in accordance with landmarks identified within the images.
- 15) A system according to any one of the claims 12 to 14, wherein the one or more processing devices are configured to determine the identity of the individual at least in part using an identification computational model, the identification computational model being trained using multiple reference images of one or more reference individuals, the multiple reference images including, for each reference individual:
- a) at least one reference image of the reference individual without performing skydiving activities wearing safety equipment; and,
 - b) at least one reference image of the reference individual without the individual wearing safety equipment.
- 16) A system according to any one of the claims 12 to 15, wherein the one or more processing devices are configured to:
- a) analyse image data to detect a face of the user wearing goggles and a helmet;
 - b) extract key landmark features from the face of the user using the landmark model;
 - c) convert the extracted landmark features into a feature vector; and,
 - d) compare feature vectors captured during flying and registration to identify the individual.
- 17) A method for imaging an individual performing a skydiving activity, the method including:
- a) providing a number of imaging devices configured to capture images of a flying region, the cameras being controllable to capture images of different parts of the flying region;
 - b) in one or more processing devices in communication with the number of imaging devices:
 - i) receiving image data from the imaging devices, the image data being indicative of one or more images captured by the imaging devices; and,
 - ii) analysing the one or more images to track the individual within the flying region.