

(57) Abstract: A system for identifying and tracking a user while engaged in a sporting activity that includes a wearable identification device configured to wrap around a portion of the user's body. The device includes a wireless communications module configured to transmit data and receive only confirm connection data and/or firmware updates, and a smart ball that includes a wireless communications module configured to receive the data transmitted by the wearable device. The smart ball includes at least one motion sensor.

SYSTEM FOR TRACKING SPORTS INTERACTIONS INCORPORATING A USER ASSOCIATED DEVICE

Technical Field

[0001] The present system provides a user associated device that is associated with a single user that can be used, in combination with a piece of smart sports equipment, to associate user data with data relating to a specific motion event from the smart sports equipment.

Background Art

[0001] Any discussion of the prior art throughout the specification is not an admission that such prior art is widely known or forms part of the common general knowledge in the field.

[0002] Systems exist which capture motion data of sports equipment. However, such systems are typically overly complicated, prone to system breakdowns, difficult to use in practice, and therefore not practical.

[0003] The present invention is intended to ameliorate one or more of the deficiencies identified above, or at least provide a consumer with a useful choice.

Disclosure of Invention

[0004] The present invention provides, in a first embodiment, a system for identifying a user that interacts with a piece of smart sports equipment, the system including at least one user associated device, the at least one user associated device including a user transmitter and primary user data, where the user transmitter is configured to transmit the primary user data to one or more receivers, such that: the at least one user associated device is associated with a single user only; the primary user data is sufficient to identify the user; the smart sports equipment is selected from the list consisting of balls, javelins, shotputs, discus, hammers, cabers, flying disks, bats, clubs, shoes and shuttle cocks; and the user associated device cannot receive wireless data other than 'confirm connection' data and/or firmware updates; wherein the smart sports

equipment includes a receiver that receives the primary user data and associates it with a specific movement event data it has recorded.

[0005] Preferably the system further includes a centralised receiver such that the smart sports equipment includes a smart sports equipment transmitter configured to transmit the specific movement event data to the centralised receiver, the centralised receiver including a microprocessor configured to: process the specific movement data; and identify the user and forward an output, the output being either directly or indirectly sent to a centralised display and/or a receiver associated with a viewer.

[0006] Preferably at least one user associated device is attached to the user and at least one user associated device is attached to a piece of sporting equipment used by the user, the piece of sporting equipment being configured to interact with the smart sports equipment.

[0007] Preferably the system further includes a registration database which associates each user associated device to one individual user.

[0008] Preferably the user transmitter is further configured to transmit associated data which includes an individual user's name.

[0009] The present invention, in a second embodiment, provides a system for identifying and tracking a user while engaged in a sporting activity, including a wearable identification device (wearable device) including a body configured to latch onto or wrap around a portion of the user's body, the device further including a wireless communications module configured to only transmit data other than 'confirm connection' data and/or firmware updates; and a smart ball including a wireless communications module configured to receive the data transmitted by the wearable device, the smart ball including at least one motion sensor. Preferably the wearable device is configured without a display.

[00010] Preferably the wearable device is a glove. Preferably the wearable device is a bracelet or badge. Preferably the wearable device is part of a shoe. Preferably smart ball is selected from the list consisting of a golf ball, a cricket ball, a hockey ball, a lawn bowls ball or a bowling ball. Preferably the

wireless communications module of the device and the wireless communications module of the smart ball are configured for peer-to-peer communications. Preferably the wireless communications module of the device and the wireless communications module of the smart ball are configured for Bluetooth communications. Preferably the wireless communications module of the device and the wireless communications module of the smart ball are configured for communication across the 2.4GHz radio frequency range.

[00011] In a third embodiment the invention provides a system for identifying and tracking a user while engaged in a sporting activity, including a wearable identification device including a body configured to latch onto or wrap around a portion of the user's body, the device further including a wireless communications module configured to transmit identification data associated with a user profile of the user wearing the device; a smart ball including a wireless communications module configured to receive the identification data transmitted by the wearable device, the smart ball including at least one motion sensor; and a remote server configured to receive motion data in real-time from the smart ball, the server being programmed to match the user profile with the received motion data by using the identification data transmitted from the wearable device.

[00012] In a fourth embodiment the invention provides a system for identifying and tracking a piece of smart sports equipment while engaged in a sporting activity, including an identification device including a body configured to latch onto or wrap around a portion of a piece of sports equipment, the device further including a wireless communications module configured to transmit identification data associated with a profile of that particular piece of sports equipment that the device is attached to; a smart ball including a wireless communications module configured to receive the identification data transmitted by the device, the smart ball including at least one motion sensor; and a remote server configured to receive motion data in real-time from the smart ball, the server being programmed to match the sports equipment profile with the received motion data by using the identification data transmitted from the wearable device.

[00013] In a fifth embodiment the invention provides a system for tracking the location of a smart sports ball while engaged in a sporting activity, including an identification device including a body configured to be placed at strategic locations around the sports field, these locations may include being attached directly to sports equipment, sports users, on the ground or buried under the ground, the device further including a wireless communications module configured to transmit identification data associated with the modules position in the sports field; a smart ball including a wireless communications module configured to receive the identification data and radio signal strength transmitted by the device, the smart ball including at least one motion sensor; and a remote server configured to receive motion data in real-time from the smart ball, the server being programmed to read the unique ID's of the identification devices, recognise their position on a sports field or court and estimate the location of the smart sports ball based on the signal strength of the identification devices.

Brief Description of Drawings

[00014] By way of example only, a preferred embodiment of the present invention is described in detail below with reference to the accompanying drawings, in which:

- Figure 1 is a pictorial view of a first embodiment of the system;
- Figure 2 is a pictorial view of a second embodiment of the system which relates to a multitude of users;
- Figure 3 is a pictorial view of a third embodiment of the system which involves a single user and a piece of sports equipment which interacts with a piece of smart sports equipment; and
- Figure 4 is a pictorial view of a system for tracking the position of a piece of smart sports equipment in real-time.

Detailed Description

[00015] Referring to Figure 1 a first embodiment of the invention is shown; this first embodiment is a system (1) which identifies a user (2) that interacts with a piece of smart sports equipment (3). The system (1) includes: a user associated device (4) (UAD); a piece of smart sports equipment (3); a first receiver (6); a second receiver (7); and a computing device (9).

[00016] The smart sports equipment (3) is a device used to play sports that includes sensors, a transceiver and performs some or all of the functions of a computer. The sensors, alone or in combination with an internal microprocessor, within the smart sports equipment (3) can provide information relating to the position of the smart sports equipment (3) in absolute or relative terms. The sensors may also provide velocity, impact and/or change in velocity information relating to the smart sports equipment (3) they are associated with. Though not intended to be an exhaustive list the following pieces of sports equipment may be smart sports equipment (3): balls, javelins, shotputs, discus, hammers, cabers, flying disks, darts, paintball guns, bats, clubs, rackets, shoes, skates and shuttle cocks.

[00017] The computing device (9) may be part of a network of one or more local or remote servers, for example 'the cloud', a localised server or a localised computing device.

[00018] When purchased the UAD (4) preferably needs to be registered to associate it with a single user (2), and though a user (2) may have more than one UAD (4), or specific identifier associated with them, each UAD (4) has only a single associated user (2).

[00019] Each UAD (4) wirelessly communicates with a first receiver (6) in the smart sports equipment (3), transmitting primary data (15) to that first receiver (6). The primary data (15) allows the identification of the single user (2) registered to that UAD (4). It is preferred that the UAD (4) only transmits primary data (15) to the smart sports equipment (3), though additional data may also be transmitted.

[00020] It should be noted that the UAD (4) can transmit any data required, but it may only receive data from the smart sports equipment (3). The data received by the UAD (4), from any source, is limited to identification handshake data (handshake, query/response, confirm connection data) to maintain a connection and/or firmware updates that may be required by the UAD (4).

[00021] The smart sports equipment (3) upon receiving the primary data (15) from the UAD (4), it associates that primary data (15) with information from the sensors to form secondary data (17). The information from the sensors, which may be processed by the microprocessor within the smart sports equipment (3), associates a specific motion event experienced by the smart sports equipment (3) to that UAD (4).

[00022] The secondary data (17) is transmitted to a second receiver (7) which is part of an alpha device (20). The alpha device (20) may be a smart device that creates modified secondary data (21), or simply a relay to transmit the secondary data (17) unchanged to the computing device (9).

[00023] The computing device (9) accepts the secondary data (17), or modified secondary data (21), processes it and transmits tertiary data (23) which associates a specific user (2) to the specific motion event. This tertiary data (23) is interpreted by the alpha device (20), and then displayed on a visual display unit (25) which is part of the alpha device (20).

[00024] In this first embodiment of the invention a single user (2) interacting with the smart sports equipment (3) is associated with a specific motion event, which can then be analysed in more detail if required. For example, a user (2) is a javelin thrower analysing their throws to improve the distance they throw, or a sporting event where each user throws in turn and the distance thrown is automatically calculated and displayed with the user's (2) name. The display of the tertiary data (23) may be via a central monitor (25a) or on an individual alpha device (20) or a beta device (27) that includes a visual display (25). The beta device (27) receives the tertiary data (23) but does not transmit any data relating to the specific motion event or UAD (4) to the

computing device (9). In one aspect the alpha and beta devices (20,27) are smart phones or tablets.

[00025] In this first embodiment of the invention the computing device (9) may include a database (26) which stores information relating to the user (2), smart sports equipment (3) and the specific motion event. This information can be viewed or later analysed by the user (2) or others if necessary.

[00026] In a second embodiment of the invention, shown in Figure 2, there are a plurality of UADs (4), and a plurality of users (2, 28). The smart sports equipment (3) can determine which individual user (28) caused a specific motion event and transmit secondary data (17) which has only the primary data (15) from that individual user (28) incorporated. The identification of the individual user (28) uses any known technique for determining the closest radio signal to a receiver (6,7) at the time an event occurs, for example signal strength. The smart sports equipment (3) may ignore certain UADs (4) if they are precluded from causing that specific motion event. This ability to ignore a specific UAD (4) may occur if a referee or umpire is present, or where user (2,28) interacts with the smart sports equipment (3) with a bat, racket or club which moves the interaction point away from the UAD (4) of the individual user (28), but closer to the UAD (4) of another user (2).

[00027] In the second embodiment of the invention the computing device (9) includes a data processor (33) and a database (26). The data processor (33) accepts the secondary data (17) and/or modified secondary data (21) and carries out predetermined calculations then forwards this to the database (26) for storage and forwarding back to the alpha device (20) for display on the visual display unit (25).

[00028] The database (26) may also hold information relating to the registered user (2) of the UAD (4) to allow the identification of the individual user (28). The database (26) may hold additional information relating to that individual user (28) so that this can be provided as part of the tertiary data (23). The database (26) also stores the information relating to the specific motion event, smart sports equipment (3) and the individual user (28).

[00029] If the alpha device (20) is a smartphone then additional calculations may be undertaken prior to the tertiary data (23) being displayed on the visual display (25). For example, the smart phone may link to betting information or individual user (28) information (photograph, user position, user statistics, etc.) and display this as well. The alpha device (20) may also only show the portion of the tertiary data (23) the owner wishes to view, with or without additional linked information.

[00030] The use of a UAD (4) associated with an individual user (28) allows spectators and others watching a sports event to determine the individual user (28) that interacts with a piece of smart sports equipment (3). They may also be provided with specific information relating to the specific motion event, for example the distance the smart sports equipment (3) travels, how long it was before it interacted with another user (2) and what effect that had.

[00031] In a third embodiment of the invention, as shown in Figure 3, the system (1) includes multiple UADs (4), a central receiver (35), a broadcaster (37) and a spectator (38) with a spectator device (39). The spectator device (39) is likely to be a smart phone or tablet which includes the second receiver (7), though in this case the second receiver (7) does not receive the secondary data (17), only the tertiary data (23) from the computing device (9).

[00032] In this third embodiment the user (2) wears a first UAD (4) and uses a piece of sports equipment (40) to which a second UAD (4) is attached. The piece of sports equipment (40) is adapted to interact with the smart sports equipment (3) when it is used by the user (2). The smart sports equipment (3) accepts primary data (15) from both of the UADs (4), then forwards secondary data (17) which is derived from this primary data (15) and specific motion event data to the central receiver (35). The central receiver (35) then forwards, with or without additional processing, as alpha secondary data (41) to the computing device (9). The alpha secondary data (41) is processed by the computing device (9) and tertiary data (23) is transmitted to the second receiver (7) and/or the broadcaster (37). The tertiary data (23) transmitted may differ depending

on the intended recipient (7, 37). This tertiary data (23) may also be stored in a database (26).

[00033] In one or more of the embodiments described the UAD (4) does not include any form of visual display able to display data, though it may include a status light to confirm it is active or updating firmware. In these cases, there may be an additional optical transceiver (visible, UV or IR) that is part of the UAD (4), this optical transceiver is used to wirelessly transmit data, or accept firmware updates.

[00034] In one or more embodiment where the UAD (4) is permanently associated with a piece of sports equipment (40) the firmware of the UAD (4) can be updated with information relating to that piece of sports equipment (40). Once the firmware is updated the primary data (15) from that UAD (4) will include information relating to the piece of sports equipment (40).

[00035] In one or more of the embodiments previously described the term sensor is intended to include any sensor, for example accelerometers, gyroscopes, magnetometers, pressure sensors, gravimetric sensors, GPS transponders, GPS sensors or anything similar that can provide position/velocity data. Additional sensors, for example thermometers, humidity sensors and/or optical sensors may be present to provide additional information relating to the user (2,28), UAD (4) or environment around the UAD (4).

[00036] In one or more of the described embodiments the UAD (4) may be associated with both a user (2) and a specific piece of sports equipment (40). This allows the information relating to a specific motion event to be associated with a user (2) and the piece of sports equipment (40). For example, a golfer may apply a UAD (4) to a specific club and register this. Each time the user (2) uses that club the smart sports equipment (3), in this case a golf ball, forwards secondary data (17) associated with the user (2) and the specific piece of sports equipment (40) used.

[00037] In one or more of the embodiments described the UAD (4) can be releasably or permanently attached to a strap (145) (figure 1) so that it can be

attached to a user (2,28) by wrapping the strap (145) around a portion of a user (2,28). The UAD (4) could incorporate hook and loop connectors to allow it to adhere to directly to clothing, include a strap with a buckle, incorporate a pin (similar to a badge), incorporate a surface to which a temporary adhesive is applied, incorporate a surface to which a permanent adhesive is applied, magnetic connectors, a combination of these or any other similar connection device that will allow it to be attached to a user (2,28), the piece of sports equipment (40) or the user's (2,28) clothing. As an alternative the UAD (4) can be built, or moulded, into an item such as a shoe, boot, a specific item of clothing or a piece of sports equipment (40).

[00038] In one or more of the embodiments described, where a database (26) is present, this database (26) can be a registration database, simply linking specific primary data (15) from a UAD (4) to a user (2,28).

[00039] In one or more of the embodiments of the invention, see Figure 1 for example, the primary data (15) may include associated data (150). This associated data (150) is data which may include one or more of the following: the name of the user (2,28), the team the user (2,28) plays for, contact details, or other user (2,28) associated information. This associated data (150) can be displayed by the alpha device (20).

[00040] In one or more of the embodiments described above the primary data (15) and/or secondary data (17) is a string of information including at least one of the following pieces of information: the UAD (4) identity, user (2,28) information, sports equipment (40) information, smart sports equipment (3) information, information related to a specific motion event, 2D/3D location data, velocity data, time/date data, weather data, and temperature data. For example, in a simple form, the primary data (15) may simply be an alphanumeric string (e.g., a MAC address) identifying the UAD (4) so that without access to the database (26) the user (2,28) cannot be identified. This alphanumeric string may also be encrypted to prevent misuse or alteration of the information.

[00041] In certain configurations, more than one UAD (4) may be attached or built into to a piece of sports equipment (40) so that the data from each UAD (4) for a specific motion event can be combined to determine the movement of the piece of sports equipment (40) during that specific motion event.

[00042] In some cases, the transmission of data (15,17,23,41) is wirelessly transmitted. It is expected that this transmission will occur over a dedicated 2.4 GHz and/or 5 GHz channel, though a dedicated channel is not a prerequisite. Some or all of the transmitted data may be encrypted or unencrypted. If the transmission is encrypted then there may be multiple secondary and/or tertiary (17,23,41) data streams, each encrypted differently to allow different content to be delivered to different recipients (7,37) or subsets of these recipients (7,37). Communication may be peer to peer, networked or a combination of these.

[00043] Each UAD (4) may incorporate wireless charging circuitry so that it can be charged during use.

[00044] In one or more of the embodiments the computing device (9) may be, or may be part of, a group of servers, sometimes called 'the cloud'.

[00045] In one or more of the embodiments described, the second receiver (7) or central receiver (35) may include a plurality of sub-receivers (160), shown in Figure 2, spaced around a predetermined area to allow the position and motion of the user (2,28) and/or smart sports equipment (3) to be determined.

[00046] It should be noted that the term user (2) and individual user (28) can be any animal, human or otherwise.

[00047] Referring to Figure 4 a system (200) for tracking a piece of smart sports equipment (203) in real time is shown. This system (200) includes a plurality of identification devices (205), a piece of smart sports equipment (203) and a remote server (209). Each of the parts (203, 205,209) of the system (200) includes a wireless communications module (210). The smart piece of sports equipment (203) further includes a motion sensor (215). The motion

sensor (215) can be any of the options described for a sensor in the previously described embodiments, where that sensor can provide position or motion information.

[00048] Each of the identification devices (205) is placed at a predetermined and known position around or within the area that a sports event is being held. Some of these identification devices (205) may be attached to existing structures, buried in the ground or sunk into the water. Each communications module (210) transmits a signal and this signal can be received by other parts (203,205,209) of the system (210). The signal strength received by the communications module (210) within the smart sports equipment (203) from each of the other communications modules (210), can be used to calculate the position of the smart sports equipment (203) in real time. To calculate the position the communications module (210), within the smart sports equipment (203), may simply transmit data which includes the signal strength from each of the other communications modules (210) present to the remote server (209), or use this information to calculate a position relative to all of the identification devices (205) then transmit this to the remote server (209), in a form it understands.

[00049] Optionally the system (200) may also include a User Associated Device (UAD) (214) associated with each player or user (2,28) involved. This UAD (214) is similar to the UAD (4) described in any of the previous embodiments, in that it is used to determine which player or user (2,28) has interacted with the piece of smart sports equipment (203) when a specific motion event occurs. The UAD (214) may include a communications module (210) that behaves in the same way as all of the other communications modules (210) present, except that it can only receive handshake or firmware update signals. In a further optional form, the system (200) includes a piece of sports equipment (240) that the player or user (2,28) uses to interact with the smart sports equipment (203), this piece of sports equipment (240) has a UAD (214) attached, or built in, that identifies the user (2,28) and/or piece of sports equipment (240).

[00050] The remote server (209) matches the information it receives to determine the sporting equipment profile (25) relating to the piece of sports equipment (240), and preferably the identity of the registered user (2,28).

[00051] EXAMPLES:

[00052] 1. A cricket player interacts with a smart ball, either directly or using a cricket bat. The smart sports device is the ball (it is a smart ball), and each cricket player wears a UAD. When the cricket player hits or throws the smart ball the sensors within that smart ball determine it is a specific motion event and associate it with that cricket player and/or the cricket bat. The information relating to the specific motion event and the cricket player concerned is then displayed on a screen (which may be on a smart phone, tablet, television or a monitor at the ground).

[00053] 2. A soccer ground has a number of identification devices placed around the pitch and a soccer player interacts with the soccer ball, which is a smart ball, the signal strength from each of the identification devices is used to determine the location of the soccer ball. The change in position of the soccer ball determines the motion of that soccer ball. Motion sensors within the soccer ball can detect when a specific motion event occurs and preferably links this to a specific soccer player that is identified by a UAD. As the position of the soccer ball is being determined in real time this can be displayed locally or remotely on a visual display. Depending on the accuracy of the position determination the system can determine if the soccer ball passes into the goal.

[00054] 3. A user purchases a number of UAD and registers them, one being registered to a specific golf club. The registration server has access to a generalised profile of that golf club and links that data to that UAD. The UAD is attached to the golf club and the user wears a second UAD which is attached by a hook and loop connector strap to the user's wrist. The user then plays a round of golf, each time the user uses that golf club they use a smart golf ball, and this measures the strike, distance and final position of the smart golf ball. The smart golf ball then transmits this data to a local server within the

golf cart used by the user. This data may then be further transmitted, locally or remotely to a second database for further storage or analysis.

[00055] 4. A number of users play water volleyball, each user wears a UAD and the volleyball is a smart ball, each time a user interacts with the volleyball it associates the specific motion event that occurs and links it to the UAD primary data received from the closest UAD. This information is transmitted to a computing device which is cloud based. The computing device carries out calculations and associates the user to the UAD data then forwards that data to spectators, broadcasters or monitors so that the player and the specific motion event are linked.

[00056] The foregoing description is by way of example only, and may be varied considerably without departing from the scope of the disclosure. For example only, the dongle can be recharged wirelessly using inductive charging or utilising a radio signal charging device. It can also be re-charged via a direct input plug such as USB. The dongle's body may include a silicone rubber material designed to protect the electronics from impact, moisture, dust and dirt. Some parts may also be made out of a hard plastic such as PVC or ABS. Ceramic materials may be added to the silicone to customise the composition to customise its physical characteristics. The dongle can be attached to the athlete or their equipment in a number of ways including in the form of a wrist band, a necklace, a clip-on device to attach to clothing, use of adhesive tapes and glues or fabrics such as hook and eye (Velcro) or stitched into a clothing garment or piece of equipment such as a shoe. A player may have more than one ID, but an ID may be completely unique and is preferably only be owned by one player. The dongle is preferably a small device no larger than 20cm x 20cm x 10cm that contains electronics, a power source and a radio transmitter. The electronics may also include one or more movement sensors to recognise player movement such as accelerometers, gyroscopes, magnetometers, pressure sensors, thermometers, LED lights and/or an optical sensor for heart rate recognition.

[00057] The features described with respect to one embodiment may be applied to other embodiments, or combined with or interchanged with the features of other embodiments, as appropriate, without departing from the scope of the disclosure.

[00058] Other embodiments of the disclosure will be apparent to those skilled in the art from consideration of the specification and practice of the embodiments disclosed herein. It is intended that the specification and examples be considered as exemplary only, with a true scope and spirit of the invention being indicated by the following claims.

Claims

1. A system for identifying a user that interacts with a piece of smart sports equipment, said system including: at least one user associated device, a piece of smart sports equipment and one or more receiver, the at least one user associated device including a user transmitter and primary user data, where the user transmitter is configured to transmit the primary user data to one or more receivers, so that the at least one user associated device is associated with a single user only; said primary user data is sufficient to identify the user; said smart sports equipment is selected from the list consisting of balls, javelins, shotputs, discus, hammers, cabers, flying disks, bats, clubs, shoes and shuttle cocks; and said user associated device cannot receive wireless data other than confirm connection requests and/or firmware updates;

wherein said smart sports equipment includes a receiver that receives said primary user data and associates it with a specific movement event data it has recorded.

2. The system as claimed in claim 1, wherein the system further includes a centralised receiver such that the smart sports equipment includes a smart sports equipment transmitter configured to transmit the specific movement event data to said centralised receiver, the centralised receiver including a microprocessor configured to:

process the specific movement data; and

identify the user and forward an output,

the output being sent to a centralised display and/or a receiver associated with a viewer.

3. The system as claimed in any one of the preceding claims, wherein at least one user associated device is attached to the user and at least one user associated device is attached to a piece of sporting equipment used by the

user, said piece of sporting equipment being configured to interact with the smart sports equipment.

4. The system as claimed in any one of the preceding claims, wherein the system further includes a registration database which associates each user associated device to one individual user.

5. The system as claimed in any one of the preceding claims, wherein the user transmitter is further configured to transmit associated data which includes an individual user's name.

6. A system as claimed in any one of claims 1 to 5, wherein the at least one user associated device does not include a visual display.

7. A system for identifying and tracking a user while engaged in a sporting activity, comprising:

a wearable identification device including a body configured to latch onto or wrap around a portion of the user's body, said device further including a wireless communications module configured to transmit data and receive only confirm connection data and/or firmware updates; and

a smart ball including a wireless communications module configured to receive the data transmitted by said wearable device, said smart ball including at least one motion sensor.

8. The system of claim 7, wherein said wearable device is configured without a display.

9. The system of either claim 7 or 8, wherein said wearable device is a glove.

10. The system of either claim 7 or 8, wherein said wearable device is a bracelet or badge.

11. The system of either claim 7 or 8, wherein said wearable device is part of a shoe.

12. The system of any one of claims 7 to 11, wherein said smart ball is selected from the list consisting of a golf ball, a cricket ball, a hockey ball, a lawn bowls ball or a bowling ball.

13. The system of any one of claims 7 to 12, wherein said wireless communications module of said device and said wireless communications module of said smart ball are configured for peer-to-peer communications.

14. The system of any one of claims 7 to 13, wherein said wireless communications module of said device and said wireless communications module of said smart ball are configured for Bluetooth communication.

15. The system of any one of claims 7 to 13, wherein said wireless communications module of said device and said wireless communications module of said smart ball are configured for communication across the 2.4GHz radio frequency range.

16. A system for identifying and tracking a user while engaged in a sporting activity, including:

a wearable identification device associated with said user, said wearable identification device including a body configured to latch onto or wrap around a portion of the user's body, said device further including a wireless communications module configured to transmit identification data associated with a user profile of the user wearing the device;

a smart ball including a wireless communications module configured to receive the identification data transmitted by said wearable identification device, said smart ball including at least one motion sensor; and

a remote server configured to receive motion data in real-time from said smart ball, said server being programmed to match the user profile with the received motion data by using the identification data transmitted from said wearable identification device.

1/2

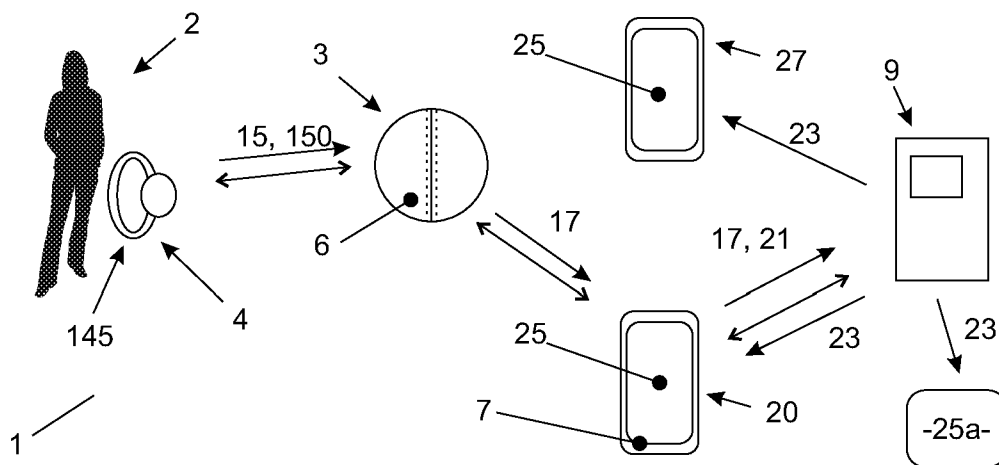


Figure 1

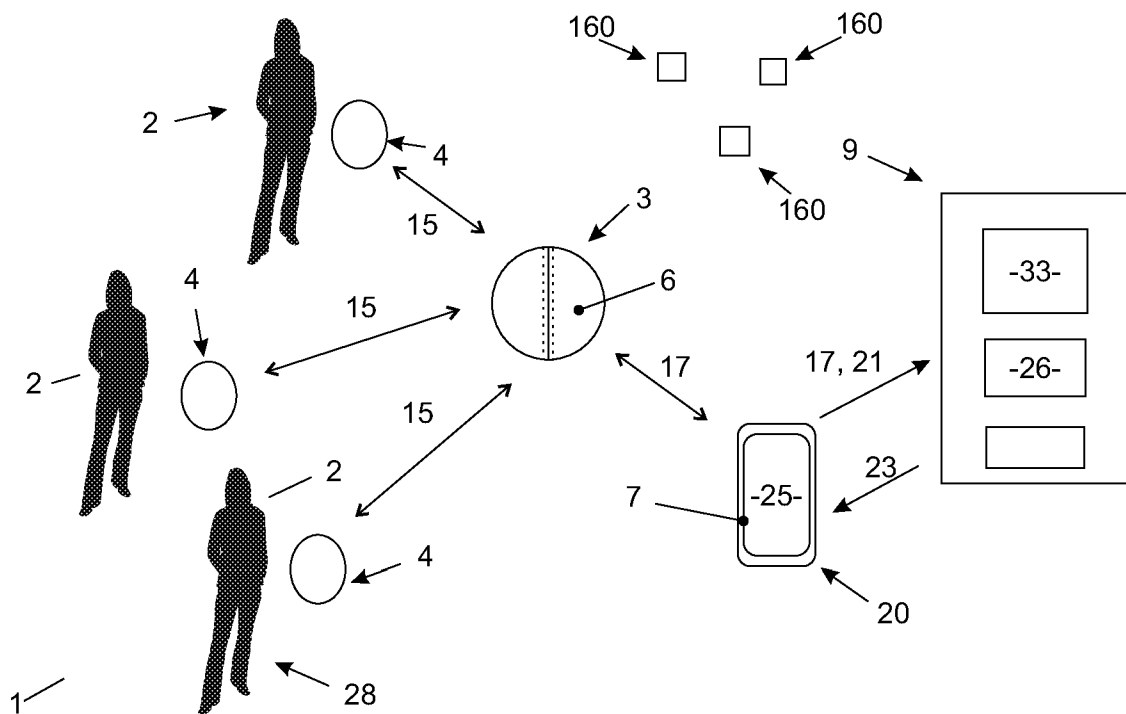


Figure 2

2/2

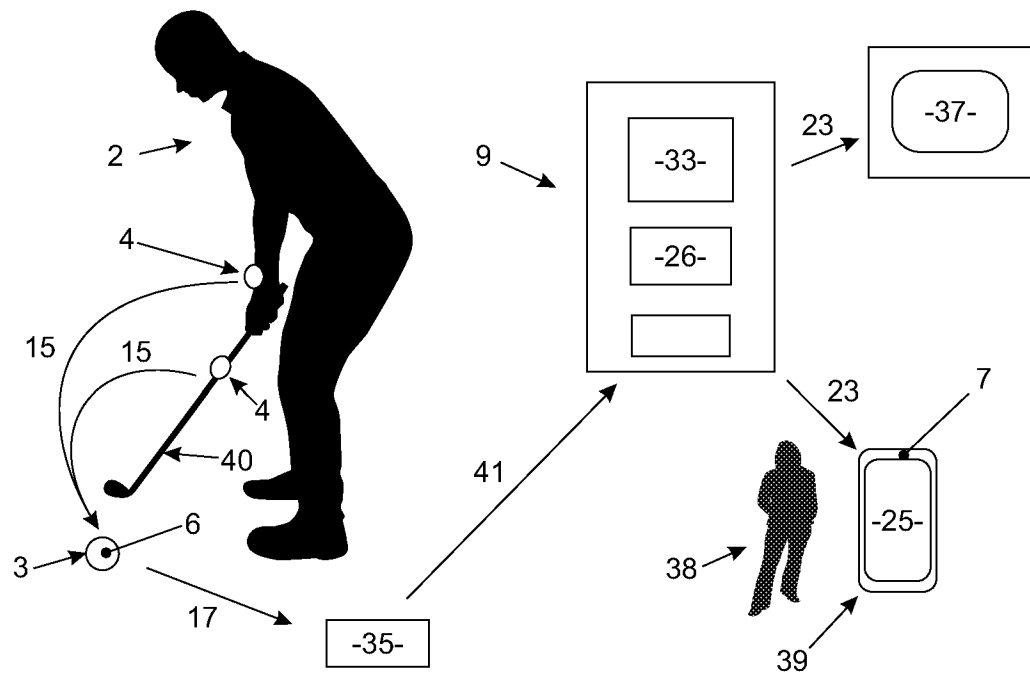
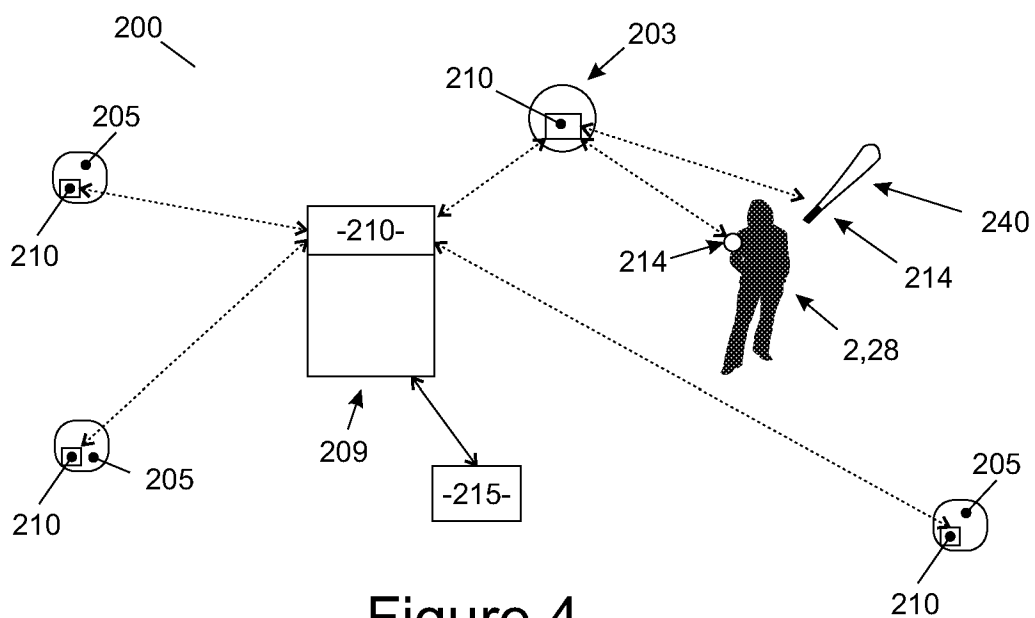


Figure 3



INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2019/050704

A. CLASSIFICATION OF SUBJECT MATTER

G06F 1/16 (2006.01) A63B 43/00 (2006.01) A63B 24/00 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PATENW: IPC & CPC - G06F1/163; A41D1/002; A43B5/00; A63B24/0003; A63B53/00; A63B59/50; A63B65/02; A63B65/04; A63B65/06; A63B65/10; A63B67/187; A63B2220/803; A63B2225/15; A63B2244/14; A63B2244/15; A63B2244/16; A63B2244/17; A63H33/18; keywords - golf, hockey, cricket, bowling, ball, javelin, shotput, frisbee, caber, bat, club, discus, shuttlecock, smart, watch, bracelet, wristband, glove, shoe, electronic, motion, sensor, analyse, user, profile, identify, wireless, wifi, bluetooth, rfid, and like terms.

Google, Google Scholar and Google Patents websites: Similar keywords as above.

Applicant inventor name searches were performed in Google, Espacenet websites and internal databases provided by IP Australia

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	



Further documents are listed in the continuation of Box C



See patent family annex

* Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"D" document cited by the applicant in the international application	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search
21 August 2019

Date of mailing of the international search report
21 August 2019

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INTERNATIONAL SEARCH REPORT		International application No.
C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		PCT/AU2019/050704
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 8360904 B2 (OLESON et al.) 29 January 2013 Col 39 ln 25 - Col 41 ln 35; Col 41 ln 34 - Col 43 ln 67; Fig. 42-43	1-16
X	US 2013/0130843 A1 (NIKE, INC.) 23 May 2013 [0056], [0067]-[0068], [0072], [0077], [0079], [0081]-[0084], [0098]-[0102], [0110]-[0115], [0133]-[0142]	1-16
A	US 2018/0020328 A1 (PLAY IMPOSSIBLE CORPORATION) 18 January 2018 Abstract; Fig. 15, [0036]-[0037], [0057], [0059]	

Form PCT/ISA/210 (fifth sheet) (July 2019)

INTERNATIONAL SEARCH REPORT		International application No.	
Information on patent family members		PCT/AU2019/050704	
This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.			
Patent Document/s Cited in Search Report		Patent Family Member/s	
Publication Number	Publication Date	Publication Number	Publication Date
US 8360904 B2	29 January 2013	US 2009048044 A1	19 Feb 2009
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		CN 101367011 A	18 Feb 2009
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		EP 2363178 A2	07 Sep 2011
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Form PCT/ISA/210 (Family Annex) (July 2010)

INTERNATIONAL SEARCH REPORT		International application No.	
Information on patent family members		PCT/AU2019/050704	
This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.			
Patent Document/s Cited in Search Report		Patent Family Member/s	
Publication Number	Publication Date	Publication Number	Publication Date
		US 2009047645 A1	19 Feb 2009
		US 8702430 B2	22 Apr 2014
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INTERNATIONAL SEARCH REPORT		International application No.	
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		End of Annex			
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