US 20060040756A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2006/0040756 A1**

Kestler (43) **Pub. Date: Feb. 23, 2006**

(54) **GOLF DRIVE MONITOR**

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(21) Appl. No.: **10/922,088**

(22) Filed: **Aug. 19, 2004**

Publication Classification

(51) **Int. Cl.**
A63B 69/36 (2006.01)

(52) **U.S. Cl.** **473/131**

(57) **ABSTRACT**

A wireless connection **(101)** is connected to an object monitor **(103)** that is capable of determining trajectory characteristics of a moving object, such as a golf ball driven by a golfer practicing golf drives and strokes. The wireless connection **(101)** facilitates the transmission of the attributes associated with the moving object, such as the trajectory characteristics, geographic location, date, time, equipment used, user identification, and so forth, to a wireless access point **(105)** of a computer network.

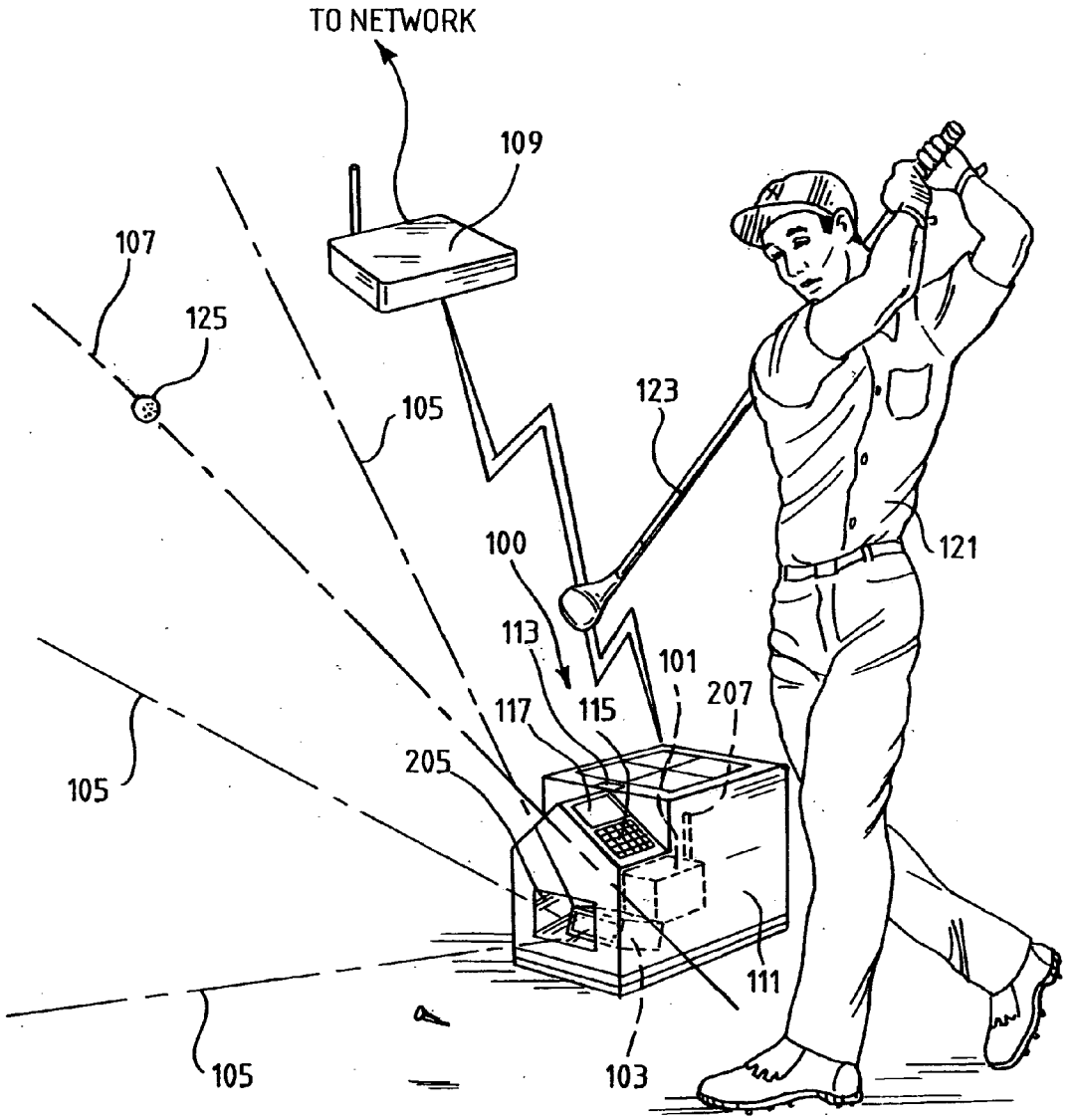


FIG. 1

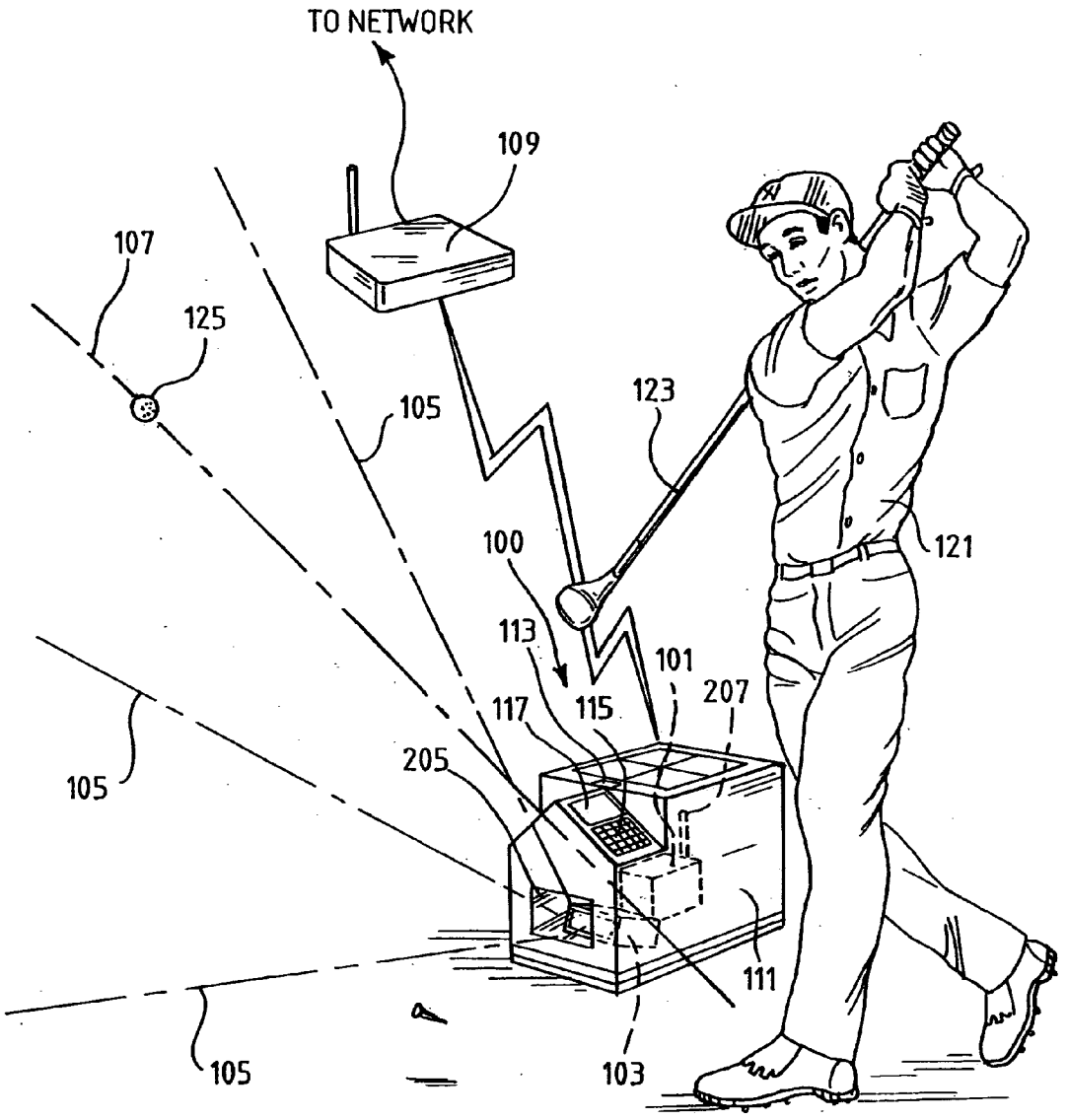

TO NETWORK
109
107
125
105
123
100
121
113
101
207
117
115
205
105
111
105
103

FIG. 2

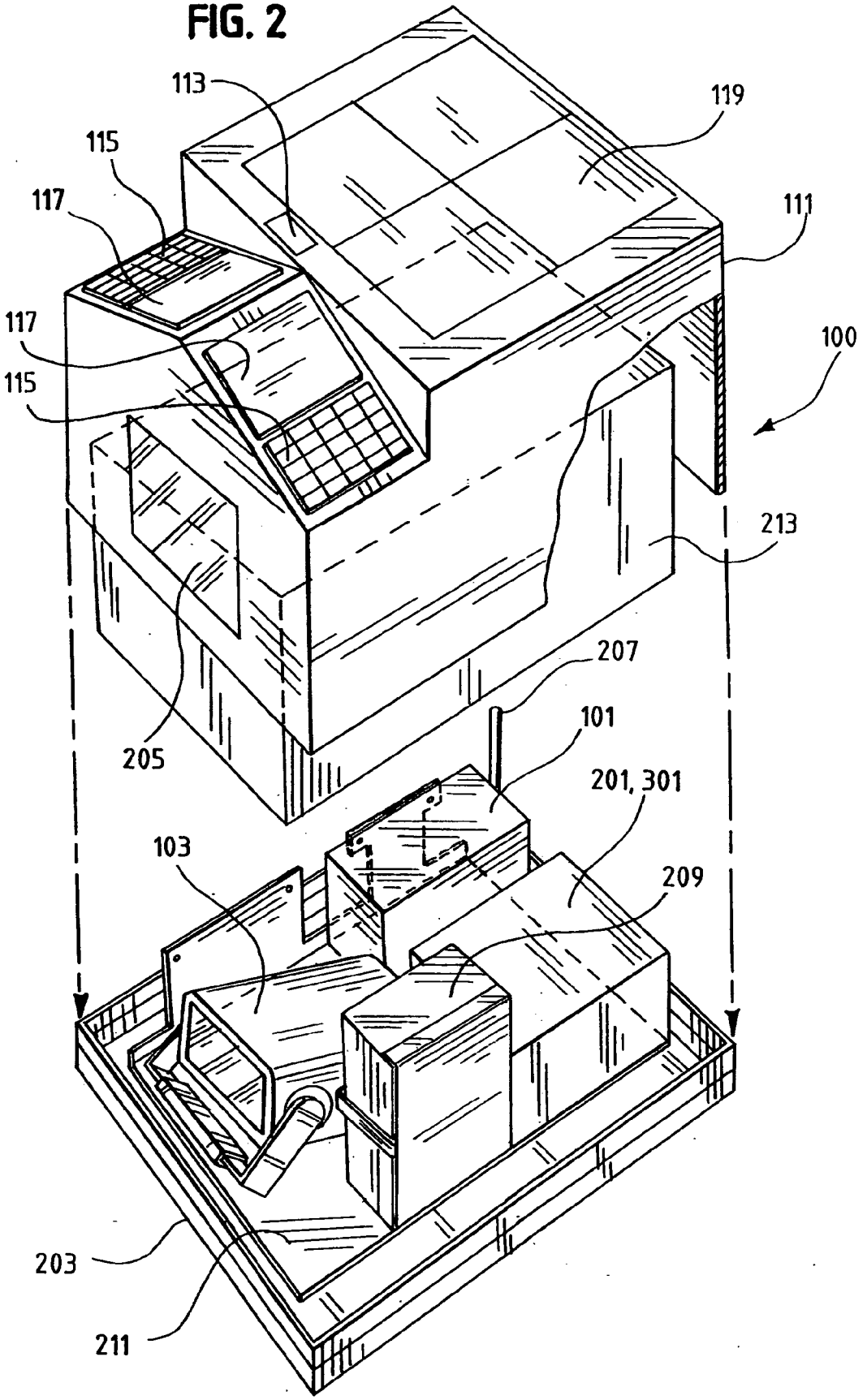

113
119
115
117
111
117
100
115
213
207
101
205
201, 301
103
209
203
211

FIG. 3

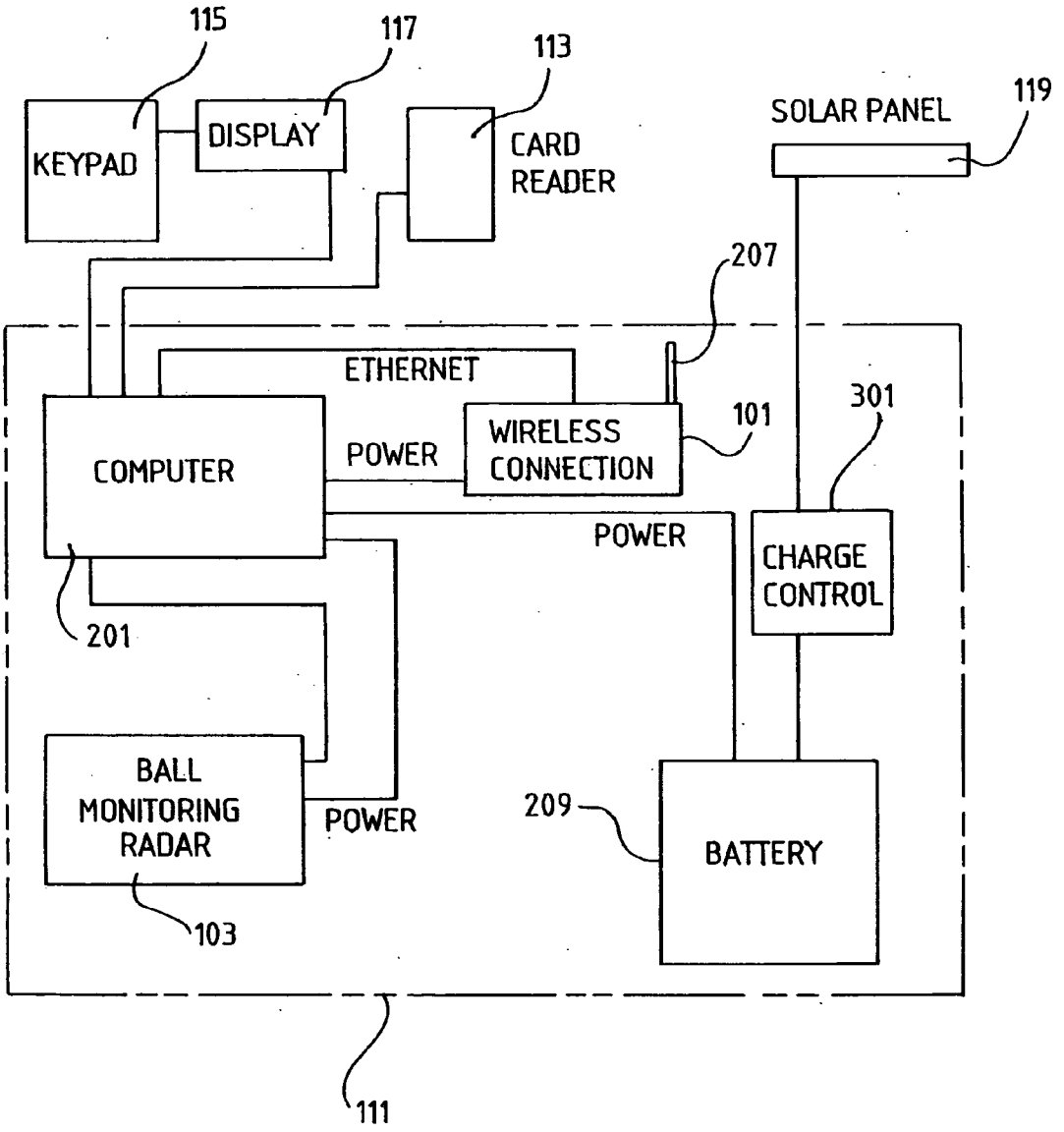
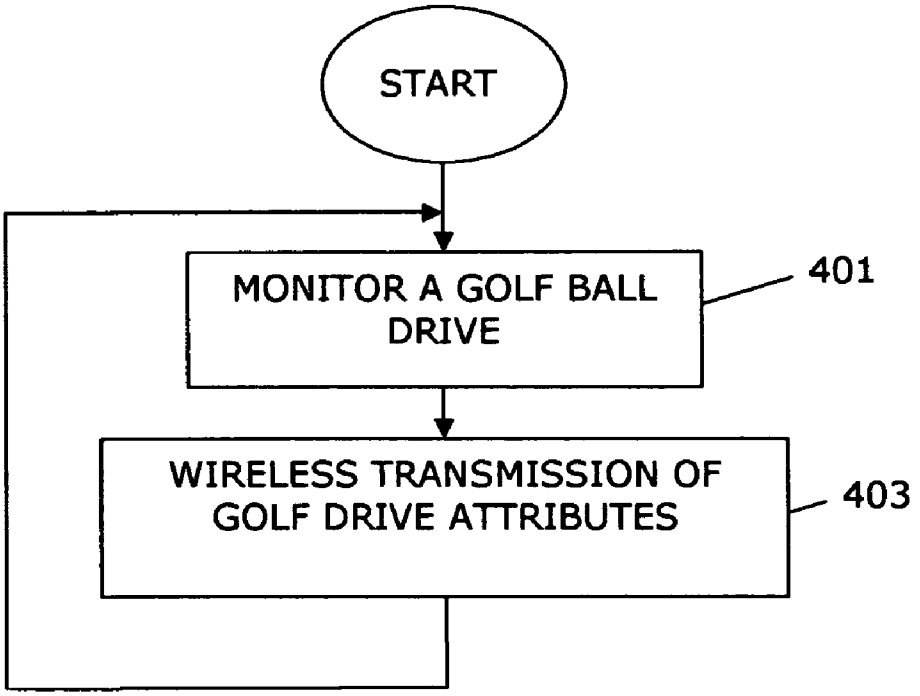

115
117
113
119
KEYPAD
DISPLAY
CARD READER
SOLAR PANEL
207
ETHERNET
301
101
COMPUTER
POWER
WIRELESS CONNECTION
POWER
CHARGE CONTROL
201
BALL MONITORING RADAR
POWER
209
BATTERY
103
111

FIG. 4


START
MONITOR A GOLF BALL DRIVE
401
WIRELESS TRANSMISSION OF GOLF DRIVE ATTRIBUTES
403

GOLF DRIVE MONITOR

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] Not Applicable

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH/DEVELOPMENT

[0002] The present invention does not involve any form of federally sponsored research or development.

BACKGROUND OF THE INVENTION

[0003] The present invention relates to the sport of golf, including, but not limited to, a wireless connection attached to a golf ball monitor for use in transmitting attributes of a golfer's practice drive. Devices and methods for monitoring golfer performance at hitting a golf ball, particularly the measurement of the golf ball movement and trajectory, are known. One of the best known forms for measuring golfer performance is the placement of targets at a golf range. This device relies on the golfers own visual observation and memory for determining performance and performance improvement over time. More sophisticated golf monitoring devices actually monitor golf ball movement immediately after being struck by a golf club. Characteristics such as golf ball speed, direction, spin, and so forth are measured by the device and are used to calculate a trajectory of the ball. Radar based devices have proven to be very accurate and can predict golf ball trajectory and distance within a few percent. Other performance measuring devices include sensors that are located on the ground near a target at a facility such as driving range so that actual drive impact location and distance is correlated to an impact location predicted by a radar monitoring device. The results of specific practice sessions can be viewed on a display screen or a printout. Practice data can be stored locally at the driving range on the monitoring device for later viewing; however, having to return to the golf range can be an inconvenience and time consuming for the golfer. Further, the objective comparison of results over extended time periods including numerous sessions either do not exist or would be a time consuming effort.

[0004] For many sports a large number of repetitions are important to improving performance. Ideally, performance under a variety of conditions or locations can be helpful in improving overall performance. Collecting and objectively analyzing performance data can help eliminate psychological bias in interpreting results. In the case of a simple target at a golf range, a golfer's interpretation of his own practice drive performance based on visual observation of a golf ball driven towards a target at a driving range lacks any real objective analysis or comparison of a large number of drives. Hiring a golf professional to observe the golf as the golfer practices at the driving range is typically cost prohibitive. Further, the displaying of practice results stored by more sophisticated monitoring device, such as a radar unit, typically shows performance for a specific session and not for multiple sessions extending over time and from other locations.

[0005] Accordingly, there is a need for generating golf practice data over time from a plurality of drives with a variety of clubs and possibly from various locations, yet being able to collect and transmit the data for objective analysis of performance.

BRIEF SUMMARY OF THE INVENTION

[0006] An apparatus includes a wireless connection connected through a computer to an object monitor that is capable of measuring movement and determining trajectory of a moving object, more specifically a golf ball. The wireless connection can transmit data to and receive data a wireless access point of a computer network.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] **FIG. 1** illustrates an apparatus that monitors and transmits data for a golfer's drive of a golf ball in accordance with the invention.

[0008] **FIG. 2** illustrates an expanded view of the apparatus that is capable of monitoring and transmitting data about a driven golf ball in accordance with the invention.

[0009] **FIG. 3** illustrates a wiring diagram for the apparatus that is capable of monitoring and transmitting data about a driven golf ball in accordance with the invention.

[0010] **FIG. 4** is a flowchart of a method for monitoring and transmitting data about a driven golf ball in accordance with the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0011] The following describes an apparatus for and method of monitoring and transmitting data about a driven golf ball. The apparatus includes a wireless connection that is connected to a golf ball monitor. The wireless connection facilitates the collection of a plethora of golf drive practice data. The apparatus allows golf drive data to be easily collected over extended time periods and from different apparatuses located at multiple locations. The data can be used to evaluate a golfer's performance and changes in performance.

[0012] An apparatus that monitors and transmits data for a golfer's drive of a golf ball is shown in **FIG. 1**. The apparatus **100** includes a wireless connection **101** that is connected to an object monitor **103**. The object monitor **103** preferably uses electromagnetic radiation **105**, for example radio waves to monitor golf ball movement. The electromagnetic radiation can include radio waves in the microwave regime. The object monitor **103** can determine a golf ball trajectory **107** and estimate the distance the golf ball will travel. Alternatively, audio waves, also known as sonar, and video imaging can be used to monitor the movement of a driven golf ball and determine trajectory and distance. The monitoring of an object with radio frequency electromagnetic radiation including microwaves is commonly known as radar. Radar can accurately measure a moving object and is capable of estimating the distance that golf ball travels to within a few percent. An example of such a device is a golf ball radar unit manufactured by Distance Caddy Corp. The apparatus **100** is capable of transmitting collected and calculated data about the driven golf ball to a computer network access point **109**.

[0013] The apparatus **100** has a housing **111** to which a card reader **113**, at least one keypad **115**, at least one display

117, preferably a LCD display, and a solar panel 119 are attached. A golfer 121 activates the apparatus with a key card (not shown) which is swiped past or contacted with the card reader 113. The card reader 113 reads the key card so that the golfer can be identified and the apparatus 100 accessed. Once access is gained, the golfer uses the apparatus 100 by entering the type of club 123 selected for the practice drive into the apparatus 100 through the keypad 115. The golfer's identification and the selected club can be displayed on the display 117 before the golfer drives for confirmation by the golfer. Upon driving the golf ball 125 attributes of the particular golf ball drive such as golfer identification, club, drive distance, date, location, and so forth can be either stored for later transmission or immediately transmitted the wireless access point 109. In addition, the drive results can be displayed on the display 117.

[0014] An expanded view of the apparatus that is capable of monitoring and transmitting data about a driven golf ball is shown in FIG. 2. The housing 111 encloses and supports components of the apparatus 100 that are electronically connected together. The wireless connection 101, the object monitor 103, and a computer 201 are mounted to the housing base 203, preferably by attaching the components to a chassis 211 that attached to the housing base 203. Typically, a chassis cover 213 covers the components mounted to the chassis 211. The object monitor 103 is attached to the housing base 203 so as to be proximately located along a centerline location adjacent to the aperture 205 in the housing 111. Because the driven golf ball is monitored with electromagnetic radiation, the object monitor 103 is mounted at the appropriated position to allow electromagnetic radiation to and from the object monitor 103 to pass through the aperture 205. Alternatively, the chassis 211 can be movably mounted to the housing base 203 so as to allow positioning the object monitor 103 to better accommodate right and left handed golfers. Further, the housing 111 can be designed to accept up to two sets of keypads 115 and displays 117 to permit the use of the apparatus 100 by right handed, left handed, or both right and left handed golfers.

[0015] The housing 111, housing base 203, chassis 211, and chassis cover 213 can be constructed of metal, plastic, or a combination of metal and plastic. Typically, the wireless connection 101 includes an antenna 207 to facilitate the transmission of wireless signals from the wireless connection 101 to the wireless access point 109. Typically, wireless access point 109 is a wireless access point to a remote computer network. When the housing 111 or chassis cover 213 are made of plastic the antenna 207 can be entirely enclosed by the housing 111. Alternatively, when the housing 111 of chassis cover 212 are made of metal the antenna 207 must be mounted on an outer surface of the housing 111. Although the preferred embodiment includes a wireless connection of the object monitor to a remote computer, the object monitor can be directly connected the remote computer access point and/or the remote computer, such as by a hard-wire connection.

[0016] Preferably, the apparatus 100 is powered by the solar panel 119 that supplies power to the battery 209. The battery 209 is mounted to the housing base 203. Alternatively, the apparatus can be powered by an external power supply

[0017] A wiring diagram for the apparatus that is capable of monitoring and transmitting data about a driven golf ball is shown in FIG. 3. The wiring diagram shows how the electronic components of the apparatus 100 are connected. As commonly known in the industry the connections can be either an electronic data connection or an electric power connection. In this embodiment of the invention, the wireless connection 101 and the object monitor 103, for example a radar unit manufactured by Distance Caddy Corp, are both connected to the computer 201 for the transmission of electronic data. Alternatively, the object monitor 103 can be directly connected to the wireless connection 101. The computer 201 is also connected to the card reader 113, the keypad 115, and the display 117. Although the keypad 115 is shown as being indirectly connected to the computer 201 through the display 117, the keypad 115 can be directly connected to the computer 201.

[0018] The computer 201 can perform a number of functions. When the golfer places a key card on or waves the key card past the card reader 113, identification data read by the card reader 113 passes to the computer 201. The identification data can include golfer identification, access number, and so forth. The computer can store and use the identification data to identify the golfer and provide access to the apparatus 100 after checking the golfer's account status. The computer can check the golfer's account status locally against information stored in the computer or the computer can check status after remotely accessing account information. For example, the computer can transmit and receive account information from an Internet website accessed through the wireless connection 101.

[0019] The computer 201 can also store and use golfer supplied data entered through the keypad 115. For example, the golfer can enter the type of golf club that will be used for the drive. The keypad can be configured to also accept other data inputs from the golfer. Keyed-in data can be sent to the computer 201 and then displayed on the display 117 with other data, or the keyed-in data can be displayed first for verification before the data is sent to the computer 201. In addition, the computer 201 can store and use information about the apparatus 100, such as physical location, for example the name and address of the golf range, date, time and so forth. Besides keying-in this additional data via the keypad 115, the additional data can be preprogrammed into the computer 201, entered into the computer 201 upon installation of the apparatus 100, access remotely through the wireless connection, and so forth.

[0020] The computer 201 can also store and use data from the object monitor 103. For each drive of a golf ball, the object monitor 103 measures golf ball movement and determines trajectory. Trajectory characteristics such as speed, direction, spin, projected drive distance, and so forth can be determined by the object monitor 103 and sent to the computer 201. The computer 201 can use the data by combining the data with other data so as to assemble attributes of a specific drive into a data file. For example, the computer can generate a data file that includes location of the driving range, date, time, golfer identification, club type, and trajectory characteristics received from the object monitor 103. In addition, the computer can save the golf ball drive attributes into a database for later retrieval or transmission via the wireless connection 101. Alternatively, the computer can immediately transmit golf ball drive data that is received by the computer over the wireless connection 101. In

addition, the computer can output the data file and database information to the display **117** after each drive.

[**0021**] Beside electronic data connections, the apparatus components have electric power connections. Preferably, the apparatus **100** is powered by solar energy collected by the solar panel **119**. Alternatively, the apparatus **100** can be powered by an outside electric power source, such as electricity from an electric utility that either directly powers the apparatus or recharges the battery, particularly, when there is not enough solar energy. Both the solar panel **119** and the battery **209** are connected to a charge controller **301**. The charge controller **301** controls the flow of solar generated electricity from the solar panel **199** to the battery **209**. Preferably, the charge controller **209** is integrated as part of the computer **201**. Alternatively, the charge controller **301** can be a stand alone component.

[**0022**] In this embodiment the computer **201** is connected to and powered by the battery **209**. Electric power that enters the computer **201** powers the computer **201**, the card reader **113**, the keypad **115**, and the display **117**. In addition, the computer **201** controls the distribution of electric power to the wireless connection **101** and the object monitor **103**. Alternatively, each component can be directly connected to the battery or outside power source.

[**0023**] A flowchart of a method for monitoring and transmitting data about a driven golf ball is shown in **FIG. 4**. At step **401**, the object monitor **103** measures the movement and determines the trajectory characteristics of a driven golf ball including the estimated distance the ball will travel. At step **403**, the wireless connection **101** transmits attributes of the driven golf ball, particularly trajectory characteristics received from the object monitor **103**, to a wireless access point of a computer network.

[**0024**] The method for monitoring and transmitting golf drive data can comprise other steps. For example, access to the apparatus **100** can require verification of the golfer account status. Access permission can require the reading a golfer's key card by the card reader **113** to identify the golfer and checking the golfer's account status based on the read identification. Once golfer identification is known and access granted, the method can associate the golfer's identification with each drive. The method can also include the step of identification of the club used by the golfer. For example, this step could include entering the golf club style or type via the keypad **115**. The method can also include the step of displaying golf ball attributes before and after the drive. For example, the golfer's name and the club being used can be displayed before the drive, and after the drive the estimated distance the golf ball traveled can be displayed. Finally, the method can include the steps of storing and combining various golf drive attributes into a single date file by the computer **201** for transmission to a computer network via the wireless connection **101**. For example, golfer's name, club type and style, date, time, location, and estimated distance the golf ball traveled can be combined into a single data file. Alternatively, the file can include trajectory characteristics, such as golf ball speed, golf ball direction, golf ball spin, and so forth.

[**0025**] Although the present invention is illustrated by the example of an apparatus for monitoring and transmitting date related to practice drives of golf balls, the present invention may be applied to: other sporting events that involve moving objects such as baseball, softball, football, soccer, tennis, basketball, and so forth where performance evaluation based on numerous repetitions is important, including those sports that involve motorized vehicles such as automobiles, dragsters, motorcycles, boats, planes, and so forth.

[**0026**] The present invention provides a number of advantages, including the ability to transmit golf drive practice data to a computer network. The present invention provides for generating golf drive performance data, yet does not restrict data accessibility to the location at which the data is generated. Transmitting practice data via a wireless connection to a computer network allows the data from various locations and time periods to be accumulated and analyzed, particularly, to identify changes in performance. The present invention reduces the reliance on more subjective practice techniques such as visually observing golf balls driven towards a driving range target. The present invention allows a golfer to focus on driving technique as opposed to trying to visually follow a driven golf ball. Thus, a golfer's score at golf can improve because of the availably of objective practice data from a large number of drives.

[**0027**] The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes that come within the meaning and range of equivalency of the claims are to be embraced within their scope.

What is claimed is:

1. An apparatus comprising:

an object monitor capable of measuring movement and determining trajectory of a moving object, and;

at least one wireless connection electronically connected to the object monitor, wherein the wireless connection is capable of receiving data from and transmitting to a remote receiver.

2. The apparatus of claim 1, further comprising a computer connected the object monitor and the wireless connection, wherein the computer is capable of receiving and storing attributes of the moving object.

3. An apparatus of claim 1, wherein the remote receiver is a wireless access point of a computer network.

4. The apparatus of claim 1, further comprising at least one keypad connected to the computer, wherein the computer can receive data from the keypad.

5. The apparatus of claim 1, further comprising at least one display panel connected to the computer.

6. The apparatus of claim 5, wherein the display panel is a liquid crystal display panel.

7. The apparatus of claim 1, further comprising a key card reader connected to the computer.

8. The apparatus of claim 1, further comprising a power source connected to the computer.

9. The apparatus of claim 8, wherein the power source comprises a solar panel.

10. The apparatus of claim 1, wherein the object monitor uses electromagnetic radiation to measure the movement of the moving object.

11. The apparatus of claim 10, wherein the electromagnetic radiation is radio waves.

12. The apparatus of claim 1, wherein the object monitor uses audio waves to measure the movement of the moving object.

13. The apparatus of claim 1, wherein the object monitor uses video to measure the movement of the moving object.

14. The apparatus of claim 1, wherein the moving object is a golf ball.

15. An apparatus comprising:

a radar device capable of measuring movement and determining trajectory of a golf ball;

a computer connected the radar device wherein the computer is capable of receiving and storing golf ball attributes;

a wireless connection connected to the computer, wherein the wireless connection is capable of receiving data from and transmitting data to a wireless access point of a computer network;

at least one keypad connected to the computer, wherein data is entered into the computer via the keypad;

at least one display panel connected to the computer; and

a key card reader connected to the computer.

16. The apparatus of claim 15, wherein the display panel is a liquid crystal display panel.

17. The apparatus of claim 15, wherein the radar device is a radar unit manufactured by Distance Caddy Corp.

18. The apparatus of claim 15, wherein the golf ball attributes comprise golfer identification, golf club identification, and estimated golf ball distance.

19. A method comprising the steps of:

monitoring movement and determining trajectory characteristics of a moving object with a object monitor; and

transmitting object attributes through a wireless connection connected to the object monitor to a wireless access point of a computer network.

20. The method of claim 19, further comprising accessing an apparatus comprising the object monitor and the wireless connection.

21. The method of claim 20, wherein accessing comprises reading user identification from a key card and verifying user account status.

22. The method of claim 19, further comprising entering attributes associated with the object through a keyboard attached to a computer.

22. The method of claim 19, displaying object attributes on a display screen.

23. The method of claim 19, combining object attributes in a data file on a computer connected to the object monitor and the wireless connection, wherein the data file can be transmitted through the wireless connection to a wireless access point of a computer network.

24. The method of claim 19, wherein the object attributes comprises user identification, equipment identification, and object trajectory characteristics.

25. The method of claim 19, wherein the object is a golf ball.

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