Title: **US6959259: System and methods for determining performance data**

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Derwent Title: Sport performance monitoring system for e.g. skiing uses one or more sensors integrated into sport implements such as snowboard or ski, for measuring airtime, power, speed and or drop distance for jump

High Resolution

Low Resolution

81 pages

Country: **US** United States of America

Inventor: **Vock, Curtis A.**; Boulder, CO, United States of America
Darcy, Dennis; Dracut, MA, United States of America
Burke, Shawn; Andover, MA, United States of America
Flentov, Peter; Carlisle, MA, United States of America

Assignee: **PhatRat Technology, Inc.**, Niwot, CO, United States of America
other patents from PHATRAT TECHNOLOGY, INC. (730703) (approx. 9)
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Application Number: **US2002000283642**

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IPC-7: **G06F 11/32**;

ECLA Code: **A63C5/06**; A42B3/04B6; A61B5/11; A63B24/00G; A63B69/18C; A63B71/06; A63B71/10; G01C21/10; G01C21/20; G01P1/06; G01P3/42; G01P3/50; G01P15/00; G01P15/08L; G01S19/19; G04F8/08; K61B562/02C; K63B5/00; K63B24/00G3; K63B69/00U; K63B69/16; K63B69/18; K63B69/18M; K63B71/06B; K63B71/06D4; K63B220/12; K63B220/13; K63B220/14; K63B220/16; K63B220/30; K63B220/40; K63B220/44; K63B220/62; K63B220/64; K63B220/80A; K63B220/80M; K63B220/83A; K63B244/19; K63C203/18; S01S11/14; S01S15/60;

U.S. Class: **702/142**; 342/104;

Field of Search: 702/142,149,150-152,153,94-97,143,160,188 342/104-107,109,113,357.06-357.14,357.17,450,451,458,460

Priority Number: 2002-10-30 **US2002000283642**
1998-06-02 **US1998000089232**
1996-12-12 **US1996000764758**
1997-06-02 **US1997000867083**
1998-03-09 **US1998000077251P**

Abstract: The invention determines performance data during activity of a person. A microprocessor and a sensor, such as a GPS sensor, attach to the person or to a vehicle ridden by the person. The sensor and

microprocessor may integrate in clothing or in a watch worn by the person. Wireless signals may be generated to a remote base station or to a watch. Performance data may for example include speed, drop distance, airtime and power.

Attorney, Agent or Firm: **Lathrop & Gage, LC** ;

Primary / Asst. Examiners: **Hoff, Marc S.**; Raymond, Edward

Maintenance Status: CC Certificate of Correction issued
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Related Applications:

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Application Number	Filed	Patent	Pub. Date	Title
US1998000089232	1998-06-02		2003-03-25	Sport monitoring system for determining airtime, speed, power absorbed and other factors such as drop distance
US1996000764758	1996-12-12		1999-09-28	Apparatus and methods for determining loft time and speed
US1997000867083	1997-06-02		2001-07-24	Sport monitoring apparatus for determining loft time, speed, power absorbed and other factors such as height

Parent Case:

RELATED APPLICATIONS

This application is a continuation of and claims priority to U.S. patent application Ser. No. 09/089,232, filed Jun. 2, 1998 now U.S. Pat. No. 6,539,336, which is a continuation-in-part of U.S. application Ser. No. 08/764,758 (now U.S. Pat. No. 5,960,380), filed on Dec. 12, 1996, and U.S. application Ser. No. 08/867,083, filed on Jun. 2, 1997 now U.S. Pat. No. 6,266,623, and which claims priority to U.S. Provisional Application No. 60/077,251, filed on Mar. 9, 1998, each of which is expressly incorporated herein by reference.

Family: Show 114 known family members

First Claim:
Show all 4 claims

1. A system for determining motion characteristics of a sportsman, comprising:

an accelerometer-based sensor for attachment with the sportsman, the accelerometer based sensor sensing acceleration of the

sportsman during movement and processing the acceleration to determine airtime of the sportsman during the movement; and

a watch to be worn by the sportsman, the sensor wirelessly communicating data incorporating the airtime to the watch, the watch receiving the data and indicating the motion characteristics.

2. A system of claim 1, the sensor further processing the acceleration during the airtime to determine the motion characteristics, the sensor wirelessly communicating the data between the sensor and the watch to report, through the watch, the motion characteristics to the sportsman.

3. A system of claim 2, the motion characteristics comprising one or both of speed and distance traveled.

4. A system of claim 1, the sensor further processing the acceleration during the airtime to determine the one or both of distance traveled and speed of the sportsman during the airtime, the sensor wirelessly communicating the data between the sensor and the watch to report, through the watch, at least one of the speed said distance traveled as the motion characteristics to the sportsman.

Background / Summary:

FIELD OF THE INVENTION

The invention relates generally to monitoring and quantifying sport movement (associated either with the person or with the vehicle used or ridden by the person), including the specific parameters of “air” time, power, speed, and drop distance. The invention also has “gaming” aspects for connecting users across the Internet. The invention is particularly useful in sporting activities such as skiing, snowboarding, mountain biking, wind-surfing, skate-boarding, roller-blading, kayaking, racing, and running, in which sporting persons expend energy, catch “air”, move at varying speeds, and perform jumps.

BACKGROUND OF THE INVENTION

It is well known that many skiers enjoy high speeds and jumping motions while traveling down the slope. High speeds refer to the greater and greater velocities which skiers attempt in navigating the slope successfully (and sometimes unsuccessfully). The jumping motions, on the other hand, include movements which loft the skier into the air. Generally, the greater the skier's speed, the higher the skier's loft into the air.

The interest in high speed skiing is apparent simply by observing the velocity of skiers descending the mountain. The interest in the loft motion is less apparent; although it is known that certain enthusiastic snowboarders regularly exclaim “let's catch some air” and other assorted remarks when referring to the amount and altitude of the lofting motion.

The sensations of speed and jumping are also readily achieved in other sporting activities, such as in mountain biking, skating, roller-blading, wind-surfing, and skate-boarding. Many mountain bikers and roller-bladers, like the aforementioned skiers, also crave greater speeds and “air” time.

However, persons in such sporting activities only have a qualitative sense as to speed and loft or “air” time. For example, a typical snowboarder might regularly exclaim after a jump that she “caught” some “big sky,” “big air” or “phat air” without ever quantitatively knowing how much time really elapsed in the air.

Speed or velocity also remain unquantified. Generally, a person such as a skier can only assess whether they went “fast”, “slow” or “average”, based on their perception of motion and speed (which can be grossly different from actual speed such as measured with a

speedometer or radar gun).

There are also other factors that sport persons sometimes assess qualitatively. For example, suppose a snowboarder skis a double-diamond ski slope while a friend skis a green, easy slope. When they both reach the bottom, the “double-diamond” snowboarder will have expended more energy than the other, generally, and will have worked up a sweat; while the “green” snowboarder will have had a relatively inactive ride down the slope. Currently, they cannot quantitatively compare how rough their journeys were relative to one another.

OBJECTS OF THE INVENTION

It is, accordingly, an object of the invention to provide systems and methods for determining “air” time associated with sport movements.

It is another object of the invention to provide systems and methods for determining the speed of participants and/or vehicles associated with sport movements.

It is yet another object of the invention to provide improvements to sporting vehicles which are ridden by sporting participants, and which provide a determination of speed, airtime, drop distance and/or power of the vehicle.

Still another object of the invention is to provide systems and methods for determining the amount of “power” or energy absorbed by a person during sporting activities. One specific object is to provide a gauge of energy spent by a sporting participant as compared to others in the same sport, to provide a quantitative comparison between two or more participants.

Yet another object of the invention is to provide the “drop distance” associated with a jump; and particularly the drop distance which occurs within “airtime”.

Still another object of the invention is to provide a gaming system to quantitatively compare airtime, drop distance, power, and/or speed between several participants, regardless of their location.

These and other objects of the invention will become apparent in the description which follows.

SUMMARY OF THE INVENTION

As discussed herein, “air” or “loft” time (or “airtime”) refer to the time spent off the ground during a sporting movement. For example, airtime according to the invention can include a snowboarder catching air off of a mogul or a ledge. Typically, airtime is greater than one-half (or one-third) second and less than six seconds. In “extreme” sporting events, the maximum airtime can increase up to about ten or fifteen seconds.

In most cases, it is useful to specify the lower and upper limits of airtime—e.g., from one second to five seconds—so as to reduce processing requirements and to logic out false airtime data. More particularly, the following description provides several techniques and methods for determining airtime. One technique, for example, monitors the vibration of the user's vehicle (e.g., a ski or snowboard) moving on the ground; and senses when the vibration is greatly reduced, indicating that the vehicle is off the ground. However, when such a user stands in line for the chair-lift, she might remain motionless for thirty seconds or more. By restricting the upper limit to five seconds, a system of the invention can be made to ignore conditions such as standing in line. Similarly, when a user walks slowly, there are cyclical periods of relatively small vibration (e.g., when the user lifts his foot off the ground). Therefore, a lower limit of one-half second or one second are appropriate; so that any detected “airtime” that falls below that lower limit is ignored and not stored.

In another aspect of the invention, the measurement of airtime is used to quantify the efficiency by which a person or sport vehicle

remain on the ground. By way of example, speed skiers desire to remain on the ground; and the invention thus provides a system which monitors the person and/or vehicle (e.g., the slalom ski) to detect airtime. This information is fed back to the person (in real time or in connection with a later review of video) so that he or she can improve their posture to reduce unwanted airtime. In such applications, airtime is typically less than about three or four seconds; and the lower limit is essentially zero (that is, providing miniscule airtime data can be appropriate for training purposes).

As used herein, “power” refers to the amount of energy expended by a person or vehicle during a sporting activity, typically over a period such as one ski run. The following description provides several systems, techniques and methods for determining power. Power need not correspond to actual energy units; but does provide a measure of energy expended by the person or vehicle as compared to other persons and vehicles in the same sporting activity. Power can be used to quantify “bragging rights” between sport enthusiasts: e.g., one user can quantify that he expended more energy, or received more “punishment”, as compared to a friend. Power can refer to the amount of “G's” absorbed during a given period of activity. Power is typically quantified over a period that is selectable by the user. For example, power can be determined over successive one-second periods, or successive five second periods, or successive one minute periods, or successive five minute periods, or other periods. Power can also be measured over a manually selected period. For example, two snowboarders can initialize the period at the beginning of a run down a ski slope and can stop their period at the end of the run.

“Speed” refers the magnitude of velocity as measured during a sport activity. Speed generally refers to the forward direction of the moving sportsman.

“Drop distance” refers to the height above the ground as experienced by a user or vehicle during a sport activity. Drop distance preferably corresponds to a measured airtime period. For example, a snowboarder who takes a jump off of a ledge might drop thirty feet (drop distance) in three seconds (airtime). Drop distance can also specifically refer to maximum height above the ground for a given jump (for example, a user on a flat surface can first launch upwards off a jump and return to the same level but experience a five foot drop distance).

The invention thus provides systems and methods for quantifying airtime, power, speed and/or drop distance to quantify a user's sport movement within one or more of the following activities: skiing, snowboarding, wind-surfing, skate-boarding, roller-blading, kayaking, white water racing, water skiing, wake-boarding, surfing, racing, running, and mountain biking. The invention can also be used to quantify the performance of vehicles upon which users ride, e.g., a snowboard or ski or mountain bike.

The following U.S. patents provide useful background for the invention and are herein incorporated by reference: U.S. Pat. Nos. 5,343,445; 4,371,945; 4,757,714; 4,089,057; 4,722,222; 5,452,269; 3,978,725; and 5,295,085.

Drawing Descriptions: Show drawing descriptions

Description: Show description

Forward References: Show 64 U.S. patent(s) that reference this one

U.S. References: **Go to Result Set:** All U.S. references | Forward references (64) | Backward references (31) | Citation Link

Buy PDF	Patent	Pub.Date	Inventor	Assignee	Title
	US3978725	1976-09	Hadtke	Robert Hain Associates, Inc.	Speedometer particularly for water skis
	US4089057	1978-05	Eriksson		Method and device for measuring jump-lengths on a ski-jump
	US4317126	1982-02	Gragg, Jr.	Motorola, Inc.	Silicon pressure sensor
	US4371945	1983-02	Karr et al.	Karr; Lawrence Joseph	Electronic pedometer
	US4423630	1984-01	Morrison		Cyclic power monitor
	US4516110	1985-05	Overmyer		Ski stress signaling device
	US4578769	1986-03	Frederick	Nike, Inc.	Device for determining the speed, distance traversed, elapsed time and calories expended by a person while running
	US4694694	1987-09	Vlakancic et al.	Vertical Instruments, Inc.	Solid state accumulating altimeter
	US4699379	1987-10	Chateau et al.	Chateau; Robert E.	Athletic monitoring device
	US4722222	1988-02	Purdy et al.	Skisonics Corporation	Ski speedometer
	US4736312	1988-04	Dassler et al.	Puma AG Rudolf Dassler Sport	Arrangement for the determination of movement sequences in running disciplines
	US4757714	1988-07	Purdy et al.	Insight, Inc.	Speed sensor and head-mounted data display
	US4903212	1990-02	Yokouchi et al.	Mitsubishi Denki Kabushiki Kaisha	GPS/self-contained combination type navigation system
	US5067081	1991-11	Person		Portable electronic navigation aid
	US5162628	1992-11	Furness et al.	Moulinex (Societe Anonyme)	Support means for a spit in an electric oven with combined microwave and resistance heating
	US5295085	1994-03	Hoffacker	Avocet, Inc.	Pressure measurement

					device with selective pressure threshold crossings accumulator
	US5343445	1994-08	Cherdak	Stern; David	Athletic shoe with timing device
	US5446775	1995-08	Wright et al.		Motion detector and counter
	US5452269	1995-09	Cherdak	Stern; David	Athletic shoe with timing device
	US5524637	1996-06	Erickson		Interactive system for measuring physiological exertion
	US5583776	1996-12	Levi et al.	Point Research Corporation	Dead reckoning navigational system using accelerometer to measure foot impacts
	US5590908	1997-01	Carr		Sports board having a pressure sensitive panel responsive to contact between the sports board and a surface being ridden
	US5636146	1997-06	Flentov et al.	PhatRat Technology, Inc.	Apparatus and methods for determining loft time and speed
	US5721539	1998-02	Goetzl		Speedometer for in-line skates
	US5724265	1998-03	Hutchings		System and method for measuring movement of objects
	US5955667	1999-09	Fyfe	Governors of the University of Alberta	Motion analysis system
	US5960380	1999-09	Flentov et al.	PhatRat Technology, Inc.	Apparatus and methods for determining loft time and speed
	US6002982	1999-12	Fry		Sports computer with GPS receiver and performance tracking capabilities
	US6013007	2000-01	Root et al.	Liquid Spark, LLC	Athlete's GPS-based performance monitor
	US6305221	2001-10	Hutchings	Aeceleron Technologies, LLC	Rotational sensor system
	US6619835	2003-09	Kita	Casio	Body wearable

				Computer Co., Ltd.	information processing terminal device

Foreign References: None

Continuity Data:

Application Number	Filed	Notes
US2002000283642	2002-10-30	is a related to the prior publication US20030093248A1 issued 2003-05-15 Mobile speedometer system, and associated methods
US2002000283642	2002-10-30	is a related to the prior publication US20050021292A1 issued 2005-01-27 Systems and methods for determining performance data
US2002000283642	2002-10-30	is a related to the prior publication US20060015287A1 issued 2006-01-19 Sport performance systems for measuring athletic performance, and associated methods
US2002000283642	2002-10-30	is a related to the prior publication US20060259268A1 issued 2006-11-16 Mobile GPS systems for providing location mapping and/or performance data
US2002000283642	2002-10-30	is a related to the prior publication US20060265187A1 issued 2006-11-23 Shoes and garments employing one or more of accelerometers, wireless transmitters, processors, altimeters, to determine information such as speed to persons wearing the shoes or garments
US2002000283642	2002-10-30	is a related to the prior publication US20070061106A1 issued 2007-03-15 Helmet that reports impact information, and associated methods
US2002000283642	2002-10-30	is a related to the prior publication US20070061107A1 issued 2007-03-15 Pressure sensing systems for sports, and associated methods
US2002000283642	2002-10-30	is a related to the prior publication US20070067128A1 issued 2007-03-22 Location determining system
US2002000283642	2002-10-30	is a related to the prior publication US20080021676A1 issued 2008-01-24 System And Method For Determining Airtime Using Free Fall
US2002000283642	2002-10-30	is a related to the prior publication US20080306707A1 issued 2008-12-11 Impact Reporting Head Gear System And Method
US2002000283642	2002-10-30	is a related to the prior publication US20090006029A1 issued 2009-01-01 Shoes and Garments Employing One or More of Accelerometers, Wireless Transmitters, Processors Altimeters, to Determine Information Such as Speed to Persons Wearing the Shoes or Garments

US2002000283642 2002-10-30 is a related to the prior publication

US20090063097A1 issued 2009-03-05 PRESSURE SENSING SYSTEMS FOR SPORTS, AND ASSOCIATED METHODS

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US20100036639A1 issued 2010-02-11 Shoes and Garments Employing One or More of Accelerometers, Wireless Transmitters, Processors Altimeters, to Determine Information Such as Speed to Persons Wearing the Shoes or Garments

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US20100191499A1 issued 2010-07-29 Systems And Methods For Determining Drop Distance And Speed Of Moving Sportsmen Involved In Board Sports

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US2002000283642 2002-10-30 is a related to the prior publication

US20110060550A1 issued 2011-03-10 System And Method For Non-Wirelessly Determining Free-Fall Of A Moving Sportsman

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US2002000283642 2002-10-30 is a related to the prior publication

US20110282594A1 issued 2011-11-17 Board Sports Sensing Devices, And Associated Methods

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13567895 is a continuation of

US2011000190098 2011-07-25

US8239146 issued 2012-08-07 Board sports sensing devices, and associated methods

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13548344 is a continuation of

US2011000164351 2011-06-20

US8249831 issued 2012-08-21 Pressure sensing systems for sports, and associated methods

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13190098 is a continuation of

US2010000942857 2010-11-09

US7991565 issued 2011-08-02 System and method for non-wirelessly determining free-fall of a moving sportsman

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12942857 is a continuation of

US2010000753658 2010-04-02

US7860666 issued 2010-12-28 Systems and methods for determining drop distance and speed of moving sportsmen involved in board sports

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13164351 is a continuation of

US2008000210844 2008-09-15

US7966154 issued 2011-06-21 Pressure sensing systems for sports, and associated methods

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12538004 is a continuation of

US2008000207032 2008-09-09

US7623987 issued 2009-11-24 Shoes and garments employing one or more of accelerometers, wireless transmitters, processors, altimeters, to determine information such as speed to persons wearing the shoes or garments

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12753658 is a continuation of

US2008000135893 2008-06-09

US7693668 issued 2010-04-06 Impact reporting head gear system and method

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US2008000135893 2008-06-09 is a continuation of

US2007000864748 2007-09-28

US7640135 issued 2009-12-29 System and method for determining airtime using free fall

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US1997000867083 is a continuation of

US2007000864748 2007-09-28 (pending) [presumed granted]

US7640135 issued 2009-12-29 System and method for determining airtime using free fall

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12135893 is a continuation of

US2007000864748 2007-09-28

US7640135 issued 2009-12-29 System and method for determining airtime using free fall

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12897427 is a continuation of

US2006000601406 2006-11-17

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US2001000992966 is a continuation of

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US1999000353530 is a continuation of

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US2006000599123 2006-11-14 (pending) [presumed granted]

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US2007000864748 2007-09-28 is a continuation of
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US7386401 issued 2008-06-10 Helmet that reports impact information, and associated methods

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12207032 is a continuation of
US2006000495112 2006-07-28 (pending) [presumed granted]
US7457724 issued 2008-11-25 Shoes and garments employing one or more of accelerometers, wireless transmitters, processors, altimeters, to determine information such as speed to persons wearing the shoes or garments

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systems for measuring athletic performance, and associated methods

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US7054784 issued 2006-05-30 Sport monitoring systems

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US2006000598410 2006-11-13 is a continuation of

US2004000842947 2004-05-11 (granted)

US7072789 issued 2006-07-04 Systems for assessing athletic performance

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US2005000221029 2005-09-07 is a continuation in part of

US2004000842947 2004-05-11 (pending) [presumed granted]

US7072789 issued 2006-07-04 Systems for assessing athletic performance

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US1996000764758 is a continuation of

US2004000842947 2004-05-11

US7072789 issued 2006-07-04 Systems for assessing athletic performance

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US1994000344485 is a continuation of

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US7072789 issued 2006-07-04 Systems for assessing athletic performance

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12210844 is a continuation of

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US7072789 issued 2006-07-04 2006-07-04 Systems for assessing athletic performance

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12210844 is a continuation of

US2004000842947 2004-05-11

US7072789 issued 2006-07-04 Systems for assessing athletic performance

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12135893 is a continuation of

US2004000842947 2004-05-11

US7072789 issued 2006-07-04 Systems for assessing athletic performance

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11864748 is a continuation of

US2004000842947 2004-05-11

US7072789 issued 2006-07-04 Systems for assessing athletic performance

11599123		is a continuation of
US2004000842947	2004-05-11	
US7072789 issued 2006-07-04	Systems for assessing athletic performance	

11221029		is a continuation of
US2004000842947	2004-05-11	
US7072789 issued 2006-07-04	Systems for assessing athletic performance	

US2005000221029	2005-09-07	is a continuation in part of
US2003000601208	2003-06-20	(pending) [presumed granted]
US7174277 issued 2007-02-06	Product integrity systems and associated methods	

US2003000601208	2003-06-20	is a continuation of
US2002000297270	2002-12-04	(pending) [presumed granted] WO2001US0051620
US8280682 issued 2012-10-02	Device for monitoring movement of shipped goods	

US2008000135893	2008-06-09	is a continuation of
US2002000289039	2002-11-06	
US6963818 issued 2005-11-08	Mobile speedometer system and associated methods	

US2008000135893	2008-06-09	is a continuation in part of
US2002000289039	2002-11-06	
US6963818 issued 2005-11-08	Mobile speedometer system and associated methods	

US2007000864748	2007-09-28	is a continuation in part of
US2002000289039	2002-11-06	(granted)
US6963818 issued 2005-11-08	Mobile speedometer system and associated methods	

US2006000599123	2006-11-14	is a continuation in part of
US2002000289039	2002-11-06	(granted)
US6963818 issued 2005-11-08	Mobile speedometer system and associated methods	

US2006000598410	2006-11-13	is a continuation in part of
US2002000289039	2002-11-06	(granted)
US6963818 issued 2005-11-08	Mobile speedometer system and associated methods	

US2005000221029	2005-09-07	is a continuation in part of
US2002000289039	2002-11-06	(granted)
US6963818 issued 2005-11-08	Mobile speedometer system and associated methods	

US1998000089232		is a continuation in part of

US2002000289039 2002-11-06

US6963818 issued 2005-11-08 Mobile speedometer system and associated methods

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12210844 is a continuation in part of

US2002000289039 2002-11-06

US6963818 issued 2005-11-08 2005-11-08 Mobile speedometer system and associated methods

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US6963818 issued 2005-11-08 Mobile speedometer system and associated methods

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12135893 is a continuation in part of

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US6963818 issued 2005-11-08 Mobile speedometer system and associated methods

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11864748 is a continuation in part of

US2002000289039 2002-11-06

US6963818 issued 2005-11-08 Mobile speedometer system and associated methods

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US2002000289039 2002-11-06

US6963818 issued 2005-11-08 Mobile speedometer system and associated methods

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11221029 is a continuation in part of

US2002000289039 2002-11-06

US6963818 issued 2005-11-08 Mobile speedometer system and associated methods

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US2004000921743 2004-08-19 is a division of

>US2002000283642< 2002-10-30 (pending) [presumed granted]

US6959259 issued 2005-10-25 Mobile speedometer system, and associated methods

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US2004000921743 2004-08-19 is a division of

>US2002000283642< 2002-10-30 (granted)

US6959259 issued 2005-10-25 System and methods for determining performance data

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US2004000921743 is a division of

>US2002000283642< 2002-10-30

US6959259 issued 2005-10-25 2005-10-25 System and methods for determining performance data

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US2004000921743 is a division of

>US2002000283642< 2002-10-30

US6959259 issued 2005-10-25 System and methods for determining performance data

US2005000950897 is a division of

US2002000234660 2002-09-04

US6856934 issued 2005-02-15 2005-02-15 Sport monitoring systems and associated methods

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US2004000950897 2004-09-27 is a division of

US2002000234660 2002-09-04 (granted)

US6856934 issued 2005-02-15 Sport monitoring systems and associated methods

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US2002000289039 is a division of

US2002000234660 2002-09-04

US6856934 issued 2005-02-15 Sport monitoring systems and associated methods

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US2004000842947 2004-05-11 is a continuation of

US2001000992966 2001-11-06 (granted)

US6885971 issued 2005-04-26 Methods and systems for assessing athletic performance

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US2004000842947 is a continuation of

US2001000992966 2001-11-06

US6885971 issued 2005-04-26 2005-04-26 Methods and systems for assessing athletic performance

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US6885971 issued 2005-04-26 Methods and systems for assessing athletic performance

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US2001000992966 is a continuation of

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US6885971 issued 2005-04-26 Methods and systems for assessing athletic performance

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US2002000234660 2002-09-04 is a continuation of

US2001000886578 2001-06-21 (granted)

US6498994 issued 2002-12-24 Systems and methods for determining energy experienced by a user and associated with activity

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US2002000234660 is a continuation of

US2001000886578 2001-06-21

US6498994 issued 2002-12-24 2002-12-24 Systems and methods for determining energy experienced by a user and associated with activity

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US2002000234660 is a continuation of

US2001000886578 2001-06-21

US6498994 issued 2002-12-24 Systems and methods for determining energy experienced by a user and associated with activity

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US2002000289039 2002-11-06 is a continuation of
US2001000784783 2001-02-15 (granted)

US6516284 issued 2003-02-04 Speedometer for a moving sportsman

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US2002000289039 is a continuation of
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US6516284 issued 2003-02-04 2003-02-04 Speedometer for a moving sportsman

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US2002000289039 is a continuation of
US2001000784783 2001-02-15

US6516284 issued 2003-02-04 Speedometer for a moving sportsman

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US2002000283642 2002-10-30 is a non-provisional of provisional
US2001000323601P 2001-09-20

US2002000283642 2002-10-30 is a non-provisional of provisional
US2001000285032P 2001-04-19

US2002000283642 2002-10-30 is a non-provisional of provisional
US2001000261359P 2001-01-13

US2005000221029 2005-09-07 is a continuation in part of
US2000000607678 2000-06-30 (pending) [presumed granted]

US7739076 issued 2010-06-15 Event and sport performance methods and systems

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US2002000283642 2002-10-30 is a non-provisional of provisional
US2000000259271P 2000-12-29

US2002000283642 2002-10-30 is a non-provisional of provisional
US2000000257386P 2000-12-22

US2002000283642 2002-10-30 is a non-provisional of provisional
US2000000256069P 2000-12-15

US2001000784783 2001-02-15 is a continuation of
US1999000353530 1999-07-14 (granted)

US6496787 issued 2002-12-17 Apparatus and method for determining loft time and speed

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US2001000784783 is a continuation of
US1999000353530 1999-07-14

US6496787 issued 2002-12-17 2002-12-17 Apparatus and method for determining loft time and speed

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US2001000784783 is a continuation of
US1999000353530 1999-07-14

US6496787 issued 2002-12-17 Apparatus and method for determining loft time and speed

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US2002000283642 2002-10-30 is a non-provisional of provisional
US1999000141794P 1999-06-30

>US2002000283642< 2002-10-30 is a continuation of
US1998000089232 1998-06-02 (pending) [presumed granted]

US6539336 issued 2003-03-25 Sport monitoring system for determining airtime, speed, power absorbed and other factors such as drop distance

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>US2002000283642< 2002-10-30 is a continuation of
US1998000089232 1998-06-02 (granted)

US6539336 issued 2003-03-25 Sport monitoring system for determining airtime, speed, power absorbed and other factors such as drop distance

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>US2002000283642< is a continuation of
US1998000089232 1998-06-02

US6539336 issued 2003-03-25 2003-03-25 Sport monitoring system for determining airtime, speed, power absorbed and other factors such as drop distance

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>US2002000283642< is a continuation of
US1998000089232 1998-06-02

US6539336 issued 2003-03-25 Sport monitoring system for determining airtime, speed, power absorbed and other factors such as drop distance

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US2001000992966 2001-11-06 is a continuation of
US1998000089232 1998-06-02 (granted)

US6539336 issued 2003-03-25 Sport monitoring system for determining airtime, speed, power absorbed and other factors such as drop distance

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US2001000992966 is a continuation of
US1998000089232 1998-06-02

US6539336 issued 2003-03-25 2003-03-25 Sport monitoring system for determining airtime, speed, power absorbed and other factors such as drop distance

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US2001000992966 is a continuation of
US1998000089232 1998-06-02

US6539336 issued 2003-03-25 Sport monitoring system for determining airtime, speed, power absorbed and other factors such as drop distance

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US2002000283642 2002-10-30 is a non-provisional of provisional
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>US2002000283642< 2002-10-30 is a continuation in part of
US1997000867083 1997-06-02 (granted)

US6266623 issued 2001-07-24 Sport monitoring apparatus for determining loft time, speed, power absorbed and other factors such as height

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US2001000886578 is a continuation of

US1997000867083 1997-06-02

US6226623 issued 2001-05-01 Global financial services integration system and process

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US2001000886578 2001-06-21 is a continuation of

US1997000867083 1997-06-02 (granted)

US6266623 issued 2001-07-24 Sport monitoring apparatus for determining loft time, speed, power absorbed and other factors such as height

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US2001000886578 is a continuation of

US1997000867083 1997-06-02

US6266623 issued 2001-07-24 2001-07-24 Sport monitoring apparatus for determining loft time, speed, power absorbed and other factors such as height

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US2001000886578 is a continuation of

US1997000867083 1997-06-02

US6266623 issued 2001-07-24 Sport monitoring apparatus for determining loft time, speed, power absorbed and other factors such as height

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US1998000089232 1998-06-02 is a continuation in part of

US1997000867083 1997-06-02 (granted)

US6266623 issued 2001-07-24 Sport monitoring apparatus for determining loft time, speed, power absorbed and other factors such as height

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US1998000089232 is a continuation in part of

US1997000867083 1997-06-02

US6266623 issued 2001-07-24 2001-07-24 Sport monitoring apparatus for determining loft time, speed, power absorbed and other factors such as height

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US1998000089232 is a continuation in part of

US1997000867083 1997-06-02

US6266623 issued 2001-07-24 Sport monitoring apparatus for determining loft time, speed, power absorbed and other factors such as height

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US1996000764758 is a continuation in part of

US1997000867083 1997-06-02

US6266623 issued 2001-07-24 Sport monitoring apparatus for determining loft time, speed, power absorbed and other factors such as height

---

US1999000353530 1999-07-14 is a continuation of

US1996000764758 1996-12-12 (granted)

US5960380 issued 1999-09-28 Apparatus and methods for determining loft time and speed

---

US1999000353530 is a continuation of

US1996000764758 1996-12-12

US5960380 issued 1999-09-28 1999-09-28 Apparatus and methods for determining loft time and speed

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US1999000353530 is a continuation of
US1996000764758 1996-12-12
US5960380 issued 1999-09-28 Apparatus and methods for determining loft time and speed

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US1998000089232 1998-06-02 is a continuation in part of
US1996000764758 1996-12-12 (granted)
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US1996000764758 1996-12-12 (granted)
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US1998000089232 is a continuation in part of
US1996000764758 1996-12-12
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US1998000089232 1998-06-02 is a continuation of
US1996000764758 1996-12-12
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US1996000764758 1996-12-12
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US1997000867083 1997-06-02 is a continuation in part of
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US5960380 issued 1999-09-28 Apparatus and methods for determining loft time and speed

---

US1996000764758 is a continuation in part of

US1996000764758 (pending) [presumed granted]

US5960380 issued 1999-09-28 Apparatus and methods for determining loft time and speed

---

US1994000344485 is a continuation in part of

US1996000764758 1996-12-12

US5960380 issued 1999-09-28 Apparatus and methods for determining loft time and speed

---

US2001000992966 is a continuation of

US1996000089232 1996-06-02

US6539336 issued 2003-03-25 Sport monitoring system for determining airtime, speed, power absorbed and other factors such as drop distance

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US1998000089232 1998-06-02 is a continuation of

US1994000344485 1994-11-21 (granted)

US5636146 issued 1997-06-03 Apparatus and methods for determining loft time and speed

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US1997000867083 1997-06-02 is a continuation in part of

US1994000344485 1994-11-21 (granted)

US5636146 issued 1997-06-03 Apparatus and methods for determining loft time and speed

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US1997000867083 is a continuation in part of

US1994000344485 1994-11-21

US5636146 issued 1997-06-03 1997-06-03 Apparatus and methods for determining loft time and speed

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US1997000867083 is a continuation of

US1994000344485 1994-11-21

US5636146 issued 1997-06-03 Apparatus and methods for determining loft time and speed

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US1997000867083 is a continuation in part of

US1994000344485 1994-11-21

US5636146 issued 1997-06-03 Apparatus and methods for determining loft time and speed

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US1996000764758 1996-12-12 is a continuation of

US1994000344485 1994-11-21 (granted)

US5636146 issued 1997-06-03 Apparatus and methods for determining loft time and speed

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US5636146 issued 1997-06-03 Apparatus and methods for determining loft time and speed

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US5636146 issued 1997-06-03 1997-06-03 Apparatus and methods for determining loft time and speed

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US5636146 issued 1997-06-03 Apparatus and methods for determining loft time and speed	
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12210844	(pending)
US1997000867083	is a continuation in part of
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US2004000842947	is a continuation of
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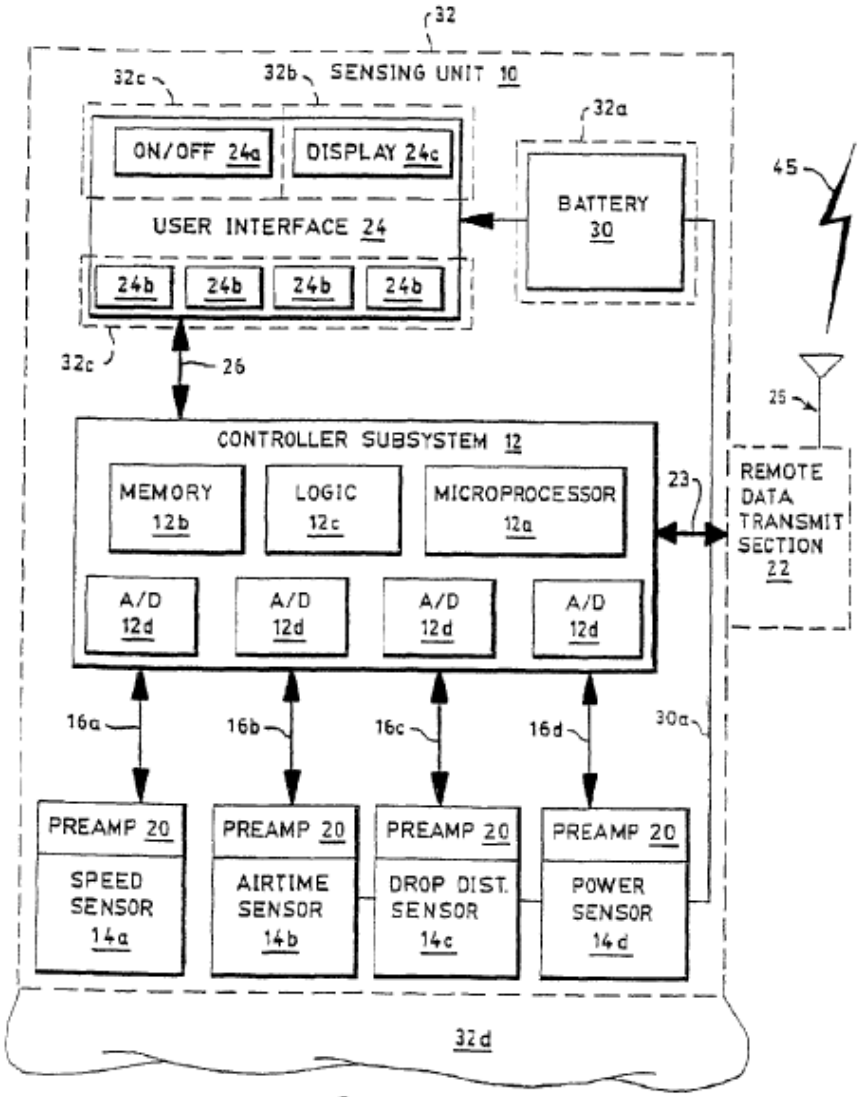
32
32c
32b
SENSING UNIT 10
32a
ON/OFF 24a
DISPLAY 24c
USER INTERFACE 24
24b
24b
24b
24b
BATTERY 30
45
32c
26
25
CONTROLLER SUBSYSTEM 12
MEMORY 12b
LOGIC 12c
MICROPROCESSOR 12a
23
REMOTE DATA TRANSMIT SECTION 22
A/D 12d
A/D 12d
A/D 12d
A/D 12d
16a
16b
16c
16d
30a
PREAMP 20
PREAMP 20
PREAMP 20
PREAMP 20
SPEED SENSOR 14a
AIRTIME SENSOR 14b
DROP DIST. SENSOR 14c
POWER SENSOR 14d
32d

FIG. 1A