Abstract

Multiple visual perspectives in video of private and public activities including those in public areas such as entertainment venues captured by cameras located near the activities can be transmitted over data networks to a server where video-related data is processed and recorded for selective display by authorized, remote video display devices (e.g., HDTV, set top boxes, computers, handheld devices) in wired/wireless communication with the server. Users can be registered and authorized to access the server to provide/access video captured by cameras at activities. Wireless handheld devices can selectively retrieve video-related data captured at activities for server storage and subsequent display by video display devices. Captured video/pictures can be organized in a server based on at least one of: activity title, activity time, activity date, activity place, wireless handheld device location at time of video recording, distance from location of interest. Simultaneous display of multiple videos on a display can be synchronized.

Methods and systems for authorizing access by a user of at least one service associated with an event at a venue based on a location of the user as determined by assets of a data communications network (e.g., Internet protocol based networks, computer network, telecommunications network, wireless network, Internet, etc). A location of at least one user can be determined based on communications of at least one computing device utilized by the at least one user with the data communications network supporting data communications of the at least one computing device. The at least one computing device can be authorized to receive the at least one service based on the location as determined by the data communications network and/or a server. The data communications network can further comprise at least one of a server, a gateway, a home location register and a visiting location register.
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Claims

1. A system for remote viewing of at least one activity from at least two different visual perspectives to a remote audience, said system comprising: a server to receive the at least two different visual perspectives of the at least one activity simultaneously captured during the at least one activity as a streaming video signal by a combination of at least one of a plurality of cameras singularly included in each of at least one of a plurality of hand held devices and at least one of a plurality of standalone cameras, all located near the at least one activity; said server having circuitry to process the streaming video signal into video-related data and record the video-related data in a database associated with said server; selection means to selectively retrieve and display said streaming video display signal by at least one of a plurality of remote video display devices authorized to communicate with the server and retrieve streaming video-related data over a data network; and a registration module to register the at least one of a plurality of remote video display devices and authorize access to said server.

2. The system of claim 1 wherein said server communicates with at least one of a plurality of wireless hand held devices, wherein each of said at least one of said plurality of wireless hand held devices includes integrated components comprising a GUI based menu driven touch screen display and a video processing unit with video tuning hardware to select segments of the streaming video signal viewable on said GUI based menu driven touch screen display as real time or pre-recorded video footage.

3. The system of claim 1 wherein the registration module authorizes access to said server to retrieve the streaming video signal of the at least two different visual perspectives from said database.

4. The system of claim 1, wherein the registration module authorizes access to said server to upload the streaming video signal into said database of the at least one activity captured by the combination of the at least one of said plurality of cameras and the at least one of said plurality of standalone cameras camera.

5. The system of claim 4, further comprising an activity organization module to organize the streaming video signal uploaded into said database from a combination of streaming video
signals emanating from the at least one of said plurality of cameras and the at least one of said plurality of standalone cameras, wherein video from the streaming video signal is automatically organized by said server based on at least one of: at least one activity title, an activity time, an activity date, an activity place, a location of the at least one wireless handheld device at a time of a video recording of the streaming video signal.

6. The system of claim 2, further comprising an activity organization module to organize the streaming video signal simultaneously captured during the at least one activity by a combination of the at least one of said plurality of cameras and the at least one of said plurality of standalone cameras, located near the at least one activity and provided to said server, wherein said streaming video signal is automatically organized by at least one of said server based on at least one of: at least one activity title, an activity time, an activity date, an activity place, a location of the at least one of said plurality of wireless handheld devices at a time of recording of the streaming video signal.

7. The system of claim 1, wherein said registration module registers at least one remote video display device among the at least one of a plurality of remote video display devices and authorizes access to said server to selectively retrieve and display the streaming video-related data captured at the at least one activity.

8. The system of claim 2, further comprising an activity organization module to provide selective access to the streaming video signal of the at least two of said plurality of different visual perspectives from said server, wherein said streaming video signal is provided to at least one remote video display device among said remote video display devices from said server based on a request for at least one of: at least one activity title, an activity time, an activity date, an activity place, a location of the at least one of said plurality of wireless handheld devices at a time of video recording, and a distance from a location of interest.

9. The system of claim 2, further comprising a community association module to associate with at least one of a plurality of online communities also registered within said server and to provide selective access to the streaming video signal of the at least one activity stored on said server that were captured using a combination of the at least one of said plurality of cameras and the at least one of said plurality of standalone cameras, located near the at least one of said plurality of activities and stored on said server in association with the at least one online community, wherein the streaming video signal is provided from said server based on requests of at least one of: a name of said at least one of said plurality of online communities at least one activity title, an activity time, an activity date, an activity place, a location of the at least one of said plurality of wireless handheld devices at a time of a recording of the streaming video signal, and a distance from a location of interest.

10. The system of claim 2, further comprising a community association module to associate with at least one of a plurality of online communities also registered within said server and to provide selective access to the streaming video signal of activities stored in said database that were captured using a combination of the at least one of said plurality of cameras and the at least one of said plurality of standalone cameras, operated and located near the at least one activity and stored in said database in association with the at least one of said plurality of online communities at least one activity title, an activity time, an activity date, an activity place, a location of the at least one of said plurality of wireless handheld devices at a time of a recording of the streaming video signal, and a distance from a location of interest.
communities, wherein said streaming video signal is provided from said server based on requests of at least one of: a name of the at least one of said plurality of online communities, an activity title, an activity time, an activity date, an activity place, a location of the at least one of said plurality of wireless handheld devices at a time of recording of the streaming video signal, and a distance from a location of interest.

11. A system for synchronized remote viewing of at least one of a plurality of activities from at least two of a plurality of visual perspectives to a remote audience, said system comprising: a multimedia server including a video synchronization module, wherein said server comprising circuitry to simultaneously receive the at least two visual captured during the at least one activity as video by a combination of at least one of a plurality of cameras singularly included in each at least one of a plurality of wireless handheld devices and at least one of a plurality of visual perspectives of the at least one activity; wherein the combination of the at least one camera and the at least one standalone camera are configured to generate video image tags with time of capture information; and said video synchronization module processes the at least two different visual perspectives into video-related data for selective retrieval and synchronized display on at least one of a plurality of remote video display devices comprising at least one of a plurality of handheld device displays; and a video synchronization engine for synchronizing the playing of video of the at least two visual perspectives of the at least one activity on the at least one of the plurality of remote video display devices based on time of capture information related to said video image tags on images.

12. The system of claim 11 wherein said at least one of said plurality of handheld device displays including an onboard video processing unit, an onboard GPS chipset, said onboard video processing unit having circuitry to process incoming and outgoing video furnished with GPS space and time coordinates on a toolbar screen inset.

13. A method for remote viewing of at least one activity from at least two different visual perspectives to a remote audience, said method comprising: receiving via a server, the at least two different visual perspectives of the at least one activity simultaneously captured during the at least one activity as a streaming video signal by a combination of at least one of a plurality of cameras singularly included in each of at least one of a plurality of handheld devices and at least one of a plurality of standalone cameras, all located near the at least one activity; processing the streaming video signal into video-related data and recording the video-related data in a database associated with said server; selectively retrieving and displaying said streaming video display signal by at least one of a plurality of remote video display devices authorized to communicate with the server and retrieve streaming video-related data over a data network; and registering via a registration module, the at least one of a plurality of remote video display devices and authorizing access to said server via a registration module.

14. The method of claim 13 wherein said server communicates with at least one of a plurality of wireless handheld devices.

15. The method of claim 14 wherein each of said at least one of said plurality of wireless handheld devices includes integrated components comprising a GUI based menu-driven touch screen display and a video processing unit with video tuning hardware to select segments of the streaming video signal viewable on said GUI based menu-driven touch screen display as real
time or pre-recorded video footage.

16. The method of claim 13 wherein the registration module authorizes access to said server to retrieve the streaming video signal of the at least two different visual perspectives from said database.

17. The method of claim 13 wherein the registration module authorizes access to said server to upload the streaming video signal into said database of the at least one activity captured by the combination of the at least one of said plurality of cameras and the at least one of said plurality of standalone cameras camera.

18. The method of claim 16 wherein said server communicates with at least one of a plurality of wireless hand-held devices.

19. The method of claim 18 wherein each of said at least one of said plurality of wireless hand-held devices includes integrated components comprising a GUI based menu driven touch screen display and a video processing unit with video tuning hardware to select segments of the streaming video signal viewable on said GUI based menu driven touch screen display as real time or pre-recorded video footage.

20. The method of claim 17 wherein said server communicates with at least one of a plurality of wireless hand-held devices and wherein each of said at least one of said plurality of wireless hand-held devices includes integrated components comprising a GUI based menu driven touch screen display and a video processing unit with video tuning hardware to select segments of the streaming video signal viewable on said GUI based menu driven touch screen display as real time or pre-recorded video footage.

1. A method for authorizing access by a user of at least one service associated with an event at a venue based on a location of said user as determined by assets of a data communications network, said method comprising: determining a location of at least one user based on communications of at least one computing device utilized by said at least one user with said data communications network supporting data communications of said at least one computing device; and authorizing said at least one computing device to receive said at least one service based on said location as determined by said data communications network.

2. The method of claim 1 wherein said data communications network further comprises at least one of a server, a gateway, a home location register and a visiting location register.

3. The method of claim 1 wherein said at least one user comprises a subscriber.

4. The method of claim further comprising: storing subscriber information associated with said subscriber in a database; and utilizing said subscriber information to authorize said at least one service for said subscriber.

5. The method of claim 1 wherein said at least one service comprises at least one of video data,
statistical information, concession information and advertisements.

6. The method of claim 1 wherein said authorizing said at least one computing device further comprises preventing said at least one computing device from receiving said at least one service beyond or within a particular geographical area based on said location determined by said data communications network.

7. The method of claim 1 wherein said authorizing said at least one computing device further comprises preventing said at least one computing device from receiving said at least one service absent at least one authorization code.

8. A system for authorizing access by a user of at least one service associated with an event at a venue based on a location of said user as determined by assets of a data communications network, said system comprising: a processor; a data bus coupled to said processor; and a computer-usable medium embodying computer code, said computer-usable medium being coupled to said data bus, said computer program code comprising instructions executable by said processor and configured for: determining a location of at least one user based on communications of at least one computing device utilized by said at least one user with said data communications network supporting data communications of said at least one computing device; and authorizing said at least one computing device to receive said at least one service based on said location as determined by said data communications network.

9. The system of claim 8 wherein said data communications network further comprises at least one of a server, a gateway, a home location register and a visiting location register.

10. The system of claim 8 wherein said at least one user comprises a subscriber.

11. The system of claim 10 wherein said instructions are further configured for: storing subscriber information associated with said subscriber in a database; and utilizing said subscriber information to authorize said at least one service for said user.

12. The system of claim 8 wherein said at least one service comprises at least one of video data, statistical information, concession information and advertisements.

13. The system of claim 8 wherein said instructions for authorizing said at least one computing device further comprise instructions for preventing said at least one computing device from receiving said at least one service beyond or within a particular geographical area based on said location determined by said data communications network.

14. The system of claim 8 wherein said instructions for authorizing said at least one computing device further comprise instructions for preventing said at least one computing device from receiving said at least one service absent at least one authorization code.

15. At least one server for authorizing access by a user of at least one service associated with an event at a venue based on a location of said user as determined by assets of a data communications network, said at least one server comprising: at least one processor capable of
determining a location of at least one user based on communications of at least one computing device utilized by said at least one user with said data communications network supporting data communications of said at least one computing device; and at least one processor capable of authorizing said at least one computing device to receive said at least one service based on said location as determined by said data communications network.

16. The at least one server of claim 15 wherein said data communications network further comprises at least one of a server, a gateway, a home location register and a visiting location register.

17. The at least one server of claim 15 wherein said at least one user comprises a subscriber.

18. The at least one server of claim 17 further comprising: at least one memory capable of storing subscriber information associated with said subscriber in a database; and at least one processor capable of utilizing said subscriber information to authorize said at least one service for said user.

19. The at least one server of claim 15 wherein said at least one service comprises at least one of video data, statistical information, concession information and advertisements.

20. The at least one server of claim 15 wherein said authorizing said at least one computing device further comprises preventing said at least one computing device from receiving said at least one service beyond or within a particular geographical area based on said location determined by said data communications network.

21. The at least one server of claim 15 wherein said authorizing said at least one computing device further comprises preventing said at least one computing device from receiving said at least one service absent at least one authorization code.

Description

CROSS-REFERENCE TO RELATED APPLICATIONS AND PRIORITY

[0001] The present application is continuation of U.S. patent application Ser. No. 12/844,122, which was filed on Jul. 27, 2010, and which is incorporated herein by reference in its entirety. U.S. patent application Ser. No. 12/844,122 in turn is a continuation of U.S. patent application Ser. No. 12/210,971, entitled "Providing Multiple Video Perspectives of Activities Through A Data Network to a Remote Multimedia Server for Selective Display by Remote Viewing Audiences," which was filed on Sep. 15, 2008, the disclosure of which is incorporated herein by reference in its entirety.

[0002] U.S. patent application Ser. No. 12/210,971 is a continuation-in-part of U.S. patent application Ser. No. 10/620,098 entitled "Providing Multiple Synchronized Camera Views for Broadcast From a Live Venue Activity to Remote Viewers" filed on Jul. 14, 2003, which is a


[0006] U.S. patent application Ser. No. 12/210,971 is also related to issued U.S. Pat. No. 7,376,388, also incorporated herein by reference in its entirety for its teaching.

TECHNICAL FIELD

[0007] Embodiments are related to video-enabled data processing devices and systems. Embodiments also relate to techniques for providing increased viewing opportunities for video and photographic perspectives of activities that can occur during their recording privately or at public entertainment venues and community environments, such as sports stadiums, arenas, convention centers, concert halls, political convention, trade shows, Olympic events, and the like. Embodiments additionally relate to techniques for transmitting video-related data captured by cameras located near an activity over a data network to a server. Servers can be located at or
away from a recorded activity. More particularly, embodiments are also related to a system capable of processing video-related data including multiple visual perspectives or vantage points captured by multiple cameras located at or near the activity and stored in a remote multimedia server for selective display of visual perspectives at a variety of user video display devices (e.g., digital televisions, set-top boxes, computers, wireless handheld devices) in wired or wireless communication with multimedia servers and service providers.

BACKGROUND OF THE INVENTION

[0008] Most modern sports stadiums and live entertainment facilities, convention centers, halls or arenas and the like (herein also collectively referred to as "entertainment venues") employ cameras positioned to capture video images at diverse locations within the stadium. The audience at a typical sporting event, for example, can generally view advertisements, instant replays, and other sports-related data on the large television screens within the sports stadium itself. Audience viewing sporting events remotely (e.g., from their homes) can also view video, instant replays, advertisements and other sports-related data; however, video feeds that are broadcasted remotely through satellite and cable television networks or displayed at the venue are limited to a single aspect provided for broadcast to remote displays one at a time from venue controlled media or broadcast media directors. Media directors, normally located in a broadcast room/booth, have access to several perspectives of an activity captured by cameras located at the entertainment venue simultaneously and can cause the real time play and replay of various aspects of the action at the event while also enabling commentators to provide comments about what is being displayed. Video feeds are typically transmitted/broadcasted under licensing arrangements with broadcasting entities for viewing by a remote viewing audience.

[0009] Fans/spectators of an entertainment venue activity have been limited in the past over what video perspectives they can view because video broadcasted from or shown at a venue because perspectives are pre-selected by media directors and broadcasters for the remote viewing audience. The remote viewing audience can utilize television sets to view broadcasted video transmitted through cable television, satellite and radio frequency (RF) transmissions. Computers can also be used to view streaming video data transmitted over data networks. Despite the availability of remote resources for the remote viewing audience to view video captured by cameras at entertainment venues, the user is still currently restricted to viewing a single pre-selected (or released) video. Furthermore, video perspectives are limited by the amount and placement of cameras located within the entertainment venue and controlled by entertainment venue operators and licensees. Even in situations where multiple perspectives of an activity are recorded, images recorded from various perspectives are not synchronized to a particular time period and location. What is needed are more video viewing options for remote viewing audiences where multiple perspectives of an activity are available as recordings. What is also needed are video media viewing options that enable remote viewing audiences to view multiple perspectives of an activity from the same point in time and at different angles with respect to the activity.

[0010] It is therefore desirable given the present invention that remote viewing audiences be provided enhanced viewing options in the form of multiple viewing perspectives captured by cameras within the entertainment venue as well as any other activity, public or private, wherein
cameras may be utilized to capture video. The present inventor believes that additional video perspectives provided in the form of new video viewing options captured at entertainment venues and of other activities not necessarily tied to an official sports venue can be provided to remote viewing audiences over current data networks (wired and wireless) for display at various user devices (e.g., computers, High Definition Televisions (HDTVs), set-top boxes such as TiVo.TM. devices and those provided by cable and satellite companies like Comcast.TM., DirecTV.TM. and Dish Network.TM., and handheld devices, such as Palm.TM., BlackBerry.TM. and iPhone.TM. PDAs, other data/video-enabled cellular telephones, and other hand held wireless video-enabled devices such as Apple iTouchT.TM., Nintendo DS.TM. and Sony Playstation.TM. (PSP) devices), iPhone.TM. and iTouch.TM. are registered trademarks of Apple Inc., BlackBerry.TM. is a trademark of Research In Motion Ltd., Palm.TM. is a trademark of Palm Inc., TiVO.TM. is a trademark of TiVo Inc., DIRECTV.TM. is a trademark of DIRECTV Inc., Dish Network is a trademark of EchoStar Communications Corporation, Nintendo DS.TM. is a trademark of Nintendo of America Inc., and Sony PSP.TM. is a trademark of Sony Corporation Entertainment America Inc.

[0011] Much of what is needed to teach aspect of the present invention has already been described in the patent applications that are incorporated herein by reference with priority extending back to the years 2001 and 2000. Since then, video sharing websites and online communities have come into being such as YouTube.com.TM., MySpace.com.TM., Flickr.TM., Faneast.TM. and MyFrontRow.com.TM. for basic video and picture sharing, and Second Life.TM. (abbreviated SL), for more engaged interaction by community members virtually using avatars. YouTube is a trademark of Google Inc., MySpace.TM. is a trademark of MySpace Inc., Flickr.TM. is a trademark of Yahoo Inc., Facebook.TM. is a trademark of Facebook Inc., Faneast.TM. is a trademark of Comcast Corporation, MyFrontRow.TM. is a trademark of Front Row Technologies, LLC, and Second Life.TM. is a trademark of Linden Research Inc. The number on online communities with video and picture sharing capabilities continues to grow; but there is still much room for improvement in the delivery of media to end users such as those that are members of an online community, or to remote spectators watching high definition television through cable and satellite broadcasting services. Enhanced video and picture management and retrieval where multiple perspectives of the same activity when available will provide a higher level of service value to end users of current online multimedia services and resources and is what is still needed in online communities as they continue to develop. Enhanced video and picture capturing, sharing, searching and viewing capabilities for multimedia content providers, enablers and broadcasters will now be possible with the reaching of the present invention.

[0012] Handheld computing devices (i.e., also referred to as "hand held devices" or "wireless handheld devices") have become increasingly popular over the past decade for storing and maintaining information. Many handheld devices include video recording capabilities and can communicate with available wired and wireless data communications networks including the Internet via wireless communication transceiver links to data communications networks (e.g., cellular data networks that are 3G enabled). Handheld devices that are capable of displaying and recording video and can communicate wirelessly with data networks were also taught in the prior patent applications for which the present application claims priority.

[0013] The present inventor further believes that viewing audience can also be provided
enhanced access to captured video content through servers where the data is identified for access from the multimedia servers based on title, location, date, and other related data. A geotag or geostamp is a sequence of characters that can be associated with data to denote a time and location at which a certain event occurred. A geotag can typically include information about latitude, longitude, time, and elevation. Data can be taken from Global Positioning Satellites (GPS). Although tags with geographical information can be used in association with captured video and pictures, current wireless handheld devices with integrated cameras, GPS and wireless data communications capabilities are not adapted to automatically tag pictures as they are taken. Geographical tagging without automation (and possible standardization) is simply not convenient for most users because tagging requires too much time or steps using available software and hardware to determine and associate with captured video and picture data.

[0014] The present inventor believes that wireless GPS-enabled handheld devices that include video cameras, video recording capabilities and wireless data communications can be utilized to provide video and still pictures with geographical information, automatically. It would also be more desirable and acceptable for general use if video and pictures could automatically be tagged with location, time and date information so that subsequent retrieval from a server can be facilitated based on a location, date and time of interest. It would also be desirable if users accessing servers containing tagged video and pictures could retrieve video and picture related data based on membership or access to a particular community, or to be able to search a point in time and location of interest. For example, a user may want to search for content from a specific GPS location and within a specific distance from the GPS location, at a specific date and within a particular point of or span in time. Such a capability would be of high value and very useful for entertainment, business and national security purposes.

[0015] The present invention enables many new capabilities for video related media to address a broad spectrum of applications and the needs of end users. The present invention provides enhancements over spectator access to video and picture related data accessible via servers, online services and communities, and over a data communications and broadcast networks and end user multimedia hardware.

BRIEF SUMMARY

[0016] One aspect of the present invention provides improved methods and systems for delivering activity-related video data and pictures to a multimedia server for access by remote video display devices having access to the multimedia server.

[0017] It is another aspect of the present invention to provide improved methods and systems for delivering video captured from different visual perspectives of an activity, such as private activities as well as public activities including those occurring in an entertainment venue, to a server for processing and access by remote display devices.

[0018] It is still another aspect of the present invention to provide methods and systems for providing multiple visual perspectives from an activity for viewing through remote display devices.
[0019] It is yet another aspect of the present invention to provide systems and associated methods that provide on-demand video action and instant replays from multiple camera angles captured from venue and/or private user cameras focused on the activity.

[0020] It is yet another aspect of the present invention that venue and/or private user handheld devices with cameras that are focused on the activity can capture video including identifying data such as electronic tag bearing the date, time and location information where the video (or pictures) were captured (e.g., GPS location and time stamped where time stamping can be provided from GPS-UTC or from Atomic dock time).

[0021] It is another aspect of the present invention to provide wireless handheld devices with wireless data network communications, a video camera, GPS and software enabling automatic geographic location and time tagging for recorded media.

[0022] It is yet another aspect of the present invention that enables users to access a multimedia server and access video and photos captured of an activity and including identifying data such as electronic tag bearing the date, time and location information where the video (or pictures) were captured (e.g., GPS and time stamped) and also enables the users to search for video and/or photos of an activity based on time, date, location, title, category, and also enable the limiting of distance from the location of interest and timeframe for which data should be retrieved when location information is provided with the data.

[0023] It is yet another aspect of the present invention that enables users to access video of an activity in multiple visual perspectives from a multimedia server and simultaneously play/replay the multiple visual perspectives of video in synchronicity based on data tagging embedded in video data.

[0024] According to unique features of the present invention, systems and methods provide increased remote video viewing opportunities of activities, private and public, including activities that occur at entertainment venues. Video-related data including multiple visual perspectives captured by cameras located at or near the activity can be transmitted over wired/wireless data networks to a server where video-related data is processed and recorded for selective display by authorized, remote video display devices (e.g., HDTV, set-top boxes, computers, and wireless handheld devices) also in wired/wireless communication with the server. Users and online communities can be registered with multimedia servers or a service and users can be authorized to access a server to provide video captured at an activity. Single user registration or registration in association/membership with a community is enabled. Video can be captured by users using a camera included in a wireless handheld device. Registered user can selectively retrieve video related data captured at the activity for display by video display devices. Captured video can be organized in servers based on at least one of: activity title, activity time, activity date, activity place, GPS location of wireless handheld device at time of video recording.

[0025] A server can be provided that is adapted to: receive different visual perspectives of a public activity captured by more than one camera located at the activity, process the different visual perspectives into video-related data and record the video-related data for selective retrieval.
and display by user video display devices authorized to communicate with the remote server over a data network.

[0026] A registration module can be provided that is adapted to register users and authorize user access to the server to provide video captured at the activity using a camera included in a wireless handheld device and selectively retrieve video-related data captured at the activity for display by a user video display device.

[0027] An activity organization module can be provided that is adapted to organize video captured by a user at the activity using a camera included in a wireless handheld device and provided to the server, wherein the video is automatically organized by the server based on identifying data including at least one of: activity title, activity time, activity date, activity place, GPS position of wireless handheld device at time of video recording, and the activity organization module can be further adapted to provide a user selective access to the organized video from the server based on a request from the user of at least one of: activity title, activity time, activity date, activity place, wireless handheld device GPS position at time of video recording. GPS information typically includes the latitude, longitude, and time (e.g., UTC or Atomic dock time). The time, date and location can be specified when provided as part of the search criteria for media (e.g., GPS Lat xx.xx.xx and Long xx.xx.xx within a 0.5 mile radius, from 1700 hrs to 1730 hrs). Proper "time" identification tagging of video when/as recorded is important where synchronization of multiple perspectives for accurate viewing simultaneously on displays associated with video display devices is desired. Accurate timing can be provided by GPS-based UTC time and also by Atomic Clock time to ensure that video of an activity recorded by/from disparate sources can be synchronized when played or replayed on remote video systems.

[0028] A community association module can be provided that is adapted to associate registered users with online communities also registered within the server and to provide a user with selective access to organized video of activity captured by cameras used by community members of an activity and provided to a server, wherein the video is provided to the user from the server based on a request from the user of at least one of: activity title, activity time, activity date, activity place, wireless handheld device location (e.g., GPS) at time of video recording, and distance from a location of interest.

[0029] A method providing increased remote video viewing opportunities of activities including those public and private that occur at entertainment venues to a remote audience can include the step of registering users and online communities at a server adapted to receive and process video and authorizing the users associated with online communities to access said server adapted to receive and process video to provide video captured at the activity using a camera included in a wireless handheld device and to selectively retrieve video-related data captured at the activity for display by video display devices.

[0030] A method step can be provided for receiving different visual perspectives of an activity captured as video by more than one camera located at an activity at a server adapted to receive and process video, wherein the different visual perspectives are received at the server adapted to receive and process video through a data network.
A method step can be provided for processing the different visual perspectives at the server adapted to receive and process video into video-enabled data and recording the video-enabled data in a memory (e.g., database) associated with the server adapted to receive and process video.

A method step can be provided for organizing video captured by a user at the activity using a camera included in a wireless handheld device and provided to the server adapted to receive and process video based on identifying data including at least one of: online community name, activity title, activity time, activity date, activity place, wireless handheld device GPS position at time of video recording.

A method step can be provided for providing user access to the organized video from the server adapted to receive and process video based on a request from the user of at least one of: activity title, activity time, activity date, activity place, wireless handheld device GPS position at time of video recording. The video-related data is provided to the video display devices from a server adapted to receive and process video over a data network. Again, it is a feature of the present invention that the time, date and location of an event capture can be specified when provided as part of the search criteria for recorded media (e.g., GPS lat xxxxxx and long xxxxxx within a 0.5 mile radius, from 1700 hrs to 1730 hrs, on Dec. 31, 2008). Again, accurate timing recorded on the media, e.g., if provided by GPS-based UTC time and also by Atomic Clock time, can ensure that video of an activity recorded by/from disparate sources can be synchronized when played or replayed on remote video systems; especially when multiple perspectives are played on a display simultaneously over split screen views provided in a video display.

Yet another method step can be provided that enables accessed video of an activity in multiple visual perspectives from a multimedia server to be simultaneously play/replay in synchronicity on a video display based on data tagging embedded in video data.

The above and other aspects of the invention are achievable as will now be further described.

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of this invention are set forth in the appended claims. The invention itself, however, as well as a preferred mode of use, further objects, and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

FIG. 1 depicts a diagram wherein several cameras are recording various perspectives of an activity at a venue;

FIG. 2 illustrates a block diagram of camera-enabled handheld devices recording video of an activity from different perspectives for transmission through a wireless gateway for storage at a multimedia server;
FIG. 3 illustrates a block diagram of cameras recording video data of an activity for storage in a server and a remote client accessing the stored video from the server over a data network;

FIG. 4 illustrates a block diagram of cameras recording video data of an activity for storage in a server and a handheld multimedia device, capable of viewing video, accessing captured video as streaming data from the server through a wireless data communications network and/or as a broadcast;

FIG. 5 illustrates a system diagram of video captured by cameras at an activity provided to a server and the video data provided to wireless handheld devices located near the activity through data communications hardware, and also data provided by data communication hardware through a data network to remote multimedia content provider hardware for transmission via cable, radio frequency transmission or satellite to a multimedia presentation device (e.g., high definition television, set top box, computer or handheld devices located away from the activity);

FIGS. 6-7 illustrate block diagrams of typical data flows and protocols in a data communications network;

FIG. 8 illustrates a data network system diagram for a typical client, server, data network, Internet service provider communications arrangement;

FIG. 9 illustrated an exemplary screen shot for a video archiving and subscription service entitled MyFrontRow.TM, which enables community and individual user registrations, video archiving, and video retrieval for video captured at activities by venue operators, fans and privately owned, video camera-enabled, handheld device users; and

FIGS. 10-13 illustrate flow diagrams of various methods for providing increased remote video viewing opportunities of activities including private activities and public activities that occur at entertainment venues and within physical communities to a remote audience, in accordance with features of the present invention.

DETAILED DESCRIPTION

Referring to FIG. 1, illustrated is an example of an entertainment venue 100, such as a football stadium. An entertainment venue typically includes a public attendee seating area 101, which is typically divided according to seats and sections, surrounding an activity area 110, which is typically reserved for access by authorized personnel and performers/athletes. The seating area 101 surrounding the activity area 110 can be divided into sections, e.g., sections A through N is shown. Several venue controlled video cameras C1-Cn can be deployed throughout the entertainment venue 100 and can typically surround the activity area 110 to provide multiple vantage points from which to capture video for broadcast and display of the activity taking place in the entertainment venue. In addition to entertainment venue controlled cameras C1-Cn, many private handheld devices enabled with video cameras M1-Mn and owned/carried by attendees (e.g., spectators and fans) can be located throughout the entertainment venue. An entertainment venue 100 can be utilized for sports activities, concert...
activities, political rallies, or other activities requiring a large space. Entertainment venue controlled cameras C1-Cn together with private handheld cameras M1-Mn provide an opportunity for vast coverage of the activity area 110.

[0047] FIG. 1 illustrates how effectively an entertainment area 110 can be covered by various video cameras capturing video and/or pictures of an activity. Entertainment venue controlled camera one (C1) 121 is shown located near the center field location of the venue providing a central view of the activity area 110. Entertainment venue controlled cameras two (C2) 122 and three (C3) 123 are shown located at opposite end zone locations of the activity area 110. Entertainment venue controlled camera n (Cn) 124 is shown at the opposite side of the activity area 110 in Section H. The entertainment venue controlled cameras C1-On can obviously provide good visual coverage of the activity area; but it can be appreciated that attendee handheld devices equipped with video recording capabilities are mobile and can also be deployed in several areas through the public attendee area 101, thereby providing an even richer selection of video perspectives for fans that might be observing the activity, or may be located at home or any other remote location outside of the venue proper.

[0048] Attendee handheld device one (M1) 131 is shown located in Section A with a slightly different vantage point that entertainment venue controlled camera one (C1) 121. Attendee handheld device one (M1) 131 clearly compliments the perspective captured by entertainment venue controlled camera one (C1) 121 from Section A. Attendee handheld devices two (M2) 132 and three (M3) 133 are located at centralized end zone locations (Sections E and K respectively). Attendee handheld devices two and three clearly provide views that were not covered by the entertainment venue controlled cameras. Another attendee handheld device (Mn) 134 is shown located in Section G, providing yet another perspective for activity fans.

[0049] The deployment of multiple cameras as shown for the entertainment venue illustrated in FIG. 1 offers unique multimedia content, which can be of value to all spectators. Although an entertainment venue 100 is shown in FIG. 1, it should be appreciated that an "activity" does not have to take place within a public "entertainment" venue to be recorded by video cameras. Indeed, activities of interest can also take place at private or public events and locations that do not draw large scale attendance but are nevertheless of high interest. For example, a little league baseball game might be recorded by several parents attending the game. A competition that is distributed over a vast area, such as a bike or auto race, can be captured from various, distributed perspectives. Views captured by private attendees at such events are of value to all attendees and can be shared by using a multimedia server in accordance with features of the present invention. Camera views can be captured by more than camera deployed about and/or in surrounding a live sports or entertainment venue activity 110, such as a racing event, ball game, concert, golf, Olympic event, political rally, boxing or wrestling ring, and casino activities such as sports book. The activity does not have to be entertainment based to be of value and can be stored in a server by individuals working alone or as a member of an organized community/group. Proper "time" identification tagging of video when/as recorded is important where synchronization of multiple perspectives for accurate viewing simultaneously on displays associated with video display devices is desired. Accurate timing can be provided by GPS-based UTC time and also by Atomic Clock time to ensure that video of an activity recorded by/from disparate sources can be synchronized when played or replayed on remote video systems.
An activity can also be of educational, commercial or government interest. For example, if a natural disaster or terrorist act occurred where several witnesses were able to record the event with personal handheld video cameras, the video images may be of very high value from a national security or investigation standpoint and can be shared via a multimedia server adapted to collect and organize various videos. The Department of Homeland Security (DHS) and government investigative and intelligence agencies, for example, would be interested in collecting as much information about an unfortunate, public event as possible in order to find those responsible, or to prevent future occurrences. A Hollywood scenario in the 2008 movie release "Vantage Point" is a fictitious action movie that provides moviegoers a scenario where an attempted assassination of the president is told from five different points of view. Although fictitious, the scenario revealed in this movie is a good example where video data in synchronicity from different vantage points from a real-world situation can become highly valuable and necessary for investigative purposes. As another example, a casino operator can also be very interested in monitoring various perspectives within the casino for security purposes. Fulfillment of these needs and other application can be envisaged now given the present invention.

Referring again to the illustration in FIG. 1, assuming that the venue 101 is instead a town or a city, the activity 110 of interest may be observed by spectators at various locations surrounding the activity. If witnesses to an activity also have the means to capture video or photographs of the activity and could upload the captured data into a server where the date, time and location for the data is also identified, then researchers or investigators can easily find important, high value information about the activity from servers. Again, proper "time" identification tagging of video when/as recorded is important where synchronization of multiple perspectives for accurate viewing simultaneously on displays associated with video display devices is desired. Accurate timing can be provided by GPS-based UTC time and also by Atomic Clock time to ensure that video of an activity recorded by/from disparate sources can be synchronized when played or replayed on remote video systems. GPS tagging, which will be described in more detail below, can actually provide date, time and location with great accuracy and may be best suited for providing this information on media.

Those sidled in the art can appreciate that hand held devices can be implemented as a Internet-enabled cellular communications device, such as a Blackberry.TM., iPhone, and Palm Treo.TM. Smart phones and PDA devices sold today include high-speed data network access (e.g., HSPA-HSDPA, WiMAX, Edge, GSM, etc.), providing video streaming, provide Internet access, and can capture video with greater than 1 megapixel image capturing capability. Global position system (GPS) chipsets are also provided on handheld devices today. Handheld devices such as PDAs and Smart Phones have been thoroughly described in the patent applications which are incorporated by reference with priority. Furthermore, those skilled in the art are currently well informed about most of the features and operation of handheld devices. For these reasons, additional detail is not required for a generally understanding of wireless handheld devices as they are used with or to carry out the unique features of the present invention.

To the extent the provision of wireless handheld devices with wireless data network communications, GPS and video recording camera can be improved to best operate in
In accordance with features of the present invention, a software module can be provided as part of the multimedia features in a handheld device that can automatically include a data tag on the recorded media that can indicate the location and time of video or picture recording. For example, a time and location sentence can be embedded in the digital file or as a message embedded in pixilated media that will provide the time and location of the recorded activity. A data tag sentence that will indicate that a photograph or video was captured on Dec. 31, 2008 at UTC time 12:35:19 and at GPS location Latitude 48 deg 07.038' N; Longitude 11 deg 31.000' E can be provided in a simplified format that can read as follows: 12312008,123519,4807.038,N,01131.000,E. An abbreviated data tag can be easily searched for in searchable databases within a server. The server and/or database can be programmed to convert the data tag into searchable media where a user of a multimedia service may request that video/pictures be found from a within one half mile of a specification GPS location within a range of time by entering identifying information into search field over a graphical user interface (GUI). An example search can include the following: Search within Distance=0.5 mile(s) of GPS Location=Latitude 48 deg 07.038' N and Longitude 11 deg 31.000' E ; at Time=1700 hrs to 1730 hrs; Date=Dec. 31, 2008). Access to recorded media, therefore, can be provided to users from the server based on search criteria specific to the timeframe, date and location of the data's capture as described above. For example, a researcher can request from the multimedia server that video and pictures of an activity taking place at a specific location, at a specific date, during a given timeframe as receive only media that is relevant to the exact activity of interest (e.g., winning touchdown, questionable call by a referee, a spectacular public sighting, a catastrophic event, and event of political, educational and investigative interest).

[0054] As described above, if wireless handheld devices have GPS capability and integrated video cameras, software programming can be incorporated as a companion application with multimedia software used to capture/record video and photographs to enabling the tagging of any media captured by the video camera (video or pictures) to include an associated data stamp that includes, the date, time, and GPS location for the captured video or picture data as it is actually recorded. It can even be possible to include the direction in degrees (e.g., using an electronic compass) and altitude of the handheld device when the video/pictures were actually captured by the camera. Additional data can be entered into the server when video/photos are uploaded, such as title, location or event names, etc. Users can later access the multimedia data, now organized as video or pictures from a server with at least one of: activity title, activity time, activity date, activity place, wireless handheld device GPS position at time of video recording, altitude at capture, orientation or direction of capture by handheld during capture (i.e., provided in degrees from magnetic north an electronic compass integrated in the camera/handheld device).

[0055] It is appreciated that privacy may come into play with certain technology. The idea of automatically tagging video or photographs when they are captured by cameras may not settle well with some users. For this reason, Handheld devices can also be programmed to enable the user/owner of the cameras to disable or suppress tagging for photograph if location information is not desired. This may be an important privacy feature depending on the sensitivity of the multimedia content being recorded by the camera. The software module can allow GPS to be overriding by depressing a button, soft button or set up parameter before taking video footage with the handheld device.
Referring to FIG. 2, a block diagram of camera-enabled handheld devices 131-134 including integrated video cameras 137 for recording video of an activity 110 for transmission through a wireless gateway 140 for storage at a server 150 is illustrated. In accordance with a feature of the present invention, a server 150 can be provided that is capable of receiving different visual perspectives of an activity 110 captured by more than one camera 131-134 located at, near and/or around the activity 110. The server 150 can process the different visual perspectives of the activity 110 into video-related data and record the video-related data for selective retrieval and display by user video display devices authorized to communicate with the server 150 over data networks.

A registration module 151 can be provided with the server 150 that is adapted to register users and authorize user access to the server to: provide video captured at the activity 110 using a camera 137 included in a wireless handheld device 131 and selectively retrieve video-related data captured at the activity for display by a user video display devices.

An activity organization module 152 can be provided with the server 150 that is adapted to organize video captured by users at the activity using a cameras 131-134 including a camera 137, where videos of various perspectives of the activity 110 are provided to the server 150, and wherein the video is automatically organized by the server based on identifying data including at least one of: activity title, activity time, activity date, activity place, location (e.g., GPS stamp as a location data tag) of wireless handheld device at time of video recording. The activity organization module can be further adapted to provide a user selective access to the organized video from the server based on a request from the user of at least one of: activity title, activity time, activity date, activity place, and wireless handheld device location at time of video recording. Camera orientation, location and direction can also be features that are used as information associated with an electronic tag included with video images.

A community association module 153 can be provided with the server 150 that is adapted to associate registered users with online communities (e.g., membership group) also registered within the server 150 and to provide a user selective access to organized video of activity captured using a camera 137 included in a wireless handheld device 131 by registered community members attending an activity and which are provided to the server 150. Video can then be provided to all registered users of the community from the server 150 based on a request from the registered community user of at least one of: activity title, activity time, activity date, activity place, wireless handheld device location at time of video recording.

A video synchronization module 154 can be provided with the server as shown in FIG. 2, or with the remote client (e.g., HDTV, set-top box, and other video display devices not shown in FIG. 2). The video synchronization module 154 when provided is adapted to simultaneously play/replay video captured from different visual perspectives of an activity in synchronization with each other based on the time that the simultaneous videos were captured. Synchronization is possible using time stamp information embedded as data tagging information in video data associated with streaming video.

Those skilled in the art can appreciate that although real time video data may be transmitted to server 100, past captured video images can also be stored/archived within server...
100 and transferred to user display devices such as hand held device 131 for display at display. For example, instant replays may be transferred as video data to hand held device 131 upon the request of a user of hand held device 131 at a venue, or a user watching an activity from home can request the replay for display on a high definition television set, or through a video router, on a computer or on a handheld device. Such instant replay footage can be displayed on display screen of various, data network enabled devices for the user to view.

[0062] Referring to FIG. 3, a block diagram 200 of cameras 131-134 recording video data 221-224 of an activity 110 for storage in a server 150 and a remote client 180 having a display 185 and adapted to access the stored video data 221-224 from the server 150 over a data network 170.

[0063] Referring to FIG. 4, a block diagram 300 of cameras 121-124 recording video data 221-224 of an activity 110 for storage in a server 150 and a handheld multimedia device 380 having a display screen 385 and capable of viewing the video data 221-224 by accessing the video data 221-224 from the server 150 through a wireless data communications network as streaming video and/or as a broadcast. Server 100 can also communicate with handheld devices through a wireless cellular communication network (e.g., 3G, HSPA/HSDPA, Edge, WiMAX, COMA, or other wireless communication means). A wireless data transmitter/receiver 340 capable of supporting the wireless data communications can be integrated with hand held device 380.

[0064] Referring to FIG. 5, a system diagram 400 of video captured by cameras 421-422 at an activity 110 provided to a server 150 and the video data provided to wireless handheld devices 310 located near the activity through data communication hardware 340. Data can also provided by data communication hardware 340 through a data network 170 to remote multimedia content provider hardware 450 for transmission via cable 430, radio frequency transmission 420 or satellite 440 to a multimedia presentation device 410 (e.g., high definition television, set-top box used with satellite and cable television service such as devices provided by TiVo.TM., computer or handheld devices located away from the activity 110) is illustrated. In the illustration, the example activity 110 is shown as a boxing ring incorporate cameras surrounding the ring and synchronized in a master-slave relationship located over the ring for automated the capture of video using master-slave camera technology. Servers and multimedia devices referred to herein can include systems such as those supported by subscription services (e.g., digital cable television and satellite television providers) and digital recording equipment. Thereafter, multiple camera view data can be viewed and replayed via cable or satellite to a users/subscriber's remote viewer (e.g., HDTV display, set-top boxes).

[0065] Those skilled in the art can appreciate that wireless networks and servers can also receive and retransmit other data, in addition to video data. For example, a server or other computer system may be integrated with wireless network to provide team and venue data, which can then be transferred to wireless data transmitter receiver from wireless network and displayed thereafter as team and venue information within display screen of a users display device. Other data that may be transferred to hand held device for display include real-time and historical statistics, purchasing, merchandise and concession information, and additional product or service advertisements.

[0066] Data can also include box scores, player matchups, animated playbooks, shot/hit/pitch
charts, historical information, and offense-defense statistics. In a concert venue, for example, as opposed to a sporting event, information pertaining to a particular musical group can be also transferred to the hand held device, along with advertising or sponsor information. Note that both the video data and other data described above generally comprise types of venue-based data. Venue-based data, as referred to herein, may include data and information, such as video, audio, advertisements, promotional information, propaganda, historical information, statistics, event scheduling, and so forth, associated with a particular venue and generally not retrievable through public networks. Information data can be transmitted together with video data received from data transmitter. Such information may be displayed as streaming data within a dedicated display area of a user's video display or simply stored in a database for later retrieval by the user.

[0067] A wireless gateway 124 and server 150 can be associated with a wireless network implemented in association with stadium venue 100. Those skilled in the art can appreciate that such a wireless network can be geographically located in a stadium venue 100, or the immediate surrounding area. It should also be appreciated that a server can operate across a country and still operate as taught herein to register user, retrieve, store and provide video form/to registered users. Capacity and transmission bandwidth are the only constraints for a multimedia delivery system. These limitations continue to be overcome with faster servers, optical data networks, and high-bandwidth wireless data communication networks such as 3G cellular and WiMAX.

[0068] It can be appreciated by those skilled in the art that the system illustrated with respect to FIGS. 6 to 8 generally describes an example of one type of computer network in which the embodiments disclosed can be implemented. It can be appreciated that other types of computer networks can also be utilized in accordance with alternative embodiments of the present invention, such as, for example, token ring networks, Intranets or organizationally dedicated computer networks rather than a more open computer network, such as the Internet. FIGS. 6 & 8 are thus presented for illustrative purposes only and are not considered limiting features of the system as data network communications systems continue to evolve and improve. Note that the term "Internet" is well known in the art and is described in greater detail herein. Also note that the client/server architecture described in FIGS. 6-8 represents merely an exemplary embodiment. It is believed that the present invention can also be embodied in the context of other types of network architectures, such as, for example company "Intranet" networks, wireless communication networks, cellular (3G, HSDPA or high-speed downlink packet access which is part of the high-speed packet access family of protocols, and future, e.g., HSPA+, etc. as released), WiMAX, and the like.

[0069] FIG. 6 illustrates a block diagram illustrative of a client/server architecture system 600 in which one or more embodiments can be implemented. As indicated in FIG. 6, user requests 601 for data can be transmitted by a client 610 (or other sources) to a server 650. Server 650 can be analogous, for example, to server 100 described earlier herein. Server 650 can be implemented as a remote computer system accessible over the Internet, the meaning of which is known, or other communication networks. Server 650 can perform a variety of processing and information storage operations. Based upon one or more user requests, server 650 can present the electronic information as server responses 602 to the client process. The client process may be active in a first computer system, and the server process may be active in a second computer system, communicating with one another over a communications medium, thus providing distributed
functionality and allowing multiple clients to take advantage of information processing and storage capabilities of the server, including information retrieval activities such as retrieving documents from a managed service environment.

[0070] FIG. 7 illustrates a detailed block diagram of a client/server architectural system 700 in which one or more embodiments can be implemented. Although the client 710 and server 750 are processes that are generally operative within two computer systems, such processes can be generated from a high level programming language, which can be interpreted and executed in a computer system at runtime (e.g., a workstation), and can be implemented in a variety of hardware devices, either programmed or dedicated.

[0071] Client 710 and server 750 communicate utilizing the functionality provided by HTTP 701. Active within client 710 can be a first process, browser 715, which establishes connections with server 750, and presents information to the user. Any number of commercially or publicly available browsers can be utilized in various implementations in accordance with one or more embodiments. For example, a browser 715 can provide the functionality specified under HTTP 701. A customer administrator or other privileged individual or organization can configure authentication policies, as indicated herein, using such a browser 715.

[0072] Server 750 can execute corresponding server software, such as a gateway, which presents information to the client in the form of HTTP responses 701. A gateway is a device or application employed to connect dissimilar networks (i.e., networks utilizing different communications protocols to serve digital television customers) so that electronic information can be passed or directed from one network to the other. Gateways transfer electronic information, converting such information to a form compatible with the protocols used by the second network for transport and delivery. Embodiments can employ Common Gateway Interface (CGI) 704 for such a purpose.

[0073] In computer to computer environments where a data network such as the Internet is used to transfer data, the HTTP responses 701 generally correspond with "Web" pages represented using HTML 702, or other form data 706 generated by server 750. Server 750 can provide HTML 702. The Common Gateway Interface (CGI) 704 can be provided to allow the client program to direct server 750 to commence execution of a specified program contained within server 750. Through this interface, and HTTP responses 701, server 750 can notify the client of the results of the execution upon completion.

[0074] FIG. 8 illustrates a high-level network diagram illustrative of a computer network 800, in which embodiments can be implemented. Computer network 800 can be representative of the Internet, which can be described as a known computer network based on the client-server model discussed herein. Conceptually, the Internet includes a large network of servers 814-820 that are accessible by clients 802-812, typically users of personal computers, through an Internet service provider 822.

[0075] Each of the clients 802-812 can operate a browser 715 to access one or more servers 814-820 via service provider 822. Each server 814-820 can operate a so-called "Web site" that supports files in the form of documents and web pages. Clients 802-912 and server 814-820 can
also operate as a peer-to-peer network, which is popular for data/file sharing. A network path to servers 814-820 can be generally identified by a Universal Resource Locator (URL) having a known syntax for defining a network collection. Computer network 800 can thus be considered a "Web-based" computer network.

FIG. 9 illustrates a pictorial view of a sample graphical user interface "web page" window 900 that can be implemented as a graphical user interface display in accordance with features of the present invention. Those skilled in the art will appreciate that the term "webpage" refers simply to a "page" of an Internet "web" site. The term "homepage" is commonly utilized in the Internet computer networking arts to refer to a primary web page or primary web "site". Subsets or specific related areas can be referred to simply as "pages." FIG. 9 illustrates a web browser-based graphical user interface "window." 900 in which multiple perspectives of activity taking place within a venue such as venue 100 can be selected by a user and displayed within the display screen of a client such as 802 that is in communication with a server 150 via the Internet 800. Window 900 can display, for example, a web browser application. Where multiple visual perspectives of the same activity are available, they can be simultaneously displayed in separate display areas as will be further described. Additionally, where video has been time tagged (e.g., using Atomic dock, UTC time and GPS, as previously described), video can be synchronized to run simultaneously so that more than one visual perspective of the same activity can be seen at the same time. This provides the user a greater viewing experience. A display area streaming a particular view of interest to the user can be selected and enlarged (blown up) up to a full screen view for enhanced viewing. Streaming videos can be reversed, forwarded and replayed at will by the user. All video streams, when synchronized, can be reversed, forwarded and replayed in synchronization where the video are data tagged as described herein.

Icons 921 are generally displayed within the web browser application which can permit a user to implement web browser commands. In graphical user interface environments, icons are typically small graphical images displayed to represent objects that can be manipulated by a user via a pointing device such as a mouse. For example, the icon entitled "Find" 905 can be utilized to implement a command that instructs the web browser application to search for a particular web page or database content. The icon entitled "Sign in" 910 enables registered users to log into the server 150 and utilize its multimedia data services and tools 955 to upload video or retrieve videos. Videos can be searched for using video "Find" 905 button, which can bring up a search engine or search fields. The current hypertext address of the displayed web page is shown as Universal Resource Locator (URL) address 908. Thus, the current URL for the displayed web page is "http://www.myfrontrow.com". Window 900 can include a scroll bar 923, used with an up-arrow feature, and a down-arrow feature. An elevator 924 permits a user to scroll up and down a displayed web page to view portions of the web page not currently displayed within window 900. Button 960 to be used to find a community or group, or register with a community as a member. Communities can be used for private group members to privately share video from multiple perspective of a related activity which is of interest to the community.

Graphical video images 921 and 922, which are images of different perspective captured simultaneously of the same activity, can be displayed simultaneously within window 900. Images 921 and 922 can be viewed within a video display area such as, for example, video display area 940, which is graphically displayed in a "split screen" format. A variety of other
display areas 942-950 can also display photographs and videos within window 900. Video data associated with live action video images displayed within video display area 940 can be displayed within these display areas. Live action video data from other various venues can be displayed simultaneously within display areas 942-950. Selection buttons 951, 952, 953, and 954, when selected by a user, can permit a user to view various recorded and live video perspectives via the web page 900, including multiple perspectives of activities including events taking place within a venue such as venue 100 or via cameras such as video cameras 121, 122, 123, 124 and mobile handheld video camera 137.

[0079] Various selection buttons and hypertext links are displayed within homepage window which contain links to other web "pages" or portions of web site associated with the URL – www.myfrontrow.com. For example, selection button 951, when selected by a user, permits the user to access and post video data to an associated web page with the topic "news". Similarly, Selection button 952, when selected by a user permits the user to access and/or post video data of interest to a Biog. Selection button 953, for example, permits the user to access and post video data to an associated web page dealing with the topic "sports". A mouse click on the selection button 954 permits a user to access "Entertainment" other than sports such as movies or shows. Selection button 955, when selected by a user, permits a user to access tools that will enable the user to manage video images streamed to web page 900, such as, for example, video images 921 and 922 associated with the events taking place within venue 100. Selection of button 956 will enable a user to access the user's private videos (e.g., for viewing or uploading and deletion). Button 957 enables users to "sign up" to the web site and its services. Selection button 958, when selected by a user, enables the listing of various venues available for video display. Selection button 958, when accessed by a user, can also permit the user to retrieve live streaming video and audio entertainment data from a user's preferred (or registered) venues such as, for example, venues 100, or a private activity. Button 959 enables users to view recent videos uploaded into the website, e.g., the www.myfrontrow.com website. Finally, button 960 enables users to search for communities and register with communities of interest to the member. Button 960 also enables the user to access tools for setting up/register new communities and enable invited party access by setting up usernames and passwords for guests.

[0080] The Video Synchronization Engine 970 button invokes the synchronization capabilities, either at the server or on the remote viewers/devices and enables simultaneous video play and replay synchronization based on "timing" data embedded in streamed videos. With video synchronization, video streams of images 921 and 922, as well as 942 an 944, can be displayed on display 900 in synchronicity based on the time (e.g., GPS-UTC, Atomic clock) that the videos were recorded at the same activity. For optimum viewing the display 900 and its individual windows can be expanded to a full screen view (and reduced again) using features available currently with most media players.

[0081] It should be appreciated that remote viewers/devices that take advantage of access to multimedia, synchronized camera views can not only include venue-based hand held devices and Internet connected computer, but can include remote video receiving systems monitors such as those offered from cable and satellite service provider with enhanced digital capabilities such as high definition television (HDTV) formatting, or other digital enabled viewing systems and devices that might come into use in the form of a home multimedia server used for providing
home-based customers with enhanced multimedia entertainment access and control. It can now be appreciated that, when multiple visual perspectives of the same activity are available, multiple videos can be simultaneously displayed in separate display areas (e.g., split screens) on the video screen in a similar manner as described with respect to the GUI in FIG. 9. Time tagged video can be synchronized to run simultaneously on the television screen, whether it is an HDTV bid screen, or a projection based screen) so that more than one visual perspective of the same activity can be seen, in synchronicity, at the same time. Like a computer mouse is typically used to navigate around a screen and select media in a computer, a wireless remote control can be used to navigate about the content being displayed on a large video screen to display single or multiple views of live or recorded video streams from content providers (e.g., cable and satellite programming providers providing on demand sports programming). Set-top boxes can be enabled with programming that will allow, via wireless remote control, for user navigation and selection of video perspective for display and can also enable rewinding, fast forwarding, pause and replay capabilities which are already available on set-top boxes as associated remote controls for viewing single perspective videos. Enhanced functionality in accordance with unique features of the present invention provides a greater viewing experience by programming customers.

[0082] With teaching of the present invention, it can even be envisaged that multiple perspectives can be recorded for movies and shows by filmmakers and producers of the "Movie Industry" in order to enhance home video entertainment. Although movie theatres are still routinely attended, home video rental or on-demand video streams purchases are becoming a much larger part of the movie industries revenue stream. In fact, new movie releases are being provided in DVD sales and rental and online services very shortly after their debut and theatre runs. With this in mind, it can be appreciated that enhanced movie releases for the home entertainment market can include, for example, four perspectives of an action scene that can be viewed simultaneously in a split screen format similar to the presentation format shown on the display 185 in FIG. 3, on a home-based video monitor such as the monitor HDTV 410 mentioned in FIG. 4. Flat panel displays and home theatre rear projections screen are so large today that they can support simultaneous display. Flat panels displays are now widely available to consumers at sizes up to sixty-five inches (65.degree.) measured diagonally.

[0083] The different vantage points or perspectives can be of a single character or of different characters at different location operating at the same time in a movie scene, such as the perspective shown of two hockey players 921, 922 shown in the split screen format 940 on the display 900 described in FIG. 9, which may be at different location on the playing field for the game. Such distributed, but synchronized scenarios became popular in the Fox.TM. television broadcast series "24", where several scenes of characters hypothetically operating at different locations at the same time were shown in split screen areas of the viewing display. This is only illustrative of how a concept of video synchronization would be amusing and valuable, depending on the application. A financial premium may be recognized for the sale of a recoded movie in a multiple perspective format, where a single perspective can be viewed at view disruption, or several views can be shown simultaneously in split screen synchronized format. Again, all recorded video streams, when synchronized using a video synchronization engine, can be reversed, forwarded and replayed in synchronization where the video is data tagged as described herein. Synchronization engine software can be configured to function automatically on the display or set top box, where simultaneous video perspectives are being streamed and
timing information is available. With movies as another possible application for the present invention, it should be appreciated that the definition of "activity" herein should extend to movie-related entertainment media.

[0084] Referring to FIG. 10, a flow diagram 1000 of a method for providing increased remote video viewing opportunities of activities including private activities and public activities that occur inside or outside of entertainment venues to a remote audience is illustrated, in accordance with features of the present invention. The method starts can begin as indicated at Block 1010. As illustrated at Block 1020, a server can be provided that can be adapted to: receive different visual perspectives of a public activity captured by more than one camera located at an activity, process the different visual perspectives into video-related data and record the video-related data for selective retrieval by and display on video display devices authorized to communicate with the server over a data network. Thereafter as described at Block 1030, different visual perspectives of an activity captured by more than one camera located at an activity can be received wherein the different visual perspectives received at the server through a data network. As shown in Block 1040, the different visual perspectives are processed at the server into video-enabled data and recording the video-enabled data in a memory associated with the server. Then, as shown at Block 1050, video-related data selected by video display devices is provided to video display devices. The video-related data can be provided to the video display devices from the server over a data network. The method then ends at Block 1060.

[0085] As illustrated in FIG. 11, a method is depicted that can provide increased remote video viewing opportunities of activities to a remote audience is illustrated. The method begins at Block 1110. Then as shown in Block 1120, different visual perspectives of an activity captured as video by more than one camera located at an activity at a server adapted to receive and process video are received. The different visual perspectives are received at the server through a data network. Thereafter, as illustrated at Block 1130, the different visual perspectives can be processed at the server adapted to receive and process video into video-enabled data and recording the video-enabled data in a memory associated with the server. Next, as described at Block 1140, video-related data selected by video display devices can be provided to video display devices. The video-related data can be provided to the video display devices from the server adapted to receive and process video over a data network. The method can then terminate as shown at Block 1150.

[0086] Referring to FIG. 1200, a flow diagram of a method providing increased remote video viewing opportunities of activities to a remote audience is illustrated. The method begins at Block 1210. Thereafter, as described in Block 1220, users can be registered at a server adapted to receive and process video and authorizing the users to access the server adapted to receive and process video to provide video captured at the activity using a camera included in a wireless handheld device and to selectively retrieve video-related data captured at the activity for display by video display devices. As described at in block 1230, different visual perspectives of an activity captured as video by more than one camera located at an activity are received at the server adapted to receive and process video. The different visual perspectives can be received at the server through a data network. Thereafter, as depicted at Block 1240, the different visual perspectives are processed at the server adapted to receive and process video into video-enabled data and then recorded in a memory associated with the server adapted to receive and process...
video. As indicated next at Block 1250, video captured by a user at the activity using a camera included in a wireless handheld device and provided to the server adapted to receive and process video are processed based on identifying data including at least one of: activity title, activity time, activity date, activity place, location of wireless handheld device at time of video recording. Then as shown in Block 1260, user access is provided to the organized video from the server adapted to receive and process video based on a request from the user of at least one of: activity title, activity time, activity date, activity place, wireless handheld device location at time of video recording. The video related data can be provided to video display devices from the server adapted to receive and process video over a data network. The method can then terminate as indicated at Block 1270.

[0087] Referring to FIG. 13, a method providing increased remote video viewing opportunities of activities to a remote audience is illustrated. The method begins at block 1310. As depicted next at Block 1320, users and online communities (e.g., memberships, groups) are registered at a server adapted to receive and process video and authorizing the users associated with online communicates to access the server adapted to receive and process video to provide video captured at the activity using a camera included in a wireless handheld device and to selectively retrieve video-related data captured at the activity for display by video display devices. Thereafter as described and in Block 1330, different visual perspectives of an activity captured as video by more than one camera located at an activity are received at a server adapted to receive and process video. The different visual perspectives are received at the server adapted to receive and process video through a data network. Then next, as illustrated in Block 1340, the different visual perspectives can be processed at the server adapted to receive and process video into video-enabled data and can be recorded the video-enabled data in a memory associated with the server adapted to receive and process video. Thereafter, as described at Block 1350, video captured by a user at the activity using a camera included in a wireless handheld device and provided to the server adapted to receive and process video and can be organized based on identifying data including at least one of: online community name, activity title, activity time, activity date, activity place, wireless handheld device location at time of video recording. As shown in Block 1360, user access can be provided to the organized video from the server adapted to receive and process video based on a request from the user of at least one of: activity title, activity time, activity date, activity place, wireless handheld device location at time of video recording, wherein the video-related data is provided to the video display devices from the server adapted to receive and process video over a data network. The method can then terminate, as indicated at Block 1370.

[0088] Referring to FIG. 14, a method providing synchronized viewing of more than one visual perspective recorded in video format by a remote audience is illustrated. The method begins at block 1410. As depicted next at Block 1420, receiving in a server different visual perspectives of an activity captured as video and time stamped with time of capture information by more than one camera located at an activity are received at a server. As shown in Block 1430, the different visual perspectives are processed on the server for synchronized and simultaneous display as more than one video on a single video display device. As shown in Block 1440, the different visual perspectives are displayed simultaneously and in synchronicity with respect to time as more than one video on a single video display. The method can then terminate (and the end of a user’s viewing session), as indicated at Block 1450.
**CROSS-REFERENCE TO RELATED APPLICATIONS**

[0001] This application is a continuation of U.S. patent application Ser. No. 13/314,385, which was filed on Dec. 8, 2011, and which in turn is a continuation of U.S. patent application Ser. No. 12/884,810, entitled "Transmitting Sports and Entertainment Data to Wireless Hand Held Devices Over a Telecommunications Network," which was filed on Sep. 17, 2010 and is incorporated by reference in its entirety.


[0003] U.S. patent application Ser. No. 12/329,631 was in turn a continuation of U.S. patent application Ser. No. 11/738,088 entitled "Providing Video of a Venue Activity to a Hand Held Device Through a Cellular Communications Network" which was filed on Apr. 20, 2007. U.S. patent application Ser. No. 11/738,088 was in turn a continuation of U.S. patent application Ser. No. 11/498,415 entitled "Broadcasting Venue Data to a Wireless Hand Held Device," filed on Aug. 2, 2006, which issued on May 20, 2008 as U.S. Pat. No. 7,376,388 and was a continuation of U.S. patent application Ser. No. 09/708,776 entitled "Providing Multiple Perspectives for a Venue Activity Through an Electronic Hand Held Device," which was filed on Nov. 8, 2000 and which claims the benefit of U.S. Provisional Application Ser. No. 60/243,561, which was filed on Oct. 26, 2000. This application therefore traces its priority date to and claims the benefit of the Oct. 26, 2000 filing date of U.S. Provisional Application Ser. No. 60/243,561.
This patent application is also a continuation of U.S. patent application Ser. No. 13/364,793, which filed on Feb. 2, 2012 and claims priority to U.S. patent application Ser. No. 09/887,492, entitled "Systems, Methods and Apparatuses for Brokering Data Between Wireless Devices and Data Rendering Devices," which was filed on Jun. 22, 2001, and which is incorporated herein by reference in its entirety, and which claims priority as a continuation to U.S. Provisional Patent Application Ser. No. 60/214,339, entitled "Systems, Methods and Apparatuses for Brokering Data Between Wireless Devices and Data Rendering Devices," which was filed on Jun. 27, 2000. This application therefore also traces its priority date to and claims the benefit of the Jun. 27, 2000 filing date of U.S. Provisional Patent Application Serial No. 60/214,339, which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

Embodiments are related to wireless electronic hand held devices, such as Personal Digital Assistants (PDAs), hand held televisions, Smartphones, and cellular and data-enabled wireless telephones. Embodiments are also related to techniques for remotely delivering sports and entertainment data to hand held devices. In addition, Embodiments relates to techniques for providing increased viewing opportunities for audiences within and external to venue environments, such as stadiums and concert arenas. Additionally, embodiments related to wireless video, audio and other data transmission to and from hand held devices.

BACKGROUND OF THE INVENTION

Most modern stadiums and live entertainment facilities or arenas (herein also collectively referred to as "venues"), which feature sporting events and concerts, typically employ large television screens that receive video images and are linked within the stadium to a plurality of television cameras positioned to capture video images at diverse locations within the stadium. The audience at a typical sporting event, for example, can generally view advertisements, instant replays, and other sports related data on the large television screens within the sports stadium itself. Feeds are additionally generally provided from the cameras to announcers in a broadcast booth, replaying certain plays from the event so that the announcers and can make comments about plays, and finally transmitting a telecast to the viewing audience, including some aspects of captured video and data to the stadium audience.

Despite the availability of such large screen television monitors, venue event audience members still lack enhanced viewing options or perspectives within the stadium itself. To compensate for the lack of viewing options, sports and concert promoters often rent binoculars to audience members prior to or during the event. Such binoculars can permit the typical audience member to obtain a somewhat better, but limited, view of the event, such as a baseball, a basketball, a football or a hockey game, but even these views are often obstructed by other audience members and are tied to only one perspective.

The large television screens placed in the stadium are typically linked to cameras that are either fixed and mobile, the placement of the cameras about the stadium or venue are generally tied to an enterprise system. The movement of the game ball in a baseball or football game, for example, along with the players on the field is dynamic and unpredictable, and may not always...
be caught by the active camera having the best perspective. Thus, during a game, the large television screens typically provide only one view, which can be obstructed further by other players or officials, often destroying a critical angular view.

[0009] In addition, such large screens are often utilized to bombard audience members with advertisements, thereby cutting into data such as instant replays at a time when an audience member might otherwise wish to view instant replays, a current play or other event data. The audience members, therefore, essentially view the large screen at the behest of the camera operator and cannot select their own views or camera angles.

[0010] Based on the foregoing, the present inventors have found that such problems in venue environments can be solved through the use of hand held devices, such as PDAs, data/video-enabled cellular telephones, and other hand held wireless video-enabled devices. For example, the recent shift in the consumer electronics industry from an emphasis on analog technology to a preference for digital technology is largely based on the fact that the former generally limits the user to a role of a passive recipient of information, while the latter is interactive and allows the user to control what, when, and how he or she receives and manipulates certain formation. This shift in focus has resulted in the development and increasingly widespread use of a digital device generically referred to as a "personal digital assistant" (PDA).

[0011] These devices are hand held computing devices (i.e., hereinafter referred to as "hand held devices" or "handheld devices") that are becoming increasingly popular for storing and maintaining information. Although PDAs may be connected to a desktop personal computer or other PDAs via infrared, direct wire, or wireless communication links, PDAs and similar hand held devices, can be linked to remote networks, such as the internet, or local wireless resources, through available wireless communications techniques.

[0012] The most advanced data- and video-enabled wireless communication devices currently available in the marketplace take the form of a PDA (such as the Palm OS, Handspring OS, and Windows CE compatible hand held computers). Unlike personal computers, which are general-purpose devices geared toward refining and processing information, PDAs are designed to capture, store and display information originating from various sources. Additionally, while a certain level of skill is required to use a personal computer effectively, PDAs are designed with the novice and non-computer user in mind.

[0013] A typical PDA includes a microprocessor, memory unit, a display, associated encoder circuitry, and selector buttons. It may optionally contain a clock and infrared emitter and receiver. A graphical user interface permits a user to store, retrieve and manipulate data via an interactive display. A PDA may also include a calendar, datebook, and one or more directories. The calendar shows a month of dates organized as rows and columns in the usual form. The datebook shows one day at a time and contains alphanumeric text entered in free format (typically, with a time of day and an event and/or name). Each directory contains entries consisting of a name field and a free form alphanumeric text field that can contain company names, addresses, telephone and fax numbers, email addresses, etc.

[0014] Entries may be organized alphabetically according to the name field and can be scanned
or searched for by specifying a specific sequence of characters in the name field. A menu displayed via the graphical user interface permits a user to choose particular functions and directories. Most PDAs come equipped with a stylus, which is a plastic-tipped pen that a user utilizes to write in, for example, a "graffiti area" of the display and tap particular graphically displayed icons. Each icon is indicative of a particular activity or function. Touch screen interfaces, however, are also increasingly being implemented with PDAs to permit a user to activate software modules in the form of routines and subroutines therein.

Attempts have been made to provide venue-based, interactive entertainment to enhance the fan experience at live events. Such attempts utilize touch-screen technology integrated directly into seats at outdoor or indoor arenas. Such devices, however, due to their integration with the viewer seat, can be easily damaged by audience members. Systems that incorporate such devices are also expensive because they literally require miles of cable.

Some recently constructed arenas, for example, that implement such seat-integrated technology are requiring hundreds of miles of electronic cabling, including audiovisual, broadcast, and multiband lines. Such a plethora of large cables are expensive and require extra space, which often cannot be found in older stadiums, or would require a greater expense to integrate into newly built stadiums. The cost of retrofitting an older stadium with such technology can be staggering. Additionally, many fans who attend games or concerts with such technology integrated directly into the seats may find such a feature distracting.

Another problem faced by venue promoters and arena owners who integrate fixed technology directly into the seat is that such technology can quickly become obsolete, if a new facility is fitted with such electronic/data intensive technology, the technology may become quickly outdated, requiring an expensive update and/or retrofit.

The present inventors thus realize that a solution to these problems lies in the use of wireless hand held devices. By utilizing modern technology integrated with hand held devices, on-demand live action, instant replays from multiple camera angles, and real-time team and venue information may be readily provided to fans without the expense and problems associated with present in-seat integrated technical environments. Additionally, it is anticipated that the deployment of venue-based systems facilitating the use of such devices would be relatively inexpensive, at least in comparison to seat integrated systems. Finally, such systems will provide the venue attendee with increased mobility and freedom of use within and throughout the venue environment.

BRIEF SUMMARY

It is one aspect of the disclosed embodiments to provide methods, systems and servers for authorizing computer devices for receiving venue-based data based on the location of the user.

It is another aspect of the disclosed embodiments to provide methods, systems and servers for delivering venue-based data such as video, audio, advertisements, video replay, statistics and other information to one or more computing devices.
It is another aspect of the disclosed embodiments to provide improved methods, systems and servers for delivering venue-based data to hand held computing device(s) located remote from a venue and/or within the venue itself.

It is still another aspect of the disclosed embodiments to provide methods and systems for the delivery and authorization of sports/entertainment data and related information to computing devices through a data communications network.

The above and other aspects of the invention are achieved as will now be further described. Methods, systems and servers are disclosed for authorizing access by a user of at least one service associated with an event at a venue based on a location of the user as determined by assets of a data communications network (e.g., Internet protocol based networks, computer network, telecommunications network, wireless network, Internet, etc). A location of at least one user can be determined based on communications of at least one computing device utilized by the at least one user with the data communications network supporting data communications of the at least one computing device. The at least one computing device can be authorized to receive the at least one service based on the location as determined by the data communications network. The data communications network can further comprise at least one of a server, a gateway, a home location register and a visiting location register. In some embodiments, the at least one user can be, for example, a subscriber. In other embodiments, the subscriber information associated with the subscriber can be stored in a memory (e.g., a database), and the subscriber information can be utilized to authorize the at least one service for the user. The at least one service can comprise, for example, at least one of video data, statistical information, concession information and advertisements. In some embodiments, authorizing the at least one computing device can further comprise preventing the at least one computing device from receiving the at least one service beyond or within a particular geographical area based on the location determined by the data communications network. In other embodiments, authorizing the at least one computing device can further comprise preventing the at least one computing device from receiving the at least one service absent at least one authorization code.

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of this invention are set forth in the appended claims. The invention itself, however, as well as a preferred mode of use, further objects, and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

FIG 1 depicts a block diagram illustrating components of a hand held device, in which embodiments may be implemented;

FIG. 2 illustrates a pictorial representation of a hand held device, which may be utilized to implement an embodiment;

FIG. 3 depicts a pictorial representation of a hand held device adapted for receiving a module, in accordance with an alternative embodiment;
FIG. 4 illustrates a system for providing multiple perspectives through a hand held device of activities at a venue, in accordance with an alternative embodiment;

FIG. 5 depicts a system that provides multiple perspectives of a venue activity through a hand held device adapted to receive and process real time video data, in accordance with a preferred embodiment;

FIG. 6 depicts a system for providing multiple perspectives of activity at a venue through a hand held device adapted to receive and process real time video data, in accordance with a preferred embodiment;

FIG. 7 depicts a system for providing multiple perspectives for activity at a venue at a first time/perspective and a second time/perspective, in accordance with a preferred embodiment;

FIG. 8 illustrates a system for providing multiple perspectives through a hand held device of an activity at a venue, including the use of a wireless gateway, in accordance with a preferred embodiment of the present invention;

FIG. 9 depicts a system for providing multiple perspectives through a hand held device of a venue activity, in association with a wireless network, in accordance with a preferred embodiment;

FIG. 10 illustrates a diagram depicting network attributes of a wireless network that may be utilized in accordance with one or more embodiments;

FIG. 11 depicts a prior art overview display and a detail window;

FIG. 12 illustrates a prior art spherical image space divided into a series of w rows and of columns, with the rows and columns representing individual frames as photographed from a video camera;

FIG. 13 depicts the two-dimensional representation of the spherical image space of FIG. 12 into rows and columns of image frames;

FIG. 14 illustrates a prior art overview display, a detail window and a corresponding area indicia (geometric figure outline);

FIG. 15 depicts a prior art series of saved geometric figure outlines corresponding to user selections in tracing through an overview image display for subsequent playback, which may be utilized in accordance with embodiments of the present invention;

FIG. 16 is a prior art flowchart providing a logical process for building an overview image, which may be utilized in accordance with embodiments of the present invention;

FIG. 17 illustrates a prior art flowchart illustrative of a logical process for playback interaction, which may be utilized in accordance with embodiments of the present invention;
FIG. 18 depicts a pictorial representation illustrative of a Venue Positioning System (VPS), which can be implemented in accordance with an alternative embodiment;

FIG. 19 illustrates in greater detail the Venue Positioning System (VPS) of FIG. 18, in accordance with an alternative embodiment;

FIG. 20 depicts a flowchart of operations illustrative of a method for providing multiple venue activities through a hand held device, in accordance with an alternative embodiment; and

FIG. 21 illustrates a flowchart of operations illustrative of a method for providing multiple venue activities through a hand held device from one or more digital video cameras, in accordance with an alternative embodiment.

DETAILLED DESCRIPTION

FIG. 1 depicts a schematic diagram illustrating a general hardware configuration of a hand held device 11, which can be implemented in accordance an embodiment. Those skilled in the art can appreciate, however, that other hardware configurations with less or more hardware and/or modules may be utilized in carrying out the methods and systems (e.g., hand held device 11) of the present invention, as may be further described herein. CPU 10 of hand held device 11, can perform as a main controller operating under the control of operating clocks supplied from a clock oscillator, CPU 10 may be configured as a 16-bit microprocessor. External pins of CPU 10 are generally coupled to an internal bus 26 so that it may be interconnected to respective components.

SRAM 24 can be configured as a writeable memory that does not require a refresh operation and can be generally utilized as a working area of CPU 10. SRAM (Static RAM) is generally a form of semiconductor memory (RAM) based on a logic circuit known as a flip-flop, which retains information as long as there is enough power to run the device. Font ROM 22 can be configured as a read only memory for storing character images (e.g., font) displayable on a display 18. Examples of types of displays that may be utilized in accordance with display 18 include a TFT active matrix display, an illuminated LCD (Liquid Crystal Display), or other small scale displays being developed.

CPU 10 of the present embodiment drives display 18 utilizing, among other media, font images from Font ROM 22, and images transmitted as data through wireless unit 17 and processed by image-processing unit 35. EPROM 20 may be configured as a read only memory that is generally erasable under certain conditions and can be utilized for permanently storing control codes for operating respective hardware components and security data, such as a serial number.

IR controller 14 can be generally configured as a dedicated controller fir processing infrared codes transmitted/received by an IR transceiver 116 and for capturing the same as computer data. Wireless unit 17 can be generally configured as a dedicated controller and transceiver for processing wireless data transmitted from and to a wireless communications
Port 12 can be connected to CPU 10 and can be temporarily attached, for example, to a docking station to transmit information to and from hand held device 11 to other devices, such as personal computers, retail cash registers, electronic kiosk devices, and so forth. Port 12 can also be configured, for example, to link with a modem, cradle or docking station, which is well known in the art, and can permit network devices, a personal computer or other computing devices to communicate with hand held device 11.

User controls 32 permit a user to enter data to hand held device 11 and initiate particular processing operations via CPU 10. A user interface 33 may be linked to user controls 32 to permit a user to access and manipulate hand held device 11 for a particular purpose, such as, for example, viewing images on display 18. Those skilled in the art will appreciate that user interface 33 may be implemented as a touch screen user interface, as indicated by the dashed lines linking display 18 with user interface 33. In addition, CPU 10 may cause a sound generator 28 to generate sounds of predetermined frequencies from a speaker 30. Speaker 30 may be utilized to produce music and other audio information associated with video data transmitted to hand held device 11 from an outside source.

Those skilled in the art can appreciate that additional electronic circuits or the like other than, or in addition to, those illustrated in FIG. 1 may be required to construct hand held device 11. Such components, however, are not described in the present specification, because many aspects of them are well known in the art. For example, hand held television are available for receiving public television broadcasts, but the basic technology can be modified on such devices so that they may be adapted to (e.g., proper authentication, filters, security codes, or the like) receive venue-based RF transmissions from at least one venue-based RF source (e.g., a wireless camera, or data from a camera transmitted wirelessly through a transmitter). Those skilled in the art can thus appreciate that because of the brevity of the drawings described herein, only a portion of the connections between the illustrated hardware blocks is generally depicted. In addition, those skilled in the art will appreciate that hand held device 11 can be implemented as a specific type of a hand held device, such as a Personal Digital Assistant (PDA), paging device, WAP-enabled mobile phone, and other associated hand held computing devices well known in the art.

Hand held device 11 can be configured to permit images, such as television broadcast images, to be displayed on display 18 for a user to view. Hand held device 35 thus includes an image-processing unit 35 for processing images transmitted as data to hand held device 11 through wireless unit 17. A tuner unit 34, implemented as either a single tuner or a plurality of tuners, may be linked through internal bus 26 to CPU 10. Additionally, a security unit 36 may be utilized to process proper security codes to thereby ensure that data transferred to and from hand held device 11 may be secure and/or permitted. Security unit 36 may be implemented as an optional feature of hand held device 11. Security unit 36 can also be configured with routines or subroutines that are processed by CPU 10, and which prevent wireless data from being transmitted/received from hand held device 11 beyond a particular frequency range, outside of a particular geographical area associated with a local wireless network, or absent authorized authorization codes (e.g., decryption).
[0054] Hand held device 11 can thus be configured with both wireless and wireline capabilities, depending on the needs and requirements of a manufacturer or customer. Such wireless capabilities include features such as those found in cellular telephone units, in accordance with carrying out embodiments of the present invention. Examples of hand held devices that can be utilized in accordance with the method and system of the present invention include the "Palm Pilot," PDA, manufactured and sold by Palm Computing, the Handspring Visor, the IBM Workpad or other Window CE compatible devices, RIM Blackberry-family paging devices, Motorola paging devices, and the Symbol SPT-family of PDA-type organizer devices. Customized, venue-specific devices (i.e., proprietary, limited use) may be also developed that incorporate hardware and software modules necessary to practice the methods and systems taught herein.

[0055] Those skilled in the art can appreciate that although hand held device 11 is generally illustrated in FIG. 1, hand held device 11 can be implemented as a wireless application protocol (WAP) web-enabled cellular hand held device, such as a PDA, wireless telephone, or pager or a combination thereof. Hand held device 11 can be configured with features of combination cellular telephone/PDA devices. One example of such a device is the Handspring™ palmtop and associated cellular phone attachment, which is manufactured and sold by Handspring Inc. Other such devices include the Palm-Motorola phone, which permits users to access e-mail and store calendars and contact databases. Hand held devices may be also provided in the form of a multi-RF (Radio Frequency) receiver-enabled hand held television viewing device. Regardless of the type of hand held device implemented, it is anticipated that such hand held devices will be adapted to receive and process data via image-processing unit 35 for ultimate display as moving images on display unit 18, in accordance with the present invention. Image-processing unit 35 may include image-processing routines, subroutines, software modules, and so forth, which perform image-processing operations.

[0056] FIG. 2 illustrates a pictorial representation of a hand held device 40, which may be utilized to implement an embodiment. Those skilled in the art will appreciate that hand held device 40 of FIG. 2 is analogous to hand held device 11 of FIG. 1. Hand held device 40 includes a display screen 42, which is generally analogous to display 18 of FIG. 1. Television images broadcast via radio frequency or digital data may be displayed on display screen 42 for a user to view. User controls 44 permit a user to manipulate images or text displayed on display screen 42. User controls 44 of FIG. 2 are generally analogous to user controls 32 of FIG. 1. A touch screen user interface may be further configured on the display screen 42 with hand held device 40 to permit a user to manipulate images/text displayed on display screen 42.

[0057] FIG. 3 depicts a pictorial representation of a hand held device 56 adapted for receiving a module 50, in accordance with an alternative embodiment. Hand held device 56 of FIG. 3 is generally analogous to hand held device 40 of FIG. 2, the difference being that hand held device 56 may be adapted to receive a module/cartridge that permits hand held device 56 to function according to specific hardware and/or instructions contained in a memory location within module 50. Module 50 may also be configured as a smart card, well known in the art. Such a smart card may provide, for example, access codes (e.g., decryption) to enable hand held device 56 to receive venue broadcasts. Note that as utilized herein, the term "module" may refer to a physical
module, such as a cartridge. The term "module" may also refer to a software module composed of routines or subroutines that perform a particular function. Those skilled in the art can appreciate the meaning of the term module is based on the context in which the term is utilized. Thus, module 50 may be generally configured as a physical cartridge or smart card. The term "module" as utilized herein may also refer to a software module, depending on the context of the discussion thereof.

[0058] To illustrate the use of a physical module, such as module 50, assume that a user may possess several such physical modules or cartridges. One module, when inserted into hand held device FIG. 3 may instruct hand held device 50 to function as a standard PDA, such as a Palm Pilot device. Another module, when inserted into hand held device FIG. 3, may instruct hand held device 56 to function as a portable television that receives wireless television data from a local wireless network and/or venue-based (short range) broadcasts.

[0059] Those skilled in the art can thus appreciate that hand held device 56 can be adapted to receive and cooperate with module 50. Additionally, hand held device 56 includes a display screen 52 that is generally analogous to display screen 42 of FIG. 2 and display 18 of FIG. 1. Hand held device 56 also includes user controls 54 that are generally analogous to user controls 44 of FIG. 2 and user controls 32 of FIG. 1. Hand held device 56 of FIG. 3 is generally analogous to hand held device 11 of FIG. 1. Thus, hand held device 56 can also implement touch screen capabilities through a touch screen user interface integrated with display screen 52.

[0060] Assuming module 50 is implemented as a smart card, instead of a cartridge, it is anticipated that similar features can be implemented in accordance with the smart card to insure that hand held device 56 includes touch screen user interface and video viewing capabilities. Smart cards are generally known in the art as credit-card sized plastic cards with an embedded computer chip. The chip can either be a microprocessor with internal memory or a memory chip with non-programmable logic. The chip connection can be configured via direct physical contact or remotely through a contactless electromagnetic interface.

[0061] Smart cards may be generally configured as either a contact or contactless smart card, or a combination thereof. A contact smart card requires insertion into a smart card reader (e.g., contained within hand held device 56) with a direct connection to, for example, a conductive micromodule on the surface of the card. Such a micromodule may be generally gold plated. Transmission of commands, data, and card status takes place through such physical contact points.

[0062] A contactless card requires only close proximity to a reader. Both the reader and the card may be implemented with antenna means providing a contactless link that permits the devices to communicate with one another. Contactless cards can also maintain internal chip power or an electromagnetic signal (e.g., RF tagging technology). Two additional categories of smart codes, well known in the art, which are based on contact and contactless cards are the so-called Combi cards and Hybrid cards.

[0063] A Hybrid card generally may be equipped with two chips, each with a respective contact and contactless interface. The two chips are not connected, but for many applications, this
Hybrid serves the needs of consumers and card issuers. The Comb card may be generally based on a single chip and can be generally configured with both a contact and contactless interface.

Chips utilized in such smart cards are generally based on microprocessor chips or memory chips. Smart cards based on memory chips depend on the security of the card reader for their processing and can be utilized when low to medium security requirements. A microprocessor chip can add, delete and otherwise manipulate information in its memory. Microprocessor-based memory cards typically contain microprocessor chips with 8, 16, and 32 bit architectures.

FIG. 4 illustrates a system 58 for providing multiple perspectives through a hand held device 60 of activities at a venue 80, in accordance with an alternative embodiment. For illustrative purposes only, it may be assumed that venue 80 of FIG. 4 is a stadium venue, such as a baseball stadium. Cameras 71, 73, 75, and 77 are respectively positioned at strategic points about venue 80 to capture the best images of activity taking place within venue 80. Cameras 71, 73, 75, 77 are respectively linked to transmitters 70, 72, 74, and 76. Each of these transmitters may be configured as equipment, which feeds a radio signal to an antenna for transmission.

The antenna may be integrated with the transmitter. Transmitters are well known in the art, and include active components, such as a driver, well known in the art. Transmitters also include passive components, such as a TX filter, also well known in the art. These components, when operating together, impress a signal onto a radio frequency carrier of the correct frequency by immediately adjusting its frequency, phase, or amplitude, thereby providing enough gain to the signal to project it to its intended target (e.g., a hand held device located within the venue).

A hand held device 60 may be held by a user at a stadium seat within view of the activity at the venue 80. Hand held device 60 is generally analogous to hand held device 11 of FIG. 1 and hand held device 40 of FIG. 2. Hand held device 60 of FIG. 4 may be configured as a hand held device adapted for use with a cartridge/module, such as module 50 of hand held device 56 of FIG. 3. The cartridge/module may contain the electronics (e.g., tuner, filter, etc.) to allow a hand held device to be adapted for receiving venue-based data. Hand held device 60 includes a display screen 61 (e.g., display 18 of FIG. 1).

Additionally, display screen 61 of hand held device 60 may be configured with a touch screen user interface displayable and operable on display screen 61. Those skilled in the art can appreciate that touch screen interlaces are well known in the art and further explanation thereof may be not necessary. Display screen 61 includes a touch screen display area 65 that may be associated with camera 71. Thus, images captured by camera 71 are transmitted from transmitter 70, which is linked to camera 71. Additionally, display screen 61 includes touch screen display areas 69, 63, and 67 which are respectively associated with cameras 73, 75, and 77.

Cameras 71, 73, 75, and 77 are respectively labeled C.sub.1, C.sub.2, C.sub.3, and C.sub.N to indicate that a plurality of cameras may be utilized in accordance with system 58 to view activities taking place within venue 80, such as a baseball game or concert. Although only four cameras are illustrated in FIG. 4, those skilled in the art will appreciate that additional or fewer cameras may be also implemented in accordance with system 58. Touch screen display
areas 65, 69, 63, and 67 are also respectively labeled C.sub.1, C.sub.2, C.sub.3, and C.sub.N to illustrate the association between these display areas and cameras 71, 73, 75, and 77.

[0070] Hand held device 60 may he integrated with a plurality of tuners, as illustrated by tuners 62, 64, 66, and 68. Such tuners can be activated via user controls on hand held device 60 and/or via touch screen icons or areas displayed on display screen 61 that are associated with each tuner. Such icons/areas may be respectively displayed within display areas 65, 69, 63 and 67, or within a separate display area of display screen 61. A user accesses tuner 62, for example, to retrieve real-time video images transmitted from transmitter 70 for camera 71. Likewise, a user can access tuner 64 to retrieve real-time video images transmitted from transmitter 72 for camera 73.

[0071] In addition, a user can access tuner 74 to retrieve real-time video images transmitted from transmitter 74 for camera 75. Finally, user can access tuner 68 to retrieve real-time video images transmitted from transmitter 76 for camera 77. In the example depicted in FIG. 4, a baseball player 82 is participating in a baseball game within venue 80. Cameras 71, 73, 75, and 77 capture moving images (e.g., video data) of the baseball player 82 from various angles and transmit these images to hand held device 60.

[0072] FIG. 5 depicts a system 59 that provides multiple perspectives of activity at a venue 80 through a hand held device 60 adapted to receive and process real time video data, in accordance with a preferred embodiment. Note that in FIG. 4 and FIG. 5 analogous parts are indicated by identical reference numerals. Thus, for example, cameras 71, 73, 75, and 77 of FIG. 5 are analogous to cameras 71, 73, 75, and 77 of FIG. 4. Hand held device 60 of FIG. 5 is also analogous to hand held device 60 of FIG. 4 and includes similar features thereof.

[0073] Hand held device 60 of FIG. 5, however, can be configured to receive wireless real time video data transmitted for cameras 71, 73, 75, and 77 respectively through data transmitters 102, 104, 106, and 108 to server 100 and thereafter to wireless data transmitter/receiver 110. Note that wireless data transmitter/receiver 110 is analogous to wireless unit 17 of FIG. 1. Hand held device 60 of FIG. 5 is also analogous to hand held device 11 of FIG. 1.

[0074] Hand held device 60 of FIG. 5 also incorporates a touch screen user interface, as described herein with respect to analogous hand held device 60 of FIG. 4. The difference between system 58 of FIG. 4 and system 59 of FIG. 5 lies in the inclusion of digital transmitters 102, 104, 106, and 108 which are respectively linked to cameras 71, 73, 75, and 77 of FIG. 5. In the illustration of FIG. 5, cameras 71, 73, 75, and 77 may be configured as high definition video cameras which capture real time images of events or activities taking place within venue 80, such as real time video footage of baseball player 82.

[0075] A captured image of baseball player 82 can he transferred from one or more of video cameras 71, 73, 75, and 77 of FIG. 5 and transmitted through a respective digital transmitter, such as digital transmitter 102, 104, 106 or 108 and transmitted via wired and/or wireless communications to server 100. The server 100 then processes the video data received from one or more of the digital transmitters and formats the video data for transmission via wireless means to wireless data transmitter/receiver 100, which may be integrated with hand held device 100.
Transmitter/receiver 100 can communicate with the various components of hand held device 60, such as a CPU, image processing unit, memory units, and so forth.

[0076] Those skilled in the art can appreciate that although real time video data may be transmitted to server 100, captured past video images may also be stored within server 100 and transferred to hand held device 60 for display at display screen 61. For example, instant replays may be transferred as video data to hand held device 60 upon the request of a user of hand held device 60. Such instant replay footage can be displayed on display screen 61 for the user to view.

[0077] FIG. 6 illustrates a system 79 for providing multiple perspectives of activity at a venue 80 through a hand held device 60 adapted to receive and process real time video data from at least one wide-angle and/or panoramic video camera 114, in accordance with a preferred embodiment. In system 79 of FIG. 6, wide-angle/panoramic (hereinafter referred to as "panoramic") video camera 114 may be configured as a high-definition panoramic video camera that captures images of activities taking place at venue 80. In the example illustrated in FIG. 6, panoramic video camera 114 can capture images of a baseball game and one or more baseball players, such as baseball player 82.

[0078] A data transmitter 112 may be linked to panoramic video camera 114. Video data captured by panoramic video camera 114 may be transferred to data transmitter 112, which thereafter transmits the video data to server 100 via a direct link or wireless link, depending on the needs or requirements of the promoters or venue owners. Note that this is also true of the system described in FIG. 6. Server 100 of FIG. 6 is analogous to server 100 of FIG. 5. Thus, in the case of FIG. 5, video data may be transmitted from one or more of data transmitters 102, 104, 106, and 108 via a direct wire/cable link or through wireless transmission means, such as through a wireless network.

[0079] Those skilled in the art will appreciate, of course, that hand held device 60 of FIG. 6 is analogous to hand held devices depicted in FIGS. 1-5 herein. In FIGS. 4, 5, and 6, like or analogous parts are identified by identical reference numerals. Thus, images captured by panoramic video camera 114 of activity taking place at venue 80 may be displayed as real time video images or instant replay data on display screen 61 of hand held device 60.

[0080] FIG. 7 depicts a system 89 for providing multiple perspectives for activity at a venue 120 at a first time and/or perspective (Time 1) and a second time and/or perspective (Time 2), in accordance with a preferred embodiment. In FIGS. 4, 5, 6, and 7, like or analogous parts are indicated by identical reference numerals. Thus, in system 89 of FIG. 7, an event, in this case illustrated as a hockey game, is taking place within venue 120. Venue 120 may be, for example, a hockey arena. Panoramic video camera 114 may be linked to data transmitter 111.

[0081] As explained previously, data transmitter 112 may be linked to server 100 via a direct link, such as a transmission cable or line, or through wireless communication means, such as through a wireless network. Server 100 can also communicate with hand held device 60 through a wireless network or other wireless communication means by transmitting data through such a network or wireless communications means to wireless data transmitter/receiver 110. Wireless data transmitter/receiver 110, as explained previously, may be integrated with hand held device
Thus, a video image 124 of a hockey player 122 can be captured as video data by panoramic video camera 114, along with a video image 126 of a hockey player 123 and displayed within display screen 61 of hand held device 60 as indicated at Time 1. Video image 124 and 126 can be displayed within a grid-like interface on display screen 61. Note that in the illustration of FIG. 7, display screen 61 may be divided into four sections.

When a user touches, for example the area or section of display screen 61 in which video image 124 may be displayed, the entire display area of display screen 61 can be then consumed with a close-up video shot of video image 124, as indicated at Time 2, thereby providing the user with a closer view of hockey player 122. Those skilled in the art can appreciate that the touch screen display area of display screen 61 can be arranged with graphical icons and/or user-controls that perform specific pan and zoom functions. Such icons/user-controls, when activated by a user, permit the user to retrieve panned/zoomed images of events taking place in real time within venue 120.

Note that although only one panoramic video camera 114 and one data transmitter 112 are illustrated in FIG. 7, a plurality of panoramic video cameras, servers, and data transmitters may be implemented in accordance with the present invention to capture the best video images, image-processing, and signal capacity to users, whether real time or otherwise, of events taking place at venue 120.

FIG. 5 illustrates a system 92 for providing multiple perspectives through hand held device 60 of an activity at a venue 130, including the use of a wireless gateway 124, in accordance with a preferred embodiment. Those skilled in the art can appreciate that wireless gateway 124 may be configured as an access point for a wireless LAN (Local Area Network). Access points for wireless LAN networks and associated wired and wireless hardware (e.g., servers, routers, gateways, etc.) are well known in the art and may be utilized in accordance with the present invention described herein. Again, note that in FIGS. 4, 5, 6, 7, and 8, like or analogous parts are indicated by identical reference numerals. System 92 of FIG. 8 is analogous to system 89 of FIG. 7, the difference being in the nature of the venue activity. Venue 130 can be, for example, a concert hall or stadium configured with a sound stage.

Gateway 124 can be configured as a communications gateway through which data may enter or exit a communications network, such as wireless network 152 illustrated in FIG. 9 for a large capacity of user hand device 60 users. Wireless network 152 may be configured as a wireless LAN network. Hand held device 60 can be configured to communicate and receive transmissions from such a wireless LAN network based on device identification (e.g., device address). Communication with hand held devices, such as hand held device 60, however, may also be achieved through RF (Radio Frequency) broadcasts, thereby not requiring two-way communication and authentication between, for example, a wireless LAN network and such hand held devices. A broadcast under such a scenario may also require that such a hand held device or hand held devices possess decryption capabilities or the like in order to be authorized to receive transmissions from the venue.
The remaining elements of FIG. 8 are also analogous to the elements depicted in the previous drawings, with the addition of wireless gateway 124, which may be linked to server 100 and may be in communication with several wireless data transmitters/receivers 110 and one or more electronic hand held devices, including hand held device 60. Wireless data transmitter/receiver 110, as explained previously, may be integrated with hand held device 60.

One or more panoramic video cameras, such as panoramic video camera 114, can be positioned at a venue 130 at locations that capture images not only of the events taking place on a concert stage, but also events taking place within the stadium itself.

If an audience member 140, for example, happens to be walking along a stadium aisle within view of panoramic video camera 114, the audience member's video image can be displayed as video image 144 within display screen 61 of hand held device 60, as indicated at Time 1. Likewise, panoramic video camera 114 captures images of band member 138 whose video image can be displayed as video image 142 within a display area of display screen 61, as indicated at Time 1.

Thus, a user of hand held device 60 can view not only the events taking place on a central performing platform of venue 130, but also other events within the arena itself. The band member 138 may be located on a central performing platform (not shown) of venue 130 when panoramic video camera 114 captures real-time video images of band member 138. The user may also, for example, wish to see a close-up of audience member 140. By activating user controls and/or a touch screen interface integrated with display screen 61, the user can, for example, pan or zoom to view a close-up video shot of audience member 140, as indicated at Time 2.

Captured video images are transferred from panoramic video camera 114 as video data through transmitter 112 to server 100 and through wireless gateway 124 to wireless data transmitter/receiver 110. Although a single server 100 is illustrated in FIG. 8, those skilled in the art can appreciate that a plurality of servers may be implemented in accordance with the present invention to process captured and transmitted video data. Based on the foregoing, those skilled in the art can appreciate that video data may be simultaneously transferred from server 100 or a plurality of servers to literally thousands of hand held devices located within the range of the wireless network and/or wireless gateways associated with venue 130.

FIG. 9 illustrates a system 150 for providing multiple perspectives through hand held device 60 of an activity at a venue 130 in association with a wireless network 152, in accordance with a preferred embodiment. System 150 of FIG. 9 is analogous to system 92 of FIG. 8, the difference noted in the inclusion of wireless network 152. Thus, in FIG. 8 and FIG. 9, like or analogous parts are indicated by identical reference numerals. Video data captured by a camera or cameras, such as panoramic video camera 114, may be transferred to data transmitter 112, which transmits the video data to wireless network 152. Wireless network 152 then retransmits the data, at the request of authorized users of hand held devices, such as hand held device 60, to wireless data transmitters/receivers, such as transmitter/receiver 110 integrated with hand held device 60.

Those skilled in the art can appreciate that wireless network 152 may also receive and
retransmit other data, in addition to video data. For example, a server or other computer system may be integrated with wireless network 152 to provide team and venue data, which can then be transferred to wireless data transmitter receiver 110 from wireless network 152 and displayed thereafter as team and venue information within display screen 61 of hand held device 60. Other data that may be transferred to hand held device for display include real-time and historical statistics, purchasing, merchandise and concession information, and additional product or service advertisements.

[0093] Such data can include box scores, player matchups, animated play-books, shot/hit/pitch charts, historical information, and offense-defense statistics. In a concert venue, for example, as opposed to a sporting event, information pertaining to a particular musical group can be also transferred to the hand held device, along with advertising or sponsor information. Note that both the video data and other data described above generally comprise types of venue-based data. Venue-based data, as referred to herein, may include data and information, such as video, audio, advertisements, promotional information, propaganda, historical information, statistics, event scheduling, and so forth, associated with a particular venue and generally not retrievable through public networks.

[0094] Such information can be transmitted together with video data received from data transmitter 112. Such information may be displayed as streaming data within display area 61 of hand held device 60 or simply stored in a database within hand held device 60 for later retrieval by the user. An example of a wireless network that may be utilized to implement wireless network 152 can be Bluetooth, which is described in greater detail herein, and was conceived originally to make up for the shortcomings of infrared technologies (IR). Because IR cannot be utilized to penetrate walls, carry data heavy signals, or operate within devices that are not in line of sight, Bluetooth, which is becoming well-known the art, can be configured as or with wireless network 152.

[0095] FIG. 10 illustrates an entity diagram 170 depicting network attributes of wireless network 152 that may be utilized in accordance with one or more embodiments. Wireless network 152 of FIG. 10 is analogous to wireless network 1152 of FIG. 9. Wireless network 152 as illustrated in FIG. 10 can be configured as a variety of possible wireless networks. Thus, entity diagram 170 illustrates attributes of wireless network 152, which may or may not be exclusive of one another.

[0096] Those skilled in the art can appreciate that a variety of possible wireless communications and networking configurations may be utilized to implement wireless network 152. Wireless network 152 may be, for example, implemented according to a variety of wireless protocols, including cellular, Bluetooth, and RF or direct IR communications. Wireless network 152 can be implemented as a single network type (e.g. Bluetooth) or a network based on a combination of network types (e.g., GSM, CDMA, etc).

[0097] Wireless network 152 may be configured with teachings/aspects of CDPD (Cellular Digital Packet Data) networks well known in the networking arts. CDPD network 154 is illustrated in FIG. 10. CDPD may be configured as a TP/IP based technology that supports Point-to-Point (PPP) or Serial Line Internet Protocol (SLIP) wireless connections to mobile devices, such as the hand held devices described and illustrated herein. Cellular service is generally
available throughout the world from major service providers. Data can be transferred utilizing CDPD protocols.

[0098] Current restrictions of CDPD are not meant to limit the range or implementation of the method and system described herein, but are described herein for illustrative purposes only. It is anticipated that CDPD will be continually developed, and that such new developments can be implemented in accordance with the present invention.

[0099] Wireless network 152 may preferably be also configured with teachings/aspects of a Personal Area Network 156 or Bluetooth, as described herein. Bluetooth was adopted by a consortium of wireless equipment manufacturers referred to as the Bluetooth Special Interest Group (BSIG), and has emerged as a global standard for low cost wireless data and voice communication. Current specifications for this standard call for a 2.4 GHz ISM frequency band. Bluetooth technology is generally based on a short-range radio transmitter/receiver built into small application specific circuits (ASICS, DSPs) and embedded into support devices, such as the hand held devices described and illustrated herein.

[0100] The Bluetooth standard permits up to 100 mw of power, which can increase the range to 100 M. In addition, Bluetooth can support several data channels. Utilizing short data packets and frequency hopping of up to 1600 hops per second, Bluetooth is a wireless technology that can be utilized to enable the implementation of the methods and systems described herein. Current restrictions of Bluetooth are not meant to limit the range or implementation of the present invention, but are described herein for illustrative purposes only. It is anticipated Bluetooth will be continually developed, and that such new developments can be implemented in accordance with the present invention.

[0101] Wireless network 152 may also be configured utilizing teachings/aspects of GSM network 158. GSM (Global System for Mobile Communication) and PCS (Personal Communications Systems) networks, both well known in the telecommunications arts, generally operate in the 800 MHz, 900 MHz, and 1900 MHz range. PCS initiates narrowband digital communications in the 900 MHz range for paging, and broadband digital communications in the 1900 MHz band for cellular telephone service. In the United States, PCS 1900 is generally equivalent to GSM 1900, GSM operates in the 900 MHz, 1800-1900 MHz frequency bands, while GSM 1800 is widely utilized throughout Europe and many other parts of the world.

[0102] In the United States, GSM 1900 is generally equivalent to PCS 1900, thereby enabling the compatibility of these two types of networks. Current restrictions of GSM and PCS are not meant to limit the range or implementation of the present invention, but are described herein for illustrative purposes only. It is anticipated that GSM and PCS will be continually developed, and that aspects of such new developments can be implemented in accordance with the present invention.

[0103] Wireless network 152 may also utilize teachings/aspects of GPRS network 160. GPRS technology, well-known in the telecommunications arts, bridges the gap between current wireless technologies and the so-called "next generation" of wireless technologies referred to frequently as the third-generation or 3G wireless technologies. GPRS is generally implemented
as a packet-data transmission network that can provide data transfer rates up to 115 Kbps. GPRS can be implemented with CDMA and TDMA technology and supports X.25 and IP communications protocols, all well known in the telecommunications arts. GPM also enables features, such as Voice over IP (VoIP) and multimedia services. Current restrictions of GPRS are not meant to limit the range or implementation of the present invention, but are described herein for illustrative purposes only. It is anticipated that GPRS will be continually developed and that such new developments can be implemented in accordance with the present invention.

[0104] Wireless network 152 may also be implemented utilizing teaching/aspects of a CDMA network 162 or CDMA networks. CDMA (Code Division Multiple Access) is a protocol standard based on IS-95 CDMA, also referred to frequently in the telecommunications arts as CDMA-1. IS-95 CDMA is generally configured as a digital wireless network that defines how a single channel can be segmented into multiple channels utilizing a pseudo-random signal (or code) to identify information associated with each user. Because CDMA networks spread each call over more than 4.4 trillion channels across the entire frequency band, it is much more immune to interference than most other wireless networks and generally can support more users per channel.

[0105] Currently, CDMA can support data at speeds up to 14.4 Kbps. Wireless network 152 may also be configured with a form of CDMA technology known as wideband CDMA (W-CDMA). Wideband CDMA may be also referred to as CDMA 2000 in North America, W-CDMA can be utilized to increase transfer rates utilizing multiple 1.25 MHz cellular channels. Current restrictions of CDMA and W-CDMA are not meant to limit the range or implementation of the present invention, but are described herein for illustrative purposes only. It is anticipated that CDMA and W-CDMA will be continually developed and that such new developments can be implemented in accordance with the present invention.

[0106] Wireless network 152 may he also implemented utilizing teachings/aspects of paging network 164. Such paging networks, well known in the telecommunications arts, can be implemented in accordance with the present invention to enable transmission or receipt of data over the TME/X protocol, also well known in the telecommunications arts. Such a protocol enables notification in messaging and two-way data coverage utilizing satellite technology and a network of base stations geographically located throughout a particular geographical region. Paging network 162 can be configured to process enhanced 2-way messaging applications.

[0107] Unified messaging solutions can be utilized in accordance with wireless network 152 to permit carriers and Internet service providers to manage customer e-mail, voice messages and lax images and can facilitate delivery of these communications to PDAs, telephony devices, pagers, personal computers and other capable information retrieval devices, wired or wireless.

[0108] Current restrictions of such paging networks are not meant to limit the range or implementation of the present invention, but are described herein for illustrative purposes only. It is anticipated that such paging networks, including those based on the TME/X protocol, will be continually developed and that such new developments can be implemented in accordance with the present invention.
[0109] Wireless network 152 may also be configured utilizing teachings/aspects of TDMA networks 166. TDMA (Time Division Multiple Access) is a telecommunications network utilized to separate multiple conversation transmissions over a finite frequency allocation of through-the-air bandwidth. TDMA can be utilized in accordance with the present invention to allocate a discrete amount of frequency bandwidth to each user in a TDMA network to permit many simultaneous conversations or transmission of data. Each user may be assigned a specific timeslot for transmission. A digital cellular communications system that utilizes TDMA typically assigns 10 timeslots for each frequency channel.

[0110] A hand held device operating in association with a TDMA network sends bursts or packets of information during each timeslot. Such packets of information are then reassembled by the receiving equipment into the original voice or data/information components. Current restrictions of such TDMA networks are not meant to limit the range or implementation of the present invention, but are described herein for illustrative purposes only. It is anticipated that TDMA networks will be continually developed and that such new developments can be implemented in accordance with the present invention.

[0111] Wireless network 152 may also be configured utilizing teachings/aspects of Wireless intelligent Networks (WINs) 168. WINs are generally known as the architecture of the wireless switched network that allows carriers to provide enhanced and customized services for mobile telephones intelligent wireless networks generally include the use of mobile switching centers (MSCs) having access to network servers and databases such as Home Location Registers (HLRs) and Visiting Location Registers (VLRs), for providing applications and data to networks, service providers and service subscribers (wireless device users).

[0112] Local number portability allows wireless subscribers to make and receive calls anywhere-regardless of their local calling area. Roaming subscribers are also able to receive more services, such as call waiting, three-way calling and call forwarding. A HLR is generally a database that contains semi-permanent mobile subscriber (wireless device user) information for wireless carriers' entire subscriber base.

[0113] A useful aspect of WINs for the present invention is enabling the maintenance and use of customer profiles within an HLR/VLR-type database. Profile information may be utilized for example with season ticket holders and/or fans of traveling teams or shows. HLR subscriber information as used in WINs includes identity, service subscription information, location information (the identity of the currently serving VLR to enable routing of communications), service restrictions and supplementary services/information. HLRs handle SS7 transactions in cooperation with Mobile Switching Centers and VLR nodes, which request information from the HLR or update the information contained within the HLR. The HLR also initiates transactions with VLRs to complete incoming calls and update subscriber data. Traditional wireless network design is generally based on the utilization of a single HLR for each wireless network, but growth considerations are prompting carriers to consider multiple HLR topologies.

[0114] The VLR may be also configured as a database that contains temporary information concerning the mobile subscribers currently located in a given MSC serving area, but whose HLR may be elsewhere. When a mobile subscriber roams away from the HLR location into a
remote location, SS7 messages are used to obtain information about the subscriber from the HLR, and to create a temporary record for the subscriber in the VLR.

[0115] Signaling System No. 7 (referred to as SS7 or C7) is a global standard for telecommunications. In the past the SS7 standard has defined the procedures and protocol by which network elements in the public switched telephone network (PSTN) exchange information over a digital signaling network to affect wireless and wireline call setup, routing, control, services, enhanced features and secure communications. Such systems and standards may be utilized to implement wireless network 152 in support of venue customers, in accordance with the present invention.

[0116] Improved operating systems and protocols allow Graphical User Interfaces (GUIs) to provide an environment that displays user options (e.g., graphical symbols, icons or photographs) on a wireless device's screen. Extensible Markup Language ("XML") is generally a currently available standard that performs as a universal language for data, making documents more interchangeable. XML allows information to be used in a variety of formats for different devices, including PCs, PDAs and web-enabled mobile phones.

[0117] XML enables documents to be exchanged even where the documents were created and/or are generally used by different software applications. XML may effectively enable one system to translate what another system sends. As a result of data transfer improvements, wireless device GUIs can be utilized in accordance with a hand held device and wireless network 152, whether configured as a paging network or another network type, to render images on the hand held device that closely represent the imaging capabilities available on desktop computing devices.

[0118] Those skilled in the art can appreciate that the system and logical processes described herein relative to FIGS. 11 to FIG. 17 are not limiting features of the present invention. Rather, FIGS. 11 to FIG. 17 provide examples of image-processing systems and logical processes that can be utilized in accordance with the present invention. Such a system and logical processes represent one possible technique, which may be utilized in accordance with one or more embodiments of the present invention to permit a user of a hand held device to manipulate video images viewable on a display screen of the hand held device.

[0119] FIG. 11 thus illustrates a prior art overview display 200 and a detail window 210 that may be utilized with embodiments of the present invention. The overview image display 200 is a view representative of a 360-degree rotation around a particular point in a space. While a complete rotational view may be utilized in accordance with preferred embodiments of the present invention, one of ordinary skill in the computer arts will readily comprehend that a send-circular pan such as used with wide-angle cameras) or other sequence of images could be substituted for the 360 degree rotation without departing from the subject invention. The vantage point is generally where the camera was located as it panned the space. Usually the scene is captured in a spherical fashion as the camera pans around the space in a series of rows as depicted in FIG. 12. The space is divided into w rows 220-224 and q columns 230-242 with each q representing another single frame as shown in FIG. 12.

[0120] User control over the scene (e.g., rotation, pan, zoom) may be provided by pressing a
touch screen display icon or moving a cursor displayed on a display screen of a hand held device, such as the hand held devices described herein. User control over the scene may also be provided by manipulating external user controls integrated with a hand held device (e.g., user controls 44 and 54 of FIG. 2 and FIG. 3). Movement from a frame in the overview image display to another frame is in one of eight directions as shown in FIG. 13. The user may interact with the video representation of the space one frame at a time. Each individual frame is an image of one of the pictures taken to capture the space as discussed above. The individual frames may be pieced together.

[0121] Interacting with a video one frame at a time results in the ability to present a detailed view of the space, but there are severe limitations. First, the interaction results in a form of tunnel vision. The user can only experience the overview image display as it unfolds a single frame at a time. No provision for viewing an overview or browsing a particular area is provided. Determining where the current location in the image display is, or where past locations were in the overview image display is extremely difficult. Such limitations can be overcome by creating a motif not dissimilar to the natural feeling a person experiences as one walks into a room.

[0122] Another limitation of a simple overview viewer is that there is no random access means. The frames can only be viewed sequentially as the overview image display is unfolded. As adapted for use in accordance with the present invention, this problem has been overcome by providing tools to browse, randomly select and trace selected images associated with any overview image.

[0123] FIG. 14 illustrates a prior art overview image 300, a detail window 310 and a corresponding area indicia, in this case a geometric figure outline 320. The detail window 310 corresponds to an enlarged image associated with the area bounded by the geometric figure outline 320 in the overview image 300. As the cursor is moved, the location within the overview image 300 may be highlighted utilizing the geometric figure outline 320 to clearly convey what location the detail window 310 corresponds.

[0124] One of ordinary skill in the computer arts will readily comprehend that reverse videoing the area instead of enclosing it with a geometric figure would work equally well. Differentiating the area with color could also be used without departing from the invention. A user can select any position within the overview image, press the cursor selection device's button (for example, user controls in the form of touch screen user interface buttons or icons), and an enlarged image corresponding to the particular area in the overview display is presented in the detail window 310. Thus, random access of particular frames corresponding to the overview image may be provided.

[0125] FIG. 15 illustrates a prior art series of saved geometric figure outlines corresponding to user selections in tracing through an overview display for subsequent playback. The overview image 400 has a detail window 410 with an enlarged image of the last location selected in the overview image 470. Each of the other cursor locations traversed in the overview image 420,430,440,450 and 460 are also enclosed by an outline of a geometric figure to present a trace to the user.
Each of the cursor locations may be saved, and because each corresponds to a particular frame of the overview image, the trace of frames can be replayed at a subsequent time to allow another user to review the frames and experience a similar presentation. Locations in the detailed window and the overview image can also be selected to present other images associated with the image area, but not necessarily formed from the original image.

For example, a china teacup may appear as a dot in a china cabinet, but when the dot is selected, a detailed image rendering of the china teacup could appear in the detailed window. Moreover, a closed door appearing in an image could be selected and result in a detailed image of a room located behind the door even if the room was not visible in the previous image. Finally, areas in the detailed window can also be selected to enable further images associated with the detailed window to be revealed. Details of objects within a scene are also dependent on resolution capabilities of a camera. Cameras having appropriate resolution and/or image processing capabilities are preferably used in accordance with certain aspects of the present invention.

The overview image was created as discussed above. To assist one of ordinary skill in the art to make and use the invention, a more detailed discussion of the necessary processing is presented below with reference to FIG. 16 and FIG. 17 herein.

FIG. 16 depicts a prior art flowchart providing a logical process for building an overview image display. Such a logical process may be utilized in accordance with the present invention, but is not a necessary feature of the present invention. Those skilled in the art will appreciate that such a logical process is merely an example of one type of image-processing algorithm that may be utilized in accordance with embodiments of the present invention. For example, such a logical process may be implemented as a routine or subroutine that runs via image-processing unit 35 of FIG. 1 in a hand held device. Those skilled in the art can appreciate that the logical process described with relation to FIGS. 16 and 17 herein are not limiting features of the present invention.

Such logical processes, rather, are merely one of many such processes that may be utilized in accordance with the present invention to permit a user to manipulate video images displayed via a display screen of a hand held device. Navigable movie/video data in the form of images input to the hand held device to form individual images can be thus processed, as illustrated at function block 500. User specified window size (horizontal dimension and vertical dimension) may be entered, as illustrated at function block 504.

Image variables can be specified (horizontal sub-sampling rate, vertical sub-sampling rate, horizontal and vertical overlap of individual frame images, and horizontal and vertical clip (the number of pixels are clipped from a particular frame in the x and y plane)), as depicted at function block 508. Function blocks 500, 504 and 508 are fed into the computation function block 510 where the individual frames are scaled for each row and column, and the row and column variables are each initialized to one.

Then a nested loop can be invoked to create the overview image. First, as indicated at decision block 512, a test is performed to determine if the maximum number of rows has been
exceeded. If so, then the overview image is tested to determine if its quality is satisfactory at decision block 520. If the quality is insufficient, the user may be provided with an opportunity to adjust the initial variables, as illustrated at function blocks 504 and 508. The processing is then repeated. If however, the image is of sufficient quality, it can be saved and displayed for use, as depicted at block 560.

[0133] If the maximum rows has not been exceeded as detected in decision block 512, then another test can be performed, as illustrated at decision block 514, to determine if the column maximum has been exceeded. If so, then the row variable can be incremented and the column variable can be reset to one at function block 518 and control flows to input block 520. If the column maximum has not been exceeded, then the column variable may be incremented and the sub-image sample frame can be retrieved, as depicted at input block 520. Then, as illustrated at function block 530, the frame may be inserted correctly in the overview image.

[0134] The frame may be inserted at the location corresponding to \((\text{V}_{\text{sub}} \times \text{row} \times \text{col}) + \text{H}_{\text{sub}} \times \text{col}\); where row and col refer to the variables incremented in the nested loop, and \text{V}_{\text{sub}} and \text{H}_{\text{sub}} are user specified variables corresponding to the horizontal and vertical sub sampling rate. Finally, the incremental overview image can be displayed based on the newly inserted frame as depicted at display block 540. Thereafter, the column variable can be reset to one and processing can be passed to decision block 512.

[0135] A computer system corresponding to the prior art method and system depicted in FIGS. 11 to 17 may be generally interactive. A user may guess at some set of parameters, build the overview image, and decide if the image is satisfactory. If the image is not satisfactory, then variables can be adjusted and the image is recreated. This process can be repeated until a satisfactory image results, which may be saved with its associated parameters. The picture and the parameters can be then input to the next set of logic.

[0136] Such features may or may not be present with the hand held device itself. For example, images may be transmitted from a transmitter, such as data transmitter 112 of FIG. 7, and subroutines or routines present within the server itself may utilize predetermined sets of parameters to build the overview image and determine if the image is satisfactory, generally at the request of the hand held device user. A satisfactory image can be then transmitted to the hand held device. Alternatively, image-processing routines present within an image-processing unit integrated with the hand held device may operate in association with routines present within the server to determine if the image is satisfactory, and/or to manipulate the image (e.g., pan, zoom).

[0137] FIG. 17 depicts a prior art flowchart illustrative of a logical process for playback interaction. The logical process illustrated in FIG. 17 may be utilized in accordance with a preferred or alternative embodiment, depending of course, upon design considerations and goals. Playback interaction may commence, as illustrated at label 600, which immediately flows into function block 604 to detect if user controls have been activated at the hand held device. Such user controls may be configured as external user controls on the hand held device itself (e.g., buttons, etc.), or via a touch screen user interface integrated with hand held device display screen.
When a touch screen user input or user control button press is detected, a test can be performed to determine if a cursor is positioned in the overview portion of the display. If so, then the global coordinates can be converted to overview image coordinates local to the overview image as shown in output block 612. The local coordinates can be subsequently converted into a particular frame number as shown in output block 614. Then, the overview image is updated by displaying the frame associated with the particular location in the overview image and control flows via label 600 to function block 604 to await the next button press.

If the cursor is not detected in the overview image as illustrated at decision block 610, then another test may be performed, as indicated at decision block 620, to determine if the cursor is located in the navigable player (detail window). If not, then control can be passed back via label 600 to function block 604 to await the next user input. However, if the cursor is located in the detail window, then as depicted a function block 622, the direction of cursor movement may be detected. As depicted at function block 624, the nearest frame can be located, and as illustrated at decision block 626, trace mode may be tested.

If trace is on, then a geometric figure can be displayed at the location corresponding to the new cursor location in the overview image. The overview image may be then updated, and control can be passed back to await the next user input via user controls at the hand held device and/or a touch screen user interface integrated with the hand held device. If trace is not on, the particular frame is still highlighted as shown in function block 630, and the highlight can be flashed on the overview image as illustrated at output block 632. Thereafter, control may be returned to await the next user input.

Although the aforementioned logical processes describe the use of a cursor as a means for detecting locations in a panorama, those skilled in the art can appreciate that other detection and tracking mechanisms may be utilized, such as, for example, the pressing of a particular area within a touch screen display.

FIG. 18 depicts a pictorial representation illustrative of a Venue Positioning System (VPS) 700 in accordance with an alternative embodiment. FIG. 18 illustrates a stadium venue 701 which is divided according to seats and sections. Stadium venue 701 may be utilized for sports activities, concert activities, political rallies, or other venue activities. Stadium venue 701 is divided, for example, into a variety of seating sections A to N. For purposes of simplifying this discussion, VPS 700 is described in the context of sections A to C only.

A venue positioning system (VPS) device 704 is positioned in section A of stadium venue 701, as indicated at position A2. A VPS device 702 is located within section A at position A1. In the illustration of FIG. 18, it is assumed that VPS device 702 is located at the top of a staircase, while VPS device 704 is located at the bottom of the staircase, and therefore at the bottom of section A near the sports field 711. A VPS device 706 is located near the top of section B at position B1. A VPS device 708 is located at the bottom of section B at position B2, near sports field 711. Similarly, in section C, venue positioning devices 710 and 712 are respectively located at positions C1 and C2.

A hand held device 703 may be located at a seat within section A. For purposes of this
discussion, and by way of example only, it is assumed that hand held device 703 is being
operated by a stadium attendee watching a sporting event or other venue activity taking place on
sports field 711. A hand held device 707 is located within section B. Hand held device 707, by
way of example, may also be operated by a concessionaire or venue employee.

[0145] If the user of hand held device 703 desires to order a soda, hot dog, or other product or
service offered by venue operators during the venue event, the user merely presses an associated
button displayed via a touch screen user interface integrated with the hand held device.
Immediately, a signal is transmitted by hand held device 703, in response to the user input
to/through the VPS device, wireless network or wireless gateway as previously described. One or
more of VPS devices 702, 704, 706, and 708 may detect the signal. The VPS devices may also
operate merely as transponders, in which case hand held devices will be able to determine their
approximate location within the venue and then transmit position information through wireless
means to, for example, concession personnel.

[0146] VPS devices 702, 704, 706, and 708 function in concert with one another to determine the
location of hand held device 703 within section A. Triangulation methods, for example, may be
used through the hand held device or VPS devices to determine the location of the hand held
device within the venue. This information is then transmitted by one or more of such VPS
devices either directly to hand held device 707 or initially through a wireless network, including
a wireless gateway and associated server, and then to hand held device 707. The user of hand
held device 707 then can directly proceed to the location of hand held device 703 to offer
concession services.

[0147] Additionally, hand held device 703 can be configured with a venue menu or merchandise
list. In response to requesting a particular item from the menu or merchandise list, the request
can be transmitted as wireless data from hand held device 703 through the wireless network to
hand held device 707 (or directly to a controller (not shown) of hand held device 707) so that the
user (concession employee) of hand held device 707 can respond to the customer request and
proceed directly to the location of hand held device 703 used by a customer.

[0148] FIG. 19 illustrates in greater detail the VPS 700 of FIG. 18, in accordance with an
alternative embodiment. In FIG. 18 and FIG. 19 like or analogous parts are indicated by identical
reference numerals, unless otherwise stated. Additionally wireless gateway 124 and server 100 of
FIG. 19 are analogous to the wireless gateway 124 and server 100 illustrated in FIG. 8. Venue
positioning units 702, 704, 706, and 708 are located within section A and section B. A wireless
gateway 124 is linked to server 100. Wireless gateway 124 can communicate with hand held
device 707 and hand held device 703.

[0149] Wireless gateway 124 can also communicate with VPS devices 702, 704, 706, and 708 if
the VPS devices are also operating as data communication devices in addition to providing mere
transponder capabilities. When VPS devices 702, 704, 706, and 708 detect the location of hand
held device 703 within stadium venue 701, the location is transmitted to wireless gateway 124
and thereafter to hand held device 703. It should be appreciated that a hand held device user may
also identify his/her location in a venue by entering location information (e.g., seat/section/row)
on the hand held device when making a request to a service provider such as a food concession
operation. The VPS devices will still be useful to help concession management locate concession employees located within the venue that are in closest proximity to the hand held device user. A wireless gateway 124 and server 100 can be associated with a wireless network implemented in association with stadium venue 701. Those skilled in the art will appreciate that such a wireless network may be limited geographically to the stadium venue 701 itself and the immediate surrounding area. An example of such a wireless network, as described previously is a Bluetooth based wireless network.

The hand held devices themselves may be proprietary devices owned by promoters or operators of stadium venue 701 and rented to patrons for their use while attending a venue activity. Proprietary devices will generally be manufactured using durable materials (e.g., similar to those materials used on field technician digital millimeters/devices such as the Fluke.TM. line of electronic devices). Proprietary devices will also be limited in hardware and software modules (i.e., software routines/subroutines) needed for communication with the venue system in order to display venue activities to temporary users.

Hand held devices may also be owned by the patrons themselves which they bring into the stadium venue for their use by permission of the venue promoter or stadium owners in return for the payment of a fee by the patron. In return for the fee, the venue promoter or stadium owner can provide the patron with a temporary code which permits them to access the wireless network associated with the venue itself, such as wireless network 152 described herein. Patron-owned devices may utilize smart card technology to receive authorization codes (e.g., decryption) needed to receive venue--provided video/data. Codes may also be transferred to the patron-owned device via IR or short range RF means. Wireless network 152 described herein may be configured as a proprietary wireless Intranet/Internet providing other data accessible by patrons through their hand held devices.

FIG. 20 depicts a flowchart of operations 740 illustrative of a method for providing multiple venue activities through a hand held device, in accordance with an alternative embodiment. The process is initiated, as depicted at block 742. As illustrated next at block 744, a venue attendee may activate at least one hand held tuner integrated with a hand held device, such as the hand held device illustrated in FIG. 4. At least one tuner may be integrated with the hand held device, although more than one tuner (or other simultaneous signal receiving capability) may be used within a hand held device in support of other embodiments of the invention previously described.

The tuner, or tuners, is/are associated with a transmission frequency/frequencies of a transmitter that may be linked to a particular camera/cameras focusing on a venue activity, or to a wireless gateway or wireless network transmission. To view the images from that particular angle, the user must retrieve the video images from the camera associated with that particular angle. The user may have to adjust a tuner until the right frequency/image is matched, as indicated at block 756. As illustrated at block 748, captured video images are transferred from the video camera to the transmitter associated with the camera, or a server in control of the camera(s). Video images are generally transmitted to the hand held device at the specified frequency, in response to a user request at the hand held device, as depicted at block 750.
An image-processing unit integrated with the hand held device, as illustrated at block 752 may then process transferred video images. An example of such an image-processing unit is image-processing unit 35 of FIG. 1. As indicated thereafter at block 754, the video images of the venue activity captured by the video camera can be displayed within a display area of the hand held device, such as display 18 of FIG. 1. The process can then terminate, as illustrated at block 756.

FIG. 21 illustrates a flowchart of operations 770 illustrative of a method for providing multiple venue activities through a hand held device from one or more digital video cameras, in accordance with an alternative embodiment. As indicated at block 772, the process is initiated. As illustrated next at block 774, video images of a venue activity may be captured by one or more digital video camera.

Such digital video cameras may be panoramic/wide-angle in nature and/or configured as high definition video cameras, well known in the art. The video camera or cameras may be respectively linked to data transmitters, such as data transmitters 102, 104, 106, and/or 108 of FIG. 5 or data transmitter 112 of FIG. 6 to FIG. 9 herein. As depicted next at decision block 778, if a user does not request a view of the venue activity through the hand held device, the process terminates, as illustrated thereafter at block 779.

If, as illustrated at decision block 778, the user does request a view of the venue activity through the hand held device, then as described thereafter at block 780, video data may be transferred from a data transmitter to a server, such as server 100 of FIG. 5 to FIG. 8 herein. The video data may be stored in a memory location of the server or a plurality of servers, as indicated at block 782. The video data may be then transferred to a wireless data transmitter/receiver integrated with the hand held device, as indicated at block 784.

As illustrated thereafter at block 786, the video data may be processed by an image-processing unit and associated image-processing routines and/or subroutines integrated with the hand held device. When image-processing is complete, the video images may be displayed in a display area of the hand held device. As illustrated next at block 790, if a user chooses to pan/zoom for a better view of the video images displayed within the hand held device, then two possible operations may follow, either separately or in association with one another.

The image-processing unit integrated with the hand held device may process the user's pan/zoom request, as illustrated at block 792. Alternatively, image-processing routines and/or subroutines resident at the server or a plurality of servers may process the user's pan/zoom request, following the transmission of the user's request from the hand held device to the server or plurality of servers. Such a request may be transmitted through a wireless gateway linked to the server or servers.

Image-processing may occur at the server or servers if the hand held device is not capable of directly processing the video data and video images thereof due to low memory or slow CPU allocation. Likewise, some image-processing may take place within the hand held device, while video image-processing requiring faster processing capabilities and increased memory may take place additionally at the server or servers to assist in the final image representation displayed at
the hand held device.

[0161] When image-processing is complete, the pan/zoomed images can be displayed within a display screen or display area of the hand held device, as illustrated thereafter at block 796. The process then terminates, as depicted at block 798. If the user does not request pan/zoom, as indicated at block 790, the process may then terminate, as described at block 791.

[0162] Based on the foregoing, it can be appreciated that methods, systems and servers are disclosed for authorizing access by a user of at least one service associated with an event at a venue based on a location of the user as determined by assets of a data communications network (e.g., Internet protocol based networks, computer network, telecommunications network, wireless network, Internet, etc). A location of at least one user can be determined based on communications of at least one computing device utilized by the at least one user with the data communications network supporting data communications of the at least one computing device. The at least one computing device can be authorized to receive the at least one service based on the location as determined by the data communications network. The data communications network can further comprise at least one of a server, a gateway, a home location register and a visiting location register. In some embodiments, the at least one user can be, for example, a subscriber. In other embodiments, the subscriber information associated with the subscriber can be stored in a memory (e.g., a database), and the subscriber information can be utilized to authorize the at least one service for the user. The at least one service can comprise, for example, at least one of video data, statistical information, concession information and advertisements. In some embodiments, authorizing the at least one computing device can further comprise preventing the at least one computing device from receiving the at least one service beyond or within a particular geographical area based on the location determined by the data communications network. In other embodiments, authorizing the at least one computing device can further comprise preventing the at least one computing device from receiving the at least one service absent at least one authorization code.

[0163] The embodiments and examples set forth herein are presented in order to best explain the present invention and its practical application and to thereby enable those skilled in the art to make and utilize the invention. However, those skilled in the art will recognize that the foregoing description and examples have been presented for the purpose of illustration and example only. The description as set forth is not intended to be exhaustive or to limit the invention to the precise form disclosed. Many modifications and variations are possible in light of the above teaching without departing from the spirit and scope of the following claims.

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