A portable unit is for video communication to select a user name in a user name network. A transceiver wirelessly accesses a communication network through a wireless connection to a general purpose node coupled to the communication network. A user interface can receive user input to log on to a user name network through the communication network. The user name network has a plurality of user names, at least one of the plurality of user names is associated with a remote portable unit, logged on to the user name network and available for video communication.
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**Welcome to WARP**
Users logged on:
- Vest
- Gordon
- VC1
- GreatHac
- Remote: DrHike
- Nameserver
  select one
User puts on the portable access unit with headset and sensor

User logs in and portable access unit associates with local general purpose node

Provide connection list to portable access unit from general purpose nodes

Present connection list of portable access units and media devices logged onto the system

Select entry from the selection list

Transmit selection to the general purpose node

Set connection between user’s portable access unit and the selected portable access unit or media device through the general purpose node

Exchange signals

FIG. 3
1 WIRELESS AUGMENTED REALITY
COMMUNICATION SYSTEM

CROSS-REFERENCE TO RELATED
APPLICATIONS

This application claims the benefit of priority as a continuation
14/038,760, filed on Sep. 27, 2013, which is continuation of
No. 8,633,869), filed on Dec. 21, 2012, which is a continu-
ation of U.S. patent application Ser. No. 12/698,107 (now
abandoned), filed on Feb. 1, 2010, which is a continuation
of U.S. patent application Ser. No. 11/410,517 filed on Apr. 24,
2006 (now abandoned), which is a continuation of U.S. patent
application Ser. No. 09/483,315 filed on Jan. 14, 2000 (now
U.S. Pat. No. 7,035,897), which claims priority from U.S.
Provisional Application No. 60/115,993 filed on Jan. 15,
1999, the contents of each being herein incorporated by ref-
ence in their entirety.

GOVERNMENT LICENSE RIGHTS

The U.S. Government has certain rights in this invention
pursuant to NAS7-1407 awarded by NASA.

FIELD OF THE INVENTION

The invention, in general, relates to a wireless augmented
reality system (WARS), and more particularly, to a WARS
that leverages communications and multimedia information
processing microelectronics, along with displays, imaging
sensors, biosensors, and voice recognition to provide hands-
free, tetherless, real-time access and display of network
resources, including video, audio and data.

DESCRIPTION OF THE PRIOR ART AND
RELATED INFORMATION

Online instruction manuals are becoming more prevalent
in the industrial and everyday environment. These electronic
technical manuals (ETM) may be interactive. Just as with
printed manuals, ETMs may become very difficult to use and
maintain in these environments where elements of an envi-
ronment, such as dust, chemical or general harshness may be
detrimental to the electronics and storage devices used to
display and operate the ETM. Further, it is not always poss-
ible for a worker who requires access to an ETM to stop work
to consult ETM.

These problems are multiplied in extraterrestrial environ-
ments such as a space shuttle or a space station. During intra
and extra vehicular activities, it may be virtually impossible
to access a traditional keyboard and computer display to
access an ETM. For example, during a satellite repair mis-
sion, it would not be practical for an astronaut in a bulky
extravehicular space suit to type commands on a keyboard to
access an ETM. For example, during a satellite repair mis-
sion, it would not be practical for an astronaut in a bulky
extravehicular space suit to type commands on a keyboard to
access an ETM. Further, it is not always poss-
ible for a worker who requires access to an ETM to stop work
to consult ETM.

Hands-free portable computers have been implemented in
an attempt to solve some of these problems. For example,
U.S. Pat. Nos. 5,305,244 and 5,844,824 describe systems in
which a head-up display and voice recognition is imple-
mented in a portable computer for displaying ETM. However,
these systems, being a single user-to-computer paradigm, do
not allow multiple-user access to multiple computers, multi-
media devices or nodes on a network for accessing arbitrarily-
selected data channels. Further, these previously-described
systems are self contained and their data storage needs to be
updated periodically to be sure that the latest data is dis-
played. Further, these systems do not allow two-way commu-
nication over local and wide area networks to other multi-
media users and devices, and do not provide real-time
biomedical information about the physical condition of the
user.

There is thus a need for a wireless, wearable communica-
tions system allowing two-way voice, video and data com-
munication between local users and to remote users and
devices over network nodes, along with tetherless real-time
monitoring of the local user’s physical condition.

SUMMARY

The needs of the prior art are met by a portable unit,
methods of software for video communication to select a user
name in a user name network.

In one embodiment, a transceiver wirelessly accesses a
communication network through a wireless connection to a
general purpose node coupled to the communication net-
work. A user interface can receive user input to log on to a user
name network through the communication network. The user
name network has a plurality of user names, at least one of the
plurality of user names being associated with a remote por-
table unit, logged on to the user name network and available
for video communication. In some embodiments, the user
interface comprises a touchpad configured to receive user
inputs. A display on the portable unit displays one or more of
the plurality of user names.

In an embodiment, the user interface further receives a
selection of a user name from the plurality of user names. The
display displays video communication received by the por-
table unit from the remote portable unit. The video commu-
nication is associated with the selected user name.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagrammatic illustration of the components of
the system of the present invention;
FIG. 2 is block diagram illustrating communications com-
ponents used by the personal access unit and general purpose
node of the system of FIG. 1; and
FIG. 3 is a flowchart illustrating a method performed using
the system of FIG. 1.

DETAILED DESCRIPTION OF PREFERRED
EMBODIMENTS

With reference to FIG. 1, a diagram illustrating compo-
ents of the system of the present invention is shown. The
system may comprise small pager-like devices called por-
table access units 100. The portable access units 100 are
accessorizable for different “multimedia” interfaces for dis-
play, camera, audio and sensor operation. Another embodi-
ment of the portable access unit 100 comprises a wearable
headset and microphone assembly 102a.

The portable access units 100-100a interface directly
through wireless link with a network through a general pur-
pose node 150. The general purpose node 150 allows wire-
less-to-wire communication with a local network 170. The
local area network 170 may be electrically connected to a
wide area network or Internet 172 in order to connect to
remote local area networks 174. Alternatively, the general
purpose node 150 may be directly connected to the wide area
network 172. The general purpose node 150 may thus act as a
router for routing video, display, audio and control data pack-
remote unfamiliar portable access units
portable access units be presented on a display 102 or headset 102a on any of the
media devices such as cameras 125, internet phones 104, or remote
remote, portable access units that are logged in and associated with remote general purpose
node 150-150a. The list of connections is stored in a random access memory device included in the general purpose node 150a that is electrically connected to the network. The portable access units 100a may provide communication to and from remote media devices comprising computers 180-182 running specialized client software or certain commercial multimedia Internet software products such as video conferencing products that adhere to the industry standard H.323 for multimedia data transfer.

Each portable access unit 100-100a may dynamically associate with the closest general purpose node 150-150a when it is logged on to the network 170-174 or is connected thereto. Each general purpose node 150-150a records the associations and registers each portable access unit 100-100a on a list of connections associated with the particular general purpose node 150-150a. The list of connections is stored in a random access memory device included in the general purpose node 150-150a. When a portable access unit 100a is logged off or disconnected from the network 170-174, it is disassociated from the particular general purpose node 150-150a that it was associated with, and, thus, is removed from the list of connections.

As shown on an example selection list screen 190 that may be presented on a display 102 or headset 102a on any of the portable access units 100-100a, the user may select from a menu of options such as cameras 125, internet phones 104, or remote media devices 125, 180, etc., that are logged into a network 170-174. The headset 102a may comprise a heads-up display (120 in FIG. 2) inside a headset embodying a transparent color LCD device. Using control keys or voice commands, a user of the portable access unit 100-100a may select a local or remote portable access unit 100-100a on a selection list 190 of other portable access units 100-100a or remote media devices 125, 180. The selection list 190 comprises a combination of the lists of connections stored on all of the general purpose nodes 150-150a. Users may further access a nameserver located on the access node 150 for locating remote unfamiliar portable access units 100-100a or remote media devices. By selecting entries from the selection list 190, users may communicate with portable access units 100-100a or various media devices such as cameras 125, internet phones 104, one or more computers 180-182 located throughout the networks 170-174. A user may further select from the list 190 user names representing users of other portable access units 100 that are logged in and associated with remote general purpose nodes 150a connected to the networks 170-174.

With reference to FIG. 2, the components of the access node 150 and the wearable headset embodiment of the portable access unit 100a is shown. Elements for both the general purpose access node and portable access unit 100a include a communications device 202. Data processing functions are implemented in the form of an audio/video coder/decoder (codec) pair 200, one codec 200 comprising part of the portable access unit 100a and the other codec 200 being part of another portable access node 100a or remote media device for which it is desired to exchange signals. At a portable access node, the codec 200 controls a digital data stream which is fed to the communications device 202, which is implemented as an RF modem transceiver pair with an equivalent communications device 202 located in the general purpose access node. The codecs 200 serve as the interfaces to the external elements (including possibly the user display 102a and the sensor 104) on both sides of the communication continuum comprising the communications device 202 of the general purpose node 150, an internal network interface protocol circuit 152, the external networks 170-174 and the electrical connection or general purpose access node connection to the desired remote portable access node or media device. The internal network interface protocol circuit 152 may comprise an Ethernet chip, memory and a network protocol chip. With this architecture, the system addresses the issues of multiple-access and data channel quality, through the implementation of the communications device 202. Multiple implementations of the communications device 202 in the general purpose node 150 allows for multiple simultaneous communication links with a plurality of portable access units 100-100a for the general purpose node 150.

With the base functionality of the communications device 202 and codec subsystem 200, the architecture provides flexibility in utilization of different external components such as different headset 102a configurations, sensor 104 packages, and network interface 152 capabilities. The communications device 202 is designed to operate in a high multipath space station or terrestrial indoor environment while being able to support multiple users at high, multimedia-type bandwidths. Thus the communications device's 202 physical (PHY) and media access (MAC) layers in combination support multiple access, dynamic network association, channel error rates of broadcast video quality (1.1 times 10e-6), and data rates up to broadcast-quality video bandwidths (on the order of 768 kbps per user (one-way)). Modulation to achieve this performance will be differential phase-shift keying, of binary or higher order (quadrature or high-order quadrature amplitude modulation); the order chosen reflects the necessary user data volume to be supported within fixed, FCC-specified bandwidth allocations. Orthogonal frequency division multiplexing, code division multiple access, and frequency hopping/time division multiple access may be used for achieving multiple access. Spread spectrum, channel equalization, antenna diversity and retransmission techniques may also be used for improving the reliability of the communications link. Through a combination of these technologies, two-way multimedia channel throughputs can be achieved for each of multiple simultaneous users. A variety of RF frequencies may be used, but the determining factor in frequency band selection is the availability in the band of a relatively large amount of spectrum in the space station or FCC terrestrial allocations, allowing the transmission of compressed video. Ranges in the 2.5 to 5.7 band range are preferable due to the FCC bandwidth available, the compactness of RF elements required at these frequencies, and the potentially low amount of interference that will be sustained. The RF front end of both the portable access unit 100-100a and general purpose node 150-150a may be interexchangeable with different frequency front ends for system use in different frequency bands.

Low-rate, single user implementations of the communications system may be effected through adapted commercial wireless-LAN type products following the FCC 802.11 standard such as a frequency-hopping 2.4 GHz wireless LAN transceiver by Waveaccess, Inc of Wellesley, Mass., or direct-sequence spread-spectrum 2.4 GHz wireless LAN chipset by Harris Prism of Melbourne, Fla. These radio implementations, as with commercial implementations of the industry-proposed Bluetooth and HomeRF standards, will be limited in user access and overall throughput, however, and therefore unsuitable to real-time video teleconferencing for multiple users. The preferred embodiment for full capability is to implement the communications devices' physical and media
The communications device 202 comprises a buffer memory and a radio frequency front end. Data modulation/ demodulation circuits and error detection/correction protocols are further included. Various combinations of these circuits may be obtained from Proxim of Sunnyvale, Calif., Harris of Melbourne, Fla. and Stanford Telecom of Stanford, Calif. Alternatively, all of the various circuits may be implemented with an application specific integrated circuit (ASIC), or a combination of an ASIC and discrete elements for size and weight efficiency.

Three classes of headsets 102a may be used: hi-resolution military systems which are CRT based and may be provided by Honeywell of Morristown, N.J., or Hughes Network Systems of San Diego, Calif.; medium resolution industrial systems which are CRT or LED based scanners and may be provided by Intervision of Santa Clara, Calif.; or low to medium resolution entertainment systems which are color viewfinder LCD based systems that may be supplied by Virtual Vision of Redmond, Wash. (the V-CAP and E-GLASS), Sony Europe of Hampshire, United Kingdom (GLASTRON VISOR) or Olympus of San Jose, Calif. Typical headset display 120 specifications for the portable access unit 100a include the following:

RESOLUTION: Comparable at least to VGA (640x480) or better to 1280x1024 w/off-the-shelf display & I/O configuration
DISPLAY: >10 FL/day, Display Bright. Ratio: >2, Brightness range: 2 OOM max.
FOV: 40-60 deg, Gray scale: >12
EyeRelief: 20-26 mm TSP, 14/10 mm (on/off-axis) exit pupil
Unif: 2:1 across 2/3 FOV, GLARE: <2.5% image content, PixelContrast: 25
FOCUS: Hands off, Obs: % look-around, Diopter range: + - 2, Mag: ± 1±5%, Cont: >95%, motion sensor 10° cone, Inter.
Eye adj: 52-72 mm
Image Enhn & IFF: Weaponsight, motion sensor and computer interface

The audio/video codec 200 in a portable access unit 100-100a or other client device is based around a single chip, standards-based codec that accepts analog or digital audio and video (i.e. NTSC or VGA) compresses this input, and multiplexes this compressed data with an external data stream. The preferred industry standards are: ITU 11263 based video, or a combination of an ASIC and discrete elements for size and weight efficiency.

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FOV: 40-60 deg, Gray scale: >12
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FOV: 40-60 deg, Gray scale: >12
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Unif: 2:1 across 2/3 FOV, GLARE: <2.5% image content, PixelContrast: 25
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the portable access unit 100a and the general purpose node 150 which routes the control commands to the device that the user selected, step 412.

It will thus be seen that changes may be made in carrying out the above system and method and in the construction set forth without departing from the spirit and scope of the invention, it is intended that any and all matter contained in the above description and shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

We claim:
1. A portable unit for video communication to select a user name in a user name network, the portable unit comprising: a transceiver for wirelessly accessing a communication network through a wireless connection to a general purpose node, the general purpose node coupled to the communication network;
a user interface to receive user input to log on to the user name network through the communication network, the user name network having a plurality of user names, wherein at least one of the plurality of user names is associated with a remote portable unit, logged on to the user name network and available for video communication, and wherein the user interface comprises a touchpad configured to receive user inputs; and
a display on the portable unit to display one or more of the plurality of user names, wherein the user interface further receives a selection of the user name from the plurality of user names, and wherein the display displays video communication associated with the selected user name.
2. The portable unit of claim 1, wherein the user interface receives user input to add a portable unit to a list of connections.
3. The portable unit of claim 2, wherein the user interface is configured to receive user input to remove a portable unit from the list of connections.
4. The portable unit of claim 1, wherein the video communication comprises two-way video communication.
5. The portable unit of claim 1, wherein at least one of the portable unit and the remote portable unit comprises an internet telephone.
6. The portable unit of claim 1, wherein at least one of the portable unit and the remote portable unit has pager-like dimensions.
7. The portable unit of claim 1, wherein the portable unit is configured to access a name server to locate additional remote media devices that are out-of-network.
8. The portable unit according to claim 1 further comprising:
a video input to receive real-time video information;
a video output to provide real-time video information to the display;
a codec coupled to the video input and the video output; and
wherein the transceiver comprises:
a transmitter coupled to the codec to transmit a data stream provided by the codec over the wireless connection; and
a receiver coupled to the codec to receive a data stream transmitted over the wireless connection.
9. The portable unit according to claim 8, wherein the codec encodes real-time video received from the video input, and multiplexes the real-time video encoded by the codec with other data to generate the data stream provided by the codec to the transmitter, and wherein the codec demultiplexes encoded real-time video from the data stream provided to the codec by the receiver, and decodes the encoded real-time video to provide decoded real-time video to the video output.
10. The portable unit according to claim 9, further comprising:
an audio input to receive real-time audio information; and
an audio output to provide real-time audio information, wherein the codec is in communication to the audio input and the audio output.
11. The portable unit according to claim 10, wherein the codec encodes real-time audio received from the audio input, multiplexes the real-time video encoded by the codec with at least the real-time audio encoded by the codec to generate the data stream that is provided to the transmitter.
12. The portable unit according to claim 11, wherein the codec demultiplexes encoded real-time video from the data stream provided by the receiver that also includes at least encoded real-time audio, and decodes the encoded real-time audio and provides the decoded real-time audio to the audio output.
13. The portable unit of claim 1, further comprising:
a personal biological sensor to generate real-time sensor signals associated with the user.
14. The portable unit of claim 1, wherein the portable unit is wearable.
15. A system for video communication to select a user name from a user name network, the system comprising:
a portable unit and a remote portable unit, wherein the portable unit comprises:
a first transceiver for wirelessly accessing a communications network through a first wireless connection to a general purpose node, the general purpose node coupled to the communications network;
a first user interface to receive user input to log on to the user name network through the communications network, wherein the first user interface comprises a touchpad configured to receive user inputs, and wherein the user name network has a plurality of user names:
a first display on the portable unit to display one or more of the plurality of user names; and
said first display to display video communication associated with the selected user name; and
said display to display video communication received by the portable unit from the remote portable unit, the video communication associated with the selected user name; and
wherein the remote portable unit comprises:
a second transceiver for wirelessly accessing the communications network through a second wireless connection to the general purpose node;
a second user interface to receive user input to log on to the user name network through the communications network, wherein the second user interface comprises a touchpad configured to receive user inputs;
a second display on the remote portable unit to display one or more of the plurality of user names; and
said second display to display video communication received by the remote portable unit from the portable unit.
16. The system of claim 15, wherein the first display displays at least one of the plurality of user names that is associated with the remote portable unit, logged on to the user name network and available for the video communication.
17. The system of claim 15, wherein the first user interface is configured to receive user input to add a portable unit to a list of connections.
18. The system of claim 17, wherein the first user interface is configured to receive user input to remove a portable unit from the list of connections.

19. The system of claim 15, wherein the video communication comprises two-way video communication.

20. The system of claim 15, wherein at least one of the portable unit and the remote portable unit comprises an internet telephone.

21. The system of claim 15, wherein at least one of the portable unit and the remote portable unit has pager-like dimensions.

22. The system of claim 15, wherein the portable unit accesses a name server to locate additional remote media devices that are out-of-network.

23. The system of claim 15, wherein the portable unit further comprises:
   a video input to receive real-time video information;
   a video output to provide real-time video information to the first display;
   a codec coupled to the video input and the video output; and
   wherein the first transceiver comprises:
   a transmitter coupled to the codec to transmit a data stream provided by the codec over the first wireless connection; and
   a receiver coupled to the codec to receive a data stream transmitted over the first wireless connection.

24. The system according to claim 23, wherein the codec encodes real-time video received from the video input, and multiplexes the real-time video encoded by the codec with other data to generate the data stream provided by the codec to the transmitter.

25. The system according to claim 24, wherein the codec demultiplexes encoded real-time video from the data stream provided to the codec by the receiver, and decodes the encoded real-time video to provide decoded real-time video to the video output.

26. The portable unit according to claim 24, wherein the codec encodes real-time audio received from the audio input, multiplexes the real-time video encoded by the codec with at least the real-time audio encoded by the codec to generate the data stream that is provided to the transmitter, and wherein the codec demultiplexes encoded real-time video from the data stream provided by the receiver that also includes at least encoded real-time audio, and decodes the encoded real-time audio and provides the decoded real-time audio to the audio output.

27. The system according to claim 23, further comprising:
   an audio input to receive real-time audio information; and
   a personal biological sensor to generate real-time sensor signals associated with the user.

28. The portable unit of claim 15, further comprising:
   an audio output to provide real-time audio information, and
   wherein the codec is in communication to the audio input and the audio output.

29. The portable unit of claim 15, wherein the portable unit is wearable.