(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
16 June 2005 (16.06.2005)

PCT

(10) International Publication Number
WO 2005/055579 A1

(51) International Patent Classification[7]: H04M 11/06, G10L 15/28, A61F 11/04, G10K 13/00

(21) International Application Number: PCT/AU2004/000002

(22) International Filing Date: 6 January 2004 (06.01.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2003266440 2 December 2003 (02.12.2003) AU

(71) Applicants and
(72) Inventors: **MOODY, Lynne** [AU/AU]; 12 Jolimont Avenue, Ascot, Queensland 4007 (AU). **MOODY, Miles, Phillips** [AU/AU]; 12 Jolimont Avenue, Ascot, Queensland 4007 (AU).

(74) Common Representative: **MOODY, Miles, Phillips**; 12 Jolimont Avenue, Ascot, Queensland 4007 (AU).

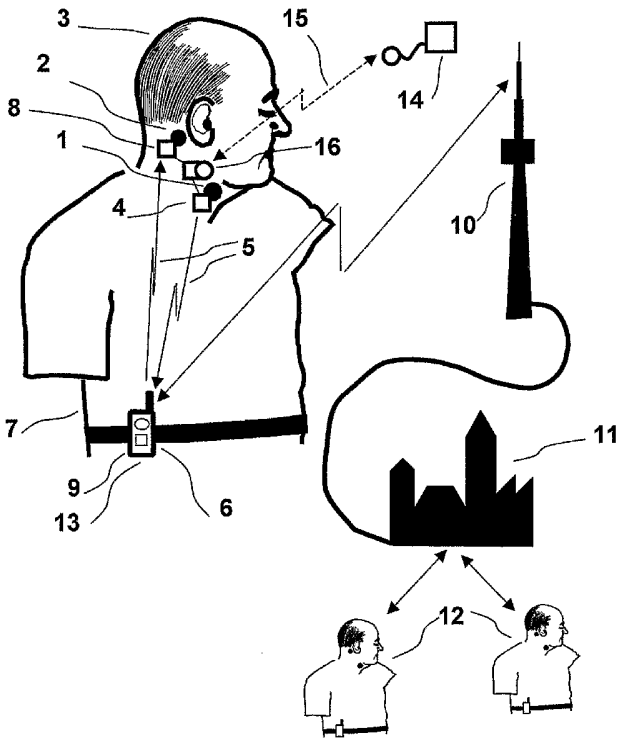
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: SYSTEM FOR PRODUCING ARTIFICIAL TELEPATHY



(57) Abstract: A device is proposed which will provide the user with a form of artificial telepathy, namely the ability to communicate with others with no obvious signs of connection. The system comprises a mobile phone 'engine' which interfaces to an existing or future public mobile telephony network. This device also contains a very low-power transponder, which is linked wirelessly to one or more corresponding transponders implanted in the body. Connected to these implanted transponders are implanted transducers, one placed in a position such that it picks up speech from the user and the other placed in a position such that it imparts speech and status signals audible to the user. The transducers may be connected acoustically, either through bone contact or contact with other tissue, or mioelectrically, through electrodes connected to tissue or nerves. In future telecommunications networks, when power level requirements are much lower, the whole device may be implanted and connected directly to a public mobile network. The system is further enhanced by the use of speech recognition technology, which makes operation of the device possible through voice or sound commands without the use of manual actions. A further enhancement of the system would be a capability for image transfer through a device connected visually or electrically to the eyes and a small camera to record what the eyes see. The characteristics of the device will emulate telepathy, in that it will give seemingly invisible voice and image communication with others connected to the network.

WO 2005/055579 A1

SYSTEM FOR PRODUCING ARTIFICIAL TELEPATHY

TECHNICAL FIELD

The present invention relates generally to mobile telephony and active implanted devices and more particularly to the provision of mobile services to a human or animal in an invisible, unobtrusive and more convenient way for speech, audio and vision.

BACKGROUND ART

Telepathy is defined as 'the action of one mind on another without the aid of the senses', however, to most people, this means being able to communicate 'thoughts' or information between one person and another over a distance, without an apparent connection. The aim of the present invention is to produce an effect which simulates some of the characteristics of telepathy. This 'Artificial Telepathy' is limited to the ability to communicate audio and/or visual information between two or more people, animals or computers, with no obvious devices and in one embodiment, with no manual actions being required to initiate connection. Figure 1 shows one possible embodiment of the invention. Background art which is used in the invention includes mobile telephony, implantable devices such as pacemakers and speech recognition technology such as IBM ViaVoice.

DISCLOSURE OF INVENTION

The means for mobile communication between individuals and computers virtually world-wide has been enabled by mobile network providers. Mobile telephony is now commonplace in most developed countries and is providing a means of communication in underdeveloped countries where wired networks do not exist. The first mobile phones weighed a number of kilograms and were about the size of a briefcase. Due to advances in computing, microelectronics and signal processing, the most modern mobile phones are based on circuitry which is no larger than a postage stamp and weighs less than thirty grams. The level of integration is such that mobile phones will soon be available on one microchip, small enough to be implanted in a human being or animal.

Many network standards exist throughout the world, but virtually all are interconnected via the public telephone system, the Internet or satellites. This interconnectivity makes it possible to relay speech, video or data between users who are located within any one of these mobile networks across the world, using small hand-held devices called mobile stations. These mobile stations may be capable of relaying speech only or speech and data, including video information, personal information and data obtained through measurement and/or calculation.

Most users of mobile phones would agree that the physical need to place the mobile phone near the mouth and ear to allow communications is distracting, can be dangerous when driving or operating machinery and can cause problems with external noise. So-called 'Hands Free Kits' are available, which allow communication with the mobile phone and the more modern of these are wirelessly connected (for example, the so-called 'Bluetooth Headsets'). These have the advantage that the mobile phone can be out of sight (in pocket or briefcase), however the headphones are still quite visible, uncomfortable, unsightly and not always available.

Speech recognition and speech synthesis are becoming relatively mature technologies, with commercial systems being available on standard desktop and even palm-held computers. The accuracy of recognition can now be achieved above 98% under certain conditions and this is improving regularly. The quality of speech synthesis is already extremely good, producing natural sounding speech from text or stored messages. The operation of a mobile phone through speech commands is now feasible, allowing complete freedom of the hands while dialing or answering a call and the mobile phone is capable of delivering status messages in naturally sounding speech, such as reading menu items, phone numbers, short messages and call status.

A partial solution to these problems is the implementation of a device which is similar to the 'Bluetooth Headset' but hidden within the body. This would produce a system which could function in a way which appeared to be 'Artificial Telepathy'. The person in whom the system is implanted would have no visible

sign that they were connected to the mobile system. At least in the early stages, the connection to the mobile network would be through a small box hidden in a pocket or briefcase or under clothing. This would provide the high power connection to the network and eliminate any radiation dangers which may arise from having a high powered transmitter close to or in the head. In future systems, when mobile networks become denser and lower powers can be implemented, the whole system may be implanted.

The implementation of the proposed invention presents certain challenges due to its implantation within the body:

It would be desirable to control the system through voice commands so that the high-power transmitter could remain hidden and so that dialing and receiving calls could be made totally hands-free. This will require a sophisticated speech recognition and synthesis system to replace keypad operations and display feedback.

Implanted audio transducers (microphones and speakers) behave differently if they do not operate through the air using normal sound pressure waves. Examples of such devices are throat microphones used by divers and bone transducers, sometimes used by the deaf when there is a problem with the ear canal. These are not presently implanted but would function similarly if they were. A further means of aural connection which is used for the profoundly deaf is through a Cochlear implant. Future research in this area may make this method available also for general users. These means of connection tend to produce signals which differ from the sound pressure signals we are used to hearing and would therefore need to be processed in a signal processing device to produce intelligible and natural sounding audio.

In most present mobile networks, and ones which will be used for the foreseeable future, power levels are such that direct implantation within human tissue would cause two problems: The attenuation of the signals due to the tissue would require even higher transmitting powers than presently used and these higher transmitting powers would produce potential health risks due to absorption by the human tissue. The solution is a low-power, low-range link to

an external high-power transmitter located externally to the body until public networks operate on lower powers.

Providing power to the implanted devices is another challenge. Modern electronic circuits generally rely on a three-volt power supply. The short-range nature of the wireless link between the implanted devices and the high-powered transmitter means that only low power would be needed. Nevertheless, a means of wirelessly charging implanted batteries would have to be provided to eliminate the need for periodic excision of spent batteries and replacement with new ones. Typical methods of doing this are through induction coils or capacitive (electrostatic) connections through the skin, but other methods are by using micro-generators implanted in the device itself, which use the movements of the body to generate the necessary electricity, or heat converters, which use the temperature of the body as a source of energy.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 shows a preferred embodiment of the invention for speech information;

FIG. 2 shows a block diagram of this preferred embodiment;

FIG. 3 shows a variation of this preferred embodiment of the invention;

FIG. 4 shows a further variation of this preferred embodiment of the invention;

FIG. 5 shows a block diagram of a fourth embodiment of the invention which also includes video information;

MODES FOR CARRYING OUT THE INVENTION

One embodiment of the invention is shown in Figure 1 with a corresponding block diagram of the system shown in Figure 2. In this embodiment, oral transducer 1 and aural transducer 2 are implanted in the head/neck 3, in such a position that oral transducer 1 can receive speech from the mouth or throat of the host and aural transducer 2 can send speech to at least one ear of the host. Oral transducer 1 is directly coupled to a low-power radio transmitter 4 which sends speech information over radio link 5 to low-power transponder 6 mounted on or near the body 7. Aural transducer 2 is directly coupled to low-power receiver 8 which receives speech information over radio link 5 from low-power transponder 6. Low-power transponder 6 is connected to mobile phone engine

9 which is registered on mobile network 10. Mobile network 10 is in turn connected to the world-wide telephone system 11 and thence to other users 12. To facilitate speech control of the system, speech recogniser and synthesizer 13 interfaces to low-power transponder 6 and mobile phone engine 9 to translate oral signals into control signals and status signals into aural signals. A charging circuit 14 provides energy over magnetic or electrostatic link 15 to one or more power supplies 16 which supply power to implanted components 1, 2, 4 and 8.

A second embodiment, shown in Figure 3, is to combine transmitter 4 and receiver 8 into one low-power transponder 17. This would require longer implanted connections to oral transducer 1 and aural transducer 2.

A third embodiment, shown in Figure 4, is the removal of transponders 4, 8 (or 17) and 6 by directly implanting mobile phone engine 9 and speech recogniser and synthesizer 13 into head 3.

A fourth embodiment, shown in Figure 5, is the addition of a video camera 18 and video display 19 connected to a low-power transponder 20 which communicates with mobile phone engine 9 through low-power transponder 6. The video camera 18 and video display 19 may be monovision or stereovision and may be external to the body (mounted in a set of spectacles for example) or may, in future embodiments, be implanted and mioelectrically connected through tissue or nerve cells.

While the preferred embodiments have been herein described, it is acknowledged that variation and modification may be made without departing from the scope of the presently claimed invention.

INDUSTRIAL APPLICABILITY

The invention is applicable to everyday communications between people.

CLAIMS

The claims defining the invention are as follows:

1. A system for producing the effect of Artificial Telepathy comprising: a public mobile telephony/data network giving wireless connection for voice and data between a human or animal individual and one or a plurality of other human or animal individuals; a mobile device allowing connection to said network and which contains a low power transponder; an implanted device which provides a low power wireless connection to said mobile device through said transponder; implanted transducers connected to said implanted device which send and receive audio, oral and visual information between the individual and the implanted device; a speech recognition method which controls the system and a means of providing power to the implanted devices.

2. The system of claim 1, wherein said public mobile telephony/data network may be terrestrial or satellite based.

3. The system of claim 1, wherein said mobile device may be external to the body (such as a normal mobile station) or part of the implanted system.

4. The system of claim 1, wherein said implanted device includes a power source capable of being charged from inside or outside the body.

5. The system of claim 1, wherein said implanted device includes a transmitter and a receiver which communicate data between it and said mobile device.

6. The system of claim 1, wherein said implanted device includes input/output connections and signal processing means to process, send and receive signals to/from said transducers.

7. The system of claim 1, wherein at least one of said transducers is connected

to the human aural system either by acoustic connection to tissue or bone or by mioelectric connection to tissue or nerve cells.

8. The system of claim 1, wherein another of said transducers is connected to the human oral system either by acoustic connection to tissue or bone or by mioelectric connection to tissue or nerve cells.

9. The system of claim 1, wherein another of said transducers is connected to the human visual system either by direct visual input or by mioelectric connection to tissue or nerve cells.

10. The system of claim 1, wherein a camera is connected wirelessly to said mobile device.

11. The system of claim 1, wherein a signal processing means is available to compensate for the effect of direct connection of aural, oral and video transducers, rather than through the air.

12. The system of claim 1, wherein said mobile device sends messages through speech synthesis and status signals to the system of claim 7.

13. The system of claim 1, wherein said mobile device is controlled through voice commands from the system of claim 8.

14. The system of claim 1, wherein said mobile device sends messages through visual images to the system of claim 9.

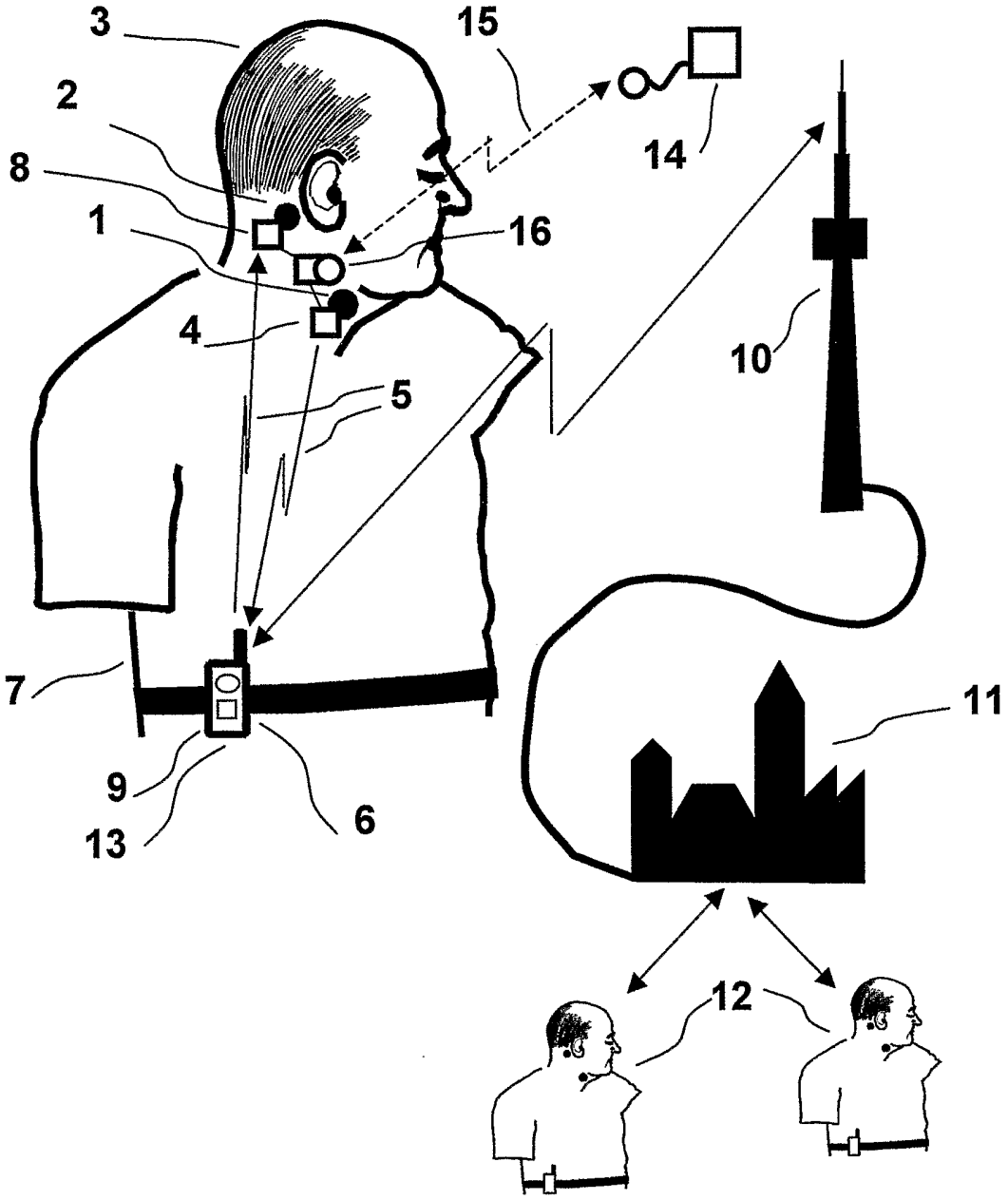


FIGURE 1

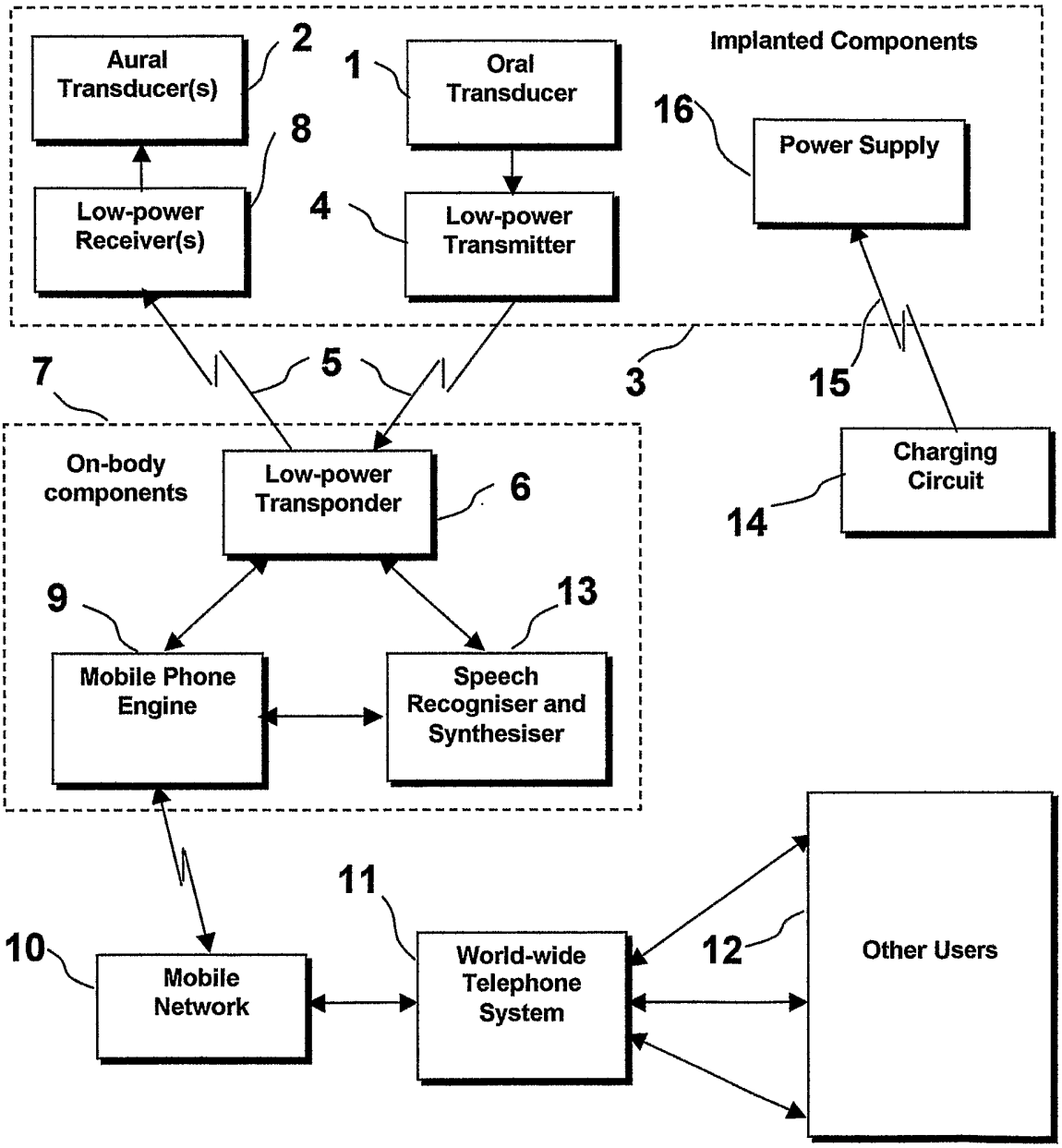

Implanted Components
Aural Transducer(s)
2
1
Oral Transducer
16
Power Supply
8
Low-power Receiver(s)
4
Low-power Transmitter
7
5
3
15
On-body components
Low-power Transponder
6
Charging Circuit
14
9
13
Mobile Phone Engine
Speech Recogniser and Synthesiser
11
10
12
Mobile Network
World-wide Telephone System
Other Users

FIGURE 2

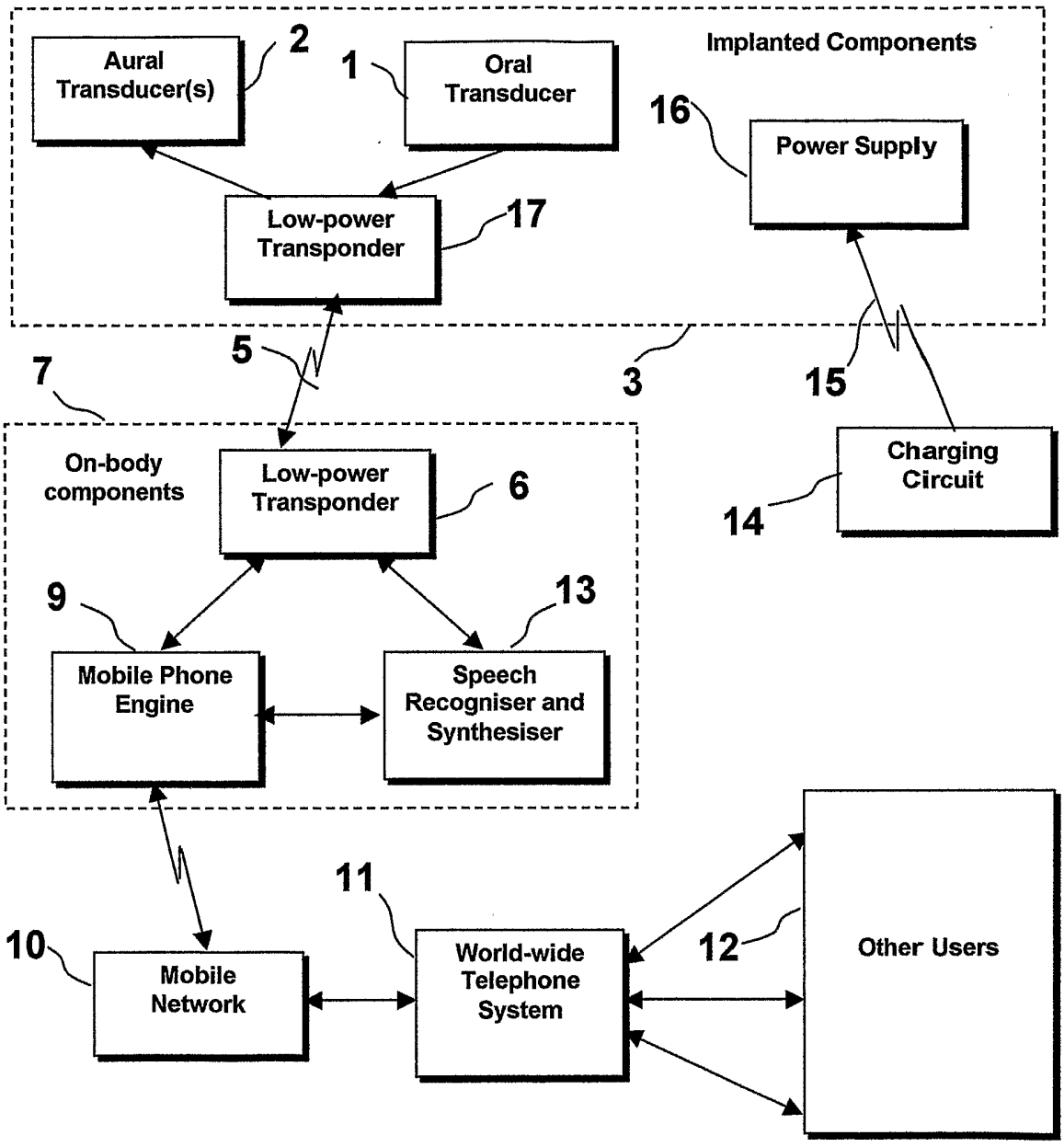

Implanted Components
Aural Transducer(s)
2
1
Oral Transducer
16
Power Supply
Low-power Transponder
17
5
7
3
15
On-body components
Low-power Transponder
6
Charging Circuit
14
9
13
Mobile Phone Engine
Speech Recogniser and Synthesiser
11
10
12
Mobile Network
World-wide Telephone System
Other Users

FIGURE 3

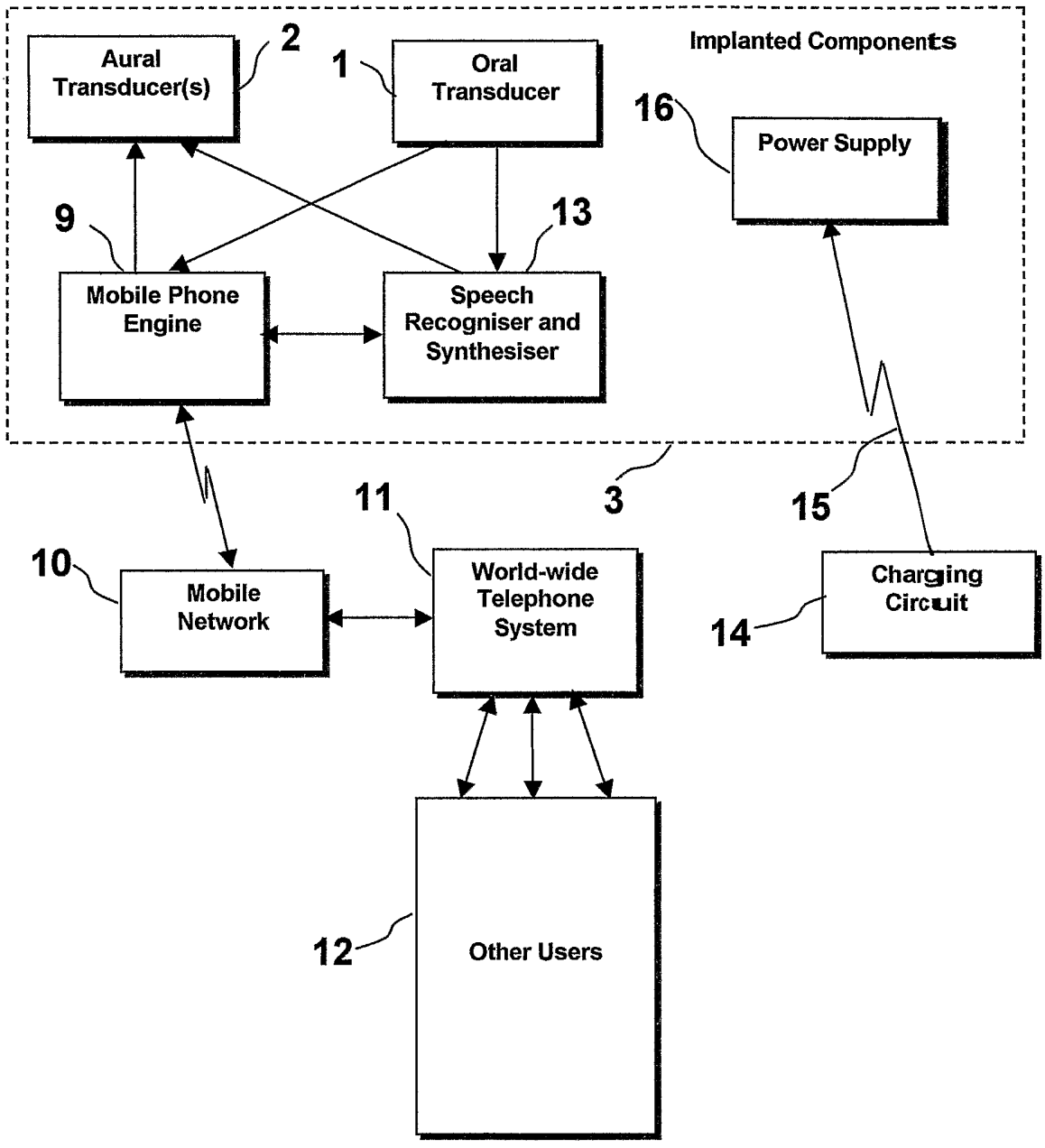

Implanted Components
Aural Transducer(s)
2
1
Oral Transducer
16
Power Supply
9
13
Mobile Phone Engine
Speech Recogniser and Synthesiser
3
15
11
10
Mobile Network
World-wide Telephone System
Charging Circuit
14
12
Other Users

FIGURE 4

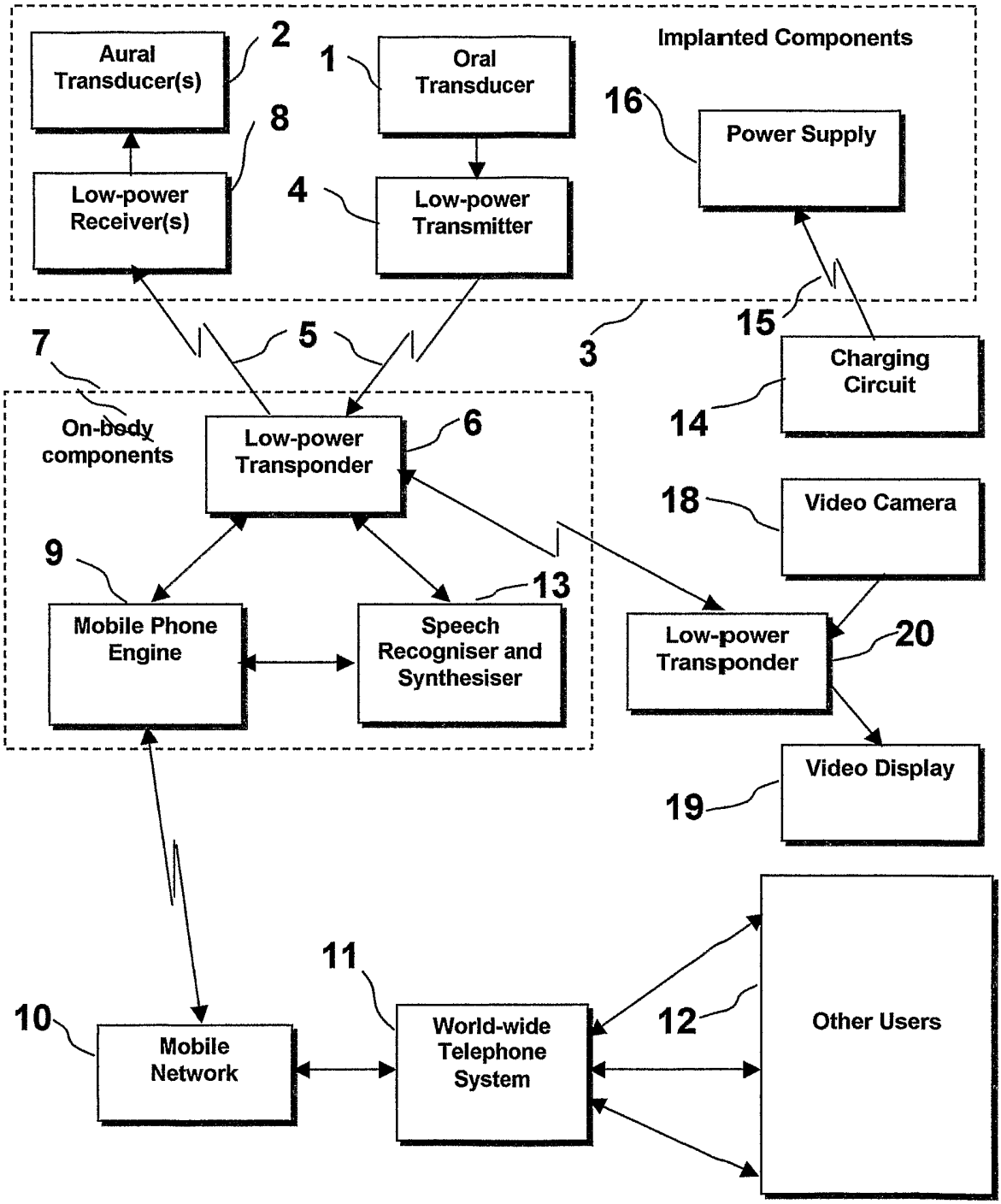

Implanted Components
Aural Transducer(s)
2
1
Oral Transducer
8
16
Power Supply
Low-power Receiver(s)
4
Low-power Transmitter
7
5
3
15
Charging Circuit
14
On-body components
Low-power Transponder
6
18
Video Camera
9
13
Mobile Phone Engine
Speech Recogniser and Synthesiser
Low-power Transponder
20
Video Display
19
11
10
12
Other Users
Mobile Network
World-wide Telephone System

FIGURE 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2004/000002

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. [7]: H04M 11/06, G10L 15/28, A61F 11/04, G10K 13/00.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
USPTO and DWPI using keywords and class marks. Keywords include: artificial telepathy, wireless, radio, voice, data, aural, oral, communication, implant+ and bionic

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2001/48739 A1 (Medtronic Inc) 5 July 2001 - whole document	1 - 14
X	US 5267323 A (Kimura) 30 November 1993 - whole document	1 - 14
X	WO 1997/01314 A1 (Cochlear Ltd) 16 January 1997 - whole document	1 - 14
Y	Derwent Abstract Accession Number 2002-149325/20, Class S05, EP 1139692 A2 (Implex Hearing Technology) 5 September 2000 - whole document, especially figure 1 (when combined with any 'X' document)	1 - 14

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 February 2004	27 FEB 2004
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized officer **J.W. THOMSON** Telephone No : (02) 6283 2214

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/AU2004/000002

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
WO	0148739	CA	2401777	EP	1228476	EP	1241981
		EP	1241982	EP	1242144	EP	1242146
		EP	1244382	EP	1244993	EP	1244994
		US	6665565	US	2001023360	US	2001031997
		US	2001031998	US	2001032085	US	2001037220
		US	2001039375	US	2001044586	US	2002026223
		US	2002193846	US	2003139785	WO	0145793
		WO	0147410	WO	0147411	WO	0147597
		WO	0147599	WO	0147600	WO	0148675
		WO	0148676	WO	0148677		
US	5267323	DE	4029697	JP	3202900	JP	3203795
		JP	3203796	JP	3203797		
WO	9701314	AU	61826/96	CA	2224199	EP	0840581
EP	1139692	DE	10015421	US	2002071581		

END OF ANNEX