NOVELTY SEARCH - SAMPLE

EXCHANGE OF HEART - GENERATED SIGNALS

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Objective:

To perform a prior art search and to identify relevant prior art including patent applications and non-patent literature pertaining to **"Exchange of Heart-Generated Signals"** as depicted in the invention disclosure.

Invention:

Proposed invention discloses about exchange of heart generated signals. Two people in remote locations want to enhance their online chat by sending and receiving heartbeat signals. A custom hardware/software system that allows people who are separated by space or time to experience a personal, physical connection with each other. This system allows two or more people to exchange their heart-generated signals across the internet

This may help remote communication into a local, personal connection. The system runs in parallel with the user's existing communication tool (mobile phone call, video conference, etc.). User's heartbeat data can be recorded and played back at a later time. The system can support one-to-one or one-to-many connections that can use real-time or pre-recorded data.

Understanding and Search Focus:

- A system that allows two or more people to exchange their heart-generated signals across the internet.
- A custom hardware/software system that allows people who are separated by space or time to experience a personal, physical connection with each other.
- Two people in remote locations want to enhance their online chat by sending and receiving heartbeat signals.
- The system runs in parallel with the user's existing communication tool (mobile phone call, video conference, etc.).
- User's heartbeat data can be recorded and played back at a later time.

Methodology:

1) Collection of Keywords:

❖ After thorough understanding of the query, key concepts were identified based on the request

❖ Appropriate synonyms (or key words) were collected for each concept by googling and by referring several related articles.

Following table highlights the various key concepts and alternative key words identified

S. No	Concept	Keywords
1	Heartbeat	Heart rate, Breathing
2	Transmission	Exchange, Transfer, communicate, transmit, connect, receive, synchronized, synchronous, sharing
3	Simulation	Simulator, soothing, calm
4	Sensor	Photoplethysmography, PPG
5	Heartbeat Data	ECG
6	Heartbeat Monitor	
7	Heartbeat Field Emitter	
8	Signal	Wave
9	Electromagnetic	Electromagnet
10	Application	Software, App
11	Internet	Wi-Fi, Cloud

2) **Identification of classification code**:

Appropriate classification codes were collected

S. No	IPC class	Definition
IPC classifications		
1	A61B5/0004	Remote monitoring of patients using telemetry, e.g. transmission of vital signals via a communication network characterised by the type of physiological signal transmitted
2	A61B5/0022	Monitoring a patient using a global network, e.g. telephone networks, internet
3	A61B5/024	Detecting, measuring or recording pulse rate or heart rate
4	A61B5/02438	Detecting, measuring or recording pulse rate or heart rate with portable devices, e.g. worn by the patient
CPC classifications		
1	A61B5/0004	Detecting, measuring or recording for diagnostic purposes. characterised by the type of physiological signal transmitted
2	A61B5/0022	Monitoring a patient using a global network, e.g. telephone networks, internet

3) **Formation of Key strings:**

- ❖ Suitable search strings were framed based on collected keywords and classification codes
- ❖ Comprehensive searches were performed on various databases
- ❖ Several search queries have been framed and several permutation combinations were tried to get a reasonable number of records

4) **Screening of Relevant Records and Report preparation**

- ❖ Search results were screened for relevancy
- ❖ Relevant references were provided with details

Databases used:

Patent
- ❖ Thomson Innovation

Non-Patent Literature
- ❖ Google scholar

- ❖ Google patents   ❖ IEE
- ❖ WIPO

Executive Search Summary:

- ❖ We have come across three core Patent/Publication references and three Non-patent literatures which are very close to the provided concept of "Exchange of heart-generated signals"

- ❖ All references are hyperlinked. Please click on the reference for complete details

- ❖ Text highlighted in color is just for your quick reference. Please open the reference for complete information

- ❖ Information for "one member per family" been provided. Please check the Family member section for complete family information

Feature Map:

Key Features of the Invention	Key Elements Mapping			
	US9155468B2	KR20160143118A	CN104784935A	NPL-1
A system that allows two or more people to exchange their heart-generated signals across the internet	✓	✓	✓	✓
Two people in remote locations want to enhance their online chat by sending and receiving heartbeat signals	✓	✓	✓	✓
The system runs in parallel with the user's existing communication tool (mobile phone call, video conference, etc.).	✓	✓	X	✓
User's heartbeat data can be recorded and played back at a later time	✓	✓	✓	✓

✓: Completely disclosing the key feature
X: Not Disclosing the feature

References (Patents/Publications):

Result 1:

Patent Application/ Publication No.	Assignee/Inventor(s)	Date of Application	Date of Publication
US9155468B2	Little Riot Ltd	2015-04-20	2015-10-13

Title of the patent application/ publication	System for remote communication of heartbeat
Family Member(s)	CN103650463A; CN110166539A; EP2705651A2; WO2012150457A2; WO2012150457A3; US2014088448A1; US9033894B2; US2015223690A1; US9155468B2

Abstract:

A system for remote communication of physiological information from one person to another and, more particularly, the mutual communication of heartbeat between two persons. The system comprises a web server which cooperates with two remote installations identified as A and B. Each of the remote installations comprises a heartbeat sensor, a pillow, and a local host. The local host may be a personal computer or laptop, or a suitable mobile phone running an appropriate application. The heartbeat sensor monitors the heartbeat of person A which is communicated via their pillow, their local host and a server, and then via a second local host to produce a visual and audible representation of heartbeat A in a pillow located with person B. At the same time, the heartbeat of person B is represented in the same manner at the pillow of person A.

Relevant Excerpts:

Para 0004

Accordingly, the present invention in one aspect provides a system for remote communication of heartbeat; the system comprising:

- ❖ a heartbeat sensor module attachable to a subject, the heartbeat sensor module having a heartbeat sensor operating to produce a signal representing the heartbeat of the subject and a wireless communication transmitter for communicating said heartbeat signal;

- ❖ a host device located in proximity to the subject, the host device including a wireless communication receiver for receiving said heartbeat signal, and including data transfer means for communicating said signal over a data network;
- ❖ a server connected to the data network to receive said signal and to communicate it to an authorised destination host device;
- ❖ a destination host device connected to the data network to receive said signal when authorised;
- ❖ an output device for producing a visual and/or audible representation of the source heartbeat.

Para 0010

In a particularly preferred form of the system, the source includes an output device and the destination includes a heartbeat sensor module, whereby heartbeat signals are mutually exchanged between two subjects.

Para 0022

Another aspect of the present invention provides a method of providing non-verbal communication between two persons, A and B, who are geographically remote, the method comprising monitoring A's heartbeat and communicating that heartbeat to B aurally and/or visually, and simultaneously monitoring B's heartbeat and communicating that heartbeat to A aurally and/or visually.

Para 0030

Referring to FIG. 1, the system comprises a web server 10 which cooperates with two remote installations identified as A and B. Each of the remote installations comprises a heartbeat sensor 12, a pillow 14, and a local host 16. The host 16 may be a personal computer or laptop, or a suitable mobile phone running an appropriate application.

Para 0031

In outline, the heartbeat sensor 12A monitors the heartbeat of person A which is communicated via the pillow 14A, the host 16A and the server 10, and then via the host 16B to produce a visual and audible representation of heartbeat A in the pillow 14B. At the same time, the heartbeat of person B is represented in the same manner at the pillow 14A.

Result 2:

Patent Application/ Publication No.	Assignee/Inventor(s)	Date of Application	Date of Publication
KR20160143118A	NEXCHAL CO LTD	2015-06-04	2016-12-14
Title of the patent application/ publication	Heart-beat and Sound Transmision System and Method Threof		
Family Member(s)	None		

Abstract:

According to an embodiment, disclosed are a system for transmitting heartbeat and voice data of a user and a method thereof. A transmission device transmits a heartbeat and a voice of the user. The transmission device comprises: a collection unit configured to collect the heartbeat data and the voice data of the user through a vibration sensor and a sound sensor installed in the transmission device; a generation unit configured to combine the heartbeat data with the voice data to generate emotional data; and a transmission unit configured to transmit the emotional data to a terminal connected to the transmission device. The emotional data is transmitted from the terminal to a speaker device, located at a remote place to be reproduced.

Relevant Excerpts:

Para 0006

A transmission device for transmitting a heart rate and a voice of a user, comprising: a collecting unit collecting heart rate data and voice data of the user through a vibration sensor and an acoustic sensor provided in the transmission device; A generator configured to synthesize the heart rate data and the voice data to generate emotion data; And a transmission unit for transmitting the emotion data to a terminal connected to the transmission device, wherein the emotion data is transmitted to and reproduced from a speaker device located at a remote location from the terminal.

Para 0009

A method of transmitting heart rate and voice of a user, comprising: ==receiving heart rate data and voice data of the user; Generating emotion data by synthesizing the heart rate data and the voice data at a terminal; And transmitting, at the terminal, the emotional data to a speaker device located at a remote location of the terminal through a cloud server, wherein the emotional data is reproduced through the speaker device.==

Para 0013

In another aspect, the generating of the emotional data by synthesizing the heartbeat data and the voice data in the terminal may include removing noise by processing the heartbeat data and the voice data.

Para 0016

Fig 1 is a schematic diagram for explaining the configuration of a heartbeat and voice transmission system according to an embodiment of the present invention.

Para 0028

The terminal 120 may include a ==smart terminal such as a smartphone, a tablet, and the like, and receives heart rate data and voice data transmitted from the transmission device== 110 or emotional data generated from the transmission device 110 through an application

Result 3:

Patent Application/ Publication No.	Assignee/Inventor(s)	Date of Application	Date of Publication
CN104784935A	HUANG YUCONG	2015-04-09	2015-07-22
Title of the patent application/ publication	System for transmitting remote heartbeats and respiration to locality and outputting heartbeats and respiration to toy		
Family Member(s)	None		

Abstract:
The invention discloses a system for transmitting remote heartbeats and respiration to locality and outputting heartbeats and respiration to a toy. A heartbeat and respiration detecting sensor is connected with an A/D converting module which is connected with a first microprocessor. Collected heartbeat and respiration analog

signals are converted into digital signals to be transmitted to the first microprocessor which is connected with a first Bluetooth module. The first Bluetooth module is connected with a first mobile phone through Bluetooth. Data are transmitted to the first mobile phone through the Bluetooth. The first mobile phone is connected with a second mobile phone through a 3G network. Data are transmitted to the second mobile phone through the 3G network. The second mobile phone is connected with a second Bluetooth module through Bluetooth. The second Bluetooth module is connected with a second microprocessor which is connected with a motor driving module. The system has the advantages that the heartbeats and the respiration of a person can be simulated to another person far away through the toy in real time.

Relevant Excerpts:

Para 0007

It is an object of the present invention to provide a system for transmitting a remote heartbeat and breathing to a local area and outputting it to a toy, solving the problem of currently having no toy capable of simulating a person's heartbeat and breathing to a distant person.

Para 0008

The technical solution adopted by the invention comprises a heartbeat breathing detecting sensor, the heartbeat breathing detecting sensor is connected to the A/D conversion module, and the A/D conversion module is connected to the first microprocessor, and the analog signal collected by the heartbeat and the breathing is converted into a digital signal. Sending to the first microprocessor, the first microprocessor is connected to the first Bluetooth module, the first Bluetooth module is connected to the first mobile phone via Bluetooth, the data is transmitted to the first mobile phone via Bluetooth, and the first mobile phone is connected to the second mobile phone through the 3G network. Sending data to the second mobile phone through the 3G network, the second mobile phone is connected to the second bluetooth module through Bluetooth, the second bluetooth module is connected to the second microprocessor, the second bit processor is connected to the motor driving module, and the motor driving module is connected to the vibration The module, the second Bluetooth module transmits the received data to the second microprocessor, and the second microprocessor sends a synchronous driving signal to the motor driving module according to the data, and the motor driving module drives the vibration module to vibrate to simulate a heartbeat.

Para 0018

As shown in FIG. 2, ==the heartbeat breathing detection sensor 1, the A/D conversion module 2, the first microprocessor 3, and the first Bluetooth module 4 are mounted on a wristband or a smart watch 11 worn by the first person.== It is convenient to carry in the heart to detect heartbeat and breathing. The first person also carries the first mobile phone 5 with him, so that the first person's heartbeat and respiratory frequency data can be sent out through the first mobile phone 5, and the receiving end is the second person. The second mobile phone 6 carried by the user receives the data, and the second Bluetooth module 7, the second microprocessor 8, the motor drive module 9 and the vibration module 10 are all installed in the toy doll 12 such as a plush bear doll, and the second micro processing After receiving the receipt, the device 8 drives the vibration module 10 to generate a synchronized heartbeat and synchronized breathing action, so that, through the system, a person's heart rate breathing data can be transmitted to the toy doll 12 of another person's hand in real time, as if he As with you, the invention is primarily used in the consumer electronics market, particularly in the star market and the couple market.

Para 0019

The system also has the advantage of increasing the ==interaction of distant relatives or couples== (or stars and fans) through remote, real-time interactive systems based on tactile (hugging bear dolls).

Core References - Non-Patent literature:

NPL 1:

How to send someone your heartbeat with Apple Watch or iPhone

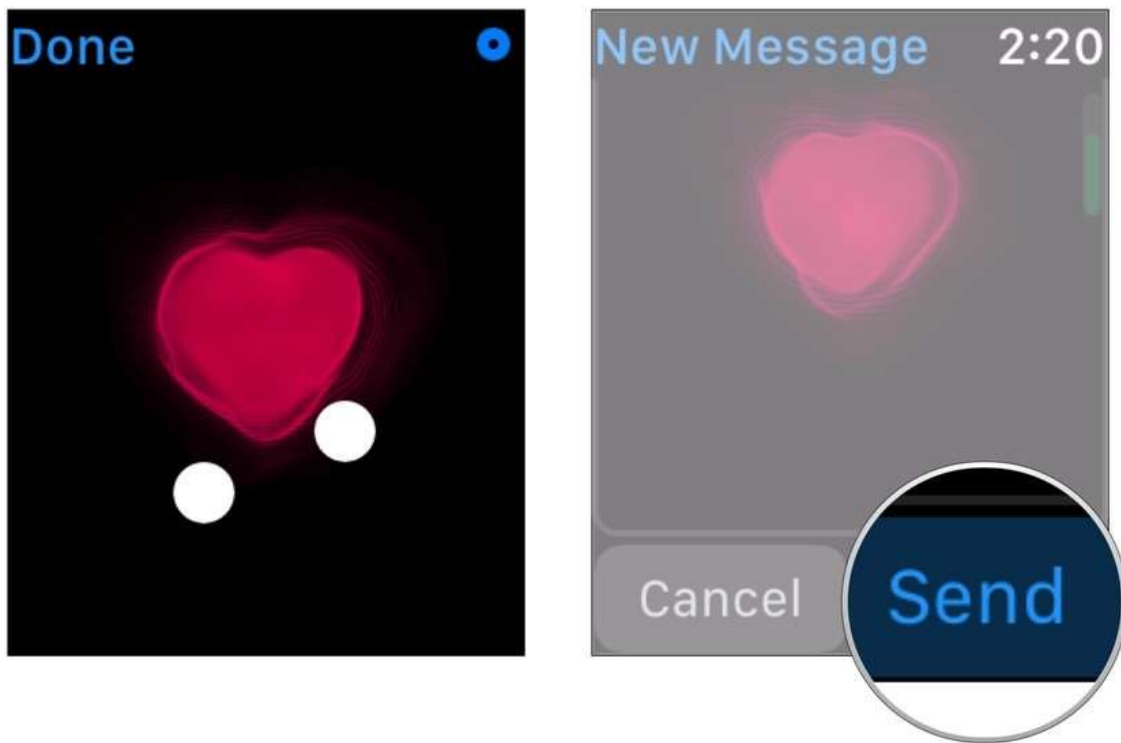https://www.imore.com/how-send-someone-your-heartbeat-apple-watch-iphone

Wondering how to ==send someone your heartbeat== for a more personal message?

How to send a heartbeat on your Apple Watch
1. Open **Messages** from the Home screen of your Apple Watch.
2. Select the **conversation** in which you wish to send a message. Alternatively, Force Touch on the display to bring up bring up the **New Message** option.
3. Tap the **Digital Touch** button (it looks like two fingers touching a heart).

4. Tap and hold two fingers on the screen until <mark>the heart appears on the screen</mark> starts beating.
5. Take your fingers off of the screen to send. If you're starting a new conversation, tap the **Send** button.

NPL 2:

App lets long-distance lovers hear each other's heartbeat

https://www.ndtv.com/world-news/app-lets-long-distance-lovers-hear-each-others-heartbeat-531971

London: Researchers have developed a new app that lets long-distance lovers listen to each other's heartbeats regardless of the distance between them.

Pillow Talk, a combination of a wristband and app from UK design company Little Riot, connects partners separated by miles by transmitting their heartbeats in real time.

<mark>The wristband picks up the wearer's heartbeat and transmits it via Bluetooth to the iOS or Android app.</mark>

<mark>"You are connected directly to your partner via the app; you will receive his/her heartbeat, and they will receive yours.</mark>

"By plugging in your headphones or the pillow speaker you can lie in bed and hear the realtime heartbeat of your loved one. The result is an intimate interaction between two lovers, regardless of the distance between them," the company said on its website.

Pillow Talk began life in a slightly different form as a university product of founder Joanna Montgomery in 2010. The project has since received more than 750,000 views on YouTube and worldwide attention, the company said.

NPL 3:

Use HB Ring

https://thetouchx.com/howto/usehbring.html

1. Real-time Heartbeat

Double tap your ring and it will blink once. this means request is sent. <mark>Within 5-12 seconds you will see and feel the real time heartbeat of your partner.</mark>

IMPORTANT! This function will not work if:

-Your ring is not connected to your phone, or there is no data/WiFi connection
-Your partner's HB Ring is not connected to the phone, or there is no data/WiFi connection

-Your partner's HB Ring is not able to read the heartbeat

-Your profiles are not paired in the HB Ring application

-Your HB Ring application is closed. HB Ring application must be open or run in background. Please see detailed instructions for HB Ring application here.

Note: Having HB Ring sensor glasses on the lower part of your finger will increase the accuracy of heartbeat reading.

2. Saved Heartbeat

Every time your HB Ring receives the real-time heartbeat it will save it. In case your HB Ring is not able to retrieve the real time heartbeat, you will see and feel the last saved heartbeat.

Your HB Ring will blink twice and after few seconds you will see and feel the last saved heartbeat of your partner.

Peripheral References

Below references partially or very partially disclosing the proposed concept

Result 1:

Patent Application/ Publication No.	Assignee	Date of Application	Date of Publication
US20180326176A1	Neil Cloet	2017-05-15	2018-11-15
Title of the patent application/ publication	Device for simulating a human presence and method		
Family Member(s)	None		

Abstract:
A device for simulating a human presence and method is disclosed herein. The device includes a speaker configured to provide an audio output substantially similar to a voice of the remote person, a heartbeat simulator configured to provide a tactile output onto a bed substantially similar to a heartbeat of the remote person, a processor communicably coupled to the speaker and to the heartbeat simulator, the processor configured to drive the speaker and the heartbeat simulator, and a power supply electrically coupled to the speaker and to the heartbeat simulator, the power supply configured to power the speaker and the heartbeat simulator. The device for

simulating a human presence is useful for mimicking the heartbeat of a mother to comfort a baby or child and maximize sleep time.

Relevant Excerpts:

Para 0008
A device for simulating a human presence of a remote person is disclosed herein. The device includes a speaker configured to provide an audio output substantially similar to a voice of the remote person, a heartbeat simulator configured to provide a tactile output onto a bed substantially similar to a heartbeat of the remote person, a processor communicably coupled to the speaker and to the heartbeat simulator, the processor configured to drive the speaker and the heartbeat simulator, and a power supply electrically coupled to the speaker and to the heartbeat simulator, the power supply configured to power the speaker and the heartbeat simulator.

Para 0009
According to one embodiment, the device for simulating a human presence of a remote person may be removable from a mattress. Additionally, the device for simulating a human presence of a remote person may include a mattress assembly into which the device for simulating a human presence of a remote person may be placed.

Para 0020
Generally, a device for simulating a human presence may be useful for mimicking the heartbeat of a mother to comfort a baby or child and may increase sleep time. The device may include a means for creating an electronic heartbeat to comfort a baby and promote sleeping. The present disclosure may be used by users of all ages. The sound of a heartbeat is naturally soothing and comforting to a user; the device may be used in hospitals, at home, or other places for increased comfort of the user.

Result 2:

Patent Application/ Publication No.	Assignee/Inventor(s)	Date of Application	Date of Publication
CN205540653U	UNIV HUAZHONG SCIENCE TECH	2016-03-22	2016-08-31
Title of the patent application/ publication	Pillow robot system is embraced in care of interactive emotion of intelligence		

Family Member(s)	None

Abstract:

The utility model discloses a pillow robot system is embraced in care of interactive emotion of intelligence, including embracing pillow robot, smart mobile phone and high in the clouds. Embracing the pillow robot and including microcomputer, sensor, functional module and power, the sensor includes temperature sensor, rhythm of the heart sensor, respiratory frequency sensor and pats the frequency sensor that the functional module is including simulation heartbeat module, voice module, simulation breathing module, the module of generating heat and pat module etc.. High in the clouds utilizes the emotion discernment of the data of smart mobile phone collection and the ECG signal realization multimode that the sensor was gathered. The big data transfer of emotion to the high in the clouds that the smart mobile phone will be gathered is judged user's physiological state (include the heartbeat, breathe, pat and body temperature) and mood and is fed back to the other side with it through embracing a pillow robot after handle in high in the clouds, both sides can experience the other side's physiology and psychological condition each other to realize interpersonal true mutual based on the robot.

Relevant Excerpts:

Para 0007

The utility model overcomes the deficiencies in the prior art mentioned above, and provides a real sense of touch, which can simulate breathing, heartbeat and body temperature, and combines the emotional data analysis of the cloud to obtain the psychological emotion of the other party. The utility model not only allows one party to feel the other heartbeat and body temperature, but also feels the other party's mood, gives a more realistic interaction feeling, has a better emotional comfort function, and achieves health care and emotional care.

Para 0009

The utility model provides an intelligent interactive emotional care pillow robot system, which comprises at least two pillow robots, a smart phone, a power source and a cloud, wherein:

Para 0010

The pillow robot includes a microcomputer, a sensor and a function module, and the sensor includes a voice sensor, a temperature sensor, a heart rate sensor, a respiratory frequency sensor, a velocity sensor, and a beat frequency sensor, and the function

module includes a voice module, a heating module, and an analog heartbeat. Module, analog breathing module, hug simulation module and tapping module;

Para 0016

The analog heartbeat module receives the ==heartbeat frequency detected by the interactive partner provided by the microcomputer and simulates the heartbeat of the interactive partner according to the heartbeat frequency==.

Para 0020

The smart garment integrates a wearable flexible textile sensor onto a related textile product for collecting the ==user's ECG signal== and can intuitively reflect the human emotion.

Additional references:

1. US10654394B2: Multi-modal distribution systems and methods using vending kiosks and autonomous delivery vehicles
Family Member (s): CN110892459A; TW201909054A; US10654394B2; US2019047460A1; US2019051086A1; US2019051087A1; US2019051090A1; US2020134952A1; WO2019014030A1
2. US10661696B2: Vehicle insert and method of vehicle loading and unloading
Family Member (s): US10661696B2; US2017225601A1
3. US7205016B2: Packages and methods for processing food products
Family Member (s): US2003185948A1; US7205016B2
4. US20070150373A1: System for delivering multi-temperature goods
Family Member (s): TW200724414A; TWI273998B; US2007150373A1
5. US6941858B2: Efficient manufacture and distribution of chilled solid food products
Family Member (s): AU2003268177A1; AU2003268177A8; BR0313801A; CA2496794A1; CN1678197A; EP1538922A2; EP1538922A4; JP2005537014A; MXPA05002055A; US2004040449A1; US6941858B2; WO2004019707A2; WO2004019707A3
6. US10315851B2: Apparatuses, systems, and methods for transporting medications from a central pharmacy to a patient in a healthcare facility
Family Member (s): US10029856B2; US10315851B2; US10518981B2; US10850926B2; US2014102859A1; US2014102860A1; US2014108027A1; US2014108028A1; US2016185527A1; US2018297785A1; US2019308819A1; US2020071086A1; US2021050082A1; US9511945B2

Client Privileged

Field of Search

Source	Jurisdiction	Query	Hits
Thomson Innovation	ALL	ALL=(Heartbeat OR breath*) AND ALL=(simula*) AND ALL=(modul*) AND ALL=(communic* OR transmit*);	51058
Thomson Innovation	ALL	CTB=(Heartbeat OR breath*) AND CTB=(simula*) AND ALL=(modul*) AND CTB=(communic* OR transmit*);	1313
Thomson Innovation	ALL	CTB=(Heartbeat) AND CTB=(simula*) AND ALL=(modul*) AND CTB=(communic* OR transmit*) AND CTB=(receiv* OR exchang* OR connect*);	514
Thomson Innovation	ALL	CTB=(Heartbeat) AND CTB=(simula*) AND ALL=(modul*) AND CTB=(communic* OR transmit*) AND ALL=(receiv* OR exchang* OR connect* or sense) AND ALL=(personal OR physical);	437
Thomson Innovation		CTB=(Heartbeat) AND CTB=(simula*) AND ALL=(modul*) AND CTB=(communic* OR transmit*) AND ALL=(receiv* OR exchang* OR	229

		connect* or sense) AND ALL=(personal OR physical) AND ALL=(remot*);	
Thomson Innovation	ALL	CTB=(Heartbeat) AND CTB=(simula*) AND ALL=(modul*) AND CTB=(communic* OR transmit*) AND ALL=(receiv* OR exchang* OR connect* or sense) AND ALL=(personal OR physical) AND ALL=(remot*) AND ALL=(mother);	20
Thomson Innovation	ALL	CTB=(Heartbeat) AND ALL=(modul*) AND CTB=(communic* OR transmit* or transf) AND ALL=(receiv* OR exchang* OR connect* or sense) AND ALL=(personal OR physical) AND ALL=(remot*) AND ALL=(mother);	236
Thomson Innovation	ALL	ALL=(heartbeat* OR Heart adj beat*) AND ALL=(exchang*) AND ALL=(remot*) AND ALL=(electromagnetic*) AND ALL=(internet);	9329
Thomson Innovation	ALL	CTB=(heartbeat* OR Heart adj beat*) AND CTB=(exchang* or transfe* OR transmit*) AND ALL=(remot*) AND ALL=(electromagnetic*) AND ALL=(internet);	1101
Thomson Innovation	ALL	TI=(heartbeat* OR Heart adj beat*) AND CTB=(exchang* or transfe* OR transmit*) AND ALL=(remot*) AND ALL=(electromagnetic*) AND ALL=(internet);	27
Thomson Innovation	ALL	TI=(heartbeat* OR Heart adj beat*) AND CTB=(exchang* or transfe* OR transmit* or receiv* OR connect* or sense) AND CTB=(remot*);	184
Thomson Innovation	ALL	ALL=(heartbeat* OR Heart adj beat*) AND CTB=(exchang* or transfe* OR transmit* or receiv* OR connect* or sense) AND CTB=(microcontroller*) AND ALL=(Modula*) AND ALL=(signal* OR wave*) AND ALL=(person OR mother);	564
Thomson Innovation	ALL	TI=(HEARTBEAT) AND TI=(COMMUNIC* OR TRANSMI* OR TRANSF* OR EXCHAN*) AND TI=(remot*);	14
Thomson Innovation	ALL	CTB=(heartbeat* OR Heart adj beat* OR breath*) AND CTB=(exchang* or transfe* OR transmit* or receiv* OR connect* or sense) AND ALL=(Modula* OR microcontroller* or sensor*) AND ALL=(signal* OR wave*) AND ALL=(personal OR mother) AND ALL=(remot*);	19476

Thomson Innovation	ALL	CTB=(heartbeat* OR Heart adj beat* OR breath*) AND CTB=(soothing OR calm* or simula*) AND CTB=(exchang* or transfe* OR transmit* or receiv* OR connect* or sense) AND ALL=(Modula* OR microcontroller* or sensor*) AND ALL=(signal* OR wave*) AND ALL=(personal OR mother) AND ALL=(remot*);	742
Thomson Innovation	ALL	CTB=(heartbeat* OR Heart adj beat* OR breath*) AND CTB=(soothing OR calm* or simula*) AND CTB=(exchang* or transfe* OR transmit* or receiv* OR connect* or sense) AND ALL=(Modula* OR microcontroller* or sensor*) AND ALL=(signal* OR wave*) AND CTB=(personal OR mother) AND ALL=(remot*);	227
Thomson Innovation	ALL	CTB=(heartbeat* OR Heart adj beat* OR breath*) AND ALL=(soothing OR calm* or simula*) AND CTB=(exchang* or transfe* OR transmit* or receiv* OR connect* or sense or connect*) AND ALL=(signal* OR wave*) AND CTB=(personal OR mother or physical*) AND ALL=(remot*) AND ALL=(rhythm*) AND ALL=(synchron*);	271
Thomson Innovation	ALL	TI=(Heartbeat) AND TI=(communic* OR transmi* or transf* or exchan*);	236
Thomson Innovation	ALL	CTB=((heartbeat*) OR (heart adj beat) or (heart adj rate) OR (heart adj rate) or (heart adj data)) AND ALL=(retrans* OR reprod*) AND CTB=(remot*) AND CTB=(exchang* or transfe* OR transmit* or receiv* OR connect* or sense or connect*);	1859
Thomson Innovation	ALL	CTB=((heartbeat*) OR (heart adj beat) or (heart adj rate) OR (heart adj rate) or (heart adj data)) AND ALL=(retrans* OR reprod*) AND CTB=(remot*) AND CTB=(exchang* or transfe* OR transmit*);	1465
Thomson Innovation	ALL	CTB=((heartbeat*) OR (heart adj beat) or (heart adj rate) OR (heart adj rate) or (heart adj data)) AND ALL=(retrans* OR reprod*) AND CTB=(remot*) AND CTB=(exchang* or transfe* OR transmit*) AND ALL=((personal adj conne*) OR (Physical adj conne*));	182
Thomson Innovation	ALL	TI=((heartbeat*) OR (heart adj beat) or (heart adj rate) OR (heart adj rate) or (heart adj data)) AND ALL=(retrans* OR reprod*) AND CTB=(remot*) AND CTB=(exchang* or transfe* OR transmit* or shar*);	33
Google Patents	All	Heartbeat signals	31,545

Google Patents	All	(Heartbeat signals) and (Transmit or share or communicate)	16,484
WIPO	All	((Heartbeat signals) and (transmit or share) and (remote or long))	2125

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