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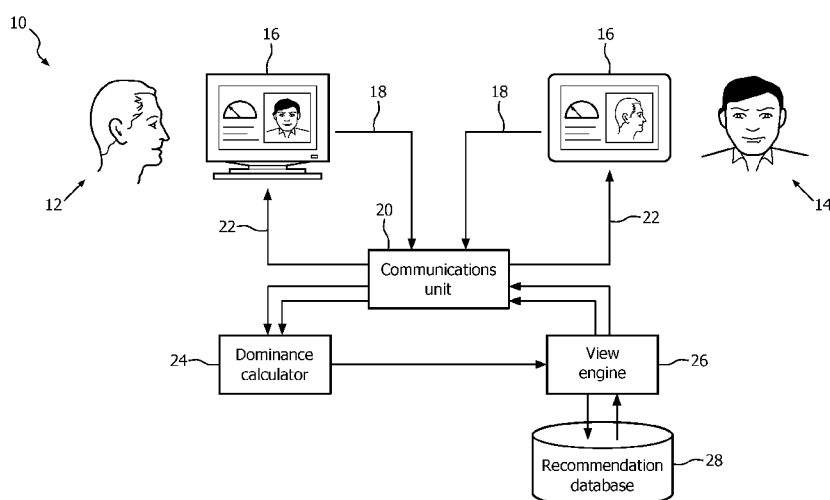


FIG. 1

(57) Abstract: A teleconferencing system includes a dominance calculator (24), and a view engine (26). The dominance calculator (24) is configured to compute a dominance score for at least one channel of a plurality of channels of communication based on received video and/or audio from each communication channel. The view engine (26) is configured to send a display overlay including a visual indicator of the computed dominance score to the at least one channel.



SUPPORTING PATIENT-CENTEREDNESS IN TELEHEALTH COMMUNICATIONS

The following relates generally to electronic conferencing. It finds particular application in conjunction with medical teleconferencing between healthcare practitioners and patients, and will be described with particular reference thereto. However, it will be understood that it also finds application in other usage scenarios and is not necessarily limited to the aforementioned application.

A traditional healthcare practitioner dominated communication model is typically one in which the practitioner listens to a patient's health complaints, provides a diagnosis, and issues instructions for the patient to follow. Patients are less likely to express all of their needs and/or complaints in a conversation in which the practitioner dominates the communication. The patient is less likely to follow the issued instructions, particularly instructions which conflict with practicalities in the life of the patient. In a patient centered model, the communication between the healthcare practitioner and the patient includes a balanced conversation. In the balanced conversation, the relationship becomes a partnership in which the patient more freely expresses needs, concerns and doubts and participates in a selection among treatment options offered by the practitioner. By participating in the selection of a treatment the patient is more likely to follow the treatment steps.

Increasingly, with the cost reduction of voice and video communication, patients, often in a home or remote setting, are communicating with a healthcare by teleconferencing. The teleconferencing includes a video and audio communication channel in each direction. Each interface to a teleconferencing device typically includes a view of the video received from the other party, and a smaller view reflecting back the video being sent to the other party. For example, the healthcare practitioner has a view of the patient and a smaller reflected view of their own transmitted image. Similarly, the patient has a view of the healthcare practitioner and a smaller reflected view of their own transmitted image. The reflected view provides minimal feedback to the sending party in how they are being perceived by the other party. For example, a sending party will likely adjust their position to be seen or centered in the feedback screen, but typically receives no other feedback. Microphones collect the speech, which are directionally sent between the parties and

provided to the receiving party by a speaker. However, research indicates that communication using technology tends to skew dominance further towards the practitioner.

A concern with processing confidential or privileged conversations, such as those between a doctor and a patient, is the recording or the storing of the conversation in whole or in part. For example, storing recordings of conversations raises concerns of security methods protecting the recordings, permitting access, storing and disposing of recordings, and the like. Additionally, recorded conversations can change what and how information is communicated by a party knowing they are being recorded.

The following discloses a new and improved mediated telehealth communication system which addresses the above referenced issues, and others.

In accordance with one aspect, a teleconferencing system includes a dominance calculator or means, and a view engine or means. The dominance calculator or means is configured to compute a dominance score for at least one channel of a plurality of channels of communication based on received video and/or audio from each communication channel. The view engine or means is configured to send a display overlay including a visual indicator of the computed dominance score to the at least one channel.

In accordance with another aspect, a method of teleconferencing includes receiving a plurality of channels of communication, each channel including streamed video and audio communications sent from a party. A dominance score for at least one channel of the plurality of channels of communication is computed based on the received video and/or audio from each communication channel. A display overlay including a visual indicator of the computed dominance score is sent to the at least one channel.

In accordance with another aspect, a computer includes a communications unit or means, a dominance calculator or means, and a view engine or means. The communications unit or means is configured to receive a plurality of communication channels and measure speech in the audio of each channel based on intensity and frequency thresholds. Each channel includes streamed audio and/or video from a party. The dominance calculator or means is configured to compute dominance scores relative to each of the communication channels based on the measured speech. The view engine or means is configured to send a display overlay on at least one channel, and the display overlay includes a visual indicator of the computed dominance score relative to the at least one channel.

One advantage is patient centeric communications.

Another advantage resides in feedback to participants in a teleconference concerning a balance of the communication.

Another advantage resides in suggestions to restore the balance in communication.

Another advantage resides in not recording or storing the conversation.

Still further advantages will be appreciated to those of ordinary skill in the art upon reading and understanding the following detailed description.

The invention may take form in various components and arrangements of components, and in various steps and arrangement of steps. The drawings are only for purposes of illustrating the preferred embodiments and are not to be construed as limiting the invention.

FIGURE 1 diagrammatically illustrates an embodiment of a mediated telehealth communication system.

FIGURE 2 schematically illustrates one embodiment of the mediated telehealth communication system.

FIGURE 3 illustrates an exemplary user interface and display overlay.

FIGURE 4 flowcharts one method of mediated telehealth communications.

With reference to FIGURE 1, an embodiment of a mediated telehealth communication system **10** is diagrammatically illustrated with communications between a healthcare practitioner **12** and a patient **14**. Each party, such as the practitioner **12** and the patient **14**, sends and receives audio and/or video communication through an audio/video (AV) device or means **16**, such as a desktop computer, tablet computer, smart phone, television set and camera, a room augmented with audio/video capabilities, and the like. The AV devices **16** each transmit on a channel streamed audio and/or video of the respective party, e.g. video and audio of the patient conversing or video and audio of the practitioner conversing.

Each transmitted channel of audio and/or video is received by a communications unit or means **20**, e.g. a channel from each party. The communication unit tracks each received channel and relays the audio and/or video to the corresponding AV device on a channel **22**, e.g. the patient transmitted audio and/or video to the AV device of the practitioner. The communication unit can be part of each AV device, such as peer-to-peer communications or be part of a centralized communications device, such as a networked video over Internet Protocol (IP) server, or an appropriate configured room. For example, directional microphones with separate video cameras in a room with both parties, each distinguishing a different party are contemplated.

A dominance calculator or means **24** analyzes each channel and computes a relative dominance score by channel. For example, in a two party communication between a practitioner and a patient, a score is computed for the practitioner and a score is computed for the patient. The computed dominance score can include verbal and non-verbal measures or factors. For example, verbal measures can include length of time speaking, average length of speaking turn, number of interruptions, number of yields to an interruption, and the like. Length of time speaking, e.g. total time speaking indicates high dominance for greater time and low dominance with lesser time. Each channel is analyzed by intensity thresholds and frequency thresholds to classify time periods of the channel audio as speech or silence. The length of time speaking by a party is determined by a sum of the periods classified as speech. Average length of speaking turn is high when dominance is high and low when dominance is low. A speaking turn is a contiguous period of non-interrupted speech. For example, while party A speaks and party B is silent, time is accumulated for the speaking turn. The turn ends when party B speaks. The number of interruptions is larger for high dominance by a party and smaller for low dominance. Interruptions occur when the interrupting party speaks before the interrupted party stops speaking. Interrupts are measured with classified speech on channels which overlap. The interrupter and interrupted are determined based on an ordering of the speaking, e.g. party speaking turn before interruption. Yields, when a party stops speaking after the other party interrupts and allows the other party to continue speaking after interrupting, indicate high dominance for fewer yields and low dominance for more yields. Yields are measured by speech after an interruption and whether the party continues to speak, e.g. classified speech, or yields to the other party, e.g. classified silence.

In another example, non-verbal measures can include a number of times and/or duration of eye contact by a party, a measure of party posture, and the like. Sustained eye contact, e.g. for more than 3 seconds of a person looking into a face or video representation indicates high dominance, and aversive eye contact indicates low dominance. Eye contact can include the number of times of eye contact and/or the length of eye contact. Facial recognition and/or eye tracking are used to analyze frames of the streamed video to determine the amount and frequency of eye contact. Dominant posture is generally indicated by upright and forward posture which fills more of the visual field of a video display. As the conversation continues between parties, a less dominant posture can be indicated by sitting back further away from the camera, e.g. fills less of the visual display. Movement is another measure of posture which is calculated by taking a bitmap difference between successive video frames. Smiling is another measure of posture which is determined from facial

recognition. Various postures can be classified as not attentive, lowly attentive, or very attentive which is used as a composite factor in the dominance score.

The dominance score is represented by $\sum \alpha_i x_i$ where x_i is a measured verbal or non-verbal factor or a function of the verbal or non-verbal factor, and α_i is a weight or coefficient. The coefficients can be determined empirically from a sample of conversations subjectively scored by experts. The weight can include a cultural factor. For example, sustained eye contact is more strongly dominant in some cultures than others. The dominance score is continuously updated and can include a cumulative score and/or a moving window score, e.g. calculated based on the last n minutes of communication.

A view engine or means **26** constructs a display overlay of a visual indicator of the computed dominance score by channel. For example, a display overlay for the practitioner receives a first dominance score based on the relative dominance of the practitioner in the communication and a display overlay for the patient receives a second dominance score based on the relative dominance of the patient in the communication. The indicator can be a numerical representation, graph, or other visual means. The display is continuously or repeatedly updated and sent by the communications unit **20** to the corresponding AV device **16** along with the relay of the corresponding communication channel **22**.

The view engine **26** based on each computed dominance score retrieves one or more written conversational suggestions from a database of suggestions **28**. The database includes access by degree of dominance and/or role. For example, written suggestions for a practitioner to decrease their dominance can include "Ask an open ended question", "Reflect back what the patient is saying", or "Allow the patient to pause and think". To increase dominance, such as with a patient who is talking without listening, suggestions can include "Interrupt and ask for permission to make a suggestion to switch topics", or "Refer patient back to agenda items".

Example suggestions for a patient to increase dominance are "Ask a question (even a small one) to the doctor", "Describe your feelings in a little more detail", "The doctor is interested in what you are thinking now, Tell him what you are thinking", or "Tell the doctor how you really feel right now." Examples to decrease dominance of the patient include "Remember to answer the doctor's question", "Listen to what the doctor has to say and then tell him what you think", or "Try to focus on the points you agreed to discuss with your doctor".

The suggestions retrieved from the suggestion database **28** based on the computed dominance score are included in the display overlay by the view engine and sent to each channel **22**. The AV device **16** receives the relayed audio/video channel **22** and displays the streamed video with the sent overlay of the visual indicator of the dominance score for the channel, and suggestions retrieved for that channel by the view engine **26**.

With reference to FIGURE 2, one embodiment of the mediated telehealth communication system **10** is schematically illustrated. Each AV device **16** includes a video camera or means **30** configured to generate video of a party and a microphone or means **32** to generate audio of a party. Each AV device **16** includes a user interface or means **34** configured to display on a display device **36** the video received on one channel, the generated video, and the display overlay of the indicator of the dominance score and retrieved suggestions. Each AV device includes a processor **38**, such as an electronic or optical processor, field programmable gate array (FPGA), application specific integrated circuit (ASIC), and the like.

The AV devices **16** are communicatively connected by a network **40**. The network can include wired or wireless communications, cellular or data communications, private or public networks, etc. The communication channels **42** connect to a server **44**, such as a teleconferencing server. The channels of communication are received by the communications unit **20**.

The communications unit **20** includes a filter unit or means **46** configured to blur the audio of incoming channels. The blurring facilitates classification of speech, e.g. easier average threshold identification, and to provide secure handling of the audio transmission. The relay of the streamed audio to the corresponding AV device is unaffected by the filter unit. For example, the inbound audio from the patient is filtered to blur the speech for analysis by the dominance calculator and the inbound audio is relayed to the practitioner as received inbound. Handling of the blurred speech by the server enhances privacy and reduces concerns over recordings.

A score history database **47** stores computed dominance scores. The computed dominance scores can be stored at selected intervals and/or termination of teleconference or communication. The view engine can summarize and/or analyze the dominance scores for a healthcare practitioner for individual teleconferences or communications or provide feedback across multiple teleconferences or communications. Changes in dominance scores over an individual conference, in different conferences across times of day, or days of week can provide indication of improvement, or indications of situations suggesting training. For

example, the analysis can indicate a practitioner has problems with beginning teleconferencing sessions, ending teleconferences, teleconferencing at a particular time of day, etc. The view engine can provide summary information at the end of a teleconference which includes statistics and trends across multiple intervals in the individual session, e.g. every n minutes, or across multiple teleconferences for a given timeframe and/or number of sessions, e.g. the last week or last n sessions.

The various units, **20**, **34**, **46**, dominance calculator **24**, and view engine **26** are suitably embodied by a data processing device, such as the processor **38** of the AV devices **16**, or by the network-based server computer **44** operatively connected with the AV devices **16** by the network **40**, or so forth. Moreover, the disclosed communication streaming, display, display overlay, filtering, suggestion retrieval, and dominance calculation techniques are suitably implemented using a non-transitory storage medium storing instructions (e.g., software) readable by a data processing device and executable by the data processing device to perform the disclosed techniques.

With reference to FIGURE 3, an exemplary display device **36** with display overlay **50** is illustrated. The example illustrates the display as viewed by the practitioner. The received streamed video from the patient is displayed in a first window region or area **52**. A second window region or area **54** displays the reflected video of the practitioner streamed to the patient. The display includes other party information **56**, such as the patient name, patient ID, demographics, summary of complaints, diagnosis, etc.

The overlay **50** is displayed concurrently with the other display regions or areas. The overlay includes a visual indicator of the dominance score **58**. The indicator includes a scale of the dominance score for ease of understanding, which indicates balance or dominance. The scale can further refine the dominance score, e.g. further delineations of dominance. In the example, an arrow points to a point on a scale indicative of the dominance score scaled between the patient and the practitioner. For example, if the arrow points vertically equally between the patient and practitioner, then the dominance score is balanced. In another example, the arrow pointing to the label “you” as the practitioner indicates that the practitioner is dominant. The degree of dominance is indicated by how closely the arrow is positioned to the “you” end of the scale and distance from the center or balanced dominance.

The overlay includes display written conversational suggestions **60** to increase or decrease dominance. In the example, the visual indicator of the dominance score points towards the practitioner indicating the practitioner is dominating the conversation, and a conversational suggestion “Use reflection to get the patient to express unvoiced concerns” is

displayed in the overlay. The overlay can be formatted to fit within one or more regions of the display. For example, the visual indicator can be displayed in a separate region or area different from the conversational suggestions. The display can be arranged according to the characteristics of the AV device and/or user preferences.

- 5 The visual indicator is updated in the display as the conversation between the practitioner and patient progresses. The following table illustrates, with an example conversation, the change in dominance score and the display of suggestions. The example uses a function for the dominance score $ds = .5a + .3b + .2c$ where a is a ratio of the speaking time of one party to the total time for all parties, b is a ratio of the number of turns of one party to the total of turns by all parties, and c is a ratio of the composite posture score to the total of composite scores by all parties.
- 10

	Event	System Action	Cum. Dominance Score	Cumulative speaking time (seconds)	Cumulative # turns	Current Posture 1: not attentive 2: lowly attentive 3: very attentive
1	Conversation begins, clinician greets the patient and patient says "hello"	Begins to extract speech features for each speaker	Clinician: 70.5 Patient: 29.5	Clinician: 20 Patient: 2	Clinician: 1 Patient: 1	Clinician: 3 Patient: 3
2	Clinician starts the conversation and has been talking for the first 3 minutes, not letting the patient say much	Calculates ongoing dominance scores based on weighted features.	Clinician 79.5 Patient: 20.5	Clinician: 200 Patient: 2	Clinician: 2 Patient: 1	Clinician: 3 Patient: 3
3	Clinician pauses and patient asks a short question.	Calculates dominance score	Clinician: 72.2 Patient: 27.8	Clinician: 200 Patient: 12	Clinician: 2 Patient: 2	Clinician: 3 Patient: 3
4	Clinician responds to question and starts to give suggestions without trying to find out more about the patient's needs. Patient becomes slightly less attentive.	Calculates dominance score and then notices that doctor is trending to be too dominant (more than two turns with > 70 dominance score), so system gives a suggestion to physician	Clinician: 78.1 Patient: 21.9	Clinician: 300 Patient: 12	Clinician: 3 Patient: 2	Clinician: 3 Patient: 2

5		System looks up a recommendation from the database for the physician to lower his dominance. It selects a suggestion that lowers dominance by a large extent: reflection				
6	Physician receives prompt on his screen: "Use reflection to check your understanding and have patient elaborate his needs." Physician reflects what the patient was saying.		Clinician: 78.1 Patient: 21.9	Clinician: 305 Patient: 12	Clinician: 3 Patient: 2	Clinician: 3 Patient: 2
7	Patient responds by talking more.		Clinician: 62.6 Patient: 37.4	Clinician: 305 Patient: 100	Clinician: 3 Patient: 3	Clinician: 3 Patient: 3
8	Physician hears a deeper concern that the patient has. He reflects the patient's thoughts again.		Clinician: 64.9 Patient: 35.1	Clinician: 310 Patient: 100	Clinician: 4 Patient: 3	Clinician: 3 Patient: 3
9	Patient agrees and elaborates.		Clinician: 52.9 Patient: 47.3	Clinician: 310 Patient: 250	Clinician: 4 Patient: 4	Clinician: 3 Patient: 3
#	Conversation continues.	System continues to measure ongoing dominance and intervenes when not balanced.				

With reference to FIGURE 4, one method of mediated telehealth communications is flowcharted. In a step or by a module 70, channels of communication are received. Each channel includes streamed video and/or audio sent by a party. Receiving a channel of communication can include blurring the speech and/or filtering the speech to classify the audio as silence or speech.

Dominance scores are computed for one or more of the channels of communication based on the received video and/or audio of each channel in a step or by a module 72. For example, the dominance score can be computed for the practitioner and not for the patient, but the computed score includes measures of both channels of communication. Computed dominance scores include verbal and/or non-verbal factors. For example, verbal factors include a length of time a party speaks, an average time of speaking turns by a party, a number of interruptions by a party, a number of yields to interruptions by a party, and the like. In another example, non-verbal factors include a number of times and/or

duration of eye contact by a party, or a measure of posture, such as the amount of display area filled by a person, facial expressions, body posture, and the like. The factors include weights which can include a cultural factor or adjustment to the weighting.

In a decision step or by a module **74**, the dominance scores are evaluated.

5 Written conversational suggestions to increase or decrease dominance of a party are retrieved based on the evaluation of the computed dominance scores for each channel of the corresponding party in a step or by a module **76**. The written suggestions are retrieved from a database of suggestions index for access by degree and direction of dominance and/or role. For example, access includes whether the retrieved suggestions increase or decrease
10 dominance. The retrieved suggestions can be organized by role, e.g. patient, practitioner, and the like. The retrieval access can include a degree of dominance, such as strongly decrease dominance, decrease dominance, etc., or according to a predefined scale of dominance. For example, with the dominance scores scaled from 1 to 100 where 50 is a balanced score, and 100 is very dominant, the retrieval access can include a numerical range in the indexed
15 access.

In a step or by a module **78**, a display overlay is generated for one or more channels. The display overlay for the channel includes a visual indicator of the dominance score and the retrieved written conversational suggestions based on the dominance score for the corresponding channel. The display overlay is included in the corresponding relay of the
20 channel of communication. The step can include storing the computed dominance score in the score history database **47**.

In a decision step or by a module **80**, the method steps repeat until the conversation ends or is otherwise terminated. The step can include recording of the final scores for training purposes. The steps can be performed by one or more processors or
25 computing devices configured to perform the steps.

It is to be appreciated that in connection with the particular illustrative embodiments presented herein certain structural and/or function features are described as being incorporated in defined elements and/or components. However, it is contemplated that these features may, to the same or similar benefit, also likewise be incorporated in other
30 elements and/or components where appropriate. It is also to be appreciated that different aspects of the exemplary embodiments may be selectively employed as appropriate to achieve other alternate embodiments suited for desired applications, the other alternate embodiments thereby realizing the respective advantages of the aspects incorporated therein.

It is also to be appreciated that particular elements or components described herein may have their functionality suitably implemented via hardware, software, firmware or a combination thereof. Additionally, it is to be appreciated that certain elements described herein as incorporated together may under suitable circumstances be stand-alone elements or otherwise divided. Similarly, a plurality of particular functions described as being carried out by one particular element may be carried out by a plurality of distinct elements acting independently to carry out individual functions, or certain individual functions may be split-up and carried out by a plurality of distinct elements acting in concert. Alternately, some elements or components otherwise described and/or shown herein as distinct from one another may be physically or functionally combined where appropriate.

In short, the present specification has been set forth with reference to preferred embodiments. Obviously, modifications and alterations will occur to others upon reading and understanding the present specification. It is intended that the invention be construed as including all such modifications and alterations insofar as they come within the scope of the appended claims or the equivalents thereof. That is to say, it will be appreciated that various of the above-disclosed and other features and functions, or alternatives thereof, may be desirably combined into many other different systems or applications, and also that various presently unforeseen or unanticipated alternatives, modifications, variations or improvements therein may be subsequently made by those skilled in the art which are similarly intended to be encompassed by the following claims.

CLAIMS:

What is claimed is:

1. A teleconferencing system **(10)**, comprising:
 - a dominance calculator or means **(24)** configured to compute a dominance score for at least one channel of a plurality of channels of communication based on received video and/or audio from each communication channel; and
 - a view engine or means **(26)** configured to send a display overlay including a visual indicator of the computed dominance score to the at least one channel.
2. The system **(10)** according to claim 1, further including:
 - a database of written conversational suggestions indexed by dominance direction and degree **(28)**; and
 - wherein the view engine or means **(26)** is further configured to retrieve at least one written conversational suggestion to the at least one channel to decrease or increase the computed dominance score from the database and include the at least one written conversational suggestion in the sent display overlay to the at least one channel.
3. The system **(10)** according to either one of claims 1 and 2, wherein the dominance calculator or means **(24)** is further configured to compute the dominance score for each channel; and
 - wherein the view engine or means **(26)** is further configured to retrieve at least one written suggested action for each of the channels to balance the computed dominance score, and send the display overlay of each visual indicator of the computed dominance score and the at least one written conversational suggestion to each corresponding channel.
4. The system **(10)** according to any one of claims 1-3, further including:
 - a communication unit or means **(20)** configured to receive the plurality of channels of communication including an audio filter **(46)** which blurs speech in the audio streamed communications.
5. The system **(10)** according to any one of claims 1-4, wherein the dominance score is computed based on at least one of:
 - a length of time of speaking by a party;
 - an average length of speaking turn by a party;

a number of interruptions by a party; or
a number of yields to interruptions by a party to another party.

6. The system **(10)** according to claim 5, wherein the speaking or the interruptions of the party are measured with intensity and/or frequency thresholds.

7. The system **(10)** according to any one of claims 1-6, wherein the dominance score is computed based on at least one of:

a number of times and/or duration of eye contact by a party; or
a measure of a party posture.

8. The system **(10)** according to any one of claims 1-7, wherein the dominance score is computed based on a cultural factor.

9. The system **(10)** according to any one of claims 1-8, wherein the dominance score is computed based on at least one of:

a most recent time period of a predetermined duration; or
a cumulative time period.

10. The system **(10)** according to any one of claims 1-9, further including:

a camera configured to generate the streamed video of one party;
a microphone configured to generate the streamed audio of the one party;
a display device configured to display the received video of another party and display the generated video of the one party; and
a user interface unit or means **(34)** configured for at least one channel to:
receive and display the overlay of the indicator of the computed dominance score on the display device; or
receive and display the overlay of the at least one written conversational suggestion on the display device.

11. A method of teleconferencing, comprising:

receiving **(70)** a plurality of channels of communication, each channel including streamed video and audio communications sent from a party;

computing (72) a dominance score for at least one channel of the plurality of channels of communication based on the received video and/or audio from each communication channel; and

sending (78) a display overlay including a visual indicator of the computed dominance score to the at least one channel.

12. The method according to claim 11, further including:

retrieving (76) at least one written conversational suggestion to the at least one channel to decrease or increase the computed dominance score from the database and including the at least one written conversational suggestion in the sent display overlay to the at least one channel..

13. The method according to either one of claims 11 and 12, further including:

computing (72) the dominance score for each channel;

retrieving (76) at least one written suggested action for each of the channels to balance the computed dominance score; and

sending (78) the display overlay of each visual indicator of the computed dominance score and the at least one written conversational suggestion to each corresponding channel.

14. The method according to any one of claims 11-13, wherein receiving (70) includes blurring speech in the audio streamed communications.

15. The method according to any one of claims 11-14, wherein computing (72) the dominance score is based on at least one of:

a length of time of speaking by a party;

an average length of speaking turn by a party;

a number of interruptions by a party; or

a number of yields to interruptions by a party to another party.

16. The method according to any one of claims 11-16, wherein computing (72) the dominance score is based on at least one of:

a number of times and/or duration of eye contact by a party; or

a measure of a party posture.

17. The system according to any one of claims 1-8, wherein computing **(72)** the dominance score is based on at least one of:

- a cultural factor;
- a most recent time period of a predetermined duration; or
- a cumulative time period.

18. A non-transitory computer-readable storage medium carrying software which controls one or more data processing devices **(38, 44)** to perform the method according to any one of claims 11-17.

19. A data processing device **(38, 44)** configured to perform the method according to any one of claims 11-17.

20. A computer **(38, 44)**, comprising:

- a communications unit or means **(20)** configured to receive a plurality of communication channels **(18, 42)** and measure speech in the audio of each channel based on intensity and frequency thresholds, each channel including streamed audio and/or video from a party;

- a dominance calculator or means **(24)** configured to compute dominance scores relative to each of the communication channels based on the measured speech; and

- a view engine or means **(26)** configured to send a display overlay on at least one channel, and the display overlay includes a visual indicator of the computed dominance score relative to the at least one channel.

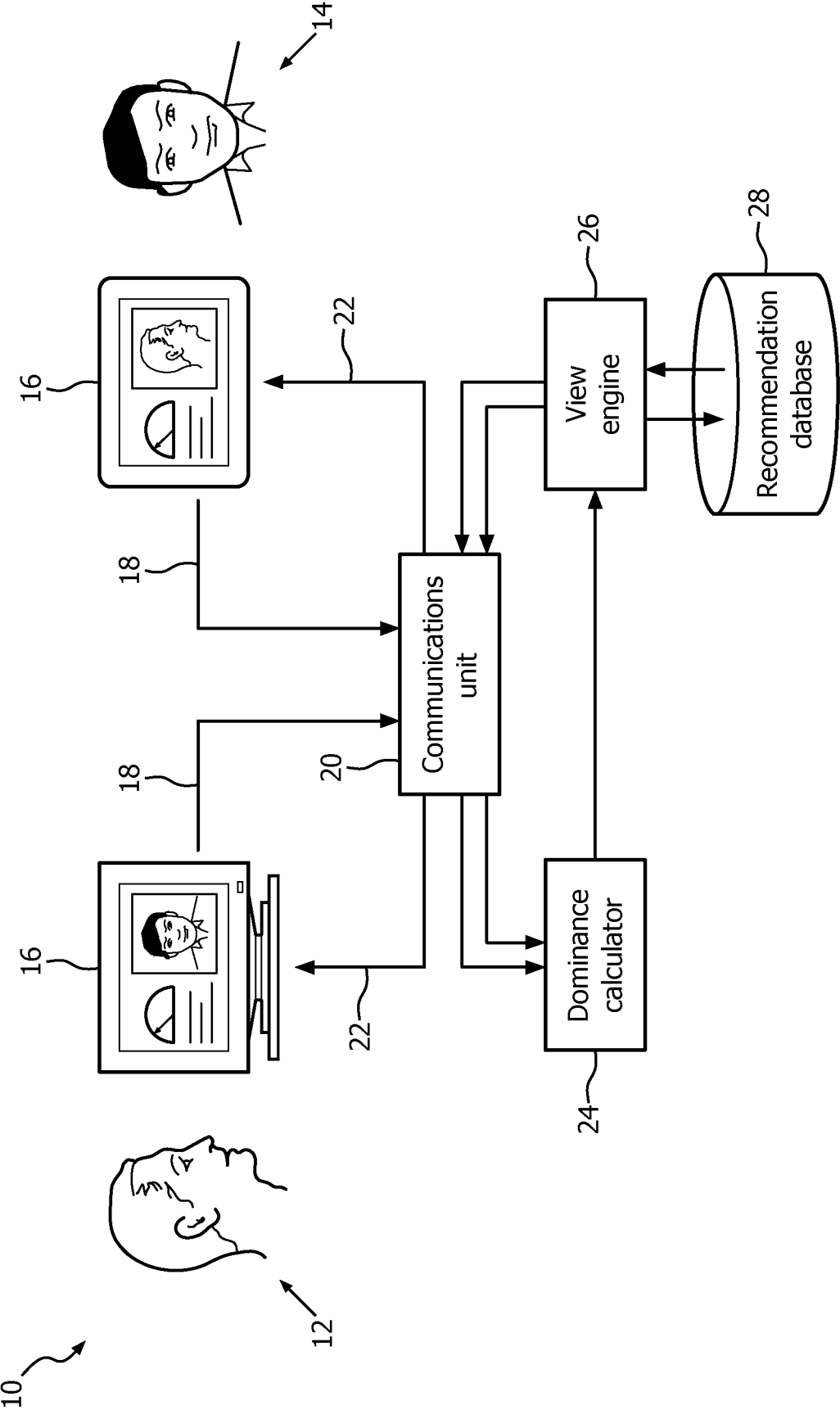


FIG. 1

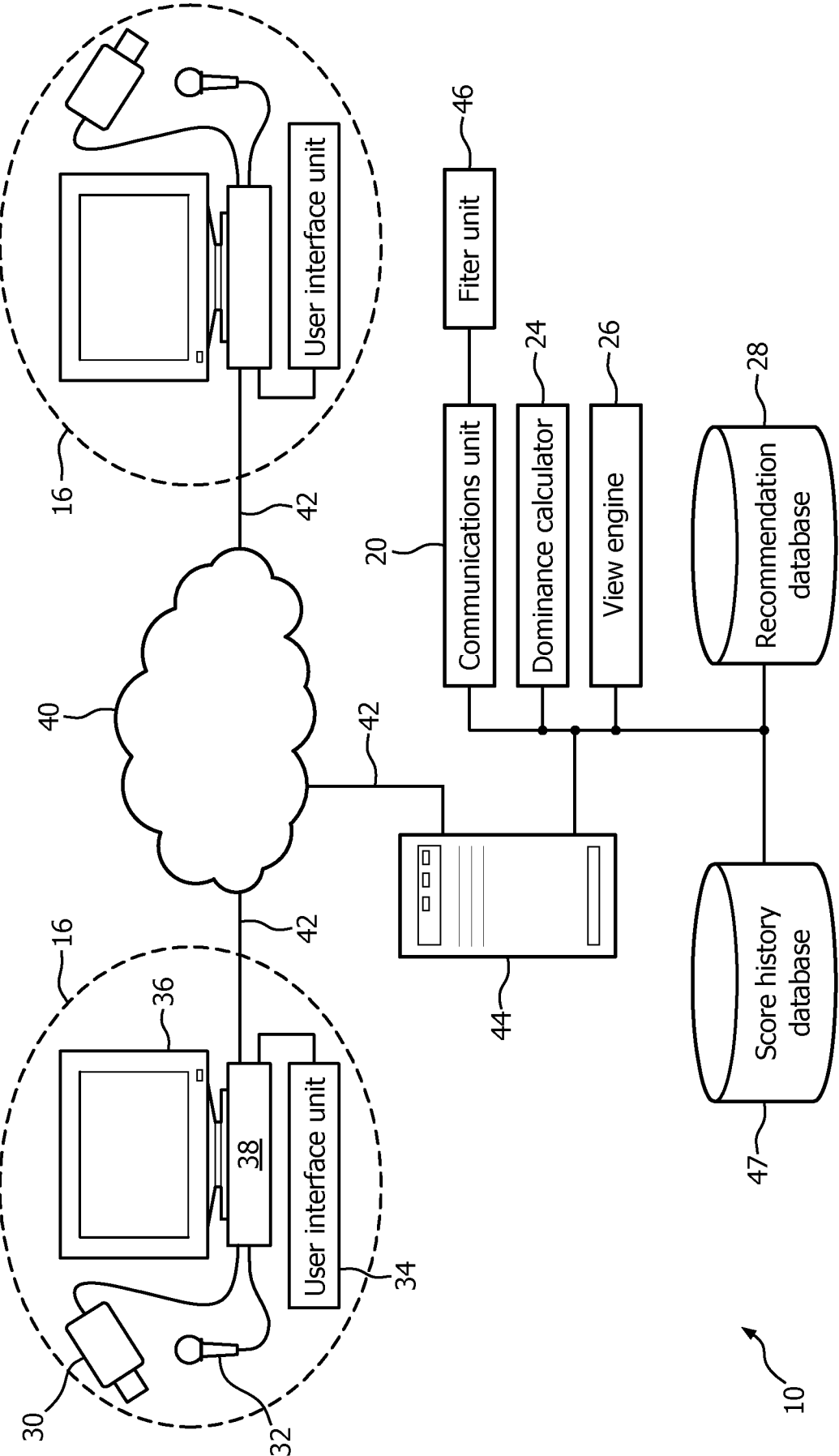


FIG. 2

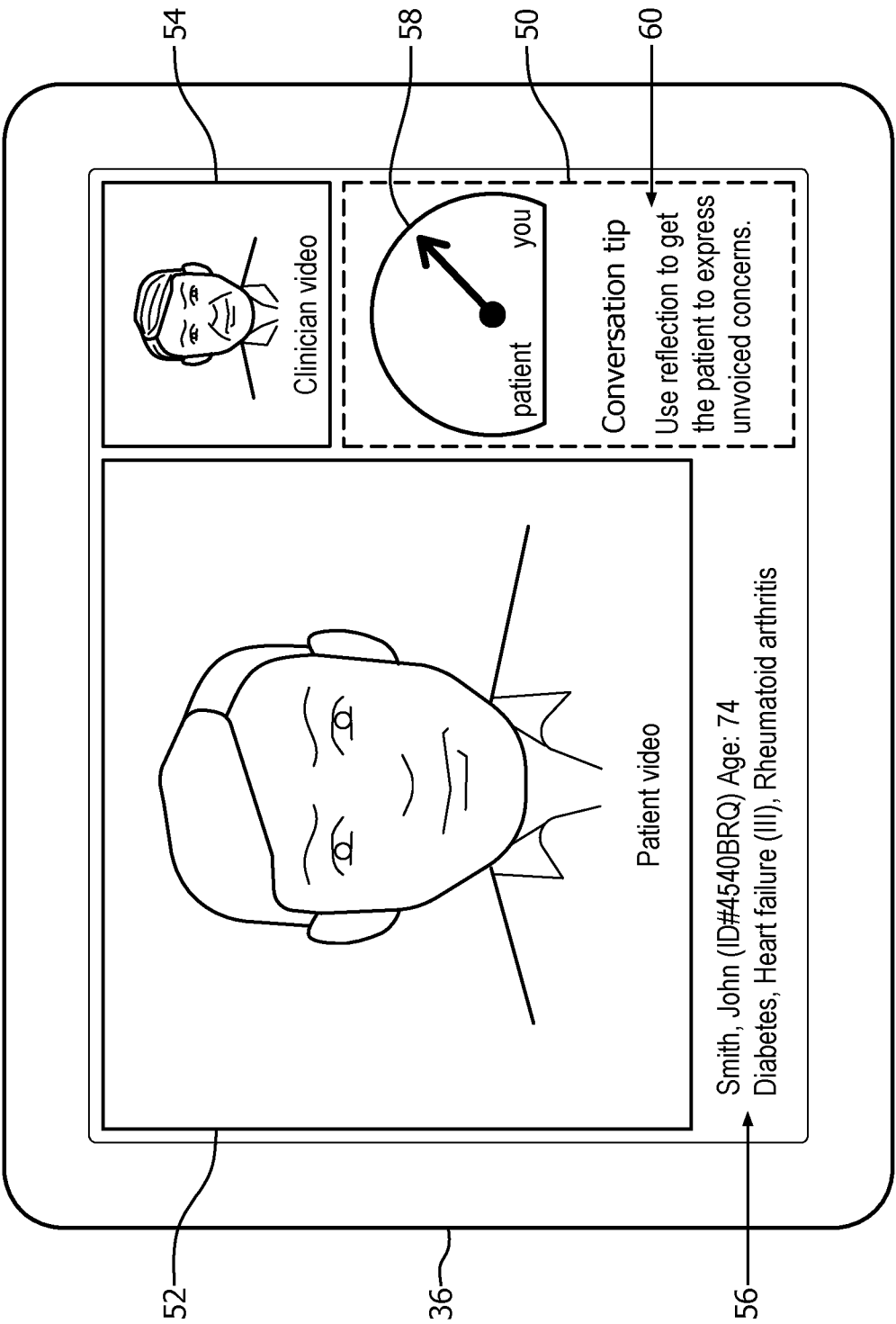


FIG. 3

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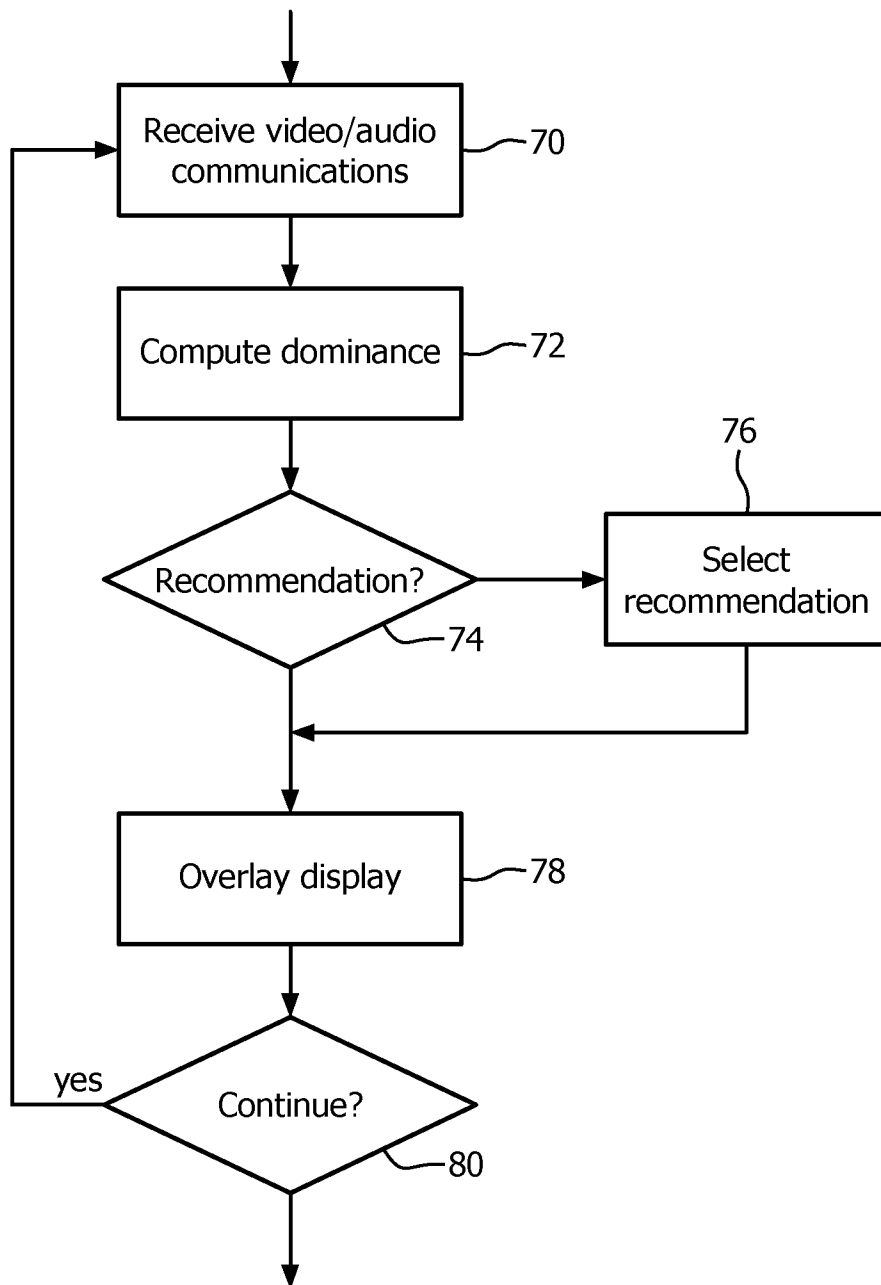


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2015/053338

A. CLASSIFICATION OF SUBJECT MATTER

INV. G06F19/00 H04L12/18 G10L25/48
ADD.

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)

G06F H04L G10L

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)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2013/124631 A1 (ROSANSKY RON [US] ET AL) 16 May 2013 (2013-05-16) abstract, summary, paragraphs 6, 8, 10-11, 14,16, 26, 28,30-32, 38, 46, 48, 50, 51, 54, 56, 62, 63, 67, 68, 93, claim 4 -----	1-20
X	US 2011/292162 A1 (BYUN BYUNGKI [US] ET AL) 1 December 2011 (2011-12-01) abstract, summary, paragraphs 18-19, 20, 22-26, 44,50,52,94, Figures 2, 3A,3B,4A, 4B, 10 -----	1-20
X	US 2005/246165 A1 (PETTINELLI EUGENE E [US] ET AL) 3 November 2005 (2005-11-03) abstract, summary, and paragraph 43 -----	1-20
A	US 2011/270605 A1 (QIN YONG [CN] ET AL) 3 November 2011 (2011-11-03) the whole document -----	1-20



Further documents are listed in the continuation of Box C.



See patent family annex.

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"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

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"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

3 August 2015

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2015/053338

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		WO 2011135001 A1	03-11-2011