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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/510,838	10/09/2014	Willem Bastiaan KLEIJN	6107-0610PUS1	4269
11057 7590 03/23/2016 Birch, Stewart, Kolasch & Birch, LLP P.O. Box 747 Falls Church, VA 22040-0747			EXAMINER AGUSTIN, PETER VINCENT	
			ART UNIT 2686	PAPER NUMBER
			NOTIFICATION DATE 03/23/2016	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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Office Action Summary	Application No. 14/510,838	Applicant(s) KLEIJN, WILLEM BASTIAAN	
	Examiner Peter Vincent Agustin	Art Unit 2686	AIA (First Inventor to File) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☐ Responsive to communication(s) filed on _____.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☒ Claim(s) 1-25 is/are pending in the application.
5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☒ Claim(s) 18 and 19 is/are allowed.

7) ☒ Claim(s) 1-5, 7-17 and 20-25 is/are rejected.

8) ☒ Claim(s) 6 is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10) ☐ The specification is objected to by the Examiner.

11) ☒ The drawing(s) filed on October 9, 2014 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a) ☐ All b) ☐ Some** c) ☐ None of the:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. _____.

3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)
Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.

4) ☐ Other: _____.

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

DETAILED ACTION

Claim Rejections - 35 USC § 101

2. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

3. Claims 20-25 are rejected under 35 U.S.C. 101 because the claimed invention is directed to a judicial exception (i.e., a law of nature, a natural phenomenon, or an abstract idea) without significantly more.

Claims 20 & 21 are directed to a computer-implemented method. The claims do not include additional elements that are sufficient to amount to significantly more than the judicial exception for the following reasons.

The method of claim 20 comprises the step of multiplying a time-frequency coefficient by a real number. This is similar to the basic concept of manipulating information using mathematical relationships (e.g., converting numerical representation in *Gottschalk v. Benson*, 409 U.S. 63, 70, 175 USPQ 673, 676 (1972)), which has been found by the courts to be an abstract idea.

The limitations following this step simply define the “time-frequency coefficient” and the “real number” and do not amount to significantly more than this abstract idea itself. Claim 21 also simply defines the “real number”.

The recitation in the preamble that the method is computer-implemented does not add anything significant. Any generic computer would be able to implement this abstract idea, and

therefore there is no inventive concept sufficient to transform the claimed subject matter into a patent-eligible application.

Accordingly, claims 20 & 21 are not patent eligible under 35 U.S.C. § 101.

Claim 22 recites a system comprising at least one processor; and a computer-readable medium coupled to the at least one processor having instructions stored thereon which, when executed by the at least one processor, causes the at least one processor to implement the exact same method recited in claim 20, which as noted above, is an abstract idea. The claimed system, processor, and medium are generic components that do not add anything significant and likewise do not provide an inventive concept to transform the claimed subject matter into a patent-eligible application.

In claim 22, the limitation that the desired-source signal is being adjusted to compensate for the desired-source signal traveling from a location of the source to a location of the beamformer or the single microphone is not claimed to be a positively-recited function performed by the processor. Rather, it is considered as an “extra-solution activity” that merely describes the manner in which the “real number” was obtained. Considering only the limitations that are positively-recited, this processor simply multiplies a time-frequency coefficient by a real number.

Claim 23 has similar issues as claim 22.

Claim 24 recites limiting a computed gain to be between 0 and 1, which computation can be performed mathematically (mentally or manually on a piece of paper), and therefore does not add anything more to the abstract idea.

Claim 25 has similar issues as claim 24.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a)(1) the claimed invention was patented, described in a printed publication, or in public use, on sale or otherwise available to the public before the effective filing date of the claimed invention.

(a)(2) the claimed invention was described in a patent issued under section 151, or in an application for patent published or deemed published under section 122(b), in which the patent or application, as the case may be, names another inventor and was effectively filed before the effective filing date of the claimed invention.

5. Claims 1-5 & 7-17 are rejected under 35 U.S.C. 102(a)(2) as being anticipated by Kim (US 2014/0307654).

In regard to claim 1, Kim discloses a system (Figures 10-12) comprising: at least one processor (understood from “digital precoding” mentioned in paragraph 0065 and “ADC” mentioned in paragraph 0138); and a computer-readable medium (inherent component where the instructions in Figures 16A through 18B are stored) coupled to the at least one processor having instructions stored thereon which, when executed by the at least one processor, causes the at least one processor to, for one or more coefficients characterizing an output signal: select a desired-source scenario from a set of predefined desired-source scenarios to maximize the amplitude of the output signal (paragraph 0004: “there is Multi-User Multi-Input Multi-Output (MU-MIMO) technology in which when a transmitter simultaneously transmits modulation symbols to a plurality of receivers using a plurality of transmit antennas, a receiver receives only the desired symbols by applying a precoder value which is selected to maximize the magnitude of the signal that the receiver desires to receive”); and select an interference scenario from a set of predefined interference scenarios to minimize the amplitude of the output signal (paragraph 0004: “...and to minimize the magnitude of interference signals”), wherein the selected desired-source scenario

and the selected interference scenario govern the operation of the at least one processor, and wherein the output signal corresponding to the selected scenario pair is used as the processor output signal (paragraph 0175: “For example, if a transmit beam $b(0)$ and a transmit beam $b(1)$ are selected for transmit antennas 0 and 1, the first condition may correspond to a case where the receive power of the signal that MS_0 has received via the transmit beam $b(0)$ of the transmit antenna 0 has the maximum value, and the receive power of the signal that MS_1 has received via the transmit beam $b(0)$ of the transmit antenna 0 has the minimum value. In the second condition, a receive beam may be selected, which satisfies the conditions in which the receive power of the signal that MS_1 has received via the transmit beam $b(1)$ of the transmit antenna 1 has the maximum value, and the receive power of the signal that MS_0 has received via the transmit beam $b(1)$ of the transmit antenna 1 has the minimum value.”).

In regard to claim 2, Kim discloses that the at least one processor is further caused to: select the desired-source scenario based on sensor input signals (see Figures 4A through 6) and quantitative predefined scenario descriptions (paragraph 0005: “digital beamforming technology is also used in which when signals are simultaneously transmitted and received via a plurality of beams, the above-described digital precoding is additionally applied”).

In regard to claim 3, Kim discloses that the at least one processor is further caused to: select the interference scenario based on sensor input signals (see Figures 4A through 6) and quantitative predefined scenario descriptions (paragraph 0005: “digital beamforming technology is also used in which when signals are simultaneously transmitted and received via a plurality of beams, the above-described digital precoding is additionally applied”).

In regard to claim 4, Kim discloses that the quantitative predefined scenario descriptions are covariance matrices (see paragraphs 0160 and 0162).

In regard to claim 5, Kim discloses that the quantitative predefined scenario descriptions are covariance matrices (see paragraphs 0160 and 0162).

In regard to claim 7, Kim discloses that the set of predefined desired-source scenarios represent angles over a range spanning a desired beamwidth (paragraph 0101: “In a third embodiment of the present disclosure, if a transmission angle and a beam width of each transmit beam are almost the same as a reception angle and a beam width of each receive beam for each antenna 1 mounted on each of BSs and MSs, the results of the first DL channel measurement by the MS may be used for the UL channel estimation and beamforming scheduling process”).

In regard to claim 8, Kim discloses that the at least one processor is further caused to: select the desired-source scenario based on sensor input signals (see Figures 4A through 6) and adaptable predefined scenario descriptions (paragraph 0005: “digital beamforming technology is also used in which when signals are simultaneously transmitted and received via a plurality of beams, the above-described digital precoding is additionally applied”).

In regard to claim 9, Kim discloses that the at least one processor is further caused to: select the interference scenario based on sensor input signals (see Figures 4A through 6) and adaptable predefined scenario descriptions (paragraph 0005: “digital beamforming technology is also used in which when signals are simultaneously transmitted and received via a plurality of beams, the above-described digital precoding is additionally applied”).

In regard to claim 10, Kim discloses that the adaptable predefined scenario descriptions are covariance matrices (see paragraphs 0160 and 0162).

In regard to claim 11, Kim discloses that the adaptable predefined scenario descriptions are covariance matrices (see paragraphs 0160 and 0162).

Claims 12-17 have similar limitations as claims 1-5 & 7-11 and are rejected on the same grounds.

6. Claims 20 & 21 are rejected under 35 U.S.C. 102(a)(1) as being anticipated by Florencio et al. (US 2008/0240463).

In regard to claim 20, Florencio et al. discloses a computer-implemented method comprising: multiplying a time-frequency coefficient by a real number (paragraph 0045: “multiplying the weight vector by the received (input) signal”), the time-frequency coefficient being part of a representation of a beamformer output signal or a single microphone output signal (paragraph 0044: “the signals 302 received at the sensor array (e.g., microphone array) are input into a converter 304 that converts the time domain signals into frequency domain signals”), wherein the real number is based on a predefined spatial covariance matrix of a desired source, a predefined covariance matrix for an interferer, a preceding beamformer, and a beamformer input for the time-frequency coefficient (paragraph 0007: “The signals in the frequency domain are used to compute a beamformer output for each frequency bin as a function of the weights for each sensor using a covariance matrix of the combined noise from reflected paths and auxiliary sources.”).

In regard to claim 21, Florencio et al. discloses that the real number is further based on beamformer input for other coefficients in the time-frequency neighborhood of the time-frequency coefficient (see Figure 5).

Allowable Subject Matter

7. Claims 18 & 19 are allowed over the prior art of record.
8. Claim 6 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
9. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record alone or in combination fails to teach or suggest:

in claim 6, wherein the set of predefined interference scenarios include at least one interference scenario and a reflection of the at least one interference scenario around 0 degrees;

in claim 18, "...combine a plurality of numbers, each number being a gain associated with a unique pair of a desired-source scenario selected from a set of predefined desired-source scenarios, and an interference scenario selected from a set of predefined interference scenarios, wherein the plurality of numbers are combined such that the resulting number approaches a largest desired-source scenario number and a smallest interference scenario number, and wherein the resulting number is used to multiply said coefficients to render new coefficients characterizing a new output signal".

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Sorensen et al. (US 2013/0083943) discloses a beamformer adapted based on a copy with injected noise and trained to minimize signals from the direction of interference.

Jensen et al. (US 2014/01777868) discloses a SC-NR algorithm that estimates the signal-to-noise ratio (SNR) for each time-frequency coefficient and applies a gain value to each time-frequency unit based on this SNR estimate.

Tzirkel-Hancock et al. (US 2014/0372129) discloses an adaptive beamformer used to enhance a received speech signal from a desired direction and to mitigate or minimize noises and interferences, i.e., unwanted signals, from other directions.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter Vincent Agustin whose telephone number is (571) 272-7567, and fax number is (571) 273-7567. The examiner can normally be reached on Monday-Thursday, 8:00 AM – 6:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Lim can be reached on (571) 270-1210. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Peter Vincent Agustin/
Primary Examiner, Art Unit 2686

Notice of References Cited	Application/Control No. 14/510,838	Applicant(s)/Patent Under Reexamination KLEIJN, WILLEM BASTIAAN	
	Examiner Peter Vincent Agustin	Art Unit 2686	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-2008/0240463 A1	10-2008	Florencio; Dinei A.	H04R3/005	381/92
*	B	US-2013/0083943 A1	04-2013	Sorensen; Karsten Vandborg	H04R3/005	381/92
*	C	US-2014/0177868 A1	06-2014	JENSEN; Jesper	H04R3/002	381/94.7
*	D	US-2014/0307654 A1	10-2014	KIM; Yung-Soo	H04B7/0617	370/329
*	E	US-2014/0372129 A1	12-2014	TZIRKEL-HANCOCK; ELI	H04R3/005	704/278
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FOREIGN PATENT DOCUMENTS

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NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.