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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/175,428	02/12/2021	Sriram JAYASIMHA	150825.00175	1046

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EXAMINER	
BYTHROW, PETER M	

ART UNIT	PAPER NUMBER
3648	

NOTIFICATION DATE	DELIVERY MODE
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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.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 17/175,428	Applicant(s) JAYASIMHA et al.	
	Examiner PETER M BYTHROW	Art Unit 3648	AIA (FITF) 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 02/12/2021.

☐ 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) 1-21 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☑ Claim(s) 21 is/are allowed.

7) ☑ Claim(s) 1-20 is/are rejected.

8) ☐ Claim(s) _____ 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 02/12/2021 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: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

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

Claim Rejections - 35 USC § 112

The following is a quotation of 35 U.S.C. 112(b):
(b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:
The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 8 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor (or for applications subject to pre-AIA 35 U.S.C. 112, the applicant), regards as the invention.

Claim 8 recites the term "as close as possible". This is a relative term which renders the claim indefinite. The term "as close as possible" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Claim 8 recites the term “said acceleration sensor”. There is insufficient antecedent basis for this limitation in the claim. Claim 8 depends from claim 7 and claim 2. The only mention of an acceleration sensor is found in claims 3, 4, and 6.

Claim 9 recites the term "and/or". The phrase renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

Claim Rejections - 35 USC § 102

In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

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.

Claim(s) 1-6, 9-11, 14, 18-20 is/are rejected under 35 U.S.C. 102(a)(1 as being anticipated by Kempkes (US 5623270).

Claim 1: Kempkes discloses A system comprising:

a plurality of antenna element structures each having a planar surface (fig 1 elements 110, col 3 line 26), said plurality of antenna element structures connected to form a structural array with a planar array configuration in which the planar surface of

said plurality of antenna element structures are substantially coplanar with one another (fig 1, 4, 5, col 3 line 25-26) and

a processing device generating a beam having a beam phase at said plurality of antenna element structures, determining structural displacement of said plurality of antenna element structures from the planar array configuration, determining a correction, and adjusting the beam phase based on the correction (col 3 lines 43-57, col 4 lines 4-48, col 5 lines 38-64)

Claim 2: Kempkes discloses a position sensor mounted to one or more of said plurality of antenna element structures, said position sensor sensing a position of said one or more of said plurality of antenna element structures, said processing device determining structural displacement of said plurality of antenna element structures based on the sensed position (col 4 lines 7-15, 34-40, col 5 lines 38-64)

Claim 3: Kempkes discloses an acceleration sensor mounted to one or more of said plurality of antenna element structures, said acceleration sensor sensing an acceleration of said one or more of said plurality of antenna element structures, said processing device determining structural displacement of said plurality of antenna element structures based on the sensed acceleration (col 4 lines 7-15, 34-40, col 5 lines 38-64)

Claim 4: Kempkes discloses a position sensor mounted to a first one or more of said plurality of antenna element structures and sensing a position of said first one or

more of said plurality' of antenna element structures, an acceleration sensor mounted to a second one or more of said plurality of antenna element structures and sensing an acceleration of said second one or more of said plurality of antenna element structures, said processing device determining structural displacement of said plurality of antenna element structures based on the sensed position and the sensed acceleration (col 4 lines 7-15, 34-40, col 5 lines 38-64, In Kempkes the accelerometer is functioning both as a sensor for measurement of antenna position as well as acceleration and velocity depending on processing applied)

Claim 5: Kempkes discloses said processing device determining position based on the sensed acceleration (col 4 lines 7-15, 34-40, col 5 lines 38-64)

Claim 6: Kempkes discloses said acceleration sensor comprising an accelerometer (col 4 lines 7-15, 34-40, col 5 lines 38-64)

Claim 9: Kempkes discloses said structural displacement comprising deformities of the planar surface and/or the planar array surface (fig 1, 4, 5, col 3 lines 43-57, col 4 lines 4-48, col 5 lines 38-64)

Claim 10: Kempkes discloses said processing device corrects for deformities of the planar surface and/or the planar array surface in real time and dynamically adjusting the beam (fig 1, 4, 5, col 3 lines 43-57, col 4 lines 4-48, col 5 lines 38-64)

Claim 11: Kempkes discloses said plurality of antenna element structures each comprise an antenna assembly (fig 4-10, col 3 line 25-26)

Claim 14: Kempkes discloses said plurality of antenna element structures comprise an antenna assembly and said structural array comprises an antenna array (fig 4-10, col 3 line 25-26)

Claim 18: Kempkes discloses a connector connecting each of said plurality' of antenna element structures to at least one neighboring one of said plurality of antenna element structures, wherein bending or flexing of said connector results in the structural displacement of said plurality of antenna element structures from the planar array configuration (fig 1, 4-10, col 3 lines 43-57, col 4 lines 4-48, col 5 lines 38-64)

Claim 19: Kempkes discloses A method for communicating comprising transmitting signals to the antenna element structure or array of claim 1 (col 3 lines 32-36)

Claim 20: Kempkes discloses A method for communicating comprising receiving signals from the antenna element structure or array of claim 1 (col 3 lines 27-32)

Claim Rejections - 35 USC § 103

In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any

correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

The factual inquiries for establishing a background for determining obviousness under 35 U.S.C. 103 are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.

3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claim 7, 15 is/are rejected under 35 U.S.C. 103 as being unpatentable over Kempkes (US 5623270) as applied to claim 1 above, and further in view of Howard (US 20180359023).

Claim 7: Kempkes does not specifically disclose each of said plurality of antenna element structures comprising a flat tile with a first side forming the planar surface, and a second side opposite the first side, further comprising a communication device mounted at the fist side and a solar cell mounted at the second side.

Howard discloses a hybrid solar panel and antenna array wherein each of said plurality of antenna element structures comprising a flat tile with a first side forming the planar surface, and a second side opposite the first side, further comprising a communication device mounted at the fist side and a solar cell mounted at the second side (fig 1 para 0026 describing a communications system utilizing the inventive array panels, fig 2A-2D, para 0032-0034 describing the panels). It would have been obvious

to modify the invention such that it taught the above limitations, as taught by Howard, in order to power communications equipment in a compact design (Howard para 0002, 0003)

Claim 15: Kempkes does not discloses said plurality of antenna element structures communicating with a processing device on Earth.

Howard discloses a hybrid solar panel and antenna array wherein said plurality of antenna element structures communicating with a processing device on Earth (fig 1 para 0026 describing a communications system utilizing the inventive array panels, para 0003, 0004 disclosing communicating with processor systems on Earth). It would have been obvious to modify the invention such that it taught the above limitations, as taught by Howard, in order to power communications equipment in a compact design (Howard para 0002, 0003)

Claim 8 is/are rejected under 35 U.S.C. 103 as being unpatentable over Kempkes (US 5623270) and Howard (US 20180359023) as applied to claim 7 above, and further in view of Robinson (US 8930047)

Claim 8: Kempkes in view of Howard does not disclose said position sensor is mounted to the first side and said acceleration sensor is mounted to the first side as close as possible to said position sensor.

Robinson discloses a phased antenna array with sensors for measuring displacement of antenna elements due to flexture or vibration in which each of said plurality of antenna element structures comprising a flat tile with a first side forming the

planar surface, and a second side opposite the first side and said position sensor is mounted to the first side and said acceleration sensor is mounted to the first side as close as possible to said position sensor (fig 1 elements 102, 104). It would have been obvious to modify the invention such that it comprised the above limitations, as taught by Robinson, in order to accurately measure displacement of the antenna elements (Roibinson col 3 lines 41-45)

Claim 12 is/are rejected under 35 U.S.C. 103 as being unpatentable over Kempkes (US 5623270) as applied to claim 1 above, and further in view of Robinson (US 8930047)

Claim 12: Kempkes does not disclose said plurality of structures each comprise a flat tile that is square or rectangular.

Robinson discloses a phased antenna array with sensors for measuring displacement of antenna elements due to flexture or vibration in which each of said plurality of antenna element structures in which said plurality of structures each comprise a flat tile that is square or rectangular (fig 1 elements 104). It would have been obvious to modify the invention such that it comprised the above limitations, as taught by Robinson, in order to form a planar array.

Claim 13 is/are rejected under 35 U.S.C. 103 as being unpatentable over Kempkes (US 5623270) as applied to claim 1 above, and further in view of Hu (US 6879875)

Claim 13: Kempkes discloses the processor monitoring structural displacement (col 3 lines 43-57, col 4 lines 4-48, col 5 lines 38-64)

Kempkes does not discloses one or more Global Positioning System (GPS) sensors and IMU sensors at said plurality of antenna element structures or structural array, where IMU position and velocity biases are refined based on the fused GPS and IMU sensor values.

Hu discloses a system for improved inertial navigation comprising one or more Global Positioning System (GPS) sensors and IMU sensors at said plurality of antenna element structures or structural array, where IMU position and velocity biases are refined based on the fused GPS and IMU sensor values (fig 1, col3 lines 55-61, col 10 line 51-col 11 line 32 disclosing processing steps for combining GPS and IMU to remove sources of error such as gyroscope drift, etc.)

It would have been obvious to modify the invention such that it comprised the above limitations, as taught by Hu, in order to implement a cost effective and highly accurate positional solution for a craft (col 2 lines 31-38)

Claim 16, 17 is/are rejected under 35 U.S.C. 103 as being unpatentable over Kempkes (US 5623270) as applied to claim 1 above, and further in view of Lach (US 5440320)

Claim 16: Kempkes does not discloses a drive device, said processing device operating the drive device to move one or more of said plurality' of antenna element structures to correct for structural displacement of said plurality of antenna element structures (fig 4, 8, col 4 lines 5-15, col 6 lines 8-37). It would have been obvious to

modify the invention such that it comprised the above limitations, as taught by Lach, in order to controllably adjust the antenna configuration in use (Lach col 2 lines 13-22, 25-33)

Claim 17: Lach further discloses said drive device comprising a torque rod applying a torque to said one or more of said plurality of antenna element structures (fig 4, 8, col 4 lines 5-15, col 6 lines 8-37). It would have been obvious to modify the invention such that it comprised the above limitations, as taught by Lach, in order to controllably adjust the antenna configuration in use (Lach col 2 lines 13-22, 25-33)

Allowable Subject Matter

Claims 21 are allowed.

The following is an examiner's statement of reasons for allowance: the prior art fails to disclose or render obvious certain limitations of the present invention. Specifically, the prior art fails to disclose A method for communicating comprising:

forming with a plurality of discrete antenna elements connected together by a plurality of connectors, a large structural array having a fully deployed configuration in which the plurality of discrete antenna elements are coplanar with one another;

generating at a processing device via the plurality of discrete antenna elements, a beam having a beam phase;

detecting with one or more sensors, structural displacement of the plurality of discrete antenna elements from the fully deployed configuration;

applying by a position correction device, a mechanical force to move said plurality of discrete antenna elements toward the fully deployed configuration; and

determining at the processing device, a correction based on the structural displacement and applying a phase correction to the beam.

The closest prior art has been listed here in this Office Action, as well as in the Notice of References cited. While many of the cited references discuss correcting for displacement of antenna elements by various means, no reference has been found which discloses or renders obvious all of the limitations of claim 21.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

This statement is not intended to necessarily state all the reasons for allowance or all the details why the claims are allowed and has not been written to specifically or impliedly state that all the reasons for allowance are set forth (MPEP 1302.14).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PETER M BYTHROW whose telephone number is (571)270-1468. The examiner can normally be reached on Monday-Friday 830am-5pm.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vladimir Magloire can be reached on 571-270-5144. 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 M BYTHROW/
Primary Examiner, Art Unit 3648