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(54) **SYSTEM AND METHOD FOR PREDICTING HYGIENE OPPORTUNITY AND HYGIENE ACTIONS FOR HYGIENE PROTOCOLS**

(57) A system and method for opportunity-based hygiene monitoring and/or reminding is disclosed. Healthcare providers may have various opportunities to interact with a patient. As such, an opportunity-based focus in managing a healthcare environment may assist in assessing the various opportunities when interacting with the patient. For example, an opportunity-based analysis

may be used for protocol compliance, such as compliance with hand hygiene protocols and/or PPE protocols. Further, infection analysis, patient care billing, staff locating, or workload analysis may be opportunity based in order to more efficiently manage the healthcare environment.

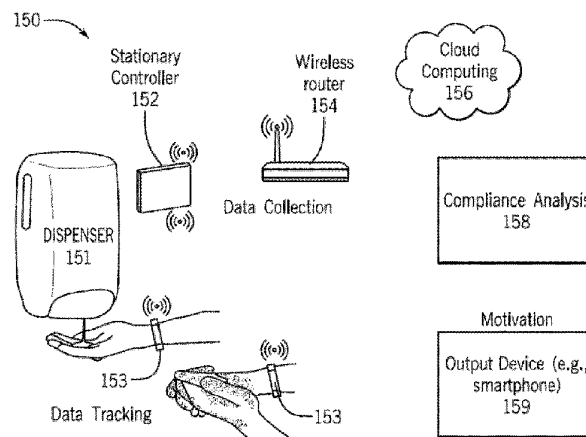


FIG. 1B

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EUROPEAN SEARCH REPORT

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2004/001009 A1 (WININGS THOMAS R [US] ET AL) 1 January 2004 (2004-01-01) * paragraph [0002]; figures 1-3 * * paragraph [0033] - paragraph [0037] * -----	1,2	INV. G08B21/24
X	US 10 475 329 B1 (KOESTER DOUGLAS [US] ET AL) 12 November 2019 (2019-11-12) * column 6, line 17 - line 65; figures 1,5 * -----	1,2	
X	US 2004/090333 A1 (WILDMAN TIMOTHY D [US] ET AL) 13 May 2004 (2004-05-13) * paragraph [0054] - paragraph [0060]; figures 1,6 * -----	1,2	
			TECHNICAL FIELDS SEARCHED (IPC)
			G08B
The present search report has been drawn up for all claims			
Place of search <b>Munich</b>		Date of completion of the search <b>10 March 2022</b>	Examiner <b>Kurzbauer, Werner</b>
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	

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**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing claims for which payment was due.

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Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

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No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

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**LACK OF UNITY OF INVENTION**

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

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**see sheet B**

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All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

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As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

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Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

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None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

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**1, 2 (partially)**

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The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



**LACK OF UNITY OF INVENTION  
SHEET B**

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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

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**1. claims: 1, 2(partially)**

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A method for identifying and determining compliance of a worker with a hygiene opportunity, the method comprising: automatically detecting a hygiene opportunity, the hygiene opportunity indicative of interaction for which compliance is to be monitored, the compliance requiring one or more hygiene actions; automatically detecting at least one or more hygiene actions; automatically determining whether at least one criterion associated with the at least one action is within a criterion amount of the hygiene opportunity; and determining compliance or non-compliance with the hygiene opportunity dependent on automatically determining whether the at least one action is within the criterion amount of the hygiene opportunity, wherein the at least one criterion associated with the at least one action comprises time and wherein automatically determining whether the at least one criterion associated with the at least one action is within the criterion amount of the hygiene opportunity comprises determining whether the at least one action is performed within one or more times of detecting the hygiene opportunity; and responsive to determining that the at least one action is performed within the one or more times of detecting the hygiene opportunity, attributing the at least one action to the hygiene opportunity in order to determine compliance or non-compliance for the hygiene opportunity.

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**2. claims: 1, 2(partially)**

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A method for identifying and determining compliance of a worker with a hygiene opportunity, the method comprising: automatically detecting a hygiene opportunity, the hygiene opportunity indicative of interaction for which compliance is to be monitored, the compliance requiring one or more hygiene actions; automatically detecting at least one or more hygiene actions; automatically determining whether at least one criterion associated with the at least one action is within a criterion amount of the hygiene opportunity; and determining compliance or non-compliance with the hygiene opportunity dependent on automatically determining whether the at least one action is within the criterion amount of the hygiene opportunity, wherein the at least one criterion associated with the at least one action comprises space; and wherein automatically determining whether the at least one criterion associated with the at least one action is within the criterion amount of the hygiene opportunity comprises determining whether the at least one action is performed within a predetermined space of the hygiene opportunity; and responsive to determining that the at least one action is performed within the predetermined space of the hygiene



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opportunity, attributing the at least one action to the hygiene opportunity in order to determine compliance or non-compliance for the hygiene opportunity.

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3. claims: 1, 2 (partially)

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A method for identifying and determining compliance of a worker with a hygiene opportunity, the method comprising: automatically detecting a hygiene opportunity, the hygiene opportunity indicative of interaction for which compliance is to be monitored, the compliance requiring one or more hygiene actions; automatically detecting at least one or more hygiene actions; automatically determining whether at least one criterion associated with the at least one action is within a criterion amount of the hygiene opportunity; and determining compliance or non-compliance with the hygiene opportunity dependent on automatically determining whether the at least one action is within the criterion amount of the hygiene opportunity, wherein automatically detecting the hygiene opportunity comprises automatically tracking movement of the worker relative to a patient area including at least one of into the patient area, out of the patient area, or within the patient area; wherein the patient area has a first stationary electronic device associated with an interior of the patient area and a second stationary electronic device associated with an entrance of the patient area; and wherein automatically tracking movement of the worker into or out of the patient area is based on both the first stationary electronic device and the second stationary electronic device.

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4. claims: 1, 2 (partially)

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A method for identifying and determining compliance of a worker with a hygiene opportunity, the method comprising: automatically detecting a hygiene opportunity, the hygiene opportunity indicative of interaction for which compliance is to be monitored, the compliance requiring one or more hygiene actions; automatically detecting at least one or more hygiene actions; automatically determining whether at least one criterion associated with the at least one action is within a criterion amount of the hygiene opportunity; and determining compliance or non-compliance with the hygiene opportunity dependent on automatically determining whether the at least one action is within the criterion amount of the hygiene opportunity, wherein the hygiene opportunity comprises a hand hygiene opportunity; wherein the compliance with the hand hygiene opportunity comprises taking hand cleaning agent from a dispenser; wherein the at least one

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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

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action comprises taking the hand cleaning agent from the dispenser; wherein automatically determining whether the at least one action is within the criterion amount of detecting the hygiene opportunity comprises determining whether taking the hand cleaning agent from the dispenser is performed within a first predetermined time before detecting the hand hygiene opportunity or within a second predetermined time after detecting the hand hygiene opportunity; responsive to determining that the hand cleaning agent was taken from the dispenser within the first predetermined time before detecting the hand hygiene opportunity or within the second predetermined time after detecting the hand hygiene opportunity, determining compliance of hand cleaning agent from the dispenser with regard to the hand hygiene opportunity; and responsive to determining that the hand cleaning agent was not taken from the dispenser within the first predetermined time before detecting the hand hygiene opportunity and was not taken from the dispenser within the second predetermined time after detecting the hand hygiene opportunity, determining non-compliance with regard to the hand hygiene opportunity.

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5. claims: 1, 2(partially)

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A method for identifying and determining compliance of a worker with a hygiene opportunity, the method comprising: automatically detecting a hygiene opportunity, the hygiene opportunity indicative of interaction for which compliance is to be monitored, the compliance requiring one or more hygiene actions; automatically detecting at least one or more hygiene actions; automatically determining whether at least one criterion associated with the at least one action is within a criterion amount of the hygiene opportunity; and determining compliance or non-compliance with the hygiene opportunity dependent on automatically determining whether the at least one action is within the criterion amount of the hygiene opportunity, wherein the compliance with the hygiene opportunity comprises detecting the hygiene opportunity within a first predetermined time since performing the at least one action; and wherein responsive to determining that the hygiene opportunity was not detected within the first predetermined time since performing the at least one action, the at least one action is not used for compliance for a later detected hygiene opportunity that was detected after the first predetermined time.

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6. claims: 3, 4(completely); 1(partially)

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A method for identifying and determining compliance of a



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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

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worker with a hygiene opportunity, the method comprising: automatically detecting a hygiene opportunity, the hygiene opportunity indicative of interaction for which compliance is to be monitored, the compliance requiring one or more hygiene actions; automatically detecting at least one or more hygiene actions; automatically determining whether at least one criterion associated with the at least one action is within a criterion amount of the hygiene opportunity; and determining compliance or non-compliance with the hygiene opportunity dependent on automatically determining whether the at least one action is within the criterion amount of the hygiene opportunity, wherein automatically detecting the hygiene opportunity is performed prior to automatically detecting the at least one action; and further comprising determining whether to generate an output to remind the worker to perform the at least one action.

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7. claims: 5, 6, 12(completely); 1, 11(partially)

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A method for identifying and determining compliance of a worker with a hygiene opportunity, the method comprising: automatically detecting a hygiene opportunity, the hygiene opportunity indicative of interaction for which compliance is to be monitored, the compliance requiring one or more hygiene actions; automatically detecting at least one or more hygiene actions; automatically determining whether at least one criterion associated with the at least one action is within a criterion amount of the hygiene opportunity; and determining compliance or non-compliance with the hygiene opportunity dependent on automatically determining whether the at least one action is within the criterion amount of the hygiene opportunity, wherein automatically detecting a hygiene opportunity comprises: initially predicting the hygiene opportunity based on one or more sensors associated with the worker; and confirming the hygiene opportunity based on one or more sensors associated with an area.

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8. claims: 7-10, 13, 14(completely); 1, 11(partially)

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A method for identifying and determining compliance of a worker with a hygiene opportunity, the method comprising: automatically detecting a hygiene opportunity, the hygiene opportunity indicative of interaction for which compliance is to be monitored, the compliance requiring one or more hygiene actions; automatically detecting at least one or more hygiene actions; automatically determining whether at least one criterion associated with the at least one action

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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

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is within a criterion amount of the hygiene opportunity; and determining compliance or non-compliance with the hygiene opportunity dependent on automatically determining whether the at least one action is within the criterion amount of the hygiene opportunity, further comprising automatically predicting which of a plurality of people performed the at least one action.

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9. claim: 15

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A method for automatically periodically checking whether a worker has complied with a hygiene protocol, the method comprising: (A) automatically determining whether the worker has complied with the hygiene protocol; (B) responsive to automatically determining that the worker has complied with the hygiene protocol, automatically determining a time at which the worker complied with the hygiene protocol and designating the time as a last time at which the worker complied with the hygiene protocol; (C) responsive to automatically determining that the worker has not complied with the hygiene protocol, determining an elapsed time since the last time at which the worker complied with the hygiene protocol; and (D) responsive to automatically determining that the elapsed time is greater than or equal to a predetermined interval between compliance actions, generating an output indicative to the worker to comply with the hygiene protocol and iterating back to (A).

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
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10-03-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
<b>US 2004001009 A1</b>	<b>01-01-2004</b>	<b>AU 2003220471 A1</b>	<b>13-10-2003</b>
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82