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(54) **Title:** METHODS AND SYSTEMS FOR NON-INVASIVE, INTERNAL HEMORRHAGE DETECTION

(57) **Abstract:** Methods and systems for detecting internal hemorrhaging in a person are provided. In an exemplary embodiment, one method includes the steps of measuring physiological conditions associated with the person and processing the measured physiological conditions using a probabilistic network to determine if the person has internal hemorrhaging. The method also includes the steps of determining the severity of any internal hemorrhaging by determining the amount of blood lost by the person and classifying this loss as non-specific, mild, moderate, and severe. The physiological measurements include an electrocardiogram, a photoplethysmogram, and oxygen saturation, respiratory, skin temperature, and blood pressure measurements. The probabilistic network included with one system determines whether there is internal hemorrhaging based on a number of factors including a physiological model, medical personnel inputs, transfer function, statistical, and spectral information, short and long term trends, and previous hemorrhage decisions.

INTERNATIONAL SEARCH REPORT

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A CLASSIFICATION OF SUBJECT MATTER
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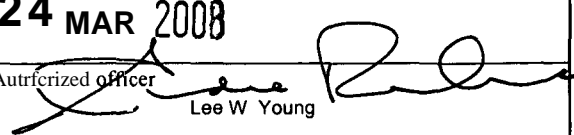
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 PubWEST (PGPB, USPT, EPAB, JPAB), Google Scholar, Google Patents, Google
 Keywords Hemorrhage, bleed, blood, algorithm, program, detect, determine, diagnose, ECG, photoplethysmogram, plethysmogram, oxygen, saturation, spo2, skin, temperature, glasgow, coma, score, filter, fouzer, wavelet, statistic, spectrum, time, temporal

C DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
X ----- Y	US 2006/0161459 A9 (ROSENFELD et al) 20 July 2006 (20 07 2006) para [0002], [0038], [0059], [0060], [0197], [0273]-[0277], Fig 9, 12	1 ----- 2-21
Y	US 2005/00101 16 A 1 (KORHONEN et al) 13 January 2005 (13 01 2005) ara [0021], [0023], [0030]-[0032], [0044], [0049], [0051]	2, 5-7, 10, 13-21
Y	US 2005/0245839 A1 (STIVORIC et al) 03 November 2005 (03 11 2005) para [0045], [0050], [0204], [0205], [021 7]	2, 5-6, 9-21
Y	US 2006/0206012 A1 (MERRETT et al) 14 September 2006 (14 09 2006) para [0009]-[0014], [0074], [0095]	2, 4, 12, 16-21
Y	US 2005/0070807 A1 (MARKS et al) 31 March 2005 (31 03 2005) para [0021]	3-4, 11-12
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Y	US 2004/0122702 A1 (SABOL et al) 20 June 2004 (20 06 2004) para [0016], [0320]	8
Y	SHIM et al , "Computational Modeling of the Cardiovascular System After Fontan Procedure," In Medical Data Analysis, Third International Symposium, ISMDA 2002 Edited by A Colosimo et al Berlin/Heidelberg Springer, 2002, Volume 2526/2002, ISBN 978-3-540-00044-0, p 105-114, especially p 105, 108, 109	19

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