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(71) Applicant: **Pioneer Corporation**
Tokyo-to (JP)

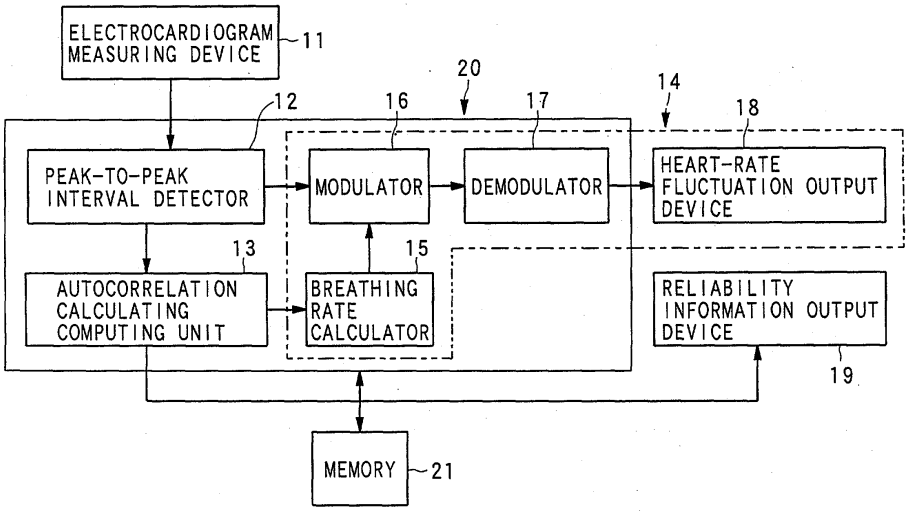
(72) Inventors:
- **Yasushi, Mitsuo**
  Tsurugashima-shi Saitama-ken (JP)
- **Yanagidaira, Masatoshi**
  Tsurugashima-shi Saitama-ken (JP)

(74) Representative: **Haley, Stephen**
Gill Jennings & Every,
Broadgate House,
7 Eldon Street
London EC2M 7LH (GB)

(54) **Apparatus and method for analyzing heart-rate variability based on electrocardiogram information**

(57) A heart-rate variability analysis apparatus comprises an electrocardiogram information detecting unit (11), heart-rate signal calculating unit (12), breathing signal calculating unit (13), and heart-rate-variability information providing unit (14). Of these, the electrocardiogram information detecting unit detects electrocardiogram information about an object to be diagnosed. The heart-rate signal calculating unit calculates a heart rate signal indicative of a heart rate of the object from the electrocardiogram information. The breathing signal calculating unit calculates, from the heart rate signal, a breathing signal in which a breathing state of the object is reflected. The heart-rate-variability information providing unit provides variability information of the heart rate of the object in which the breathing state of the object is reflected, on the basis of both of the heart rate signal and the breathing signal. Thus, the heart-rate fluctuations can be measure with higher-precision.

FIG. 5



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EUROPEAN SEARCH REPORT

Application Number
EP 03 25 4954

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	HAN K ET AL INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS: "DECOMPOSITION OF HEART RATE VARIABILITY BY ADAPTIVE FILTERING FOR ESTIMATION OF CARDIAC VAGAL TONE" PROCEEDINGS OF THE ANNUAL INTERNATIONAL CONFERENCE OF THE ENGINEERING IN MEDICINE AND BIOLOGY SOCIETY. ORLANDO, OCT. 31 - NOV. 3, 1991, NEW YORK, IEEE, US, vol. VOL. 2 CONF. 13, 31 October 1991 (1991-10-31), pages 660-661, XP000348278	1-3,7-9, 13	G06F17/00
A	* abstract * * page 660, right-hand column, last paragraph - page 661, right-hand column, last paragraph * * figure 2 * -----	4-6, 10-12	
A	SHAW-JYH SHIN ET AL: "ASSESSMENT OF AUTONOMIC REGULATION OF HEART RATE VARIABILITY BY THE METHOD OF COMPLEX DEMODULATION" IEEE TRANSACTIONS ON BIOMEDICAL ENGINEERING, IEEE INC. NEW YORK, US, vol. 36, no. 2, 1 February 1989 (1989-02-01), pages 274-283, XP000009587 ISSN: 0018-9294 * abstract * * page 275, right-hand column, paragraph 2 - page 278, right-hand column, paragraph 1 * * page 279, right-hand column, paragraph 3 - page 282, left-hand column, last paragraph * * figures 1,3,6 * -----	1-13	
	-/--		TECHNICAL FIELDS SEARCHED (Int.Cl.7) G06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	29 March 2005	Hilbig, M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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Application Number
EP 03 25 4954

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	ZHAO L ET AL: "Derivation of respiration from electrocardiogram during heart rate variability studies" COMPUTERS IN CARDIOLOGY 1994 IEEE COMPUT. SOC. PRESS LOS ALAMITOS, CA, USA, 1995, pages 53-56, XP002322495 ISBN: 0-8186-6570-X * abstract *	1-13	
A	"Heart rate variability: Standards of measurement, physiological interpretation, and clinical use" CIRCULATION, AMERICAN HEART ASSOCIATION, DALLAS, TX, US, vol. 93, no. 5, 1996, pages 1043-1065, XP002236874 ISSN: 0009-7322 * page 1048, right-hand column, paragraph 5 - page 1050, left-hand column, paragraph 1 *	1-13	
A	BERNTSON G G ET AL: "Heart rate variability: origins, methods, and interpretive caveats." PSYCHOPHYSIOLOGY. NOV 1997, vol. 34, no. 6, November 1997 (1997-11), pages 623-648, XP009045636 ISSN: 0048-5772 * abstract * * page 628, right-hand column, paragraph 2 - page 630, right-hand column, paragraph 1 *	1-13	TECHNICAL FIELDS SEARCHED (Int.Cl.7)

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EPO FORM 1503 03.82 (P04C01)

专利名称(译)	用于基于心电图信息分析心率变异性的装置和方法		
公开(公告)号	EP1394687A3	公开(公告)日	2005-05-25
申请号	EP2003254954	申请日	2003-08-08
[标]申请(专利权)人(译)	日本先锋公司		
申请(专利权)人(译)	先锋公司		
当前申请(专利权)人(译)	先锋公司		
[标]发明人	YASUSHI MITSUO YANAGIDAIRA MASATOSHI		
发明人	YASUSHI, MITSUO YANAGIDAIRA, MASATOSHI		
IPC分类号	A61B5/00 A61B5/0452 G06F17/00		
CPC分类号	A61B5/0456 A61B5/02405		
代理机构(译)	哈利，STEPHEN		
优先权	2002246635 2002-08-27 JP		
其他公开文献	EP1394687A2 EP1394687B1		
外部链接	Espacenet		

摘要(译)

心率变异性分析装置包括心电图信息检测单元（11），心率信号计算单元（12），呼吸信号计算单元（13）和心率变异性信息提供单元（14）。其中，心电图信息检测单元检测关于待诊断对象的心电图信息。心率信号计算单元根据心电图信息计算表示对象心率的心率信号。呼吸信号计算单元根据心率信号计算呼吸信号，其中反映了对象的呼吸状态。心率变异性信息提供单元基于心率信号和呼吸信号两者提供反映对象的呼吸状态的对象的心率的可变性信息。因此，可以以更高的精度测量心率波动。

FIG. 5