



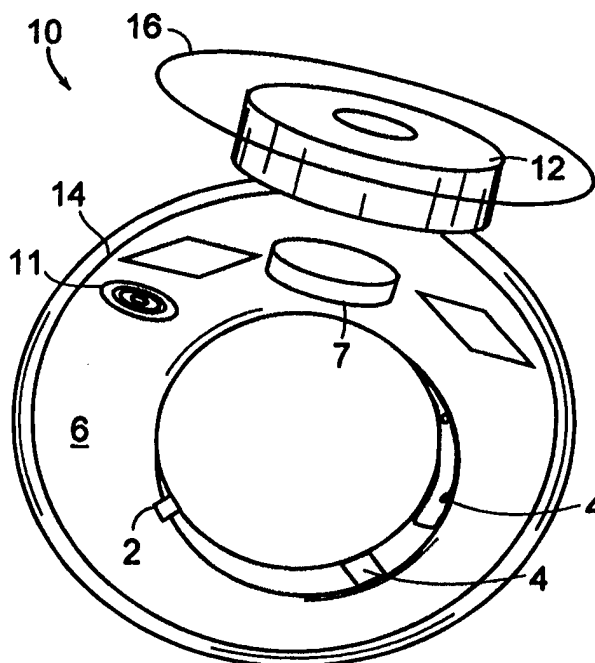
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification⁶ : A61B 5/024, 5/00, H04B 14/02</p>	<p>A3</p>	<p>(11) International Publication Number: WO 98/17172</p> <p>(43) International Publication Date: 30 April 1998 (30.04.98)</p>
<p>(21) International Application Number: PCT/US97/19205</p> <p>(22) International Filing Date: 24 October 1997 (24.10.97)</p> <p>(30) Priority Data: 60/029,253 24 October 1996 (24.10.96) US 08/954,889 8 October 1997 (08.10.97) US</p> <p>(71) Applicant: MASSACHUSETTS INSTITUTE OF TECHNOLOGY [US/US]; 77 Massachusetts Avenue, Cambridge, MA 02139 (US).</p> <p>(72) Inventors: ASADA, Haruhiko, H.; 321 Hayward Mill Road, Concord, MA 01742 (US). YANG, Boo-Ho; 221 Massachusetts Avenue #217, Boston, MA 02115 (US). KAI-YEUNG, Sunny, Siu; 197 8th Street #519, Charlestown, MA 02129 (US). CHANG, Kuo, Wei; 32 Buckman Drive, Lexington, MA 02173 (US).</p> <p>(74) Agents: SUNSTEIN, Bruce, D. et al.; Bromberg & Sunstein LLP, 125 Summer Street, Boston, MA 02110-1618 (US).</p>	<p>(81) Designated States: CA, JP, KR, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).</p> <p>Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p> <p>(88) Date of publication of the international search report: 23 July 1998 (23.07.98)</p>	

(54) Title: PATIENT MONITORING FINGER RING SENSOR

(57) Abstract

A monitoring system for monitoring the health status of a patient and transmitting to a remote receiver a signal, based on measured physiological parameters. A sensor is incorporated in a finger ring or other article of apparel so as to monitor skin temperature, blood flow, blood constituent concentration, or pulse rate of the patient. The data are encoded for wireless transmission by mapping a numerical value associated with each datum to a pulse emitted after a delay of a specified duration following a fiducial time. Multiple ring bands and sensor elements may be employed for deriving three-dimensional dynamic characteristics of arteries and tissue of the finger.



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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 97/19205

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 6 A61B5/024 A61B5/00 H04B14/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A61B H04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 706 776 A (SEIKO EPSON CORP ;SEIKO INSTR INC (JP)) 17 April 1996 see page 1, line 1 - page 3, line 19; figure 1 see page 12, line 26 - line 39 ---	1,3,7, 10,12
X	EP 0 467 853 A (HATSCHEK RUDOLF A ;HEITZ ERICH WILLI FRANZ DR MED (CH)) 22 January 1992	15,16
Y	see page 5, line 15 - line 49	17
A	see page 8, line 48 see page 15, line 34 - line 46; figure 5 ---	1,7, 10-13
Y	WO 93 16636 A (MYLLYMAEKI MATTI) 2 September 1993	17
A	see the whole document ---	1,3,6,7, 9,14
	-/--	

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

° Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
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- *O* document referring to an oral disclosure, use, exhibition or other means
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Date of the actual completion of the international search <p style="text-align: center;">27 May 1998</p>	Date of mailing of the international search report <p style="text-align: center;">08.06.98</p>
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer <p style="text-align: center;">Petter, E</p>

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 97/19205

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	US 3 972 038 A (FLETCHER JAMES C ADMINISTRATOR ET AL) 27 July 1976 see the whole document ---	1,3,7, 10-13 9
Y	EP 0 724 860 A (SPACELABS MEDICAL INC) 7 August 1996 see the whole document ---	1,3,7, 10-13
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Y	US 3 899 429 A (UENO YOSHITO ET AL) 12 August 1975 see column 1, line 4 - line 54; figures 1,2 ---	18-21
Y	US 4 648 133 A (VILNROTTER VICTOR A) 3 March 1987 see column 1, line 14 - line 39 -----	18-21

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 97/19205

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.: 22
because they relate to subject matter not required to be searched by this Authority, namely:
see FURTHER INFORMATION sheet PCT/ISA/210
2. Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-17

System for monitoring the health status a patient comprising
a) one or more bands worn by the patient with a sensor for providing a signal based on at least skin temperature, blood flow, blood constituent concentration, and pulse rate of the patient and b) a controller for analyzing the signals and determining a physiological characteristic of the patient.

2. Claims: 18-21

A method for encoding data.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Claims Nos.: 22

Rule 39.1(iv) PCT - Diagnostic method practised on the human or animal body: Claim 22 relate to a method for monitoring the health status of a patient for determining an abnormal health status. The method is therefore method carried out on the human body for diagnosing an abnormal health status of a patient.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 97/19205

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