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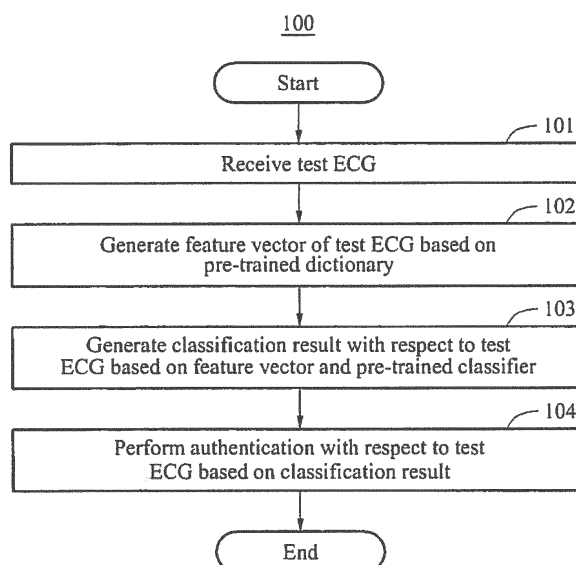
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(54) **ELECTROCARDIOGRAM (ECG)-BASED AUTHENTICATION APPARATUS AND METHOD THEREOF, AND TRAINING APPARATUS AND METHOD THEREOF FOR ECG-BASED AUTHENTICATION**

(57) Provided are electrocardiogram (ECG)-based authentication and training. An authentication method includes generating a feature vector of an ECG obtained from an entity or a person based on a dictionary, classifying the ECG through a classifier based on the feature vector, and performing authentication based on a classification result.

FIG. 1





EUROPEAN SEARCH REPORT

Application Number
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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	JIN WANG ET AL: "Human Identification From ECG Signals Via Sparse Representation of Local Segments", IEEE SIGNAL PROCESSING LETTERS, IEEE SERVICE CENTER, PISCATAWAY, NJ, US, vol. 20, no. 10, 1 October 2013 (2013-10-01), pages 937-940, XP011522346, ISSN: 1070-9908, DOI: 10.1109/LSP.2013.2267593 * pages 937-940 *	1-9	INV. A61B5/00 A61B5/0452 H04L9/32 G06F21/32 A61B5/04 ADD. H04L29/06 G06K9/00
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 26 April 2016	Examiner De la Hera, Germán
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			

EPO FORM 1503 03/02 (P04C01)



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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)
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1 The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 26 April 2016	Examiner De la Hera, Germán
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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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	BALOUCHESTANI MOHAMMADREZA ET AL: "Advanced K-means clustering algorithm for large ECG data sets based on a collaboration of compressed sensing theory and K-SVD approach", SIGNAL, IMAGE AND VIDEO PROCESSING, SPRINGER LONDON, LONDON, vol. 10, no. 1, 13 November 2014 (2014-11-13), pages 113-120, XP035593659, ISSN: 1863-1703, DOI: 10.1007/S11760-014-0709-5 [retrieved on 2014-11-13] * the whole document *	1-9	
A	US 2006/136744 A1 (LANGE DANIEL H [IL]) 22 June 2006 (2006-06-22) * the whole document *	1-9	
			TECHNICAL FIELDS SEARCHED (IPC)
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 26 April 2016	Examiner De la Hera, Germán
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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Application Number

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CLAIMS INCURRING FEES

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

☐ 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):

☐ 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.

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:

see sheet B

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

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

☐ 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:

☒ 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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☐ 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**

Application Number

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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:

1. claims: 1-9

use of ECG to perform authentication.

2. claims: 10-15

improving of ECG categorization

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

EP 16 15 4997

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

26-04-2016

10	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
	US 2006136744 A1	22-06-2006	NONE	
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EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

专利名称(译)	基于心电图 (ECG) 的认证设备及其方法 , 以及用于基于ECG的认证的训练设备和方法		
公开(公告)号	EP3056138A3	公开(公告)日	2016-09-28
申请号	EP2016154997	申请日	2016-02-10
[标]申请(专利权)人(译)	三星电子株式会社		
申请(专利权)人(译)	SAMSUNG ELECTRONICS CO. , LTD.		
当前申请(专利权)人(译)	SAMSUNG ELECTRONICS CO. , LTD.		
[标]发明人	FENG XUETAO ZHANG CHAO BAE CHISUNG PARK JONGAE KIM SANG JOON LIU YANG		
发明人	FENG, XUETAO ZHANG, CHAO BAE, CHISUNG PARK, JONGAE KIM, SANG-JOON LIU, YANG		
IPC分类号	A61B5/00 A61B5/0452 H04L9/32 G06F21/32 A61B5/04 H04L29/06 G06K9/00		
CPC分类号	A61B5/04525 A61B5/117 A61B5/7267 G06F21/32 G06K9/0055 G06K9/6249 G06K9/6255 G06K2009/00939 G16H50/20 H04L9/3231 H04L63/0861 H04L2209/88		
优先权	201510071283.3 2015-02-11 CN 1020150180291 2015-12-16 KR		
其他公开文献	EP3056138A2		
外部链接	Espacenet		

摘要(译)

提供基于心电图 (ECG) 的认证和训练。一种认证方法包括 : 基于字典生成从实体或人获得的ECG的特征向量 , 基于特征向量通过分类器对ECG进行分类 , 以及基于分类结果执行认证。

