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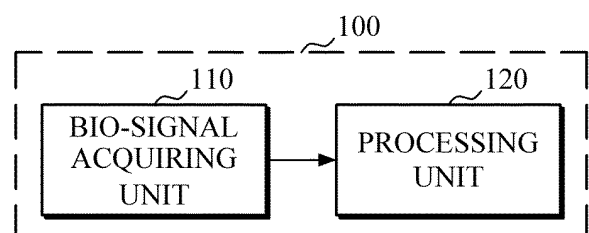
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(54) **APPARATUS AND METHOD FOR EXTRACTING FEATURE OF BIO-SIGNAL, AND APPARATUS FOR DETECTING BIO-INFORMATION**

(57) An apparatus configured to extract a feature from a bio-signal is disclosed. The apparatus includes a bio-signal acquirer configured to acquire the bio-signal, and a processor configured to analyze concavity and convexity of a waveform of the bio-signal in intervals of the bio-signal, and extract the feature from the bio-signal based on the analyzed concavity and the analyzed convexity.

**FIG. 1**



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## 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) |
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|                                                                                                                                                                                                                                                        | -----                                                                                                                                    |                                                                                                                                                                                                                                                                              | ADD.<br>A61B5/0452<br>A61B5/0488        |
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|                                                                                                                                                                                                                                                        | * paragraph [0049] *                                                                                                                     |                                                                                                                                                                                                                                                                              |                                         |
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|                                                                                                                                                                                                                                                        | * paragraph [0010] *                                                                                                                     |                                                                                                                                                                                                                                                                              | A61B                                    |
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|                                                                                                                                                                                                                                                        | * paragraph [0008] *                                                                                                                     |                                                                                                                                                                                                                                                                              |                                         |
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|                                                                                                                                                                                                                                                        | * paragraph [0010] *                                                                                                                     |                                                                                                                                                                                                                                                                              |                                         |
|                                                                                                                                                                                                                                                        | -----                                                                                                                                    |                                                                                                                                                                                                                                                                              |                                         |
| The present search report has been drawn up for all claims                                                                                                                                                                                             |                                                                                                                                          |                                                                                                                                                                                                                                                                              |                                         |
| Place of search<br><b>The Hague</b>                                                                                                                                                                                                                    |                                                                                                                                          | Date of completion of the search<br><b>12 January 2018</b>                                                                                                                                                                                                                   | Examiner<br><b>Knüpling, Moritz</b>     |
| CATEGORY OF CITED DOCUMENTS<br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document |                                                                                                                                          | T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>& : member of the same patent family, corresponding document |                                         |

EPO FORM 1503 03.82 (P04C01)



Application Number

EP 17 16 3720

**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:

☐ 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

EP 17 16 3720

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: 1-10

A method for extracting a feature from a bio-signal based on a convex-to-concave difference

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2. claims: 11-13

Apparatus configured to detect bio-information based on reflected light

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3. claims: 14, 15

A computer-readable medium to operate a medical imaging apparatus to eliminate intervals of a waveform

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

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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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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)        | 用于提取生物信号特征的装置和方法，以及用于检测生物信息的装置                                                                                                               |         |            |
| 公开(公告)号        | <a href="#">EP3272279A3</a>                                                                                                                  | 公开(公告)日 | 2018-02-21 |
| 申请号            | EP2017163720                                                                                                                                 | 申请日     | 2017-03-30 |
| [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.                                                                                                               |         |            |
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| [标]发明人         | PARK CHANG SOON<br>KWON UI KUN<br>KIM YOUNG SOO                                                                                              |         |            |
| 发明人            | PARK, CHANG SOON<br>KWON, UI KUN<br>KIM, YOUNG SOO                                                                                           |         |            |
| IPC分类号         | A61B5/00 A61B5/021 A61B5/0452 A61B5/0488                                                                                                     |         |            |
| CPC分类号         | A61B5/02116 A61B5/0452 A61B5/0488 A61B5/7235 G16H40/63 A61B5/0205 A61B5/021 A61B5/02416 A61B5/0402 A61B5/7278 A61B5/7282 A61B5/743 A61B5/746 |         |            |
| 优先权            | 1020160092166 2016-07-20 KR                                                                                                                  |         |            |
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#### 摘要(译)

公开了一种被配置为从生物信号中提取特征的装置。该装置包括：生物信号获取器，被配置为获取生物信号；以及处理器，被配置为以生物信号的间隔分析生物信号的波形的凹凸，并从生物信号中提取特征。基于分析的凹度和分析的凸性。

FIG. 1

