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**Gu et al.**

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(54) **HOST OF PHYSIOLOGICAL DETECTION SYSTEM AND PHYSIOLOGICAL DETECTION DEVICE WITH HIGH ACCURACY**

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**A61B 2560/0271** (2013.01); **A61B 2562/085**  
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(58) **Field of Classification Search**

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See application file for complete search history.

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(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 377 days.

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(51) **Int. Cl.**

**A61B 5/00** (2006.01)

**A61B 5/024** (2006.01)

**A61B 5/1455** (2006.01)

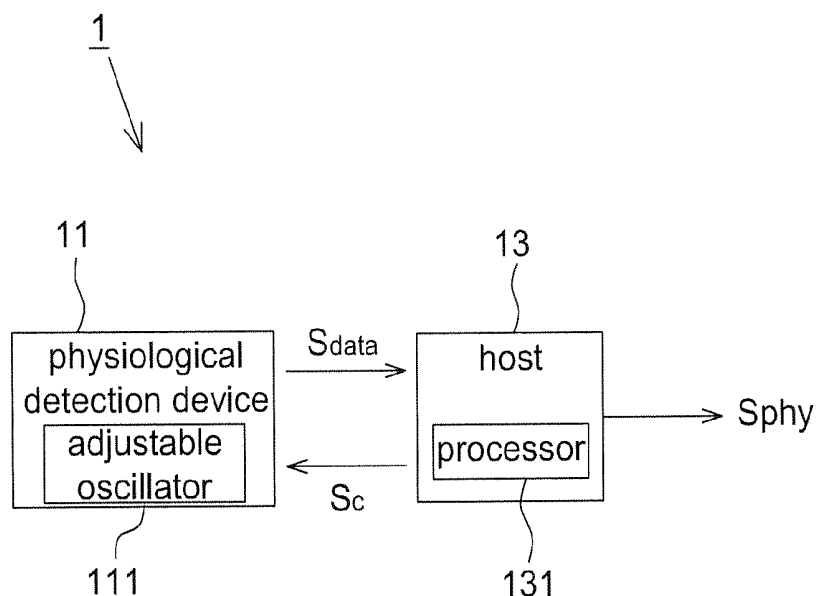
(52) **U.S. Cl.**

CPC ..... **A61B 5/7203** (2013.01); **A61B 5/002**  
(2013.01); **A61B 5/02416** (2013.01); **A61B**

(57) **ABSTRACT**

There is provided a physiological detection system including a physiological detection device and a host. The physiological detection device is configured to transmit a physiological data series to the host according to a local oscillation frequency. The host is configured to calculate a physiological value according to the physiological data series and determine a correction parameter according to a receiving data parameter and a reference data parameter, wherein the correction parameter is configured to correct the physiological value, process the physiological data series or adjust the local oscillation frequency of the physiological detection device.

**17 Claims, 5 Drawing Sheets**



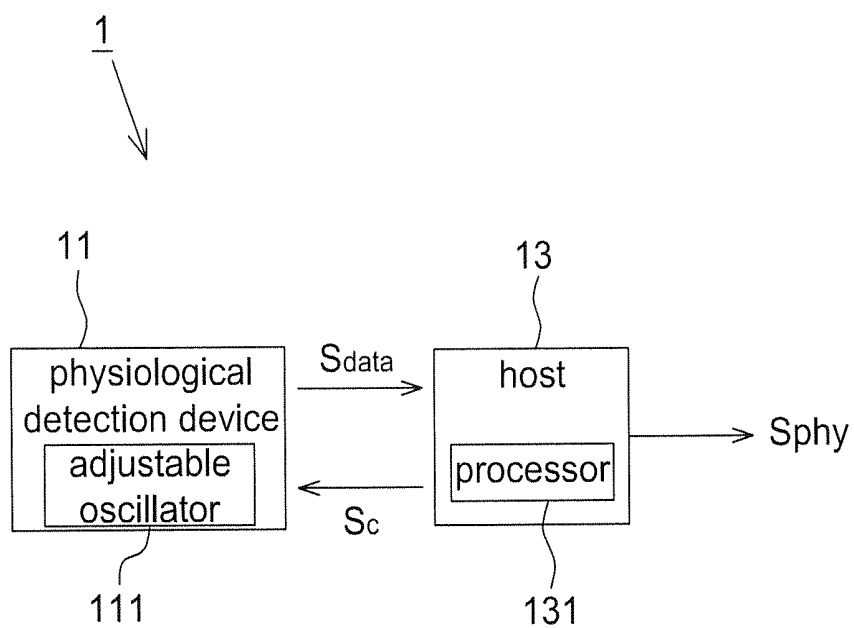


FIG. 1

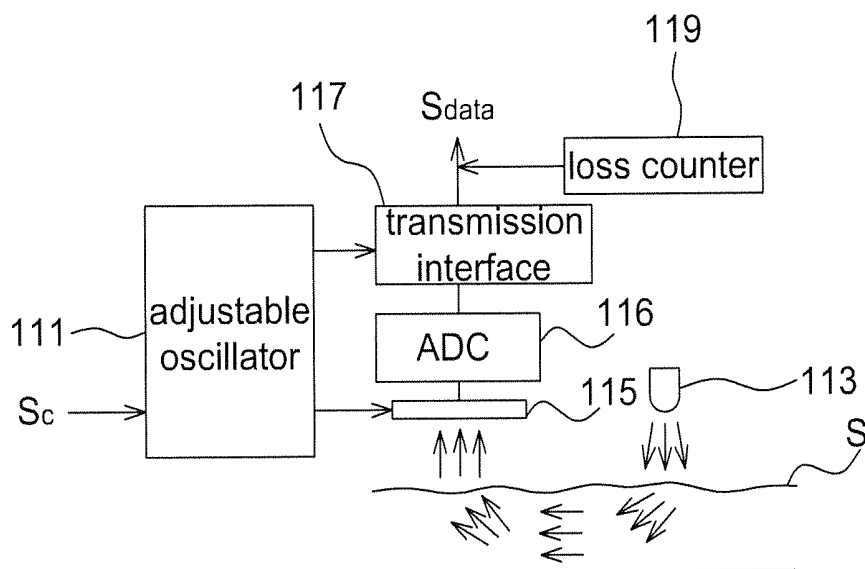


FIG. 2A

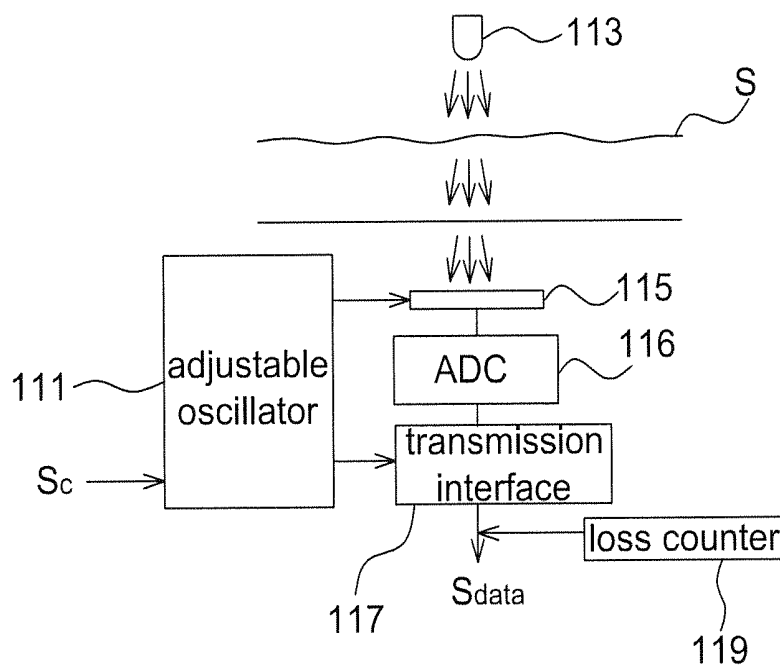


FIG. 2B

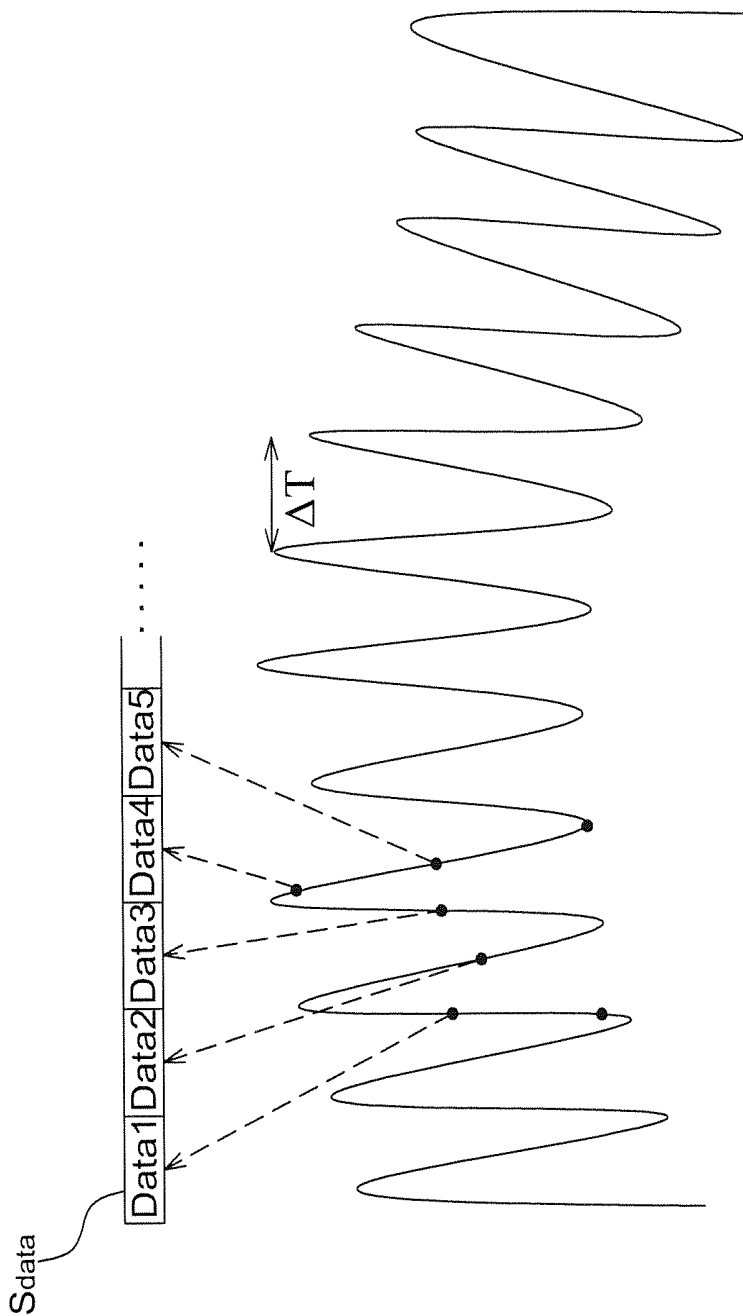


FIG. 3

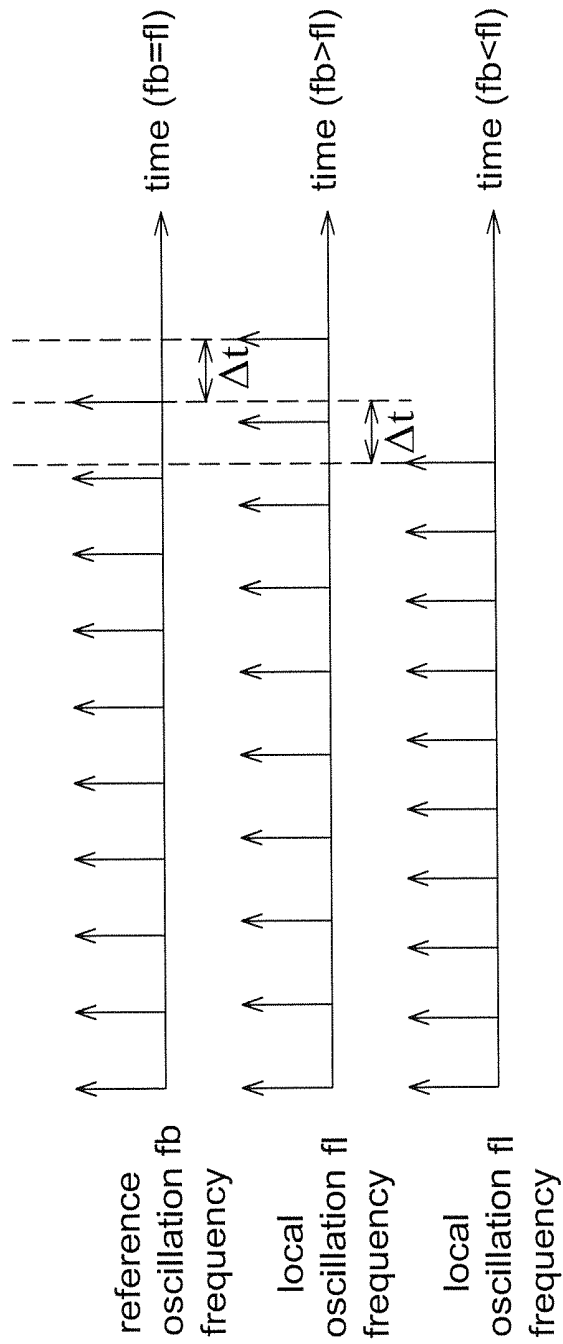


FIG. 4

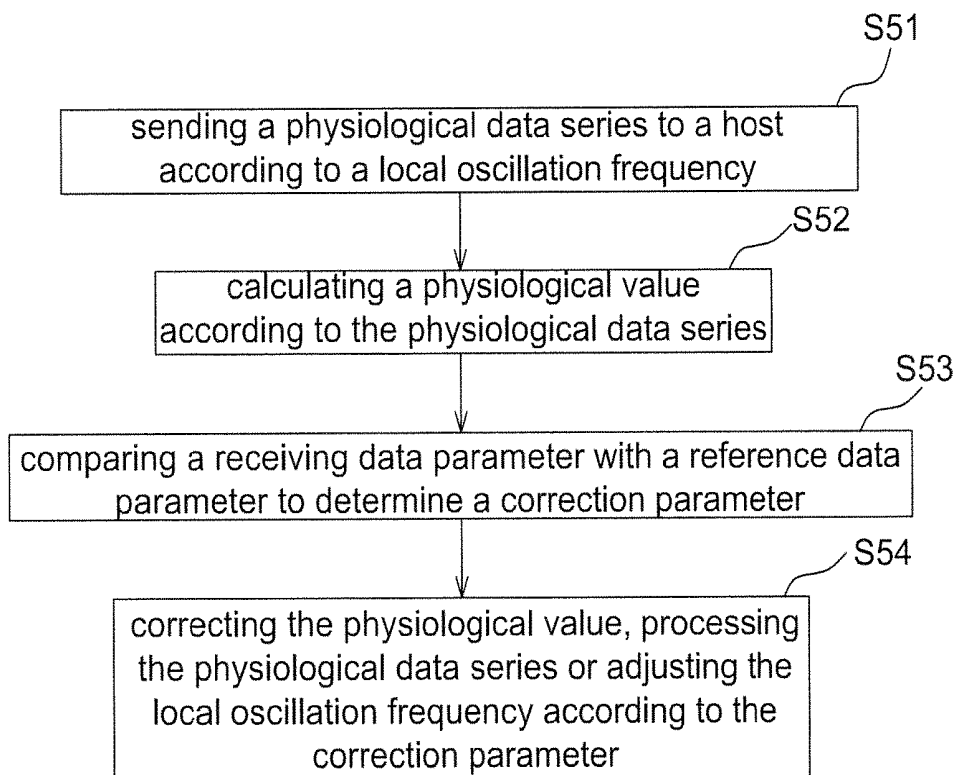


FIG. 5

# HOST OF PHYSIOLOGICAL DETECTION SYSTEM AND PHYSIOLOGICAL DETECTION DEVICE WITH HIGH ACCURACY

## RELATED APPLICATIONS

The present application is based on and claims priority to Taiwanese Application Number 103137548, filed Oct. 29, 2014, the disclosures of which are hereby incorporated by reference herein in their entirety.

## BACKGROUND

### 1. Field of the Disclosure

This disclosure generally relates to a physiological detection system and, more particularly, to a host of a physiological detection system and a physiological detection device with high detection accuracy.

### 2. Description of the Related Art

A non-invasive physiology detection utilizes a red light beam (wavelength of about 660 nm) and an infrared light beam (wavelength of about 910 nm) to illuminate body tissues, and measures physiological characteristics through detecting a light intensity variation of penetrating light based on that the oxyhemoglobin and the deoxyhemoglobin have different absorptivities for specific light spectrum.

With the popularity of portable electronic devices or wearable electronic devices, the physiological detection function is gradually applied to these electronic devices. Generally, an electronic device employs a crystal oscillator configured as a local oscillator. However, employing a crystal oscillator has a high cost, high circuit complexity and large circuit board size.

## SUMMARY

Accordingly, the present disclosure provides a physiological detection system with high accuracy that does not employ a crystal oscillator so as to reduce the cost, simplify the system circuit and decrease the circuit board size.

The present disclosure provides a physiological detection system with high accuracy that includes a physiological detection device employing an adjustable oscillator.

The present disclosure provides a host of a physiological detection system configured to receive a physiological data series sent from a physiological detection device. The host is configured to calculate a physiological value according to the physiological data series, calculate a ratio between a receiving data parameter and a reference data parameter to determine a correction parameter, and correct the physiological value according to the correction parameter.

The present disclosure further provides a host of a physiological detection system configured to receive a physiological data series sent from a physiological detection device. The host is configured to calculate a ratio between a receiving data parameter and a reference data parameter so as to determine a correction parameter, process the physiological data series according to the correction parameter, and calculate a physiological value according to the processed physiological data series.

The present disclosure further provides a physiological detection device configured to receive a correction parameter from a host, and the correction parameter is determined by the host according to a ratio between a receiving data parameter and a reference data parameter. The physiological detection device is configured to send a physiological data

series according to a local oscillation frequency and adjust the local oscillation frequency according to the correction parameter.

In one embodiment, the reference data parameter is a reference oscillating number of a host oscillation frequency of the host within a predetermined time interval, and the receiving data parameter is a receiving data number of the host receiving physiological data sent from the physiological detection device within the predetermined time interval.

In one embodiment, the reference data parameter is a reference accumulation interval or a reference average interval of a host oscillation frequency of the host oscillating for a predetermined oscillating numbers, and the receiving data parameter is an accumulation receiving interval or an average receiving interval of the host receiving the predetermined oscillating numbers of physiological data sent from the physiological detection device.

In one embodiment, the correction parameter is associated with a ratio of numbers between the reference oscillating number and the receiving data number, associated with a ratio of intervals between the reference accumulation interval and the accumulation receiving interval, or associated with a ratio of intervals between the reference average interval and the average receiving interval.

## BRIEF DESCRIPTION OF THE DRAWINGS

Other objects, advantages, and novel features of the present disclosure will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

FIG. 1 is a schematic block diagram of a physiological detection system according to one embodiment of the present disclosure.

FIGS. 2A-2B are operational schematic diagrams of a physiological detection device according to some embodiments of the present disclosure.

FIG. 3 is a schematic diagram of a physiological data series sent by the physiological detection device according to one embodiment of the present disclosure.

FIG. 4 is a schematic diagram of a reference oscillation frequency of the host and a local oscillation frequency of the physiological detection device in a physiological detection system according to one embodiment of the present disclosure.

FIG. 5 is a flow chart of a correction method of a physiological detection system according to one embodiment of the present disclosure.

## DETAILED DESCRIPTION OF THE EMBODIMENT

It should be noted that, wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

Referring to FIG. 1, it is a schematic block diagram of a physiological detection system according to one embodiment of the present disclosure. The physiological detection system 1 includes a physiological detection device 11 and a host 13. In one embodiment, the physiological detection device 11 is applicable to a portable electronic device or a wearable electronic device, and is configured to detect physiological data (described later) of a user, wherein the physiological data is, for example, digital data. The physiological detection device 11 also sends a physiological data series  $S_{data}$  to the host 13.

The host **13** includes a processor **131** and has a clock generator configured to provide a reference oscillation frequency  $f_b$ , wherein the processor **131** is, for example, a central processing unit (CPU), a microcontroller (MCU), a microchip or other processors for processing digital data. After receiving the physiological data series  $S_{data}$  from the physiological detection device **11** in a wired or wireless manner, the host **11** calculates a physiological value, e.g. a heart rate, according to the physiological data series  $S_{data}$ , but not limited thereto. In addition, the host **13** further includes a presentation unit, e.g. including a display for showing the physiological value or including a speaker for playing the physiological value, but the present disclosure is not limited thereto as long as the physiological value is presented to the user. In addition, the host **13** further performs other controls according to the physiological value according to different applications.

Referring to FIGS. **2A** and **2B**, they are operational schematic diagrams of a physiological detection device **11** according to some embodiments of the present disclosure. The physiological detection device **11** includes an adjustable oscillator **111**, a light source **113**, an image sensor **115**, an analog-to-digital converter (ADC) **116**, a transmission interface **117** and a loss counter **119**.

The adjustable oscillator **111** is configured as a local oscillator of the physiological detection device **11**, and has a local oscillation frequency  $f_l$ . To reduce the cost, simplify the system circuit, and decrease the circuit board size, the adjustable oscillator **111** is, for example, an RC oscillator, but not limited thereto.

The light source **113** is configured to emit a light beam suitable to be absorbed by body tissues, e.g. a red light beam (wavelength of about 660 nm) and/or an infrared light beam (wavelength of about 910 nm), to a skin surface  $S$ . The light emitted by the light source **113** passes through a part of the body tissues and is then received by the image sensor **115**. According to disposed positions of the light sources **113** and the image sensor **115**, the physiological detection device **11** is a reflective physiological detection device (as shown in FIG. **2A**) or a transmissive physiological detection device (as shown in FIG. **2B**). The physiological detection system **1** of the present disclosure is applicable to the physiological detection device **11** of FIGS. **2A** and **2B** without particular limitations.

The image sensor **115** includes, for example, a complementary metal oxide semiconductor (CMOS) sensor and is configured to sense the light emergent from the body tissues and output detected values (e.g. gray values). According to different applications, the image sensor **115** successively outputs the detected value of every pixel to the ADC **116** to be converted to digital data, or the image sensor **115** adds the detected values of a plurality of pixels at first and then outputs a sum of detected values to the ADC **116** to be converted to digital data.

The transmission interface **117** is a wired transmission interface or a wireless transmission interface, and is configured to send, according to the local oscillation frequency  $f_l$ , a physiological data series  $S_{data}$  to the host **13**, wherein the wired and wireless transmission techniques are known to the art and thus details thereof are not described herein. For example referring to FIG. **3**, it is a schematic diagram of an intensity variation of light emergent through the body tissues. The image sensor **115** performs the sampling according to the local oscillation frequency  $f_l$  to obtain detected values, and after the detected values are converted to digital data by the ADC **116**, the digital data is sent as a physiological data series  $S_{data}$ , e.g. Data **1** to Data **5** . . . , by the transmission

interface **117**, i.e. successively sending physiological data. It is appreciated that the density of the physiological data Data **1** to Data **5** . . . shown in FIG. **3** is determined according to the local oscillation frequency  $f_l$  and is not limited to that shown in FIG. **3**.

As mentioned above, as the ADC **116** successively converts the detected value of each pixel or the sum of detected values of a plurality of pixels, each physiological data Data **1** to Data **5** . . . of the physiological data series  $S_{data}$  is a detected value of a single pixel or a sum of detected values of a plurality of pixels. In another embodiment, the ADC **116** successively converts the detected value of every pixel, and the ADC **116** or the transmission interface **117** further adds the digital data corresponding to a plurality of pixels. In other words, the sum of detected values is a sum of analog signals or a sum of digital data.

As the local oscillation frequency  $f_l$  of the adjustable oscillator **111** changes due to the manufacturing process or operating environment, the host **13** may not be able to obtain correct physiological data series  $S_{data}$  when the physiological detection device **11** retrieves and sends physiological data according to the local oscillation frequency  $f_l$ . For example, referring to FIG. **4**, it shows that a time shift  $\Delta t$  (or phase shift) between the local oscillation frequency  $f_l$  and the reference oscillation frequency  $f_b$  appears after a time interval when the local oscillation frequency  $f_l$  of the physiological detection device **11** is faster or slower than the reference oscillation frequency  $f_b$  of the host **13**. Accordingly, if the local oscillation frequency  $f_l$  and the reference oscillation frequency  $f_b$  are different, errors may be introduced when the host **13** calculates the physiological value according to the physiological data series  $S_{data}$  sent from the physiological detection device **11**. Therefore, the present disclosure is to solve the problems caused by the mismatch between the oscillation frequencies.

In some conditions, the host **13** losses the physiological data sent from the physiological detection device **11**, e.g. when being occupied by other events. Accordingly, in some embodiments, the physiological detection device **11** further includes a loss counter **119** configured to count a data number of the lost physiological data in the physiological data series  $S_{data}$  and resend the physiological data next to the physiological data being lost such that the host **13** receives an accurate number of the physiological data. Accordingly, the accuracy of calculating the physiological value is improved.

In a first embodiment, the host **13** is configured to calculate a physiological value according to the physiological data series  $S_{data}$ , calculate a ratio between a receiving data parameter and a reference data parameter so as to determine a correction parameter  $S_c$ , and correct the physiological value according to the correction parameter  $S_c$ . In this embodiment, the correction parameter  $S_c$  is not transmitted to the physiological detection device **11**, or the host **13** transmits the correction parameter  $S_c$  to the physiological detection device **11** every a predetermined correction interval, wherein the predetermined correction interval is determined according to the system accuracy.

The host **13** (e.g. the processor **131** thereof) directly calculates a heart rate in the time domain according to the physiological data series  $S_{data}$ , e.g. calculating a time difference  $\Delta T$  between adjacent peaks (as shown in FIG. **3**) to accordingly derive the heart rate (e.g. calculating a reciprocal of the time difference  $\Delta T$ ); or the host **13** converts the physiological data series  $S_{data}$  to the frequency domain (e.g.



using Fourier Transform, but not limited to) and then calculates the heart rate according to a frequency corresponding to a peak spectrum value.

In one embodiment, the reference data parameter **13** is a reference oscillating number of a host oscillation frequency of the host **13** oscillating for a predetermined time interval. For example referring to Table 1, when a host oscillation frequency is 1000 times/second and the predetermined time interval is 1 second, the reference oscillating number is 1000 times.

In this embodiment, the receiving data parameter is a receiving data number of the host **13** (e.g. each of Data **1** to Data **5** shown in FIG. **3** indicating one receiving data) for receiving the physiological data series  $S_{data}$  from the physiological detection device **11** within the predetermined time interval. For example referring to Table 1 again, when a local oscillation frequency  $f_l$  of the physiological detection device **11** is 1100 times/second, a receiving data number of the host **13** for receiving the physiological data series  $S_{data}$  from the physiological detection device **11** within the predetermined time interval (e.g. 1 second) is 1100 times; and when the local oscillation frequency  $f_l$  of the physiological detection device **11** is 900 times/second, a receiving data number of the host **13** for receiving the physiological data series  $S_{data}$  from the physiological detection device **11** within the predetermined time interval (e.g. 1 second) is 900 times.

In this embodiment, the correction parameter  $Sc$  is associated with a ratio of numbers between the reference oscillating number and the receiving data number, e.g. 11/10, 9/10 shown in Table 1. For example, the correction parameter  $Sc$  is equal to the ratio of numbers or is a multiple of, a fraction of or a shift from the ratio of numbers. In some embodiments, the host oscillation frequency is a multiple or a fraction of an operating frequency of the host **13**.

TABLE 1

|                              |            |            |
|------------------------------|------------|------------|
| reference oscillating number | 1000 times | 1000 times |
| receiving data number        | 1100 times | 900 times  |
| correction parameter $Sc$    | 11/10      | 9/10       |

In another embodiment, the reference data parameter is a reference accumulation interval or a reference average interval of a host oscillation frequency of the host **13** oscillating for a predetermined oscillating numbers. For example referring to Table 2, when a host oscillation frequency is 1000 times/second and the predetermined oscillating numbers is 1000 times, the reference accumulation interval is 1 second and the reference average interval is 0.001 second.

In this embodiment, the receiving data parameter is an accumulation receiving interval or an average receiving interval of the host **13** for receiving the predetermined oscillating numbers of physiological data of the physiological data series  $S_{data}$  sent from the physiological detection device **11**. For example referring to Table 2, when a local oscillation frequency  $f_l$  of the physiological detection device **11** is 1100 times/second, an accumulation receiving interval of the host **13** for receiving the predetermined oscillating numbers (e.g. 1000 times) of physiological data of the physiological data series  $S_{data}$  is 1.1 second and the average receiving interval is 0.0011 second; when the local oscillation frequency  $f_l$  of the physiological detection device **11** is 900 times/second, an accumulation receiving interval of the host **13** for receiving the predetermined oscillating numbers

(e.g. 1000 times) of physiological data of the physiological data series  $S_{data}$  is 0.9 second and the average receiving interval is 0.0009 second.

In this embodiment, the correction parameter  $Sc$  is associated with a ratio of intervals between the reference accumulation interval and the accumulation receiving interval, or associated with a ratio of intervals between the reference average interval and the average receiving interval, e.g. 10/11, 10/9 shown in Table 2. For example, the correction parameter  $Sc$  is equal to the ratio of intervals or is a multiple of, a fraction of or a shift from the ratio of intervals.

TABLE 2

|                                 |            |            |
|---------------------------------|------------|------------|
| reference accumulation interval | 1 second   | 1 second   |
| accumulation receiving interval | 1.1 second | 0.9 second |
| correction parameter $Sc$       | 10/11      | 10/9       |

In a second embodiment, the host **13** is configured to calculate a ratio between a receiving data parameter and a reference data parameter so as to determine a correction parameter  $Sc$ , to process the physiological data series  $S_{data}$  according to the correction parameter  $Sc$ , and calculate a physiological value according to the processed physiological data series. In this embodiment, definitions of the receiving data parameter, the reference data parameter and the correction parameter are identical to those of the first embodiment, as shown in Tables 3 and 4, and thus details thereof are not repeated herein. Similarly, in this embodiment the correction parameter  $Sc$  is not transmitted to the physiological detection device **11**, or the host **13** transmits the correction parameter  $Sc$  to the physiological detection device **11** every a predetermined correction interval, wherein the predetermined correction interval is determined according to the system accuracy.

The difference between the second embodiment and the first embodiment is that in the second embodiment the host **13** (e.g. the processor **131** thereof) is configured to process the physiological data series  $S_{data}$  according to the correction parameter  $Sc$ .

In one embodiment, when the reference oscillating number is smaller than the receiving data number, the host **13** is configured to perform downsampling on the physiological data series  $S_{data}$  such that a data number of the processed physiological data series is equal to the reference oscillating number. For example referring to Table 3, when a reference oscillating number is 1000 times and a receiving data number is 1100 times, the correction parameter  $Sc$  is a multiple of, a fraction of or a shift from 11/10. The host **13** performs the downsampling according to the correction parameter  $Sc$ . The host **13** (e.g. the processor **131** thereof) calculates a physiological value according to the processed physiological data series, wherein the method of calculating the physiological value is illustrated in the first embodiment and thus details thereof are not repeated herein.

In this embodiment, when the reference oscillating number is larger than the receiving data number, the host **13** is configured to perform interpolation on the physiological data series  $S_{data}$  such that a data number of the processed physiological data series is equal to the reference oscillating number. For example referring to Table 3 again, when a reference oscillating number is 1000 times and a receiving data number is 900 times, the correction parameter  $Sc$  is a multiple of a fraction of or a shift from 9/10. The host **13** performs the interpolation according to the correction parameter  $Sc$ . The host **13** (e.g. the processor **131** thereof) calculates a physiological value according to the processed

physiological data series, wherein the method of calculating the physiological value is illustrated in the first embodiment and thus details thereof are not repeated herein. In some embodiments, the host oscillation frequency is a multiple or a fraction of an operating frequency of the host 13.

TABLE 3

|                                      |              |               |
|--------------------------------------|--------------|---------------|
| reference oscillating number         | 1000 times   | 1000 times    |
| receiving data number                | 1100 times   | 900 times     |
| correction parameter Sc              | 11/10        | 9/10          |
| processing physiological data series | downsampling | interpolation |

In another embodiment, when the accumulation receiving interval is smaller than the reference accumulation interval or when the average receiving interval is smaller than the reference average interval, the host 13 is configured to perform downsampling on the physiological data series  $S_{data}$  such that a data number of the processed physiological data series is equal to the reference oscillating number. For example referring to Table 4, when a reference accumulation interval is 1 second (or the reference average interval is 0.001 second) and an accumulation receiving interval is 0.9 second (or the average receiving interval is 0.0009 second), the correction parameter Sc is a multiple of, a fraction of or a shift from 10/9. The host 13 performs the downsampling according to the correction parameter Sc. The host 13 (e.g. the processor 131 thereof) calculates a physiological value according to the processed physiological data series, wherein the method of calculating the physiological value is illustrated in the first embodiment and thus details thereof are not repeated herein.

In this embodiment, when the accumulation receiving interval is larger than the reference accumulation interval or when the average receiving interval is larger than the reference average interval, the host 13 is configured to perform interpolation on the physiological data series  $S_{data}$  such that a data number of the processed physiological data series is equal to the reference oscillating number. For example referring to Table 4 again, when a reference accumulation interval is 1 second (or the reference average interval is 0.001 second) and an accumulation receiving interval is 1.1 second (or the average receiving interval is 0.0011 second), the correction parameter Sc is a multiple of a fraction of or a shift from 10/11. The host 13 performs the interpolation according to the correction parameter Sc. The host 13 (e.g. the processor 131 thereof) calculates a physiological value according to the processed physiological data series, wherein the method of calculating the physiological value is illustrated in the first embodiment and thus details thereof are not repeated herein.

TABLE 4

|                                      |               |              |
|--------------------------------------|---------------|--------------|
| reference accumulation interval      | 1 second      | 1 second     |
| accumulation receiving interval      | 1.1 second    | 0.9 second   |
| correction parameter Sc              | 10/11         | 10/9         |
| processing physiological data series | interpolation | downsampling |

In a third embodiment, the host 13 is configured to calculate a ratio between a receiving data parameter and a reference data parameter so as to determine a correction parameter Sc, to transmit the correction parameter Sc to the physiological detection device 11, and to calculate a heart rate according to the physiological detection series  $S_{data}$ , wherein the physiological detection device 11 is further configured to adjust the local oscillation frequency fl thereof according to the correction parameter Sc. In this embodi-

ment, definitions of the receiving parameter, the reference data parameter and the correction parameter are identical to those of the first embodiment, as shown in Tables 5 and 6, and thus details thereof are not repeated herein.

The difference between the third embodiment and the first and second embodiments is that in the third embodiment the host 13 transmits the correction parameter Sc to the physiological detection device 11, and the physiological detection device 11 adjusts the local oscillation frequency fl of the adjustable oscillator 111 thereof according to the correction parameter Sc.

In one embodiment, when the reference oscillating number (e.g. 1000 times) is smaller than the receiving data number (e.g. 1100 times), it means that the local oscillation frequency fl is too high and thus the host 13 transmits the correction parameter Sc to the physiological detection device 11 and the adjustable oscillator 111 decreases the local oscillation frequency fl to close to the reference oscillation frequency fb according to the correction parameter Sc; and when the reference oscillating number (e.g. 1000 times) is larger than the receiving data number (e.g. 900 times), it means that the local oscillation frequency fl is too low and thus the host 13 transmits the correction parameter Sc to the physiological detection device 11 and the adjustable oscillator 111 increases the local oscillation frequency fl to close to the reference oscillation frequency fb according to the correction parameter Sc. In some embodiment, the host oscillation frequency is a multiple or a fraction of an operating frequency of the host 13.

TABLE 5

|                              |            |            |
|------------------------------|------------|------------|
| reference oscillating number | 1000 times | 1000 times |
| receiving data number        | 1100 times | 900 times  |
| correction parameter Sc      | 10/11      | 10/9       |

In another embodiment, when the accumulation receiving interval (e.g. 0.9 second) is smaller than the reference accumulation interval (e.g. 1 second), it means that the local oscillation frequency fl is too high and thus the host 13 transmits the correction parameter Sc to the physiological detection device 11 and the adjustable oscillator 111 decreases the local oscillation frequency fl to close to the reference oscillation frequency fb according to the correction parameter Sc; and when the accumulation receiving interval (e.g. 1.1 second) is larger than the reference accumulation interval (e.g. 1 second), it means that the local oscillation frequency fl is too low and thus the host 13 transmits the correction parameter Sc to the physiological detection device 11 and the adjustable oscillator 111 increases the local oscillation frequency fl to close to the reference oscillation frequency fb according to the correction parameter Sc.

TABLE 6

|                                 |            |            |
|---------------------------------|------------|------------|
| reference accumulation interval | 1 second   | 1 second   |
| accumulation receiving interval | 1.1 second | 0.9 second |
| correction parameter Sc         | 11/10      | 9/10       |

It is appreciated that the host 13 further includes a transmission interface configured to receive the physiological data and transmit the correction parameter. In addition, values in the above embodiments are only intended to illustrate but not to limit the present disclosure.

Referring to FIG. 5, it is a flow chart of a correction method of a physiological detection system according to one

embodiment of the present disclosure, which includes the steps of: sending a physiological data series to a host according to a local oscillation frequency (Step S51); calculating a physiological value according to the physiological data series (Step S52); comparing a receiving data parameter with a reference data parameter to determine a correction parameter (Step S53); and correcting the physiological value, processing the physiological data series or adjusting the local oscillation frequency according to the correction parameter (Step S54). Referring to FIGS. 1-5 together, details of this embodiment are illustrated hereinafter.

Step S51: The physiological detection device 11 detects physiological data according to a local oscillation frequency  $f_l$  thereof and sends, through a transmission interface 117 thereof, a physiological data series  $S_{data}$  to the host 13 according to the local oscillation frequency  $f_l$  in a wired or wireless manner.

Step S52: After receiving the physiological data series  $S_{data}$ , the host 13 calculates a physiological value, e.g. a heart rate, in the time domain or frequency domain according to the physiological data series  $S_{data}$ . In this case, the heart rate is possible to be corrected in the following steps.

Step S53: After receiving the physiological data series  $S_{data}$ , the host 13 further compares a receiving data parameter with a reference data parameter  $n$  as to determine a correction parameter  $Sc$ , as illustrated in the above first to third embodiments. For example, the host 13 determines whether to perform the correction according to whether the correction parameter  $Sc$  exceeds a predetermined range, wherein the predetermined range is determined according to the system accuracy.

Step S54: According to different embodiments, the host 13 performs different processing so as to improve the accuracy of calculating the physiological value. For example, in the first embodiment the host 13 directly corrects the physiological value according to the correction parameter  $Sc$  such that even though the local oscillation frequency  $f_l$  of the physiological detection device 11 is not correct, the host 13 is still able to output correct physiological values. In the second embodiment, the host 13 processes the physiological data series  $S_{data}$  according to the correction parameter  $Sc$ , e.g. downsampling or interpolation, such that even though the local oscillation frequency  $f_l$  of the physiological detection device 11 is not correct, the host 13 is still able to output correct physiological values. In the third embodiment, the host 13 transmits the correction parameter  $Sc$  back to the physiological detection device 11 for the physiological detection device 11 to accordingly adjust the local oscillation frequency  $f_l$  thereof such that the physiological value calculated according to the local oscillation frequency  $f_l$  before being corrected is not outputted. After the local oscillation frequency  $f_l$  is corrected, the host 13 outputs the physiological value calculated according to the corrected physiological data series.

It is appreciated that the calculation of the host 13 is executed by the processor by means of software or hardware.

As mentioned above, the conventional electronic device employing a crystal oscillator has a high cost, complex system circuit and large circuit board size. Therefore, the present disclosure further provides a physiological detection system with high accuracy (FIG. 1) which employs an adjustable oscillator to replace the crystal oscillator and determines a correction parameter through comparing a receiving data parameter and a reference data parameter to accordingly correct a physiological value.

Although the disclosure has been explained in relation to its preferred embodiment, it is not used to limit the disclosure. It is to be understood that many other possible modifications and variations can be made by those skilled in the art without departing from the spirit and scope of the disclosure as hereinafter claimed.

What is claimed is:

1. A host of a physiological detection system, the host comprising a clock generator and configured to receive a physiological data series sent from a physiological detection device, wherein the physiological data series is sent according to a local oscillation frequency of the physiological detection device,
  - calculate a physiological value according to the physiological data series,
  - calculate a ratio between a receiving data parameter associated with the received physiological data series and a reference data parameter associated with a host oscillation frequency provided by the clock generator of the host to determine a correction parameter, and
  - correct the calculated physiological value according to the correction parameter when the local oscillation frequency of the physiological detection device is different from the host oscillation frequency.
2. The host as claimed in claim 1, wherein the physiological value is a heart rate.
3. The host as claimed in claim 1, wherein the reference data parameter is a reference oscillating number of the host oscillation frequency of the host within a predetermined time interval,
  - the receiving data parameter is a receiving data number of the host receiving the physiological data series sent from the physiological detection device within the predetermined time interval, and
  - the correction parameter is associated with a ratio of the reference oscillating number and the receiving data number.
4. The host as claimed in claim 1, wherein the host is configured to transmit the correction parameter every predetermined correction interval.
5. The host as claimed in claim 4, wherein the transmitted correction parameter is configured to adjust the local oscillation frequency of an adjustable oscillator of the physiological detection device.
6. The host as claimed in claim 1, wherein each physiological data of the physiological data series is a detected value of a single pixel or a sum of detected values of a plurality of pixels of a CMOS sensor.
7. A host of a physiological detection system, the host comprising a clock generator and configured to receive a physiological data series sent from a physiological detection device, wherein the physiological data series is sent according to a local oscillation frequency of the physiological detection device,
  - calculate a ratio between a receiving data parameter associated with the received physiological data series and a reference data parameter associated with a host oscillation frequency provided by the clock generator of the host so as to determine a correction parameter,
  - process the received physiological data series according to the correction parameter, and
  - calculate a physiological value according to the processed physiological data series to improve accuracy of calculating the physiological value when the local oscillation frequency of the physiological detection device is different from the host oscillation frequency.

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8. The host as claimed in claim 7, wherein the physiological value is a heart rate.

9. The host as claimed in claim 7, wherein

the reference data parameter is a reference oscillating number of the host oscillation frequency of the host within a predetermined time interval,

the receiving data parameter is a receiving data number of the host receiving the physiological data series sent from the physiological detection device within the predetermined time interval, and

the correction parameter is associated with a ratio of the reference oscillating number and the receiving data number.

10. The host as claimed in claim 9, wherein

the host is configured to perform downsampling on the physiological data series when the reference oscillating number is smaller than the receiving data number, and the host is configured to perform interpolation on the physiological data series when the reference oscillating number is larger than the receiving data number.

11. The host as claimed in claim 7, wherein the host is configured to transmit the correction parameter every predetermined correction interval.

12. The host as claimed in claim 11, wherein the transmitted correction parameter is configured to adjust the local oscillation frequency of an adjustable oscillator of the physiological detection device.

13. The host as claimed in claim 7, wherein each physiological data of the physiological data series is a detected value of a single pixel or a sum of detected values of a plurality of pixels of a CMOS sensor.

14. A physiological detection device, the physiological detection device configured to

receive a correction parameter from a host, the host comprising a clock generator for providing a host oscillation frequency,

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send a physiological data series according to a local oscillation frequency of the physiological detection device, and

adjust the local oscillation frequency according to the correction parameter when the local oscillation frequency of the physiological detection device is different from the host oscillation frequency,

wherein the correction parameter is determined by the host according to a ratio between a receiving data parameter, which is associated with the physiological data series received from the physiological detection device, and a reference data parameter, which is associated with the host oscillation frequency provided by the clock generator of the host.

15. The physiological detection device as claimed in claim 14, wherein

the reference data parameter is a reference oscillating number of the host oscillation frequency of the host within a predetermined time interval,

the receiving data parameter is a receiving data number of the host receiving the physiological data series sent from the physiological detection device within the predetermined time interval, and

the correction parameter is associated with a ratio of the reference oscillating number and the receiving data number.

16. The physiological detection device as claimed in claim 14, wherein physiological detection device further comprises a loss counter configured to count a data number of lost physiological data of the physiological data series.

17. The physiological detection device as claimed in claim 14, wherein the physiological detection device further comprises a CMOS sensor, and each physiological data of the physiological data series is a detected value of a single pixel or a sum of detected values of a plurality of pixels of the CMOS sensor.

\* \* \* \* \*

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|----------------|-------------------------------------------------------------------------------------|---------|------------|
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#### 摘要(译)

提供了一种生理检测系统，包括生理检测装置和主机。生理检测装置被配置为根据本地振荡频率将生理数据序列发送到主机。主机用于根据生理数据序列计算生理值，并根据接收数据参数和参考数据参数确定校正参数，其中，校正参数用于校正生理值，处理生理数据序列或调整生理检测装置的局部振荡频率。

