Claims

1. A method of deriving systolic blood pressure and/or diastolic blood pressure of a subject, the method comprises:

(i) receiving data related to at least one cardiac cycle of a bio-signal from the subject;

(ii) calculating a rise time and a fall time of the at least one cardiac cycle based on the received data;

(iii) calculating a parameter derived from a function of the rise time and fall time; and

(iv) determining the systolic blood pressure and/or diastolic blood pressure of the subject based on the calculated parameter; wherein

calculating the parameter derived from the function of the rise time and fall time includes calculating the parameter according to the equation: $f = (T_r)^X \times (T_f)^Y$,

where f is the parameter;

T_r is the rise time;

T_f is the fall time; and

x and y are predetermined constants selected from a range of between -3 to 3, and exclusive of 0.

2. A method of claim 1, wherein the rise time is calculated between a start of the at least one cardiac cycle to a systolic peak of the at least one cardiac cycle.

3. A method of claim 2, wherein the fall time is calculated from the systolic peak of the at least one cardiac cycle to an end of the at least one cardiac cycle.

4. A method of claim 1, wherein the rise time is calculated between 10% and 90% of a systolic peak of the at least one cardiac cycle.

5. A method of claim 1, wherein the bio-signal includes an arterial photoplethysmography (PPG) signal.

6. A method of claim 5, further comprises processing the PPG signal to digitally filter noise signals in the PPG signal.

7. A method of claim 6, wherein digitally filtering the noise signals in the PPG signal includes using a band pass filter configured to only permit signals having a frequency of between 0.5 Hz to 8.0 Hz to pass through the band pass filter.

8. A method of claim 1, wherein the data relates to a plurality of cardiac cycles, and the method includes calculating the rise time and the fall time of each of the cardiac cycles; calculating parameters respectively derived from a function of the rise time and fall time of each of the cardiac cycles; and calculating an average parameter based on the respectively calculated parameters as the parameter in step (iii).

9. A method of claim 8, wherein the cardiac cycles include being arranged consecutively.

10. A method of any preceding claim, wherein the data includes time intervals of the at least one cardiac cycle relating to a systolic peak, start time and end time of the at least one cardiac cycle.

11. A method of any preceding claim, further comprises determining the systolic peak, start time and end time by a first electronic device and transmitting the determined systolic peak, start time and end time to a second electronic device for calculating the rise time and fall time.

12. A method of any preceding claim, wherein determining the systolic blood pressure includes determining the systolic blood pressure according to the equation: $SBP = c_1 \times f + c_2 + c_3$,

where *SBP* is the systolic blood pressure;

f is the parameter; and

c_1, c_2, and c_3 are predetermined constants.

13. A method of claim 12, wherein determining the diastolic blood pressure includes determining the diastolic blood pressure according to the equation: $DBP = \sqrt{2 \times eQM^2 - SBP^2} + c_6$,

where *DBP* is the diastolic blood pressure;

eQM is an estimated quadratic mean;

SBP is the systolic blood pressure; and

c_6 is a predetermined constant; wherein

the estimated quadratic mean is determined according to the equation: $eQM = c_4 \times SBP + c_5$,

where *eQM* is an estimated quadratic mean;

SBP is the systolic blood pressure; and

c_4, and c_5 are predetermined constants.

14. A computer program for deriving systolic blood pressure and/or diastolic blood pressure of a subject, the computer program downloadable to an electronic device and includes a set of instructions, when executed, is arranged to control a processor of the electronic device to:

(i) receive data related to at least one cardiac cycle of a bio-signal from the subject;

(ii) calculate a rise time and a fall time of the at least one cardiac cycle based on the received data;

(iii) calculate a parameter derived from a function of the rise time and fall time; and

(iv) determine the systolic blood pressure and/or diastolic blood pressure of the subject based on the calculated parameter; wherein

to calculate the parameter derived from the function of the rise time and fall time includes calculating the parameter according to the equation: $f = (T_r)^X \times (T_f)^Y$,

where f is the parameter;

T_r is the rise time;

T_f is the fall time; and

x and *y* are predetermined constants selected from a range of between -3 to 3, and exclusive of 0.

15. A computer program according to claim 14, wherein the computer program is downloadable over the internet.

16. A computer program stored in a memory of an electronic device, the computer program having a set of instructions, when executed, is arranged to control a processor of the electronic device to:

(i) receive data related to at least one cardiac cycle of a bio-signal from the subject;

(ii) calculate a rise time and a fall time of the at least one cardiac cycle based on the received data;

(iii) calculate a parameter derived from a function of the rise time and fall time; and

(iv) determine the systolic blood pressure and/or diastolic blood pressure of the subject based on the calculated parameter; wherein

to calculate the parameter derived from the function of the rise time and fall time includes calculating the parameter according to the equation: $f = (T_r)^X \times (T_f)^Y$,

where f is the parameter;

T_r is the rise time;

T_f is the fall time; and

x and y are predetermined constants selected from a range of between -3 to 3, and exclusive of 0.

17. Apparatus for deriving systolic blood pressure and/or diastolic blood pressure of a subject, the apparatus comprising:

(i) a receiver for receiving data related to at least one cardiac cycle of a bio-signal from the subject; and

(ii) a processor for:

(a) calculating a rise time and a fall time of the at least one cardiac cycle based on the received data;

(b) calculating a parameter derived from a function of the rise time and fall time; and

(c) determining the systolic blood pressure and/or diastolic blood pressure of the subject based on the calculated parameter; wherein

calculating the parameter derived from the function of the rise time and fall time includes calculating the parameter according to the equation:

$$f = (T_r)^X \times (T_f)^Y ,$$

where f is the parameter;

T_r is the rise time;

T_f is the fall time; and

x and y are predetermined constants selected from a range of between -3 to 3, and exclusive of 0

18. Apparatus of claim 17, wherein the apparatus is in the form of an electronic device.

19. Apparatus of claim 18, wherein the electronic device is a telecommunications device or an optical measurement device.

20. Apparatus of claim 17, wherein the apparatus includes an optical measurement device and a telecommunications device having the receiver; and wherein the optical measurement device includes a signal sensing device for obtaining the bio-signal from the subject, and a data processing module for determining data relating to the bio-signal, wherein the receiver of the telecommunications device is arranged to receive the determined data of the bio-signal.