CLAIMS

1. A Digital Processing Module (DPM) for providing electrocardiogram (ECG) signals for a human body for storage and/or viewing on a remote/local device, the DPM comprising:

- an input adapted to receive contactless ECG signals for the human body from an array of contactless ECG sensors;
- a processor adapted to perform a selection process including:
  - o obtaining a body outline of the human body using data received from contactless ECG sensors located in proximity of the human body;
  - o detecting one or more body parts located in the body outline using a set of rules embedded in the DPM;
  - o associating a group of contactless ECG sensors with each detected body part;
  - o selecting from each group a contactless ECG sensor having a highest signal quality for the body part associated with that group of contactless ECG sensors;

the processor being adapted to produce a standard ECG signal based on the contactless ECG signals received from the selected contactless ECG sensors; and

- an output for sending the standard ECG signal to the remote/local device.

2. The DPM of claim 1, wherein the processor is further adapted to perform the steps of:

a. determining a position of the human body on the array of contactless ECG sensors;

b. dividing the contactless ECG sensors into groups and associating each group to a body part using the body outline and the position of the human body; and

c. from each group, selecting the contactless ECG sensor providing the highest signal quality.

3. The DPM of claim 2, wherein the processor identifies the contactless ECG sensors that are located in close proximity to the human body by measuring an impedance between each contactless ECG sensor and the human body.

4. The DPM of claim 1, wherein the processor is adapted to select another contactless ECG sensor for a given body part following a movement of the human body with respect to the array of contactless ECG sensors.

5. The DPM of claim 4, wherein the processor is adapted to re-run the selection process continuously to perform the selection of the other contactless ECG sensor.

6. The DPM of claim 4, wherein the processor is adapted to continuously monitor a current signal quality of the selected contactless ECG sensor associated with each body part to re-run the selection process when the current signal quality drops beyond a given threshold.

7. The DPM of claim 1, further comprising an automatic gain control mechanism adapted to control relative impedance differences between different contactless ECG sensors, and an absolute impedance between each contactless ECG sensor and the human body due to a difference in distance or type of clothing material between each contactless ECG sensor and the human body.

8. The DPM of claim 1, further comprising a wired/wireless data port for transmitting the standard ECG signal to a remote device over a data network.

9. A system for providing electrocardiogram (ECG) signals for a human body for storage and/or viewing on a remote/local device, the system comprising:

- a fabric including a sensor pad comprising an array of contactless ECG sensors;
- a processor operatively connected to the sensor pad and adapted to receive contactless ECG signals from the contactless ECG sensors and perform a selection process including:
    - o obtaining a body outline of the human body using data received from contactless ECG sensors located in proximity of the human body;
    - o detecting one or more body parts located in the body outline using a set of rules embedded in the DPM;
    - o associating a group of contactless ECG sensors with each detected body part;
    - o selecting from each group a contactless ECG sensor having a highest signal quality for the body part associated with that group of contactless ECG sensors;

the processor being adapted to produce a standard ECG signal based on the contactless ECG signals received from the selected contactless ECG sensors; and

- an output for outputting the standard ECG signal to the remote/local device.

10. The system of claim 9, wherein the sensor pad comprises a grounding pad for placing in proximity of and at distance from the human body, the grounding pad being adapted to provide a capacitively coupled ground reference to the human body for reducing interference.

11. The system of claim 10, further comprising a drive signal generator configured to feed the grounding pad with a high frequency signal that is outside of an ECG frequency band for determining the capacitively coupled ground reference for each contactless ECG sensor.

12. The system of claim 9, wherein the contactless ECG sensor comprises:
- a capacitive electrode adapted to be capacitively coupled to the human body for outputting an electrical charge which is representative of an electrical cardiac activity;
- an electrodynamic sensor configured to detect and amplify the electrical charge produced by the capacitive electrode; and
- an electrode shield physically provided in proximity of the electrode for reducing a stray interference at an input of the electrodynamic sensor.

13. The system of claim 12, wherein the contactless ECG sensor is made of a flexible material.

14. The system of claim 12, wherein the sensor pad is provided in a fabric with which the human body comes in contact or in one of: a gel, silicone, a rubber type pad, and a mat.

15. A method for providing electrocardiogram (ECG) signals for a human body using contactless ECG sensors, the method comprising:
- receiving contactless ECG signals from an array of contactless ECG sensors;
- obtaining a body outline of the human body;
- detecting body parts located in the body outline;
- associating a group of contactless ECG sensors with each detected body part;

- selecting from each group a contactless ECG sensor having a highest signal quality for the body part associated with that group of contactless ECG sensors;
- producing and outputting a standard ECG signal based on the contactless ECG signals received from the selected contactless ECG sensors.

16. The method of claim 15, further comprising:
- determining a position of the human body on the array of contactless ECG sensors;
- dividing the contactless ECG sensors into groups and associating each group to a body part using the body outline and the position of the human body;
- from each group, selecting the contactless ECG sensor providing the contactless ECG signal having the highest signal quality.

17. The method of claim 16, further comprising identifying the contactless ECG sensors that are located in close proximity to the human body by measuring an impedance between each contactless ECG sensor and the human body.

18. The method of claim 15, further comprising: repeating the steps of detecting to selecting continuously for selecting another contactless ECG sensor for a given body part following a movement of the human body with respect to the array of contactless ECG sensors.

19. The method of claim 15, further comprising

continuously monitoring a current signal quality of the selected contactless ECG sensor associated with each body part; and

when the current signal quality drops beyond a given threshold following a movement of the human body with respect to the array of contactless ECG sensors, repeating the steps of detecting, associating and selecting to select another contactless ECG sensor for at least one of the body parts.

20. The method of claim 15, further comprising controlling relative impedance differences between different contactless ECG sensors, and an absolute impedance between each contactless ECG sensor and the human body due to a difference in distance or a type of clothing material between each contactless ECG sensor and the human body.