

WE CLAIM:

1. An apparatus (100) for determining characteristics of a fluid:
 - 5 a visible light producing LED array to emit light and produce a light beam for irradiating an object;
 - an optimal system comprising:
 - a grating (106) to receive irradiated light from the object through a collimator (108) and disperse the light into wavelengths;
 - 10 a focusing lens (104);
 - a linear image sensor (102) arranged at a focal plane of the focusing lens to convert the light by the grating and focused by the focusing lens, into electrical signals;
 - a microcontroller (102) connected to the sensor to process the electrical signals
 - 15 and communicate the electrical signals
2. The apparatus as claimed in claim 1, wherein the LED array is defined by 440-660 nm and a color temperature 7000 K.
- 20 3. The apparatus as claimed in claim 1, wherein the grating (106) is defined by a spectral analyzer of 340 to 850 nm, 288 pixels based with 15 nm resolution and configured to distribute the reflected light from the object to whole spectra from 310 to 850 nm.
- 25 4. The apparatus as claimed in claim 1, wherein the LED array corresponds to a white LED ring, a combination of 6 LEDs of luminous intensity of 18 mcd placed angularly to produce a concentrated light beam.
- 30 5. The apparatus as claimed in claim 1, further comprising a remote application which collects the digital signals from microcontroller and processes the signals through signal processing technique.
6. The apparatus as claimed in claim 5, further comprising a remote server trained on datasets to collect the processed signal and predict a value for the fluid defined by

one or more of hemoglobin, bilirubin, oxygen saturation, creatinine and random blood glucose.

5 7. The apparatus as claimed in claim 1, wherein the LED array is configured to pass a visible white light to an inner side of a ring finger of a subject and penetrate through a finger-tip by passing epidermis and contact a concentrated peripheral blood.

8. A method (400) of determining characteristics of a fluid:

10 emitting (402) light by a visible light producing LED array and producing a light beam for irradiating an object;

receiving (404), from a grating (106) of an optimal system, an irradiated light from the object through a collimator (108) and dispersing the light into wavelengths;

15 converting (406) the light into electrical signals, by a linear image sensor (102) arranged at a focal plane of a focusing lens in the optimal system by the grating and focusing by the focusing lens;

processing (408) the electrical signals by a microcontroller (102) connected to the sensor and communicating the electrical signals.

20 9. The method as claimed in claim 8, wherein the LED array is defined by 440-660 nm and a color temperature 7000 K.

25 10. The method as claimed in claim 8, wherein the grating (106) is defined by a spectral analyzer of 340 to 850 nm, 288 pixels based with 15 nm resolution and configured to distribute the reflected light from the object to whole spectra from 310 to 850 nm.

30 11. The method as claimed in claim 8, wherein the LED array corresponds to a white LED ring, a combination of 6 LEDs of luminous intensity of 18 mcd placed angularly to produce a concentrated light beam.

12. The method as claimed in claim 8, further comprising:

collecting, by a remote application, the digital signals from microcontroller and processing the digital signals through signal processing technique.

13. The method as claimed in claim 12, further comprising:

5 collecting the processed signal by a remote server trained on datasets and predicting
a value for the fluid defined by one or more of hemoglobin, bilirubin, oxygen
saturation, creatinine and random blood glucose.

14. The method as claimed in claim 8, further comprising:

10 passing a visible white light by the LED array to an inner side of a ring finger of a
subject and penetrating through a finger-tip by passing epidermis and contacting a
concentrated peripheral blood.