Pranic Healing Analysis Using Bioimpedance Measurement

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Abstract— The aim of project is to observe the process of pranic healing and detect its presence by observing the change of body parameters at the time of healing. The ultimate task of the project is to design cost effective, easy to use system for health monitoring.

Key words: AD5933 Impedance Converter, Body Electrodes, Trans-Conductance Amplifier, Instrumentation Amplifier

I. INTRODUCTION

Grand Master ChoaKok Sui developed a Pranic Healing is highly evolved and tested system of energy medicine which utilizes prana to harmonise , balance and transform the body's energy process. Pranic Healing is a simple but powerful & effective system of no-touch energy healing. It works on the principle that the body is a self-repairing living entity that is able to heal itself and that the healing process is accelerated by increasing this life force that is readily available from the sun, air and ground to address physical & emotional imbalances.

This system observe the process of pranic healing and detect its presence by observing the change of body parameters at the time of healing. The parameter observed or monitotred by this system is body impedance. The ultimate task of the project is to design cost effective, easy to use system for health monitoring

II. METHODOLOGY

The AD5933 is a high precision impedance converter system solution that combines an on-board frequency generator with a 12-bit, 1 MSPS, analog-to-digital converter (ADC). It measures the impedance of skin and accordingly body parameters can be measured.

The purpose of this circuit is to generate a constant current which is sent through the body via two electrodes. The electrodes are placed on the opposite hand and ankle of the subject. Two more electrodes are placed in close proximity to the initial "current" electrodes, and will be used to measure the voltage difference. The voltage difference is then amplified by an instrumentation amplifier, read by the AD5933 chip, and an impedance value will be output by the Microcontroller.

The impedance measurement of any electronic component or circuit using ad5933 is done by directly connecting respected bock to the output of ad5933. But as the load tends to human body, instead of connecting it directly first the output voltage is converted into current format and then passed through human body.

The working principle of this mechanism is very identical to ohm's law. When there is a current, voltage drop must present. We are using that voltage drop to find out the impedance of the respective conductive path.

III. PRINCIPLE OF THE OPERATION

In this, four electrodes are placed on surface of tissue. The outer pair A and B are injected the excitation current I·sin(À0t) into tissue, while the inner pair C and D is used for measuring voltage on tissue impedance • Z . The voltage that appears across the load • Z is then amplified by instrumentation amplifier IA1 and outputs VZ • , while the voltage across the test resistance R is also amplified by instrumentation amplifier IA2 and outputs VR •

IV. HARDWARE

A. *AD5933:*

The AD5933 is a high precision impedance converter system solution that combines an on-board frequency generator with a 12-bit, 1 MSPS, analog-to-digital converter (ADC). The frequency generator allows an external complex impedance to be excited with a known frequency. The response signal from the impedance is sampled by the on-board ADC and a discrete Fourier transform (DFT) is processed by an on-board DSP engine. The DFT algorithm returns a real (R) and imaginary (I) data-word at each output frequency. Once calibrated, the magnitude of the impedance and relative phase of the impedance at each frequency point along the sweep is easily calculated. This is done off chip using the real and imaginary register contents, which can be read from the serial I2C interface. A similar device, also available from Analog Devices, Inc., is the AD5934, a 2.7 V to 5.5 V, 250 kSPS, 12-bit impedance converter, with an internal temperature sensor and is packaged in a 16lead SSOP.

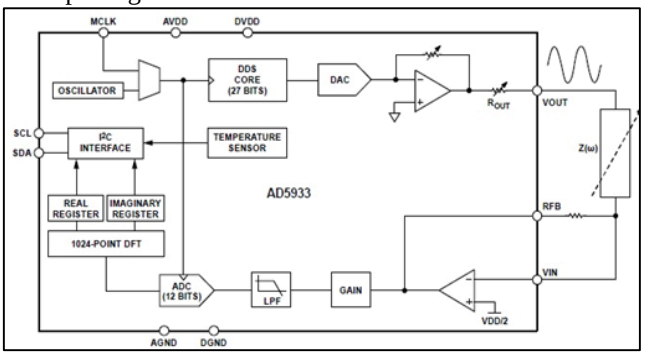

Fig. 1: Functional block diagram of AD5933

B. *Transconductance Amplifier:*

The Physical resistance can be able to measure by directly connecting it between Vout of AD5933 and Vin but for human body it is not advisable to connect it directly. As the amount of current provided by AD5933 at the Vout can harm human body so its important to reduce that current to certain level. The output of Ad5933 is in tems of voltage Fr current controlling the transconductance amplifier is used. The transconductance amplifier converts an input voltage into a current.

C. Instrumentation Amplifier:

An instrumentation amplifier is a type of differential amplifier that has been outfitted with input buffer amplifiers, which eliminate the need for input impedance matching and thus make the amplifier particularly suitable for use in measurement and test equipment.

The instrumentation amplifier amplifies the input voltage from the two electrodes placed on the body. The gain of the amplifier is calculated using the equation

$$G=1+Rf/R1$$

D. Input to AD5933:

The RFB resistor, or the Gain Setting Resistor, is set to the same value as the 1 kΩ resistor leading out of the instrumentation amplifier. This means that a gain of 1 is achieved before the PGA gain is taken into account.

E. Body Electrodes:

Placement of body electrodes is done on the basis of the body part for which the impedance measurement is required.

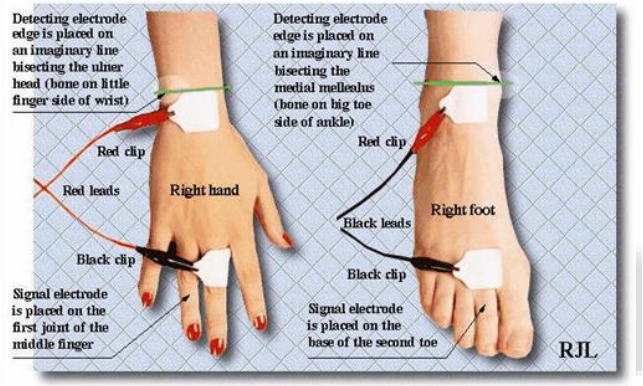

Fig. 2:

V. Impedance Standards

Magnitude Calculation:

$$Magnitude = \sqrt{Real\ data\ register^2 + imginary\ data\ register^2}$$

Calibration:

$$Gain\ Factor = \frac{Admittance}{Magnitude} = \frac{1/impedance}{Magnitude}$$

Impedance Calculation:

$$Impedance = \frac{1}{Gain\ factor \times Magnitude}$$

VI. Bio Impedance to Other Body Parameters

A. Bio impedance To Fat Measurement:

Equation used:

Fat free mass = 5.32 + 0.485 × (Ht2/ R50k) + 0.338 × W

Body Fat Percentage = (W-FFM)/W × 100%

B. Body Weight in Disease-Free Individuals of Both Genders with Normal BMI:

Body weight in male= (0.008995*Age)-(0.0116*R)+(0.871078*height)-75.55197

Body weight in females= -(0.01380*R)+(0.62966*height)-36.31924

C. Application of BIA Equations for Estimation of Dry-Weight in Prevalent HD (Hemodialysis) Patients:

Hemodialysis, also spelled haemodialysis, commonly called kidney dialysis or simply dialysis, is a process of purifying the blood of a person whose kidneys are not working normally.

DW in men= [(0.008995*Age)-(0.01116*R) + (0.871078*height) - 75.55197] * Postdialysis BMI /23.1

DW in women= [- (0.01339*R) + (0.6295*height)-36.31924] * Postdialysis BMI /21.7

VII. Preliminary Test Results

Our first BIA prototype was tested on an ordinary metal oxide resistor rating 1k Ohms with 1% precision. The tested resistor was connected between A, C and B, D, and the electrodes A and C, B and D were shorted together respectively, so the BIA performed as a bipolar measurement system. The resistor was measured at 15 frequency points ranging from 10k to 1MHz and next Fig. shows the results. The average impedance measurement error is smaller than 2.5% between 30KHz and 300KHz, and at higher frequencies the rising values both on impedances and phases demonstrate that the resistor shows inductive.

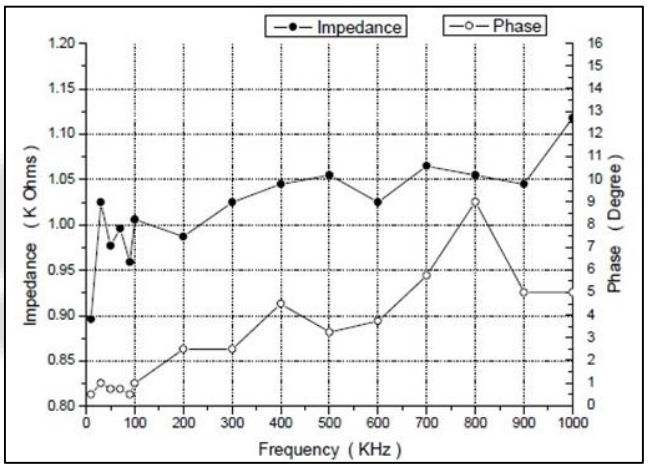

Fig. 3:

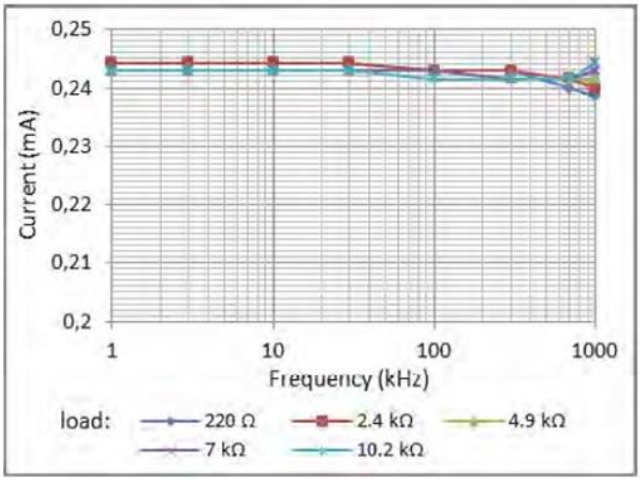

Fig. 4:

VIII. Advantages

– This method of body composition analysis is very simple and quick to perform, and if you have the right equipment can be done at home Saves Money

- Sufficient sensitivity to detect early, preclinical lymphedema, before the symptoms are noticeable.
- The ability to monitor even the very smallest changes.
- Accuracy in obtaining vital measurements plus the ability to repeat these accurate measurements.
- Sufficient speed to have obtained measurements of both the right and left arms within five minutes.
- The ability to detect lymphedema without having to rely on comparison with a limb that is not affected. This helps in cases of bilateral lymphedema affecting both limbs.
- The ability to detect lymphedema in areas other than the limbs. The FDA is considering approval of these uses but has not yet given approval

IX. Application

- Medical Application
- Pranic healing Detection
- BMI calculation
- Human Body & Health analysis
- Emergency Health Checking system

X. Conclusion

This system is very useful to calculate bio impedance of a human body with less requirements of equipment. As the system is cost effective compared to existing system, health checkup can be done at home using this technique. Pranic healing can be easily detected as it shows the change in body parameter at the time of healing.

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