A Modern Approach to an Ancient Practice of Nadi Pareeksha

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Abstract—Ayurveda, where the name only says Ayur means ‘Life’ and Veda means ‘knowledge’ i.e said to be ‘Science of Life,’ has the miraculous science upon us for knowing the imbalances of our body, without using any instruments except fingers. In Ayurveda Perception of the patterns of nadi’s is sufficient to predict the disease in human body. Various types of diseases can be detected in early stages by using this nadi pareeksha which is also called as Pulse diagnosis. This paper deals with the simulation of the nadi signals using a LabVIEW tool.

Keywords- Nadi, LabVIEW.

I. INTRODUCTION

Now a day’s Doctors can point out the problems only after seeing the scans, x-ray, MRI or physical examination, but here the pulse says it all. Nadi Pareeksha is an ancient ayurvedic technique of diagnosis through the pulse.

Nadi pareeksha can diagnose both physical and mental diseases accurately. The term nadi refers to the pulse, nerves, veins, arteries, and some sort of channel passage of physiological and biological signals. It is comprehensive and reaches the root cause of health issues, not merely addressing the symptoms. Nadi pareeksha not only diagnose the disease but also finds the root cause of the disease Nadi Pareeksha forewarns you about potential health risks [1].

In Ayurveda they have mentioned that every living thing in the earth is made up of five elements Earth, Water, Fire, air and space which are said as Prithvi, apa, Tejas, Vayu and Akash in Ayurveda respectively.

In humans, these five elements correspond to the five senses:

- Earth or Prithvi = Smell
- Water or Apa = Taste
- Fire or Tejas = Sight
- Air or Vayu = Touch
- Space or Akash = Hearing

- Kapha signals are composed of Water and Earth.
- Pitta signals are composed of Fire and Water.
- Vata signals are composed of space and Air elements.
- Pitta signals are composed of Fire and Water.

Nadi signals will vary at different ages. It gives you an insight on how to optimize your health in accordance with the elements which are predominant in your body. It gives detailed and accurate personalized and individual prognosis. Several chronic diseases like diabetes, infertility, obesity, hypertension, paralysis, mental disorders, severe joint pains and skin diseases can be detected by using this nadi pareeksha.

One can know about his health status by checking the pulses at exact pulse points from a nadi pareeksha expert. The best time to check the pulse is in the early morning, physiologically the least active time of the day. The middle, index, and ring fingers can be used to check the pulses with the index finger placed closest to the wrist crease as shown in below figure 1.1. At first, the three positions are palpated simultaneously, lightly, then with medium pressure, and finally more strongly [2].

![Figure 1. Pulse sensing position](figure)

Before placing the sensor on wrist of the subjects to acquire Nadi pulses, the following steps have to be done.

- The person whose pulses to be checked is asked to relax their hand.
- By examiner's index, Middle and ring fingers Palpation of Nadi pulses of a person are sensed. If a sensor is used then this is the best place to place the sensor at right place in subjects' wrist.
- We acquired the subject's pulse waveforms by placing sensor in their wrist when they are in the chair in relaxed state.

After this, each position is checked separately. Different systems are used whereby the pulse at each position is identified with certain organs. When the pulse is taken, attention is given to the frequency, amplitude and quality of the pulse.
II. PRIOR WORK

A computational model for the mapping of nadi-patterns using quantitative estimation of the tridosha presented by Joshi R.R., (2005) [3], Xu LS et al.,(2006) have observed the pulse waveform changes by using a pulse sensor with a strain cantilever beam transducer[4], Kalange A.E et al.,(2007) used piezoelectric sensor to develop a system to detect the human pulses[5].

M.S Duraiaras R, Divakaar P.S.(2012) have developed chronic diseases diagnostic system by using the three diaphragm element equipped with strain gauge sensor [6].

Chung-Shing Hu, et al.,(2012) have proposed pulse-taking platform to obtain the pressure waveform of the wrist pulse with a single tactile array sensor[7].

In this paper we are discussing how to simulate the signals without using the sensors.

III. METHODOLOGY

Initial step is to simulate the signal using graphical programming tool, LabVIEW. LabVIEW Advanced Signal processing toolkit has been used for simulating the radial signals. The Signal Generation sub palette under Advanced Signal Processing toolkit contains various functions to simulate standard signals and impairments.

The combination of standard signals and impairments simulated using signal generation sub palette is used for creating the three radial pulse signals Vata, Pitta & Kapha. The signals thus simulated is in its ideal form without any impairments or noise added to it which is usually present in any real world signal.

The three radial pulse signals usually appear like sawtooth signal with noise induced. These signals can be easily simulated using LabVIEW Signal processing toolkit by combining different combinations of standard sawtooth signal and noise.

The simulated data is induced with noise to represent the real world radial pulse signals Vata, Pitta & Kapha. These three pulse signal differ in terms of frequency and magnitude. These signals with induced impairments is then conditioned using a suitable filter with desired cutoff to remove the induced noise or impairments.

If Sawtooth Wave is represented by the sequence X, the program generates the pattern according to the equation as shown below.

\[ X[i] = \text{amp} \times \text{sawtooth (phase[i])} \]

For \( i = 0, 1, 2 \ldots n - 1 \),

Where \( \text{amp} = \text{amplitude} \),
\( n = \text{number of samples (#s)}, \)

And \( \text{sawtooth (phase[i])} = (\text{pmod}/180.0) \)
If: \( 0 \leq \text{pmod} < 180.0 \)
Or \( (\text{pmod}/180.0 - 2.0) \) if \( 180.0 \leq \text{pmod} < 360.0 \)
Where,
\( \text{pmod} = \text{p modulo 360.0} \) and \( \text{phase[i]} = \text{initial\_phase} + \text{frequency} \times 360.0 \times i/\text{Fs} \)

Where,
\( \text{initial\_phase} = \text{phase} \) if \( \text{reset signal} \) is TRUE, or last output phase if \( \text{reset signal} \) is FALSE.

This program is made as reentrant so that it can be used to simulate a continuous acquisition from a sawtooth wave generator function. Subsequent calls to this program produce the output sawtooth waveform containing the next \( n \) samples of a sawtooth wave, if the input control reset signal is FALSE. This VI remembers the phase and time stamp of the current waveform and uses this to continuously generate and time stamp the subsequent waveforms, as long as the reset signal input is FALSE.

IV. SIMULATION RESULTS AND DISCUSSION

On the execution of the equation code the results of simulations are as shown in below figure

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\( n = \text{number of samples (#s)}, \)
And \( \text{sawtooth (phase[i])} = (\text{pmod}/180.0) \)
If: \( 0 \leq \text{pmod} < 180.0 \)
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waveform as shown in figure 3 and figure 4 shows the simplified vata signal where the signal can be observed clearly.

![Figure 3 and Figure 4 showing simplified vata signal](image)

**Figure 5. Pitta simulated signal**

Pitta signal is as shown in figure 5 where the signal reaches a highest peak value with a very small value of slope, after reaching the peak, the signal gradually decreases after a sudden decrease in signal. Then a linear signal with a small variation continues that can be clearly observed in figure 6.

![Figure 5 showing Pitta simulated signal](image)

**Figure 6. Simplified Pitta signal**

Kapha signal looks as shown in below figure 7 and the signal can be clearly visible which can be said as a reversed sawtooth signal where the increasing slant line has fewer slopes and less variation in amplitude, whereas the decreasing line signal has a large slope and has more variation in the signal amplitude.

![Figure 7 showing Kapha simulated signal](image)

**Figure 7. Kapha simulated signal**

In most of the previously designed system they have used various types of sensors. Even though many of them have given their tribute in simulating the signal using the sensors there are some disadvantages like using pressure sensor there was a dc shift and using piezoelectric sensor, using strain gauge transducer, it was observed that pulse waveform was noisy, but in this paper we are simulating the three radical pulse signals with some equation analogy and built in functions available in LabVIEW.

The simulated signals are analyzed by extracting its features in both time and frequency domain. After extracting the features the data is compared with existing standard database by which the known disorders can be easily predicted by physicians or by any common man who has not been trained on Nadi Pareeksha.

V. CONCLUSION AND FUTURE WORK

This work presents a modern simulated approach for design and development of a portable device for Nadi Pariksha or pulse signal analysis. The system has designed with standard database of simulated signals with known disorders. This modern approach is designed for simulating a database of sensors data acquired by positioning sensors on radial artery in order to get three pulse signals Vata, Pitta and Kapha. The simulated pulse signals are conditioned by using suitable filter to remove unwanted noise induced due to interaction.

In future a system can be designed to help physicians or common man who is not trained on Nadi pareeksha for diagnosis of common disorders. Further future enhancement and be implemented by designing a portable/wearable health monitoring system for all common disorders which can be easily diagnosed at home.

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REFERENCE

Prajkta Kallurkar (2015)' Nadi Diagnosis Techniques' IJPMN, Volume 2, Issue 1, April 2015, ISSN- 2394/4668


