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# A STUDY OF SENSOR DESIGN FOR SOME DISEASES IN AYURVEDA THERAPY

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## ABSTRACT

Pulse diagnosis is a method used in Ayurveda to diagnose and treat illness by gaining insight into the source of symptoms. It's based on ancient Vedic wisdom that links the physical body, the intellect, and the spirit. Similar to the ancient Chinese Yellow Emperor's Medicine Book, the premise of Ayurvedic pulse diagnosis is that optimal health is a human right that should be fully realized throughout one's lifetime. According to Ayurveda, becoming sick happens when one's lifestyle is at odds with their Prakriti. Each person's prakriti is completely unique to them, and it's also perfectly balanced. Dosha is the term used to describe an imbalance in one of the three primary Prakriti kinds (Vata, Pitta, or Kapha). Any illness or ailment in a person may be traced back to an imbalance of this dosha. Dosha, or imbalance, is determined by an Ayurvedic diagnostic. Nadi Pariksha, often known as a pulse test, is a crucial method for identifying dosha. Nadi Pariksha involves checking the radial artery with a three-finger examination at the base of the thumb. Nadi parikshan is a method for determining one's authentic Prakriti. Prakriti, dosha, and the relative strength of the doshas are the calculating factors in Ayurvedic medicine. Each person's prakriti is composed of these three elements, or doshas. There are three doshas that may be identified: vata, pitta, and kapha. At the moment, this method is subjective, and the accuracy of the diagnosis is dependent on the knowledge and skill of the Ayurvedic doctor making it.

**KEYWORDS:** Ayurvedic pulse diagnosis, Ayurvedic doctor, Ayurvedic medicine.

## INTRODUCTION

When it comes to meeting the healthcare requirements of people everywhere, traditional medicine is essential. Six distinct medical traditions are acknowledged and used in India. Ayurveda, Unani, Siddha, Yoga, Naturopathy, and Homoeopathy are all examples. Despite its relatively recent arrival in India (the 18th century),

homoeopathy is now integrated into traditional Indian medical practices. Based on ancient Vedic wisdom, Ayurveda teaches us how to interpret and cure our own bodies. This method, which seems to organize body, brain, and mental power as one, is said to be approximately 5,000 years old.

This method is a sort of alternative medicine that is widely used in rural parts of India. Diseases (doshas) are seen as imbalances in prakriti that may be corrected. This method relies on the user's own knowledge, gained via observation and introspection. This understanding is grounded on sensory experience and has been handed down through the ages via oral tradition and written treatises. According to Ayurvedic medicine, dosha (disease/disorder) occurs when the body's energy pathways are blocked by toxins produced when food is not properly digested. A healthy diet and balanced lifestyle may help someone prevent this.

Examining the pulse, the eyes, the skin, the bowel movements, the tongue, and the rest of the body are just a few of the methods used in Ayurveda. Pulse diagnosis in Ayurveda has been the focus of a lot of study because of its broad applicability. Both traditional Chinese medicine and Ayurvedic medicine start from the premise that optimal health is a human right. The Vaidya (Doctor) of Ayurveda utilizes the patient's Nadi (pulse) to determine the nature of the illness. The following are common expressions used in Ayurvedic practice.

**Nadi**: The contraction and dilation of the arteries supplying blood to the heart causes the sensation of a nadi (pulse) pulse. Since these pulses are connected to every system in the body, analyzing their gati (flow), veg (rate), tal (rhythm), and bal (force) might help diagnose health issues.

**Nadi Pariksha**: The radial artery pulse is analyzed in nadi-pariksha (pulse diagnosis) to determine the health of the patient. Fingers are positioned as illustrated in Figure 1.1: index, middle, and ring fingers on the radial artery, just below the thumb on the side of the wrist. The right hand is utilized by males, whereas the left hand is preferred by women. The proper positioning of the fingers is essential.

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**Figure 1. 1 Classical Method**

**Prakriti**: The word "Prakriti" translates to "Nature" in English. Prakriti is unique to each person; it has its own features and may take on a variety of permutations and combinations depending on the person. Prakriti may be used as a tool for discerning a person's physiological make-up. There are three primary forms of Prakriti, or underlying conditions. Dosha refers to a disturbance in the equilibrium of these three elements. This dosha may be an indicator of the body's clinical condition, hence its detection is useful for expressing finely grained data about every biological activity. When these doshas are in harmony, a person may enjoy optimal health. When these doshas are unbalanced, a person will feel unwell and develop illness.

**Doshas**: In ayurvedic treatment, the pulse is studied and detected to identify doshas (diseases/disorders) and sub-doshas. Information carried by the bloodstream allows for a thorough and accurate diagnosis to be performed. Specifically, this is achieved by blending several elements of the panchatatva (fire, water, earth, air, and space). Doshas (tridoshas) like Vata (Wind), Pitta (Fire), and Kapha (Water) are then used for the most part to classify it.

According to Ayurveda, the body's regular functioning depends on these three fundamental controlling principles of physiology. There are states of equilibrium and disequilibrium for each of the three doshas. The expansion and contraction of the heart is a physical manifestation of the balance or disruption of the three doshas.

Medical professionals may better serve their patients by making informed decisions about illness prevention and treatment if they are able to identify early warning signs of tridosha imbalance.

Vata Qualities: These manifest as a sense of motion throughout the body. Each molecule of vata is airy, transparent, rough, and dry. They never rest and always change their location. Vata is associated with the effects of cold weather because of its innate coldness. A person with dominant Vata qualities is sharp and restless. They lack weight and muscular mass and have a frail, frail physique.

Pitta Qualities: These manifest as body temperature and metabolic activity. A Pitta person is energetic, quick, incisive, fiery, greasy, and spreading. A Pitta person has a keen intellect and speaks with a sharp tongue.

Kapha Qualities: Generally speaking, they are considered to be the framework. Kapha molecules are solid, slow moving, and smooth. The solidity of body, mind, and will may be attributed to its weight and steadiness. A kapha individual is one who is sluggish, greasy, liquid, cold, and static.

**Nadi-pariksha or Pulse Diagnosis**

By analyzing the patient's pulse, the ancient ayurvedic practice of nadi-pariksha may identify any underlying physical, mental, or emotional abnormalities. Using this method, we may focus less on treating the disease's symptoms and more on addressing its underlying causes. Sharangdhar Samhita, Shri Bhav Mishrji, Maharishi Kanada, and many more are just a few of the great philosophers, vaidyas, and saints who have made significant contributions to the science of nadi pariksha.

Nadi-pariksha is a form of diagnosis conducted by trained experts without the use of invasive procedures. This field of study asserts that an individual's pulse may provide insight into their personality and health. Three locations on a person's radial artery are monitored to determine the average pulse rate. Seven distinct downward-reading vibrational levels are used to detect various bodily activities. Three fingers are used to detect signals at three different locations on the wrist. Blood vessel constriction and relaxation, as well as blood flow, contribute to the transmission of these signals. Diabetes, infertility, paralysis, hypertension, mental problems, severe joint aches, skin illnesses, etc. are only few of the chronic diseases and ailments that may be diagnosed with the use of a nadi-pariksha. Precautions and preventative steps to avoid or ameliorate such diseases would be recommended by the doctor.

## PIEZOELECTRIC MEMS SENSOR DESIGN & IMPLEMENTATION

### 1 Sensor Design & Simulation using Lithium Niobate

The sensor was fabricated using Lithium Niobate and PolySilicon materials. The study included the analysis of sensors of varying sizes, namely square and circular shapes, under a consistent application of force.

**Square Diaphragm**

The diaphragm was created with a square form, with dimensions of 100µm for both length and width, and a height of 5µm. The diaphragm was constructed using Poly Si material. The placement of the piezoelectric material was seen at the four corners of the square diaphragm, which had dimensions of 10µm in length and 1µm in height. The piezoelectric substance used in this study was Lithium Niobate. A force of 1µN was exerted in the central region of the diaphragm. A central block of 5µm in length, 5µm in width, and 5µm in height was first used to evaluate the sensor's performance. When a force of 1µN is exerted, the diaphragm undergoes deformation due to the applied stress, resulting in the generation of an electrical potential.

**2. Circular Diaphragm**

The diaphragm sensor was built in a circular shape, with a radius of 40µm and a height of 5µm. The diaphragm was constructed using a Poly Si material. In a manner similar to the square diaphragm, the circular diaphragm also included the placement of piezoelectric material at four distinct blocks. The dimensions of the circular diaphragm were measured to be 10 µm in length and 5 µm in height. A force of 1 µN was exerted on the central block of the design. The dimensions of the central block were measured to be 5µm in length, 5µm in breadth, and 5µm in height. When pressure is applied, the design undergoes deformation, resulting in both mechanical and electrical effects.

**CONCLUSION**

Four distinct artificial intelligence approaches, including the Euclidean Distance Algorithm (EDA), the KMeans method, the Artificial Neural Network (ANN), and the Adaptive Neuro-Fuzzy Inference System (ANFIS), were used to discover Prakriti dosha. A comparative analysis was conducted to assess the sensitivity and speed of detecting the Prakriti dosha of a person across all four artificial intelligence methodologies. The sensitivity for detecting Prakriti dosha using Electrodermal Activity (EDA) was found to be between 92% and 95%, whereas the use of Adaptive Neuro-Fuzzy Inference System (ANFIS) yielded a sensitivity range of 95% to 97%. The speed at which prakriti dosha detection was achieved with EDA was 0.055 seconds, whereas the use of ANFIS resulted in a detection speed of 0.015 seconds. The user's text does not provide any information to rewrite in an academic manner.The output parameters of both the EDA and

ANFIS classification approaches, which are two methods used to classify Prakriti dosha, exhibited a high degree of similarity. However, it was shown that the efficiency of the exploratory data analysis (EDA) approach declined proportionally with the rise in database size, mostly due to the significant computational time required. In contrast, it was shown that ANFIS approaches had superior performance when applied to bigger datasets as well. The user's text does not provide any information to rewrite in an academic manner.The ANFIS approach is suggested among the four artificial intelligence techniques often used for the identification of Prakriti Dosha in cases requiring a big database.

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