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Portable Nadi Pareeksha Device: Integrating Traditional Ayurvedic Diagnosis with Modern Sensor Technology

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Abstract

Introduction:

*Nadi Pareeksha* (pulse diagnosis) is a traditional Ayurvedic diagnostic technique used to assess physical, mental, and spiritual imbalances. While highly subjective and dependent on the practitioner's skill, recent advancements in biomedical engineering have led to the development of a **Portable Nadi Pareeksha Device** to make pulse diagnosis more accessible and accurate.

Methods:

The device integrates non-invasive pressure and vibration sensors to detect pulse signals from three specific points on the wrist (representing *Vata*, *Pitta*, and *Kapha doshas*). These signals are processed through a signal processing unit, and an algorithm maps the pulse characteristics to *doshic* imbalances. The device is designed to be handheld and portable, making it suitable for both urban and rural healthcare settings. Preliminary clinical validation was conducted using a cohort of volunteers, comparing device-generated results with traditional manual pulse assessments.

Results:

Early tests demonstrated that the portable device can capture pulse waveforms and provide a real-time assessment of dosha imbalances, offering a faster and more consistent alternative to traditional methods. The device also proved to be reliable and easy to use, even in remote locations.

Discussion:

The portable Nadi Pareeksha device presents a promising tool for modernizing Ayurvedic


diagnostics. It allows for faster, more accessible, and reproducible results, potentially improving healthcare delivery, especially in underserved areas. Further validation and large-scale studies are required to refine the device's accuracy and application in clinical settings.

**Keywords:** *Portable Nadi Pareeksha, Pulse Diagnosis, Ayurveda, Dosha Imbalance, Sensor Technology*

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## Introduction

Nadi Pareeksha, or pulse diagnosis, is a central diagnostic technique in Ayurveda, used to assess physical, mental, and spiritual imbalances by examining pulse characteristics at specific points on the body, primarily the wrist. Traditionally, this process requires significant expertise, with subjective readings that vary between practitioners. However, recent advances in biomedical engineering have paved the way for the development of a **Portable Nadi Pareeksha Device**, aiming to enhance the accuracy, accessibility, and objectivity of pulse diagnosis. This device integrates modern sensor technology with traditional Ayurvedic principles to offer a more consistent and reproducible method for detecting *doshic* imbalances.

## Materials and Methods

The **Portable Nadi Pareeksha Device** consists of a handheld unit that integrates **pressure and vibration sensors** to detect pulse characteristics. The device is designed to assess pulse waveforms at three key points on the wrist, corresponding to the three doshas of Ayurveda—*Vata*, *Pitta*, and *Kapha*. Using **signal processing algorithms**, the

device analyzes the pulse data in both time and frequency domains to identify potential imbalances in the doshas.

The device's portability is a significant advancement, enabling use in various settings, including remote areas with limited access to trained Ayurvedic practitioners. The data collected is processed in real-time, and the final analysis is displayed on a connected electronic device for the user's interpretation.

## Design:

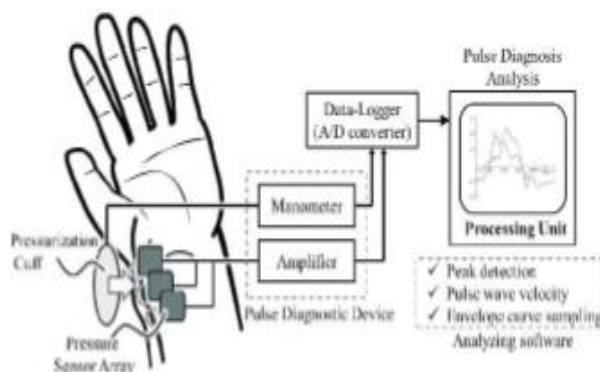
**Handheld/Compact:** The device is lightweight, making it easy for Ayurvedic doctors or practitioners to carry it anywhere.

**Sensor Technology:** It likely integrates sensors to measure pulse rate, rhythm, and strength. This sensor collects the pulse data from specific points on the wrist.

## Signal Processing:

Acquired pulse signals undergo preprocessing to remove noise and artifacts using a Butterworth filter. Subsequently, features such as pulse rate, frequency, and amplitude are extracted. These features serve as inputs for a classification algorithm designed to identify dosha imbalances.

Figure 1 Depicting The Methodology



The Wrist band/ pressurization cuff will be ligated around the wrist of the patient which has 3 electrodes – *vata*, *pitta* & *kapha*.



The 3 electrodes will be connected with 3 sensors of *vata*, *pitta* & *kapha* respectively.



The sensors will work & interpret the data accordingly and will pass it on to the processing unit.



Processed data of final *nadi* assessment will be flashed on electronic device.

#### Data Analysis:

The device may use algorithms and advanced technology to analyze pulse patterns in real-time. It could provide insights into the balance of the body's doshas and other vital signs.

#### Clinical Validation:

The device is tested on a cohort of healthy volunteers and patients diagnosed with various dosha imbalances. Pulse readings obtained from the device are compared with traditional manual assessments by experienced Ayurvedic practitioners to validate its accuracy

#### Diagnosis):

**Traditional Knowledge:** Understand the fundamental principles of *Nadi Pariksha*, where pulse reading is used to diagnose a person's health condition by analyzing the pulse at specific locations on the wrist.

**Pulse Patterns:** The *Nadi Pariksha* method identifies different pulse patterns related to *Vata*, *Pitta*, and *Kapha doshas*, which are mentioned in *ayurveda samhitas*. All the classical methods which are mentioned in *samhitas* will be taken into consideration like [5]

#### Understand Nadi Pariksha (Pulse

Table 1 depicting textual summary of nadi

S.NO	DOSHA	SIGHT AT NADI	FINGER	NATURE OF PULSE MOVEMENT	EXAMPLE	MODERN VIEW
1.	<i>Vata</i>	Anterior	Index	<i>Vakra</i>	Leech, Snake	Irregular
2.	<i>Pitta</i>	Middle	Middle	<i>Chanchal</i>	Crow, Frog	Rapid
3.	<i>Kapha</i>	Posterior	Ring	<i>Manda</i>	Swan, Pigeon	Slow

### Advantages

**Accessibility:** Makes the traditional diagnostic process accessible to a wider audience, especially in remote or rural areas where traditional Ayurvedic practitioners might not be available.

**Quick Diagnosis:** The device can deliver faster results than manual pulse reading, which usually requires years of training and experience.

**Improved Accuracy:** A well-designed device could enhance the accuracy of pulse-based diagnoses by minimizing human error and standardizing the process.

### Clinical Validation

Initial testing of the device was conducted on a cohort of healthy volunteers, as well as patients diagnosed with various dosha imbalances. Pulse readings from the device were compared with traditional manual assessments by trained Ayurvedic practitioners. This validation aimed to ensure that the device accurately captures the nuances of pulse characteristics, as detailed in classical Ayurvedic texts [1][2][3][4].

### Results

Preliminary results demonstrate that the **Portable Nadi Pareeksha Device** is able to capture pulse waveforms reliably and deliver real-time analysis. The device correctly identified *doshic* imbalances, with results consistent with manual pulse readings conducted by experienced practitioners. Additionally, the device offers the advantage of faster and more consistent results, as the traditional method often requires years of training to develop the necessary expertise.

### Discussion

The integration of modern sensor technology into the ancient practice of **Nadi Pareeksha** holds immense potential for improving the accuracy and accessibility of Ayurvedic diagnostics. The portability of the device makes it suitable for use in both urban clinics and rural healthcare settings, where access to skilled Ayurvedic practitioners may be limited. Furthermore, the device's digital storage and real-time analysis capabilities ensure that readings are more reproducible and less subject to human error, offering a promising alternative to traditional manual methods.

However, while initial results are promising, further validation studies with larger sample sizes are necessary to refine the accuracy and reliability of the device in diverse clinical settings. In particular, it is essential to test the device's performance on patients with varying degrees of *doshic* imbalance and in real-world environments where external factors could affect pulse readings.

### Conclusion

The development of the *Portable Nadi Pareeksha Device* represents a significant step forward in modernizing Ayurvedic diagnostics. By combining traditional Ayurvedic wisdom with cutting-edge sensor technology, the device promises to enhance the accessibility, precision, and standardization of pulse-based diagnostics.

Continuous testing and validation are needed to further improve the device's capabilities, but it holds great potential for widespread adoption in clinical and remote healthcare settings.

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