

Chapter 1

Introduction

'Nadi Pareeksha' is an ancient ayurvedic technique of diagnosis through the pulse. It can accurately diagnose both physical and mental diseases as well as imbalances. 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 forewarns you about potential health risks. It gives you an insight on how to optimize your health in accordance with the elements which are predominant in your body. It provides you with a personalized and individual prognosis which is detailed and accurate. 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.

Doctors can point out the problems only after seeing the scans, x-ray or physical examination, but here the pulse points say it all. We can detect energy blockages through pulse points and that's how one can know what the is. The best time to check the pulse is in the early morning, physiologically the least active time of the day. Three fingers are used to check pulse points, the middle, index, and ring, with the index finger placed closest to the wrist crease. At first, the three positions are palpated simultaneously, initially, lightly, then with medium pressure, and finally more strongly. 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. A normal pulse is distinct, discernible to the fingertip upon medium pressure, and can still be palpated with the application of heavy pressure.

The various kinds of nadi's, such as vata nadi, pitta nadi, kapha nadi, etc., which are named depending on the functionalities and behavior. Earlier, the experts (vaidyas) of Ayurveda were capable of diagnosing several physical and mental ailments only with the sense of nadi at the required pressure points of body without the help of any of the sophisticated equipments like stethoscope, sphygmograph, polygraph, or any other instrument or tests.

1.1 Motivation

Nadi Pariksha has been said as one of the Ashta Sthana Pariksha. This system of examination cannot be practiced easily because of non-availability of detail description about Nadi Pariksha in Ayurvedic literature and lack of practice in the field of science. Nadi Pariksha is an easy tool to arrive at the faster diagnosis like pulse examination in other systems of medicine. Fortunately some of the ancient Ayurvedic literature is still available to us. So, to enrich the knowledge, small effort is made to put light over pulse examination. It is well known fact that the knowledge of pulse science originated some thousand year ago in various medical disciplines of the world. The first indication about this science in original form is found in Nadi Pariksha: An Ancient Ayurvedic Method of Diagnosis Kachare and Girbide JoAYUSH (2016) 48-51 © STM Journals 2016. All Rights Reserved Page 51 the works of Sharangdhara in 14th century. Concept of Nadi Pariksha is found in various ancient Ayurved Samhitas like-Bhavprakash, Nadi Pariksha by Ravansamhita, Nadivigyan by Kanad. Theacharya Sharangdhara flourished it in his work as a means of diagnosis and prognosis. The concept of Nadi Pariksha is described in third chapter first part. Yogratnakara also describes Nadi Pariksha as diagnosis, in first chapter under heading Rog Pariksha. So, in modern era of information and technology, we the scholar have to use knowledge of Nadi which depends on the subjective knowledge and experience of the physician to objective parameters by the tool of modern science, so that the knowledge of Nadi reaches its height.

Chapter 2

Literature Survey

- I. 'A Survey on Nadi Pareeksha for Early Detection of Several Diseases & Computational Models using Nadi Patterns' Dhanalaxmi .Gaddam#1# Associate Engineer, Nichebees Technosolutions Hyderabad,India
- II. 'Nadi Pariksha: An Ancient Ayurvedic Method of Diagnosis ' Kalpana B. Kachare, Santosh G. Girbide, Snehal A. Bankar Department of Rognidan, R.A. Podar Ayurved Medical College, Worli, Mumbai, Maharashtra, India
- III. 'D. Rangaprakash, D. Narayana Dutt, "Study of wrist pulse signals using time domain spatial features", Journal of Computers and Electrical Engineering Elsevier Ltd,2015,pp 100-107.
- IV. A.E. Kalange and S.A. Gangal, "Piezoelectric Sensor for Human Pulse Detection", Defence Science Journal, Vol. 57, No. 1, January 2007, pp. 109-114.

Chapter 3

Phased Execution

An Nadi pariksha is the important technique to identify the cause of disease. The diseases can be detected by sensing various features of the pulses. Diagnosis through pulse requires highly expert technical hands to establish accurate correlation between pulsation and disease type. On the basis of this traditional technique new techniques are developing with the help of various sensor and signal conditioning system. These types of systems are standby system for the new doctors and also help full in the rural areas

Disease Diagnosis using nadi this project is inspired by the idea of having a Quick detection of disease using ancient ayurvedic methods, I settled on a small model that can detect nadi pulses and based on that gives related health issue. The goal of my project was to detect diseases that can be detected by the pulse diagnosis or nadi pareeksha and provides the information about how nadi pareeksha can be useful for the generation of computational patterns for various diseases which is useful for the early detection of several diseases. I also wanted to try this model which will be easy and convenient to handle by any authorized member in Campus.

3.1 Objectives

1. To understand and implement model for 'the Early detection of disease using nadi pattern'.
2. To interface Arduino, ESP8266 module with Pulse Sensors and DAQ.
3. Life of human beings is getting simpler as almost everything is automatic, replacing the old disease detection system to fast disease detection system using ancient Ayurvedic technique and Modern technology .

3.2 Proposed System

In this, the nadi diagnosis system is designed which is PC based and portable. The diagrammatic representation of system is shown in fig 3.3. For continuous measurement of radial pulse at three different points, three photoelectric sensors are mounted on the belt which can be wrapped around the wrist. The system setup snapshot is shown in fig. 4. This ir based photo plethysmography sensor sends ir light into the artery and the amount of light reflected back from the tissue in artery reads by the sensor. The signal is generated at particular interval with the difference between incident and reflected light by sensor. The sensor diameter is 10mm and these are place adjacent to each other at the distance of 2mm from each other. The sensor is shown in fig.5. The position of the sensors is most important so sensors must be at correct position. If the sensor is not at correct place, then it leads to incorrect heath condition of patient. So before applying the sensors on the wrist of subject for acquiring the arterial pulses, some precautions have to be taken. These sensors are further connected to USB DAQ card and hrough it to PC. The graphical programing tool was used to simulating the three signals of radial pulse. The simulated signals are generated with noise to represent the real radial pulse signals vata, Pitta, and Kapha. These signals filtered using Butterworth filter with cutoff frequency of 80Hz. The analysis of the pulse is to be done by feature extraction like number of beats per minute for all three pulses, frequency of the pulse, and the amplitude of the pulse.

3.3 Block Diagram

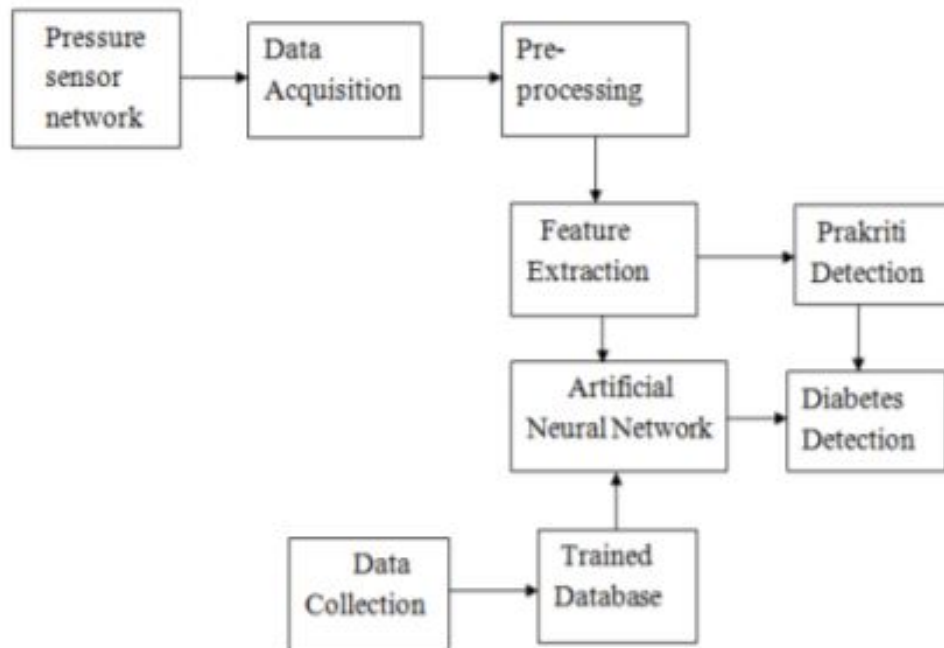


Figure 3.3: Block Diagram of System

3.4 Working

The diagrammatic representation of system is shown in fig.3.3. For continuous measurement of radial pulse at three different points, three photoelectric sensors are mounted on the belt which can be wrapped around the wrist. The system setup snapshot is shown in fig. 4. This ir based photo plethysmography sensor sends ir light into the artery and the amount of light reflected back from the tissue in artery reads by the sensor. The signal is generated at particular interval with the difference between incident and reflected light by sensor. The sensor diameter is 10mm and these are place adjacent to each other at the distance of 2mm from each other. The sensors shown in fig.5. The position of the sensors is most important so sensors must be at correct position. If the sensor is not at correct place, then it leads to incorrect health condition of patient. So before applying the sensors on the wrist of subject for acquiring the arterial pulses, some precautions have to be taken.

3.5 Methodology

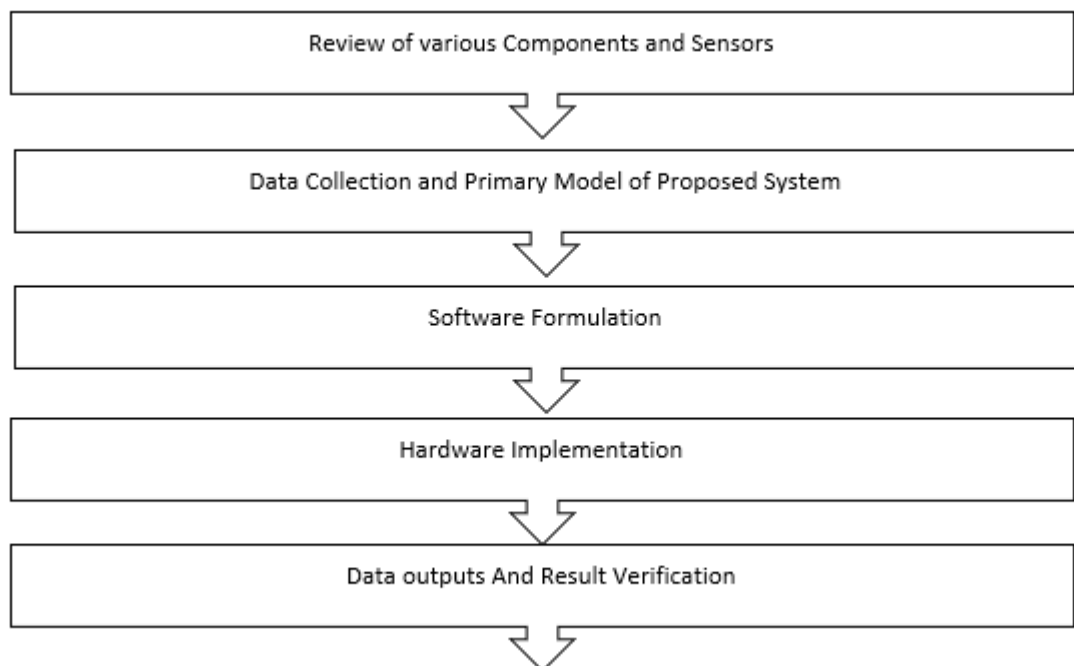


Figure 3.5: Methodology

Chapter 4

Hardware

- 1) piezoelectric sensor
- 2) Arduino and usb
- 3) Bluetooth Module (HC-05)
- 4) ESP8266
- 5) breadboard and jumper wires
- 6) data acquisition card
NI USB-6210
- 7) Breadboard Dso.
- 8) Display(lcd)

4.1 PIEZOELECTRIC SENSOR:

A piezoelectric sensor is a device that uses the piezoelectric effect to measure changes in pressure, acceleration, temperature, strain, or force by converting them to an electrical charge



Figure 4.1.1. Pulse sensor

Piezoelectric sensors are versatile tools for the measurement of various processes. They are used for quality assurance, process control, and for research and development in many industries. Pierre Curie discovered the piezoelectric effect in 1880, but only in the 1950s did manufacturers begin to use the piezoelectric effect in industrial sensing.

One disadvantage of piezoelectric sensors is that they cannot be used for truly static measurements. A static force results in a fixed amount of charge on the piezoelectric material. In conventional readout electronics, imperfect insulating materials and reduction in internal sensor resistance causes a constant loss of electrons and yields a decreasing signal. Elevated temperatures cause an additional drop in internal resistance and sensitivity. The main effect on the piezoelectric effect is that with increasing pressure loads and temperature, the sensitivity reduces due to twin formation. While quartz sensors must be cooled during measurements at temperatures above 300 °C, special types of crystals like GaPO₄ gallium phosphate show no twin formation up to the melting point of the material itself.

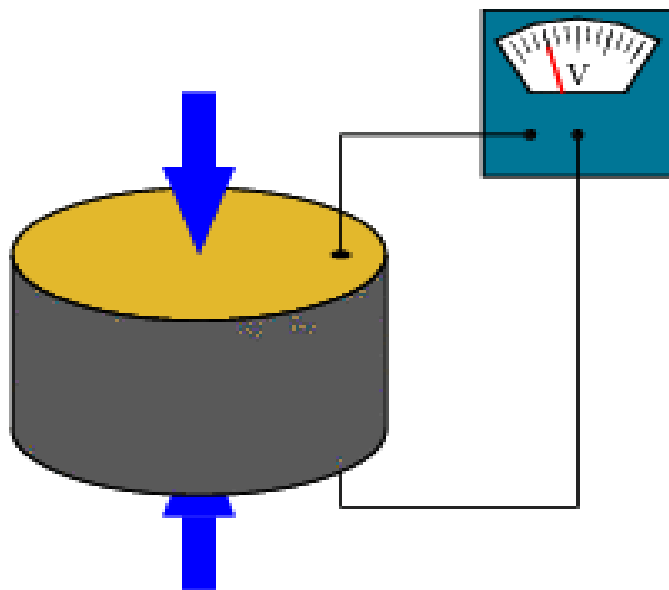
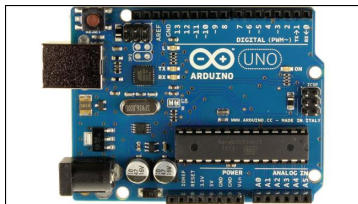


Figure 4.1.2 Modules of piezoelectric sensors

However, it is not true that piezoelectric sensors can only be used for very fast processes or at ambient conditions. In fact, numerous piezoelectric applications produce quasi-static measurements, and other applications work in temperatures higher than 500 °C.

A piezoelectric transducer has very high DC output impedance and can be modeled as a proportional voltage source and filter network. The voltage V at the source is directly proportional to the applied force, pressure, or strain. The output signal is then related to this mechanical force as if it had passed through the equivalent circuit. Frequency response of a piezoelectric sensor; output voltage over applied force versus frequency detailed model includes the effects of the sensor's mechanical construction and other non-idealities. The inductance L_m is due to the seismic mass and inertia of the sensor itself. C_e is inversely proportional to the mechanical elasticity of the sensor. C_0 represents the static capacitance of the transducer, resulting from an inertial mass of infinite size. R_i is the insulation leakage resistance of the transducer element. If the sensor is connected to a load resistance, this also acts in parallel with the insulation resistance, both increasing the high-pass cutoff frequency.

4.2 ARDUINO:



Arduino is an open-source hardware and software company.

It consists of GPIO pins, Digital I/O pins, Analog I/O pins, I2C protocol. Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards or breadboards (*shields*) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler toolchains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.

4.3 BLUETOOTH MODULE:

A HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol module, designed for transparent wireless serial connection setup. Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband.

It uses CSR Blue core 04-External single chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature. It has the footprint as small as 12.7mmx27mm. Hope it will simplify your overall design/development cycle.

4.4 ESP8266:

The **ESP8266** is a low cost microchip with full TCP/IP stack and microcontroller capability produced by Shanghai-based Chinese manufacturer Espressif Systems.

The chip first came to the attention of western makers in August 2014 with the ESP-01 module, made by a third-party manufacturer Ai-Thinker. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. However, at the time there was almost no English-language documentation on the chip and the commands it accepted. The very low price and the fact that there were very few external components on the module, which suggested that it could eventually be very inexpensive in volume, attracted many hackers to explore the module, chip, and the software on it, as well as to translate the Chinese documentation.

The ESP8285 is an ESP8266 with 1 MB of built-in flash, allowing for single-chip devices capable of connecting to Wi-Fi.

4.5 LED DOT MATRIX DISPLAY:

In a LED dot matrix display the LEDs are located at the column and row intersections of the matrix. LEDs in the same row are connected together as are LEDs in the same column. Figure 4.5.2 shows two common configurations for LED matrix displays. The display of dot matrix consist of a lights or mechanical indicators arranged in a rectangular configuration such that switching on or off certain set of light, text can be displayed. A dot matrix controller converts instructions from a processor into signals which turns on or off of lights in the matx so that the required text

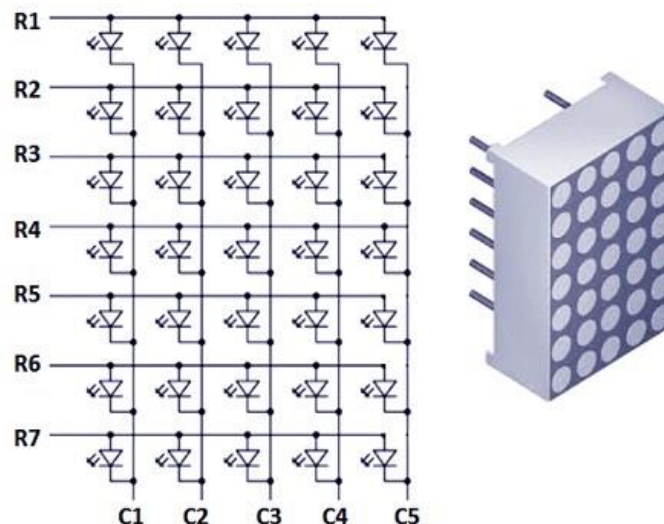


Figure.4.5.1. Inter-connection diagram of LED DOT Matrix

4.6 SENSORS:

A) piezoelectric sensors measure changes in pressure, acceleration, temperature, strain, or force by converting them to an electrical charge. The prefix piezo- is Greek for 'press' or 'squeeze'. They are used for quality assurance, process control, and for research and development in many industries. They have been successfully used in various applications, such as in medical, aerospace, nuclear instrumentation, and as a tilt sensor in consumer electronics or a pressure sensor in the touch pads of mobile phones.

In the automotive industry, piezoelectric elements are used to monitor combustion when developing internal combustion engines. The sensors are either directly mounted into additional holes into the cylinder head or the spark/glow plug is equipped with a built-in miniature piezoelectric sensor.

4.7 DATA ACQUISITION CARD NI USB-6210 :

16 AI (16-Bit, 250 kS/s), 4 DI, 4 DO USB Multifunction I/O Device—The USB-6210 is a multifunction DAQ device. It offers analog input, digital input, digital output, and two 32-bit counters. The device provides an onboard amplifier designed for fast settling times at high scanning rates. It also features signal streaming technology that gives you DMA-like bidirectional high-speed streaming of data across USB. The device is ideal for test, control, and design applications including portable data logging, field monitoring, embzed OEM, in-vehicle data acquisition, and academic. The USB-6210 features a lightweight mechanical enclosure and is bus powered for easy portability. The included NI-DAQmx driver and configuration utility simplify configuration and measurements.

Chapter 5

Software

1. Matlab
2. Arduino IDE software
3. Firebase Website

5.1 MIT App Inventor:

MATLAB (matrix laboratory) is a multi-paradigm numerical computing environment and proprietary programming language developed by MathWorks. MATLAB allows matrix manipulations, plotting of functions and data, implementation of algorithms, creation of user interfaces, and interfacing with programs written in other languages. Although MATLAB is intended primarily for numerical computing, an optional toolbox uses the MuPAD symbolic engine allowing access to symbolic computing abilities.

An additional package, Simulink, adds graphical multi-domain simulation and model-based design for dynamic and embedded systems. As of 2018, MATLAB has more than 3 million users worldwide.[16] MATLAB users come from various backgrounds of engineering, science, and economics.

5.2 Arduino IDE Software:

The Arduino integrated development environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in the programming language Java. It is used to write and upload programs to Arduino compatible boards, but also, with the help of 3rd party cores, other vendor development boards.

The source code for the IDE is released under the GNU General Public License, version 2. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from

the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub *main()* into an executable cyclic executive program with the GNU toolchain, also included with the IDE distribution. The Arduino IDE employs the program *avrdude* to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware.

5.3 Firebase Website:

Firebase Analytics

Firebase Analytics is a cost-free app measurement solution that provides insight into app usage and user engagement.

Firebase Cloud Messaging

Formerly known as Google Cloud Messaging (GCM), Firebase Cloud Messaging (FCM) is a cross-platform solution for messages and notifications for Android, iOS, and web applications, which as of 2016 can be used at no cost.

Firebase Auth

Firebase Auth is a service that can authenticate users using only client-side code. It supports social login providers Facebook, GitHub, Twitter and Google (and Google Play Games). Additionally, it includes a user management system whereby developers can enable user authentication with email and password login stored with Firebase.

Realtime database

Firebase provides a realtime database and backend as a service. The service provides application developers an API that allows application data to be synchronized across clients and stored on Firebase's cloud. The company provides client libraries that enable integration with Android, iOS, JavaScript, Java, Objective-C, Swift and Node.js applications. The database is also accessible through a REST API and bindings for several JavaScript frameworks such as AngularJS, React, Ember.js and Backbone.js. The REST API uses the Server-Sent Events protocol, which is an API for creating HTTP connections for receiving push notifications from a server. Developers using the realtime database can secure their

data by using the company's server-side-enforced security rules. Cloud Firestore which is Firebase's next generation of the Realtime Database was released for beta use. Firebase Storage

Firebase Storage provides secure file uploads and downloads for Firebase apps, regardless of network quality. The developer can use it to store images, audio, video, or other user-generated content. Firebase Storage is backed by Google Cloud Storage.

Firebase Hostin

Firebase Hosting is a static and dynamic web hosting service that launched on May 13, 2014. It supports hosting static files such as CSS, HTML, JavaScript and other files, as well as support through Cloud Functions.^[31] The service delivers files over a content delivery network (CDN) through HTTP Secure (HTTPS) and Secure Sockets Layer encryption (SSL). Firebase partners with Fastly, a CDN, to provide the CDN backing Firebase Hosting.

Crashlytics

Crash Reporting creates detailed reports of the errors in the app. Errors are grouped into clusters of similar stack traces and triaged by the severity of impact on app users. In addition to automatic reports, the developer can log custom events to help capture the steps leading up to a crash. Before acquiring Crashlytics, Firebase was using its own Firebase Crash Reporting.

Performance

Firebase Performance provides insights into an app's performance and the latencies the app's users experience.

Firebase Test Lab for Android And iOS

Firebase Test Lab for Android and iOS provides cloud-based infrastructure for testing Android and iOS apps. With one operation, developers can initiate testing of their apps across a wide variety of devices and device configurations. Test results—including logs, videos, and screenshots—are made available in the project in the Firebase console. Even if a developer hasn't written any test code for their app, Test Lab can exercise the app automatically, looking for crashes. Test Lab for iOS is currently in beta.

Chapter 6

6.1 Experimental result

Some of pictures while project is in process of each section.

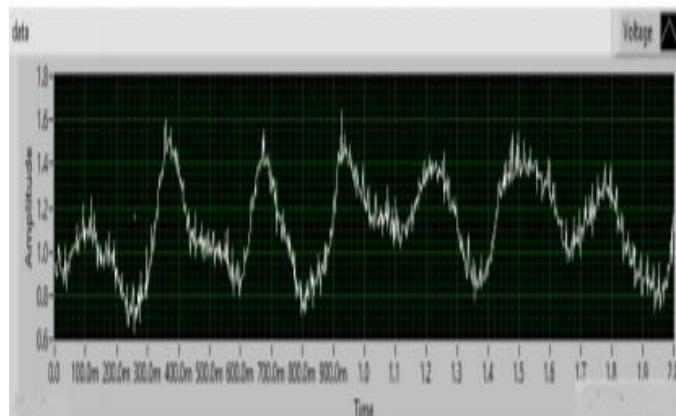


Figure 6.1.1` Raw Vata Signal

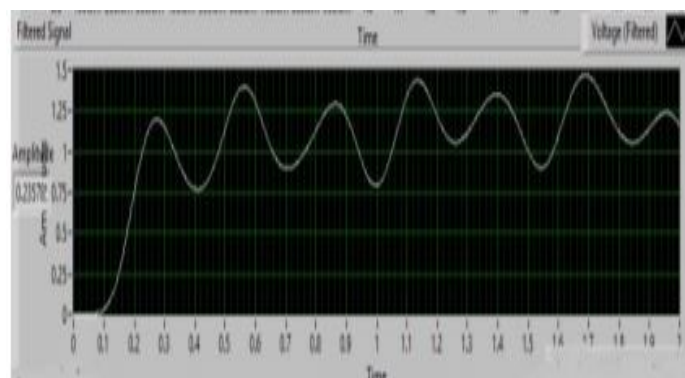


Figure 6.1.2 Filtered Vata Signal

Disease Diagnosis Using Computational Nadi Pattern

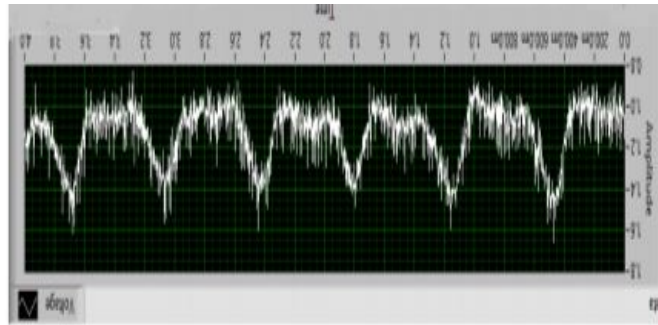


Figure 6.1.3 Raw Pitta Signal

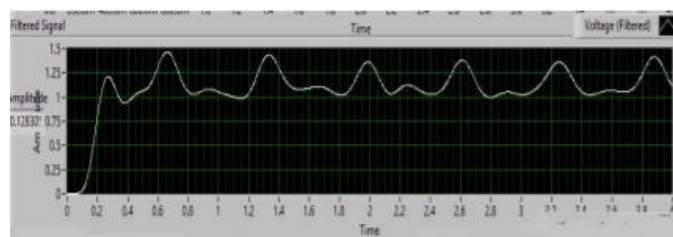


Figure 6.1.4 Filtered Pitta Signal

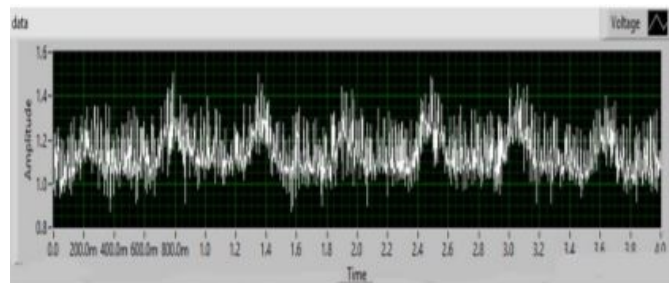


Figure 6.1.5 Raw Kapha Signal

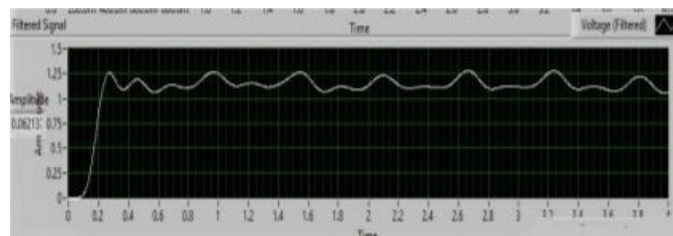


Figure 6.1.6 Filtered Kapha Signal

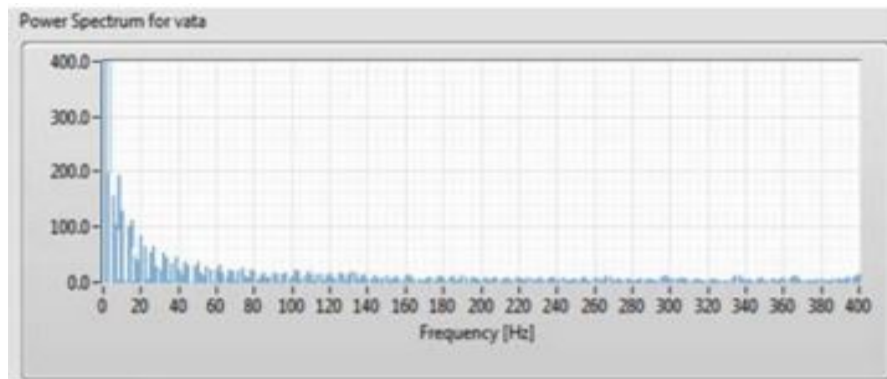


Figure 6.1.7 Power spectrum of the Vata signal

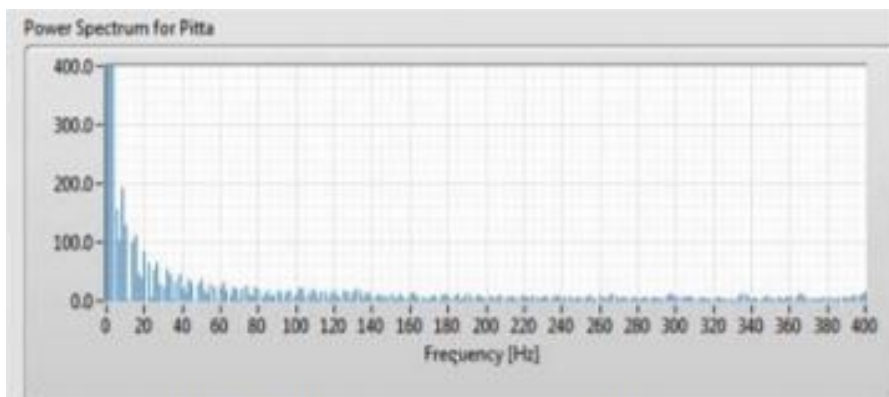


Figure 6.1.8 Power spectrum of Pitta signal

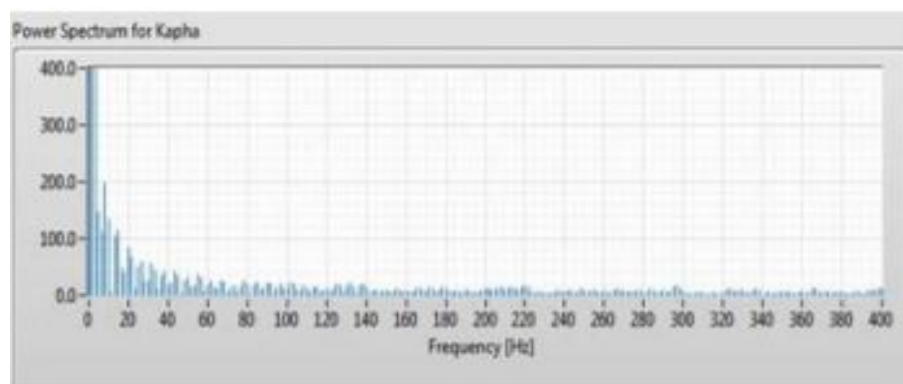


Figure 6.1.9 Power spectrum of Kapha signal

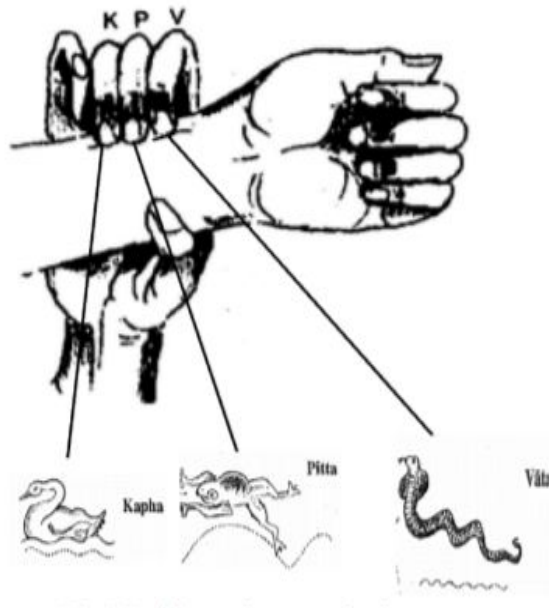


Figure 6.1.10 Position and nature of pulses

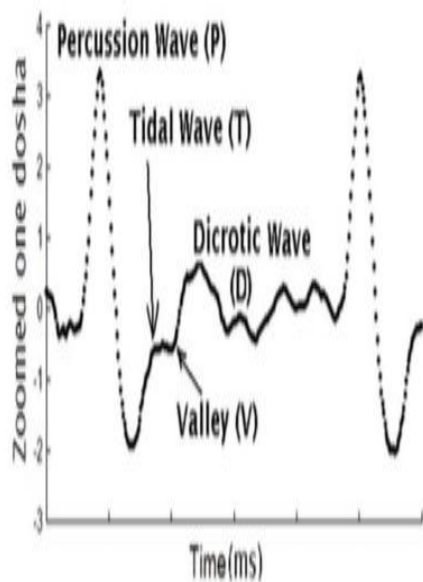


Figure 6.1.11 Standard radial pulse

Table 1. Approximate value for healthy and unhealthy person

Doshas	ApEn mean value		
	Vata	Pitta	Kapha
Healthy	0.2689	0.2523	0.2865
Unhealthy	0.1816	0.1856	0.1863

Figure 6.1.12 Approximate value for healthy and unhealthy person

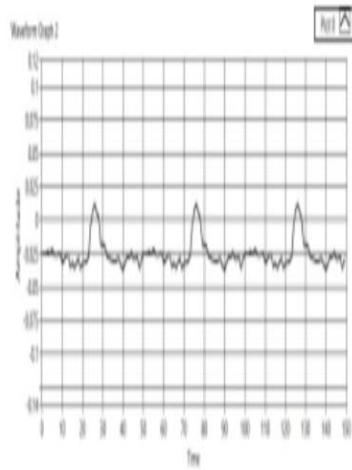


Figure 6.1.13 Simplified Vata Signal

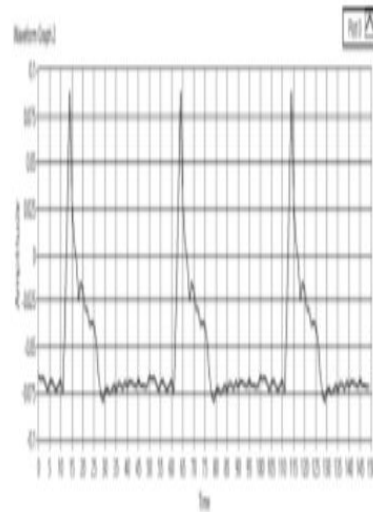


Figure 6.1.14 .Simplified Pitta signal

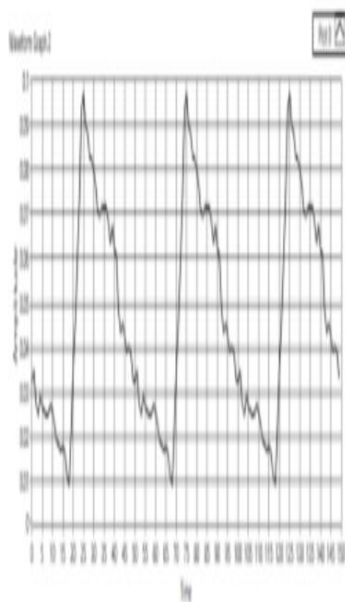


Figure 6.1.15 Simplified Kapha signal

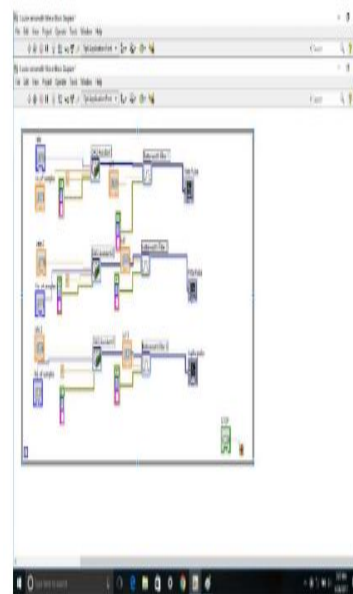


Figure 6.1.16 Matlab Filter

6.2 Actual Model



Figure 6.2.1 Actual Model Front View 1



Figure 6.2.2 Actual Model Front View 2

6.3 Practical Output of Applications

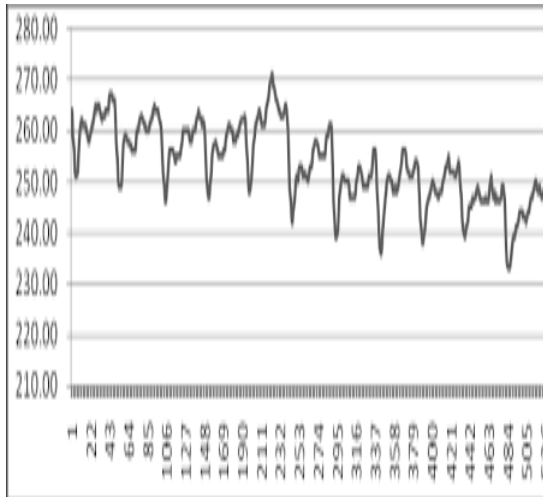


Figure 6.3.1 Detect Heart Disease using nadi pattern

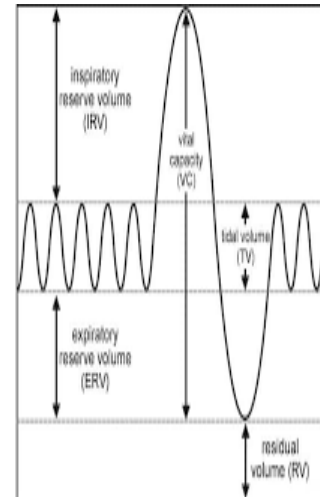


Figure 6.3.2 To detect Lung Disease using nadi pattern

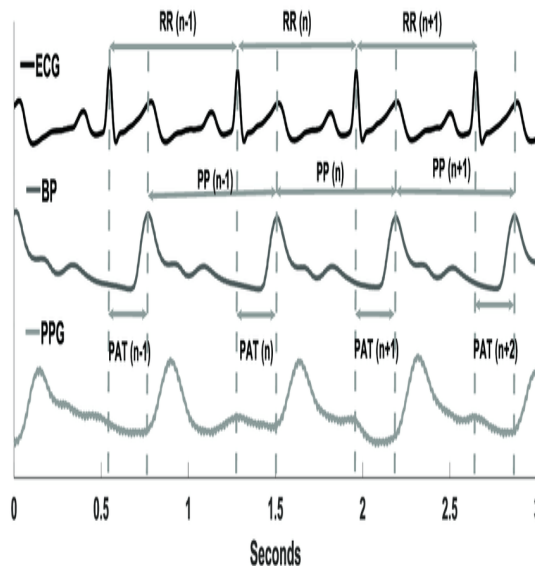


Figure 6.3.3 To Detect BloodPressure using nadi pattern

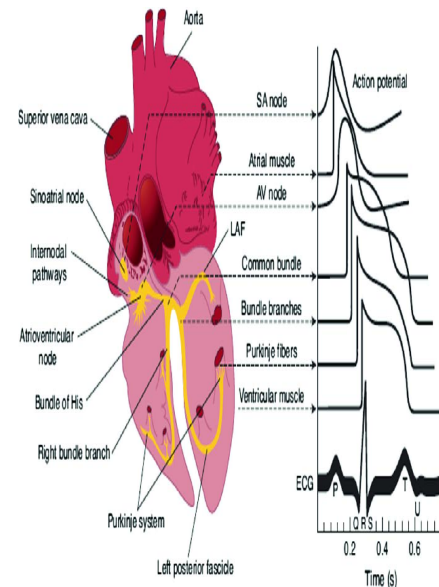


Figure 6.3.4 To detect diabetes using nadi pattern

Chapter 7

Applications

a) Medical Sector: Nadi Pareeksha is an ancient ayurvedic technique of diagnosis through the pulse. It can accurately diagnose both physical and mental diseases as well as imbalances. 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 forewarns you about potential health risks. It gives you an insight on how to optimize your health in accordance with the elements which are predominant in your body. It provides you with a personalized and individual prognosis which is detailed and accurate. 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. Doctors can point out the problems only after seeing the scans, x-ray or physical examination, but here the pulse points say it all. We can detect energy blockages through pulse points and that's how one can know what the problem is. The best time to check the pulse is in the early morning, physiologically the least active time of the day. Three fingers are used to check pulse points, the middle, index, and ring, with the index finger placed closest to the wrist crease. At first, the three positions are palpated simultaneously, initially, lightly, then with medium pressure, and finally more strongly. 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. A normal pulse is distinct, discernible to the fingertip upon medium pressure, and can still be palpated with the application of heavy pressure. The various kinds of nadi's, such as vata nadi, pitta nadi, kapha nadi, etc., which are named depending on the functionalities and behavior. Earlier, the experts (vaidyas) of Ayurveda were capable of diagnosing several physical and mental ailments only with the sense of nadi at the required pressure points of body without the help of any of the sophisticated equipments like stethoscope, sphygmograph, polygraph, or any other instrument or tests. But now even the modern vaidyas are showing interest to learn and to do the early detection of diseases using Nadi Pareeksha.

Disease Diagnosis Using Computational Nadi Pattern

Diagnosis of most of the diseases can be done using a suitable sensor based system which works on the principle of Ayurveda. Also, the diagnosis of a disease depends on certain specific parameters like blood viscosity, blood volume, etc. can be analyzed better by a specific kind of sensor. If the new technologies are used means high quality sensors which gives the noise free amplified signal and also the Raspberry pi module is used then the processing speed may increases

Chapter 8

Merits

- ▶ Wide range of applications in medical sectors
- ▶ reliable predictions
- ▶ Energy efficient and Low Cost
- ▶ Machine Learning can be used
- ▶ Quick prediction of Diseases

Demerits

- ▶ Only limited users can handle the Application
- ▶ High Speed data acquisition is required for proper Operation
- ▶ Only Predict Disease Related to Nadi Pattern
- ▶ Whole system depends on dataset of nadi patterns.

Chapter 9

Conclusion

Hence it can be concluded that “Nadi pareeksha” gives a new direction for the doctors for the detection of diseases in early stages. If it is properly applied for the detection of various diseases like diabetic and cancer, detection accuracy improves and as a result most of the people who are suffering from these diseases can be cured in early stages. But there are only very few researches done in traditional medical field due to lack of experts, domain knowledge, and generation gap. Within those limited research up to now there are no workable commercial products available in the world market. Still all systems are in the research level. So in here we have tried to design a suitable sensor based pulse detection system which works on the principle of Traditional Ayurveda Medicine. The diagnosis of a disease depends on certain specific parameters like blood viscosity, blood volume, etc. So according to our study these parameters can be analyzed better by a specific kind of sensor rather than any sensor. Up to now we have done sensor selection and came up to the level of identification of pulse patterns. In future we expect to extend this research to identify diseases using pre-identified wave patterns.

Chapter 10

Future Scope

Growth in Medical Equipment Market in India (2019-24)

The next phase for the Medical Equipment market will occur based on a few key improvements in the technology available in Automation, such as improvement in Disease Detection solutions as well as lowering of price points as the market begins to accept Detection on a single click and in an easy way usage in larger volumes. Some trends that we foresee for this phase of the industry are

1. Big companies will eventually bring out fairly mass-market automation products like 'Quick disease detecting devices' with appealing user interface but at a lower price point than today, and more people will be able to afford the products.
2. Solution offerings will slowly move to a more user-friendly design, where aside from a few key components, users will be able to buy and use the Automation products themselves without the aid of any technical expert.
3. The use of next generation disease detecting devices will also be available in few years at low price and convenient way.

Thus it can be concluded that diagnosis of most of the diseases can be done using a suitable sensor based system which works on the principle of Ayurveda. Also, the diagnosis of a disease depends on certain specific parameters like blood viscosity, blood volume, etc. can be analyzed better by a specific kind of sensor. If the new technologies are used means high quality sensors which gives the noise free amplified signal and also the Raspberry pi module is used then the processing speed may increase.

In future we expect to extend this research to identify diseases using pre-identified wave patterns

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