

DESIGN OF AN INSTRUMENT TO MONITOR PATHOLOGICAL DISORDERS USING LABVIEW

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Abstract

Acupuncture is an Ancient way of curing diseases by the use of needles. The Electro Acupuncture is same as that of the old, but in addition, the acupuncture points are stimulated by an external trigger pulse. In the early method of Electro Acupuncture only the treatment is give and monitoring of the pulses are done manually by a well-trained Acupuncture Therapist. The recent work of monitoring the acupuncture response is by means of EEG, EMG and ECG. Even the Pulses are monitored only for research purpose there is no separate instrument for Acupuncture Pulse monitoring. The Design of such an Instrument is helps the Therapist to have a permanent record of a Patient, This becomes a proof for acupuncture Treatment. The LabVIEW programming is done, this helps the user to interface the device to any computer and it is programmed and designed in a user friendly way for everyone to interact with it. The interface between the LabVIEW and the sensor is made by the Arduino Uno Rev3 board, which uses Atmel ATmega328p Microcontroller. The Pulse Generator is used to produce triggering pulse for Electro Acupuncture Treatment, which decreases the time period of Acupuncture Point Stimulation.

Keywords: *Piezo electric sensor; acupoints; pulse monitoring; Aurdino; LabVIEW*

1. Introduction

The Project is about Pathological Disorder Monitoring by means of LabVIEW using Acupuncture as a medium. A device is designed to monitor the pathological disorders associated with the organs, by means of Acupuncture Pulse Monitoring. Pathological Disorders are the problems arises in a human body, when an organ fails to carry on its regular work. The main cause is the lack of nutrients, metabolic activities, food style etc. The reason for the monitoring is to observe the activities of the organs. There are twelve major organs, which may undergo some sort disorder due to any cause. All the organs are inter related, so the improper function of any one organ may cause its effects on other organ and the series continues to affect the remaining organs.

The best way to lead a healthy life is to monitor the functions of the organs periodically and rectify the problems in it.

1.1 Need for the Device

There is no way that, all the people could learn about Acupuncture and to gain clear knowledge about the pulse condition. To rectify the problem, a preprogramed device can be designed to show the

pulses graphically and to display the condition of each pulse. In a way that a normal people can also check the organ condition and take necessary steps to rectify it.

1.2 About Acupuncture

Acupuncture is traditional way of curing the Disorders and Diseases. Acupuncture has got its credit because of its unique way of treatment. The basic concept of the Acupuncture are the Five Basic Elements which conquers the World. The Five Basic Elements are the source for Life. They are Metal, Earth, Fire, Wood, Water.

2. Ease of Use

There are some work done for creating the proof for Acupuncture, by the help of the ECG, the heart is monitored before and after the stimulus of the Acupuncture points and the results shows the effect of the Acupuncture in curing Heart disorders. There are some other proofs created for Acupuncture with the help of EEG and EMG, response of the muscles and the mind related problems respectively, due to the effect of Acupuncture.

3. Problem Formulation

3.1 Main Objective

The main aim of the project is to bring the Acupuncture Pulse Monitoring by means Electronic device and it should be universally acceptable by all. Hence to make the device user friendly.

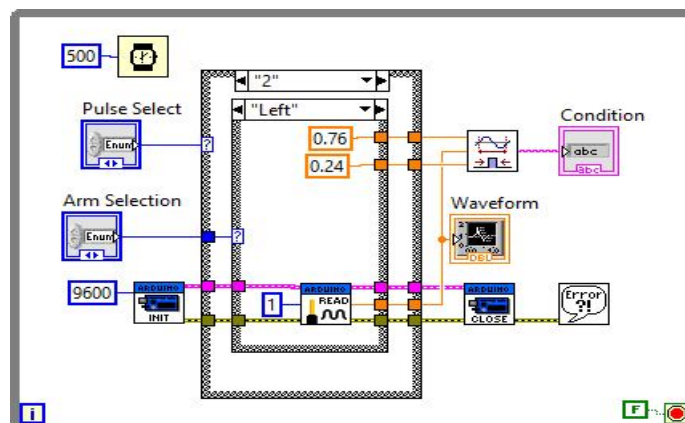
3.2 Specific Objective

The Lab View is used to monitor the Acupuncture pulse graphically. Hence the programming complexity is reduced and with this software the user can interact with the system easily. Arduino Uno R3 made the interface between the LabVIEW and the Sensor. Vibration Sensor is used to monitor the Pulse.

3.3 Methodology

The methodology deals with the various parts i.e. the Hardware and Software parts employed in the system.

3.1.1: Block Diagram



3.3.1.1 Description

The block diagram shows the various components of the System. The Piezo Electric Plate is used as the sensor, it is an Active Sensor. It produces output when it sentenced to vibration. Hence the mechanical vibration is converted to electrical energy. Then its output is fed as the input to the Arduino Uno R3 kit. The Arduino is pre- programmed in such a way that it can be interfaced with LabVIEW. The Universal Serial Bus (USB) port is used to interface the Arduino with the LabVIEW. The LabVIEW is programmed to acquire, analyse and display the Sensors output. The Pulse generator is also programmed using the LabVIEW, the generated output is available at the digital output port of the Arduino between D0 to D13, which can be wired to the Acupuncture needles.

3.12 Hardware Parts

The Hardware parts needed are as follows; A computer with LabVIEW installed. Piezo Electric Crystal. Arduino Uno Rev3 Board. USB Cable.

3.3.2.1 Computer

The computer should be in good configuration, with minimum of one USB port for interfacing. The Programming of LabVIEW takes higher processing rate, so the computer should have a sufficient processor, minimum of 2GB Ram and efficient free space in hard disk.

3.3.2.2. Piezo Electric Crystal:

Piezo Electric Crystal is a flat circular plate coated with Crystal at the Centre. The metallic plate is a Copper plate. The plate produces output when it meets any physical disturbances. So the vibration can be converted into electrical signals with the help of this sensor. The Acupuncture pulse is the vibration and the sensor can be placed over the pulse to acquire the signal.

3.3.2.3. Arduino Uno R3:

The Arduino Uno R3, is an open source, low cost device used to interface the sensor output to the LabVIEW. It Consist of a Type B USB female pin, a power port, Micro Controller Unit, Six Analog input pins (A0 to A5), Six Digital I/O pins, Six PWM pins and a Reset button.

A. Authors and Affiliations

Acupuncture in today's world play a vital role in curing any type of disorders, in a way that will not have any side effect on the patient. The way of the pulse monitoring is done by means of the Acupuncture Therapist, or the abnormalities are identified by means of ECG, EEG or EMG. The Therapist can only feel the abnormalities in the organ from the pulse, but for this there is a need for a special therapist.

When monitoring the effect of the acupuncture by means of ECG, EEG or EMG. The effect of the acupuncture on the organ can only be verified and a proof is created for Acupuncture Treatment. There is no system to monitor the Acupuncture pulse directly. The Electro Acupuncture pulse generator devices are present. It will produce pulsed electric signal as output, which in turn is connected with the needle which is pierced on the skin surface.

B. Figures and Tables

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Pulse No.	Element	Range	
		Maximum	Minimum
1	Metal	0.22	0.097
2	Earth	0.12	0.185
3	Fire 1	0.41	0.099
4	Fire 2	0.27	0.124
5	Wood	0.17	0.118
6	Water	0.14	0.095

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LabVIEW Programming

The LabVIEW program development environment is different from standard java or java development system in one important respect; while other programming system use text-based language to create lines of codes, LabVIEW uses a graphical programming language, often called "G" to create programs in a pictorial form called a block diagram.

Graphical programming eliminates a lot of the syntactical details associated with text based languages, such as where to put your semicolons and curly braces. Graphical programming allows one to concentrate on the flow of data within the application, because its simple syntax doesn't obscure what the program is doing LabVIEW uses terminology, icons and ideas familiar to scientists and engineers.

It relies on graphical symbols rather than textual language to define a program's action. Its execution is based on the principle of dataflow, in which function execute only after receiving the necessary data. Because of these features, one can learn LabVIEW even with little or no programming experience. However, knowledge of programming fundamentals is very helpful.

8.2.1 Blocks used and its Explanation

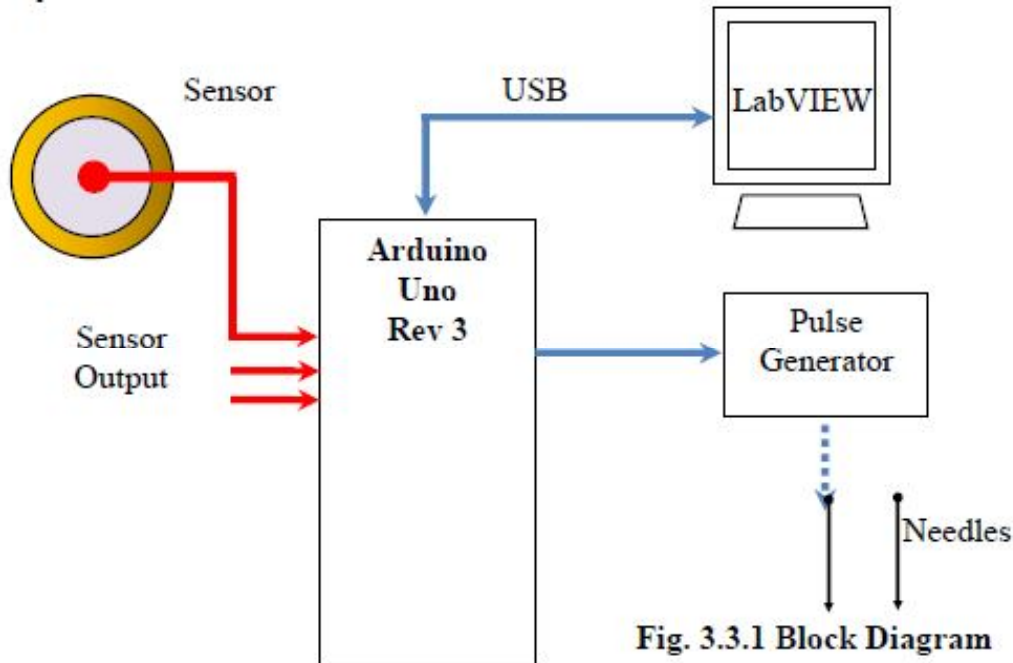


Fig. 3.3.1 Block Diagram

8.2.1.1 Arduino

These blocks are used in the System, The first is the Arduino Input Output Port Set Block, Arduino Initialize Block, Analog Read Port and Arduino Close Block. These block are used to acquire and send the signal, in and out of LabVIEW.

8.2.1.2 Enumerator Control

The Enumerator Control is present in the Ring & Enum of the Modern Tab in the Control Pallet of the Front Panel.

The Enumerator Control (Enum Control) have corresponding Numeric Values for the respective Strings. The numeric values starts from 0 to n-1. Here it is used to control the Case Structure and the Select for the pulse selection process.

8.2.1.3 Value Property Node

The Value Property Node is created by right clicking the necessary block, choose create and then property node in which the Value is Selected.

The Value Property node is used to make the Value of any block to be available to the necessary block without the use of direct wiring. Here the Value property nodes are created for the Pulse Select and Arm Select Enumerator Control.

8.2.1.4 Select

This block is present at the Comparison tab of the function Pallet of the Block Diagram Window. This block has three input and one output. The input 1 & 3 are the values to be available at

the output, the input 2 is used to select the particular input and give it as the output. This block is used in various part of the System for Selection of Various Elements.

This block is present at the Comparison tab of the function Pallet of the Block Diagram Window. This Block has two inputs and one Boolean output. When the two input are same the output is true, or else the output is false. The comparison mode of the block can be changed.

8.2.1.6 Enumerator Constant

The Enumerator Constant is present in the Programming, Numeric Tab in the Function Pallet of the Block Diagram Window.

The Enumerator Constant (Enum Constant) have corresponding Numeric Values for the respective Strings. The numeric values starts from 0 to (n-1). The Enum Constant is only visible in the Block Diagram.

8.2.1.7 String Constant

The String Constant is present in the Programming, String Tab in the Function Pallet of the Block The String Constant is used to supply the constant string value to the other blocks. Here they are used as the input to the Select, to display the element type of the Pulse.

Conclusion and Future Work

The project “Design of an Instrument to Monitor the Pathological Disorder using LabVIEW” is working successfully and getting the output for the respective pulse condition. In future work, this project can be added with some additional features like the Acupuncture points data base, location of the Acupuncture points and the details about the Acupuncture Points.

Regarding the programming of the project, in future, it can be made to monitor all the Acupuncture at the same time and display them in a single graphical indicator, the documentation and report generation can be added to it. And so it can be made similar to ECG or EEG. Thus a new device is invented to monitor the Acupuncture pulse for guiding many people to lead a healthy life, by knowing their body condition themselves.

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