

Enhancement of the Reflexology Regimen as User Friendly



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ABSTRACT: *Stress is a ubiquitous thing faced by many individuals in the society in these newfangled days. As the days slip by we see people feel overwhelmed because of the impact of the habits followed by them in this hustle and bustle lifestyle. The main reason is poor stress-relief mechanisms. The recent drugs and chemical solutions which are being prescribed to overcome the impact of stress on the human body are in vain in most of the occasions and further leads to innumerable side effects. The term acupressure is used to report a kind of medication which is being provided to cure various afflictions by applying a manual pressure to stimulate the acupressure points in the body along which the flow of energy occurs. Each time consumers need to get an appointment and wait for it wasting their precious time and in conjunction with it, the methodologies used for the treatment now-a-days are not automated i.e., they are done manually with the help of ancient designs and the patients always need the help of an authorised healer who can do acupressure. The proposed work presents the design of an embedded based acupressure tool which can be used instead of existing acupressure tools for the treatment. The design represents a new contribution to the field of reflexology. In this scheme the acupressure points on the hand are considered. It allows the user to undergo the acupressure treatment in their residence under their own steam. The working of the proposed scheme for different stimulating numerous acupressure points in the hand have been satisfactorily demonstrated and the corresponding results are provided.*

Keywords: Acupressure, solenoid, gloves

I. INTRODUCTION

Stress is a ubiquitous thing faced by many individuals in the society in these newfangled days. As the days slip by we see people feel overwhelmed because of the impact of the habits followed by them in this hustle and bustle lifestyle. The chief reason is poor stress – relief mechanisms. The recent drugs and chemical solutions which are being prescribed to overcome the impact of stress on the human body are in vain in most of the occasions and further leads to innumerable side effects. Fortunately the human society is adored with an old-fashioned Chinese practice of manual therapy called acupressure treatment. We have come up with a new automated technique for acupressure treatment.

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The term acupressure is used to narrate a kind of treatment which is being provided to cure various plagues by applying a manual pressure to stimulate certain points on the body along which the flow of energy occurs. Research says that our body has meridians which mean invisible lines of energy flow.

Our body has 14 meridians connecting our organs with other parts of the body. It is believed that the acupressure points lie on the invisible lines of energy flow. If there exists any trouble in the flow of energy, it's thought to cause various symptoms and health conditions anywhere along the meridian.

To overcome the above hinted problem we go for a ministrations in name of acupressure where the travails are taken to pull out the blocks that are devised in the flow of energy. Most people try acupressure for Headache, Menstrual cramps, Motion sickness, Muscle tension, Nausea, morning sickness and Stress management.

Thus acupressure was found to be worthwhile in bringing down the pain intensity. Each one of the acupressure points that is present along the energy flow is associated with the vital organs present in our body. Along with its potential to assist, treat diversity of infirmity, patients acquaintance with ancillary benefits of acupressure reflexology. It's a deeply relaxing escapade and like other types of escapade can help with:

- ❖ Relieving the stress, tension and anxiety
- ❖ Improving sleeping tendency
- ❖ Relaxing the muscles and joints
 - ❖ Reducing the pain and discomfort of a sports or other injury
- ❖ Reducing the digestive issues
- ❖ Minimizing the headaches
- ❖ Alleviating the chronic pain

The remedy helps in the stimulation of the body's circulatory, lymphatic and hormonal systems. It additionally helps in the activity of the immune system and the body's natural ability to salubrious itself.

The acupressure is done manually by using fingers, palms, elbows or feet of practitioners or special devices like Wooden Acupressure Hand Roll Soft, Acupressure Magnetic Twister to apply pressure to acupoints presents in the body's meridians. Sometimes acupressure treatment also involves stretching of the acupoints. Drawbacks that exist in the conventional procedure are that they need man power which is in great demand in the acupressure field nowadays. There always exists a reduction in the percentage of accuracy in most of the works handled by the manpower.

Sometimes people miss their appointments for the treatment and hence they need to wait till the next

routine arrives. Though the acupressure is a trending one, it doesn't get automated. Now-a-days most people motivate themselves to follow "do by myself" methodologies. The main motive of the project is to overcome the drawbacks that exist in the present acupressure treatment field and replace the old-fashioned tools with an automated acupressure tool and to increase the comfortness of the patients during the treatment process. This is achieved by making use of electromagnetic solenoid which get controlled via the embedded tool

II.LITERATURE SURVEY

S. Chandrasekar, Abisha. S, Elanchezhian. M, Jeysankar. M in their paper entitled "Design an Electronically Controlled Cushion for Acupressure Therapy" (2018 IEEE INTERNATIONAL CONFERENCE ON CIRCUITS AND SYSTEMS IN DIGITAL ENTERPRISE TECHNOLOGY (ICCSDET)) explain about their electronically designed acupressure kit that uses the mechanical output of the motor to operate a sleeve that in turn pushes the wooden blocks up and down. These wooden blocks are located exactly below the acupressure points when the human hand is placed above it. Using this kit the acupressure treatment can be done for a patient but without any time limit. All the acupressure points are stimulated without consideration about the organ for which the treatment needs to be carried out. The controlling option is fully done by making use of the pic microcontroller and a relay setup.

Gan-Hon Lin, Wei-Chun Chang, Kuan-Ju Chen, Chen-Chen Tsai, SungYuan Hu and Li- Li Chen in their paper entitled " Effectiveness of Acupressure on the Taichong Acupoint in Lowering Blood Pressure in Patients with Hypertension: A Randomized Clinical Trial"(EVIDENCE-BASED COMPLEMENT ALTERNATIVE MEDICINE . 2016 ; 2016: 1549658)

prove by survey that the blood pressure can be reduced immediately by undergoing the treatment continuously for a period of half an hour by applying pressure at the points associated with the blood pressure. It further includes the details of the survey which was conducted between August 2012 and January 2013 which includes the participation of 80 patients and also provided the medical report related to the patients involved before and after the survey. It also includes the Comparison of Effective Characteristics of Acupressure in the Experimental and Control Groups.

Yingbao Zhao, Xue-Ling Song, Chao-Ying Liu, Zhe-Ying in their paper entitled "Solenoid Valve Response Time Test System Based On Single Chip Micro-Computer"(SONG- 2009 INTERNATIONAL CONFERENCE ON

INTELLIGENT HUMANMACHINE SYSTEMS AND CYBERNETICS) give numerous details regarding solenoid related operations and various techniques involved in it. It enriches us with the details of how the solenoid responds to the time based operated system like

single chip Micro- Computers. It helps us to analyse the sensitivity of the solenoid in response to it's time of operation and also helps to decide the type of solenoid that can be made used in particular application depending on the level of sensitivity requirements and specifications. It also enriches us about the methodology used in detecting and selecting the solenoid of various types and also provided us with the report on the sensitive operation of the solenoid

Traditional and Complementary Medicine Division. Ministry of Health Malaysia; 2011. Practice Guideline on Reflexology for Reflexologist Practicing in Malaysia. acknowledge us about the prerequisites that should be carried out before starting the process for treatment such as food habits showering techniques and he process of rehydration it also acknowledges us with the technique to be followed as a prerequisite as most of the traditional methods like yoga has some exercises to be done before the beginning of the performance of ashanaa. It also enrich us with the contradictions and side effects in the traditional method of reflexology treatment. It also helps in identifying the recovery for the side effects that may arise due to acupressure at certain unusual cases. It also provides a details about some of the special techniques used in Malaysia

Kunz K. , Kunz B. in their paper entitled " Understanding the science and art of reflexology " (ALTERNATIVE COMPLEMENT THERAPIES.

1995;1:183–186) tells about what does an american thinks about reflexology and his way in making it get reached by the common people in America. It tells that the network of community sanctioned reflexology practitioners has been developed over a period of decades. In general American uses reflexology as the natural solution for tired feet, assessments and body awareness. Therapeutic use has been sustained in the reflexology community by anecdotes noting responses to reflexology treatment. Further practice in the reflexology treatment evolves from the reflexology theories. It also adds that the chinese government is working to create a community wide practice of reflexology.

Xavier R. in his paper entitled Facts on reflexology (foot massage) (Nurs JIndia. 2007;98:11–12.) and in addition to that Cade M. in his paper entitled "Reflexology" (Kans Nurse. 2002;77:5–6) also suggest the details about the reflexology treatment and various facts related to reflexology regimen in detailed and highly advanced manner.

III.PROBLEM STATEMENT

The usage of medicine in the form of drugs does not fit every person. Sometimes heavy dosage of the drugs leads to severe side effects .There also exist few diseases for which curing of disease via the medicines is very difficult. Such diseases can be cured via the Acupressure treatment. Despite the benefits behind the Acupressure treatment there exists a drawback in the treatment which makes it quite unpopular .

The main drawback is that it needs man power to implement the acupressure techniques. Carelessness of therapists may lead to severe impact on the patient’s health. Moreover the instruments used for the treatment many times do not produce accurate results. It is the time we look for an alternate solution in which we can undergo acupressure treatment without man power and high range of accuracy. In order to achieve this goal one of the solutions that can be provided via the engineering technology is automation of acupressure treatment .The idea of the project is to design an automated electronic acupressure kit and to make it available for a lower cost.The 10 vital acupressure points in the hand are taken into account .The too and fro motion needed for the acupressure treatment is planned to be provided via the electromagnetic solenoid which is being made to fit into the purposefully designed gloves .The two level of

IV.PROPOSED WORK

The proposed project involves the following works needs to be carried out such as deciding the vital Acupressure points need to be taken into account, the flow of the process in order to make it more user friendly, implementing the process in the form of block diagram and further to design a circuit diagram which act as the blueprint of the project and proceeding with the hardware implementation of the project.

V.TAL ACUPRESSURE POINTS

Since most of the acupressure points get located in the hand of the human body, the acupressure point at hands are considered.The following image indicates the 10 most vital points at hands that were taken into account for the project. control ie being established via the purposefully selected embedded system

VI.PROCESS FLOW

As soon as the process is started the user has to choose the organ that needs to undergo the acupressure treatment and once the organ is chosen further selection of level of treatment is chosen i.e., to choose among the options low , medium and high. The option to exit from the treatment is provided by press the reset button. The below flow chart indicates the flow of processes involved in the operation of the acupressure tool.

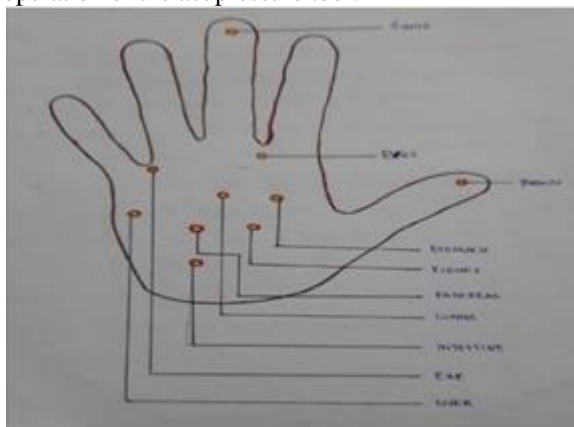


FIGURE 7.1

VII.BLOCK DIAGRAM

The block diagram that describes the acupressure tools (Enhancement of the reflexology regimen as user friendly) is shown below.

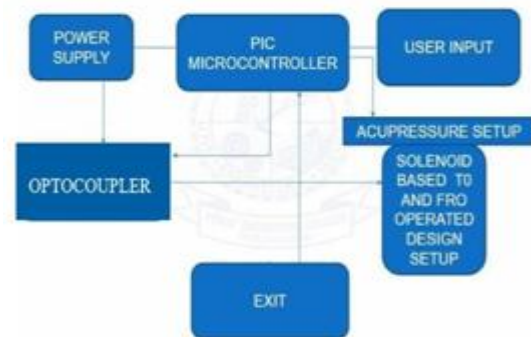


FIGURE 8.1

It consists of power supply, pic microcontroller, user input, relay, acupressure setup consisting of solenoid based to and fro operated design setup and finally exit block . The power supply is provided in order to operate the PIC microcontroller optocoupler and the solenoids connected with it. The supply from AC is stepped down by the transformer as per the requirements and energizes the PIC microcontroller circuit which acts as an interface between the user and the kit and a relay circuit that helps in operating the solenoid driven acupressure setup. The PIC microcontroller acts as the power source and the controlling unit for the entire acupressure tool. It interfaces with the user via LCD display and the pushbuttons. It operates the required solenoid based on the decision taken by the user and the logic programmed in it. The user input is provided via the push button by the patients. It is the duty of the patient to help the microcontroller in operating the required solenoid and also to choose among the options provided which determines the intensity of pain.

Optocoupler is used as a switching device to provide isolation between low and high voltage circuits. Whenever it receives the signal from the microcontroller it act as a driver circuit and transfers the supply to the solenoid and makes it start functioning.

A. ACUPRESSURE SETUP

It consist of a hand shaped newly designed gloves (customized one) into which the solenoid is incorporated at the required acupressure points in such a way that when the solenoid get operated , the piston like structure comes out and strikes at the required acupressure points.



FIGURE 8.2

VIII.CIRCUIT DIAGRAM

The circuit connections are given as per the circuit diagram given below

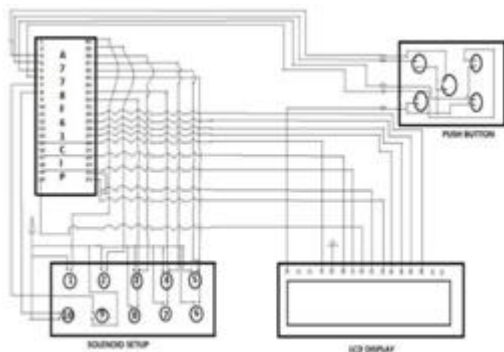


FIGURE 9.1

The four pins of the port A of the PIC microcontroller are connected with four push buttons which are being used to select the required operations. The pins A5 and E0 and eight pins of the port B of the PIC microcontroller are connected with ten solenoids. The interface between the LCD display and the PIC microcontroller is established by connecting the data pin of LCD display with the PORT D of the PIC microcontroller the enable pin and RS pins are connected with pin C0 and C3 respectively and the pin RW is grounded.

IX.HARDWARE COMPONENTS

A. PUSH BUTTON

The four push buttons are numbered as 1, 2, 3 and 4 respectively and soldered on a single piece of board and their corresponding positive terminals are taken individually and their negative terminals are connected together and taken out as a single terminal. Now the positive terminal of the push button numbered as 1 is connected with the pin A1 of the port A of the PIC microcontroller.



FIGURE 10.1

Similarly the positive terminal of the push buttons 2, 3 and 4 are connected with A2, A3, and A4 respectively. The purpose of the push button 1 is to switch on the whole setup. As soon as the push button 1 is pressed the quote “ACUPRESSURE TREATMENT” will be displayed on the LCD display. The purpose of the push button 3 is to display the various possible parts for treatments. The purpose of the push button 4 is to choose the required parts. The purpose of the push button 2 is to choose among the level of operation.

B.THE DESIGN OF A CONE SHAPED STRUCTURE:

A cone shaped structure designed using the plastic for the purpose of insulation above which a blunt metal needle like structure is placed on the solenoid which in turn strikes the human hand when the solenoid gets operated. The dimensions of the cone shaped structure is as shown below

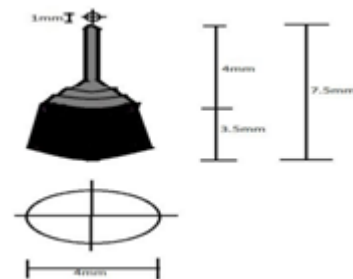


FIGURE 10.2

C. PIC MICROCONTROLLER

The PIC microcontroller used here is PIC 16F877A. The pins of the PIC microcontroller that are used for the project are A1, A2, A3, A4 for the purpose of push button interfacing. The pins A5, E0, B0, B1, B2, B3, B4, B5, B6 and B7 are used for operating solenoids. The command given via the PIC microcontroller is used to switch on and off the relay continuously.



The pin D0, D1, D2, D3, D4, D5, D6, D7, C0 and C2 are used for the connection of LCD display.

The single phase AC supply from the mains is stepped down via step down transformer and is

given to the voltage regulator where the voltage is finally converted to 5 volt which is sufficient for operating the microcontroller. The program required for the operation of the pic microcontroller is dumped using the universal dumping kit which is readily available at the corresponding laboratories. The above image shows the image of the PCB board which includes PIC16f877A fixed on the IC base. The board comprises a crystal oscillator which is the heart for the operation of the PIC microcontroller and a pair of capacitor connected to the terminals of the crystal oscillator and a voltage regulator connected to the board for the purpose of regulating the voltage.

D. SOLENOID:

A pair of five solenoids is connected with the pins B0, B1, B2, B3, B4, B5, B6, B, A5 and E0 of the PIC microcontroller respectively. The 5 pairs of solenoids are operated as per the selection of human parts by the user through the push button. As per the program dumped the solenoid operates as soon as the trigger pulse obtained from the microcontroller. The microcontroller generates the trigger pulse as soon as the push button gets operated by the user.



FIGURE 10.3

The relay is switched on and off simultaneously without time break to meet the requirements. The period for which the relay gets operated is based upon the selection of choice among low, medium and long. The relay after connection with the PIC microcontroller is placed inside a cup like structure closed using the hook below which the glove like designed cloth is placed inside which the human hand will be inserted for the acupressure treatment.



FIGURE 10.4

The above image indicates the testing of solenoid by applying voltage using regulated power supply

X.HARDWARE IMPLEMENTATION AND EXPERIMENTAL RESULTS

The single phase supply from the main is stepped down via the step down transformer. The supply from the transformer is regulated via the voltage regulator and the voltage of 5 volt from the voltage regulator is given to the PIC microcontroller. A parallel connection from the regulated supply is given to five pair of solenoids which are connected parallel with each other. The following image describes the various locations at which the solenoids are located. The solenoid is driven by the PIC microcontroller via the driver circuit made of optocoupler circuit. The solenoid is fixed to the gloves like structure which act like a skeleton of the entire setup.

The interfacing with the LCD display and push buttons with the PIC microcontroller was done successfully. During the period of operation the user selects the part for which the treatment has to be done and also the duration for which the treatment has to be done. After consolidating the acupressure doctor the following table has been prepared which indicates the period of time for which the treatment needs to be carried.

SLNO	NAME OF THE LEVELS	TIME SPAN(SECONDS)
1	LOW	60
2	MEDIUM	140
3	HIGH	175

The solenoid which has been triggered by the pic microcontroller is operated and the acupressure treatment is carried out.

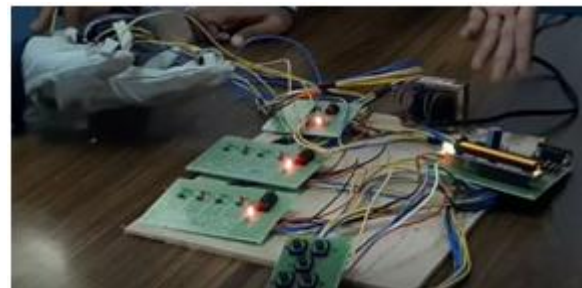


FIGURE 11.1

XI.CONCLUSION

On the whole the product is developed for the well being of the people who has been constantly under the work pressure and many minor health issues. This helps them to overcome our stress at any places anywhere and anytime. The use of embedded based acupressure kit provides high efficiency, increases the comfortness for the patients, save their time by preventing their visit to the hospital frequently.



The to and fro motion of the solenoid has been controlled which performs the acupressure operation. The hand fit glove helped us to achieve the objective of creating a user friendly acupressure setup. Two pairs of push buttons helped us in achieving the goal of establishing the communication between the human and the microcontroller for the purpose of choosing the acupressure points. The program behind the microcontroller setup is built up in such a way of operating the microcontroller so that only the selected parts of the body's acupressure point alone finally get simulated. The cone shaped setup attached at the Centre part of the solenoid provides the feel of pressure at the respective acupoints without causing harm to the patients. The whole glove based setup is a customized one and it can be altered and designed as per the requirements of the customer. In future the whole setup can be further updated and its performance can be improved by making use of highly enhanced technologies such as image processing in which the point can be automatically detected once the human hand has been placed on the predesigned structure.

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