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A Foot Print Recognition System for Diabetic Patient

G.Vijayakumari¹, D. Bhaskaran², D. Prabhakaran³, K. Sathish⁴

¹Assistant Professor, Department of ECE, New Prince Shri Bhavani College of Engineering and Technology, Chennai, India

²³⁴UG Student, Department of ECE, New Prince Shri Bhavani College of Engineering and Technology, Chennai, India

ABSTRACT: A quantitative analysis of gait is used in clinical application to make several decisions on treatment. Foot is the important part in our body which provides the functional ability of walking. The foot for diabetic patients are majorly attacked by the neurovascular complications which results in high pressure development in hands and foot. The designed prototype which continuously monitors pressure level of the foot so whenever the pressure level is not equal on the fore and hind foot its automatically stabilized giving vibration to the foot & to measure the heart beat rate for the continuous monitoring of paralysis attack patients while they do exercise. All the parametric values are continuously monitored in smart phone via Bluetooth using Bluetooth module

KEYWORDS: Foot pressure, heart rate, Bluetooth module, Smart phone.

I. INTRODUCTION

The ability of a walk is an essential motor function for normal to transport them from one place to another. A healthy manner of walking is required of nearly all persons on a daily basis, and can be necessary for employment, recreation, and general movement [1]. Due to the functional importance of walking, consideration must be given to the treatment and remediation of disorders which results in the inability to walk properly and without difficulty. There are many different methods for evaluating and diagnosing gait (A person's manner of walk) problems, with different classifications for effect of the disorder based on the level of functionality as compared to a healthy persons manner of walking.

Proceeding from the earlier diagnosis methods, specialized treatment techniques have been established and are used by clinical therapists to correct the abnormality. The main aim of rehabilitation is to enhance the walking ability of the patient to a level, where they are able to perform the normal locomotive functionality and are not at risk for subsequent health defects.

Quantitative gait analysis - a method by which human locomotion is quantitatively characterized using equipment that captures kinematic and kinetic parameters - is a powerful tool for physicians treating patients with gait disorders. Gait analysis allows for more accurate diagnoses than those performed through observational evaluation and might lead to superior functional outcomes by informing treatment decision-making. Unfortunately, expensive laboratory equipment (namely, camera-based motion capture systems and instrumented walkway devices) and time-consuming data analysis lead to high procedure costs which many insurance providers do not cover; therefore, quantitative gait analysis is not widely used. The methods deployed for measurement of gait parameters.. With the introduction of Sole Sound could be efficiently used as a tool for clinical gait analysis outside the laboratory setting [1].

Home-made sensing composite, Matrix of electrodes, Electronic system, which provides low cost Flexible High accuracy but not stable for long time [2].

A high-spatial-resolution, flexible system enabling extreme wide-dynamic-range pressure measurements with different sensing elements, and suitable for both platforms and low-cost sensing insoles embeddable into normal shoes. Experimental tests and comparisons adopting an in-house developed piezoresistive substrate [3].

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II. IMPLEMENTATION METHODOLOGY

In this design the pressure level from the fore foot and hind foot is continuously monitored using force sensitive resistor(FSR) shown in fig 1 Force Sensing Resistors, or FSRs, are robust polymer thick film (ptf) devices . This force sensitivity is optimized for use in human touch control of electronic devices such as automotive electronics, medical systems, and in industrial and robotics applications. FSRs, that allows us to measure the physical pressure it is basically a resistor the pressure values are measured based on the force applied to it .It is basically a resistor in which change in resistor is based on how much we pressed. When no pressure is applied it acts as an open circuit and exhibits as an infinite resistance based on the amount force applied its resistance value changes Fig 2 shows the graphical representation of change in resistance accordance to the force applied its shows that resistance decreases as the amount of force applied is increased



Fig.1. Force sensitive Resistor

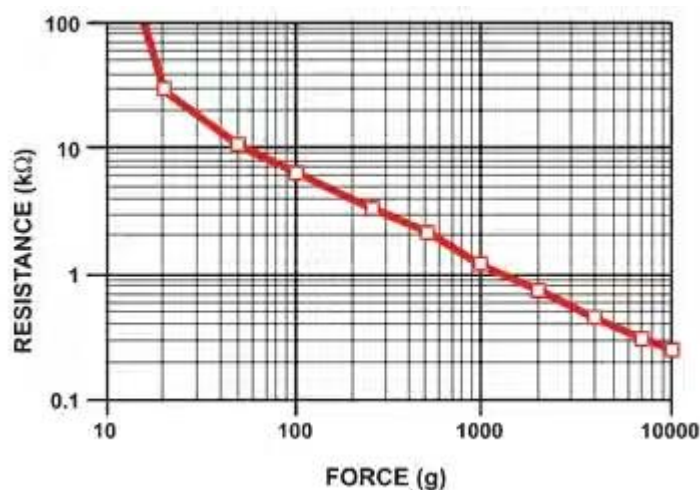


Fig.2. Resistance at different force level

The heart beat rate for paralysis attacked patient continuously monitored using heart beat sensor shown in fig 3 The sensor consists of a super bright red LED and light detector. The LED needs to be super bright as the maximum light must pass spread in finger and detected by detector. Now, when the heart pumps a pulse of blood through the

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blood vessels, the finger becomes slightly more opaque and so less light reached the detector. With each heart pulse the detector signal varies. This variation is converted to electrical pulse. This signal is amplified and triggered through an amplifier which outputs +5V logic level signal.

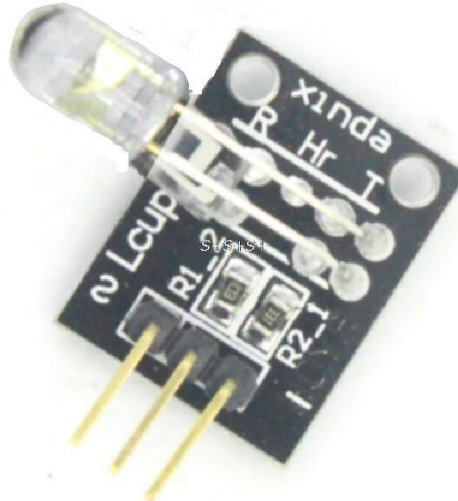


Fig.3. Heart beat sensor

As evaluating the pressure of the foot whenever it indicates the high pressure on the foot causes nerve damage which can ultimately lead to amputation or ulceration. Vascular and neural diseases are closely related. Blood vessels depend on normal neural function, and nerves depend on adequate blood flow. A person with diabetic neural dysfunction would also have Microvascular dysfunction. The pressure from the fore and hind foot has to be same if there is variation in the pressure it indicates there is no adequate blood flow through the neural networks in the which ultimately cause the persons inability to walk as a result. As a remedy, sending imperceptible vibrations through the feet of diabetics and stroke patients significantly stabilize the damaged nerves and stimulate blood flow. This system is also useful for the paralysis patient for continues monitoring of the foot pressure level in training.

The heart of this system is Microcontroller Launchpad which has the FSR and heart beat sensor interfaced with it. Actually the sole is said to be divided into two half first is fore foot section and second is hind foot section. The data are sampled from the insole sensors by the microcontroller. The System layout is shown in fig 4 This module is capable of wireless serial data transmission and receipt when paired with feedback application with smart phone via Bluetooth. If there is a unusual in the pressure vibratory motor provides the vibration to stabilize the pressure.

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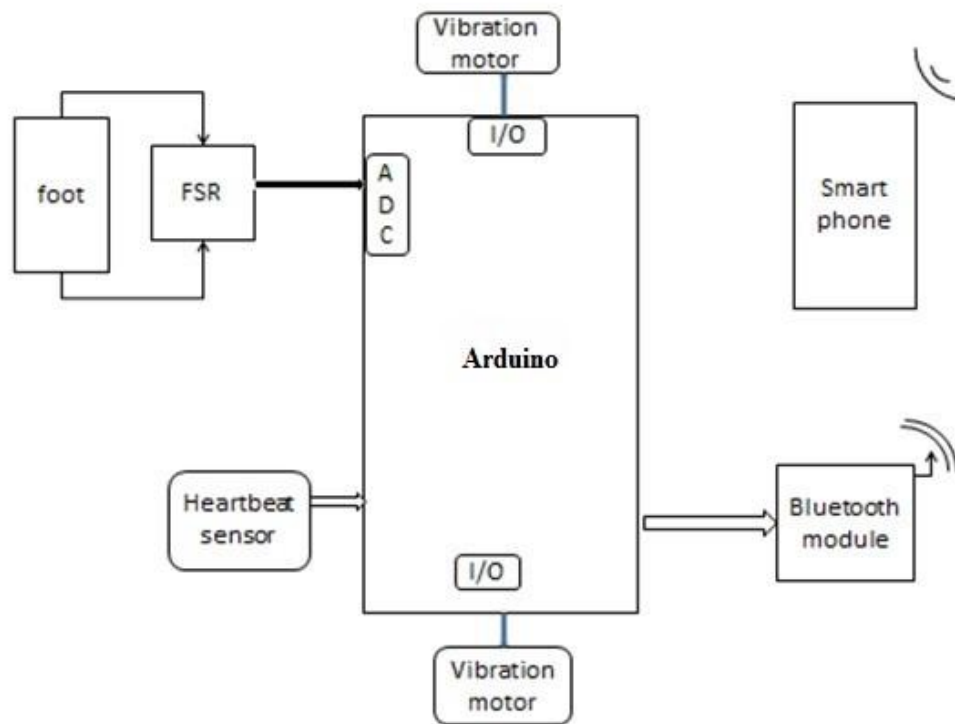


Fig.4. System Layout

The collection data is said to be done in the smart phone and it is analysed with the general gait data of a healthy person. The doctor can monitor the patient's gait movement from his cabin, and also gather the results simply through smart phone using android application.

III. RESULT AND PERFORMANCE ANALYSIS

Our proposed system is to design and build a low-cost foot pressure and foot movement analysis and blood flow stimulation system, and to measure the heart beat rate in which a patient can wear as it is available to fit in a normal shoe to monitor his or her foot pressure distribution to identify the abnormality in the foot section as soon as possible.

To improve the blood flow Vibrating Motors that stimulate the neural networks in the foot section by vibrating in different voltage level that can be configured individually, started and stopped by the user using the handheld touchscreen unit. Collect data from foot pressure sensors and foot motion sensor and periodically transfer this data to the handheld for future reference or for an analysis by a doctor.

IV. CONCLUSION

This project not only enables measure and detection of abnormalities but also provides treatment and remedy method of Diabetic Neuropathy which is a serious medical disorder. Equipment to measure foot pressure distribution is either too high cost or requires large space. The system design in our project is such that the sensors and actuators can be fitted within the shoe unit and the monitoring unit a simple handheld device. Thus our project is low cost high flexibility. As in this paper the monitoring module has a short range of communication we have enhance for long range of communication so that they can doctors can monitor anywhere muscle contraction is also major problem for

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paralytic attacked patients we have to enhance for our prototype to enhance the feature of muscle contraction monitoring

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