IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

SMART SOLE FOR POSTURE CORRECTION OF THE BODY

[1]Dr.Kavitha C, [2]Thrambadia Vishal, [3]Yuvraj Rai

[1]Head of Dept of CSE, [2]Computer Science Student, [3]Computer Science Student

[1]Department of Computer Science and Engineering,

[1]Dayananda Sagar Academy of Technology and Management, Bangalore, India

Abstract: This essay presents the current innovation, which pertains to smart sole shoes for correcting human posture, consists of a microprocessor inside the sole compartment and a sole with an upper and lower sole. The sole of the shoe may have a vibrator and several weight pressure sensors positioned inside. As a result, while the user is wearing the shoe, the multiple pressure sensors continually gather pressure from all of the weight pressure locations on each foot. The vibrator alerts the user that they are exerting extra pressure on a specific foot when the pressure stays above the threshold value for a predetermined amount of time.

Keywords— Arduino ESP-32, Pressure Sensors, Vibrators, Smart Sole, Posture Correction.

I. INTRODUCTION

Accordingly, A smart sole shoe is offered to help improve the human body's posture. The invention discloses embedding of many weight pressure monitors and vibrators along with a microcontroller and establishing the communication through Bluetooth/Wi-Fi to a smartphone programme, thereby avoiding the wear and tear of the knees & heals and reducing the pain on human body's upper back and the human body's lower back, and also helping the person to set the posture of the body correctly. In line with a current incarnation of subject matter relates to smart sole shoe comprising a sole comprising an upper and a lower sole; a piezo electric material configured to place the lower sole of the smart sole shoe; a microcontroller positioned inside the sole's section; and many weight pressure sensors positioned on the sole such that the plurality of weight pressure sensors and the microcontroller are connected through a connecting wire. A vibrator may also be affixed to the smart sole of the shoe. When a user wears a smart sole shoe, pressure from each foot's weight pressure point is continuously gathered using several weight pressure sensors. This allows the pressure to be monitored and recorded until it reaches a predetermined threshold. [1], a timer starts from that instance onwards. Accordingly, the vibrator alerts the user when they are exerting excessive pressure on a specific foot for an extended period of time when the pressure stays above the threshold value for a predetermined amount of time. The pressure of weight values and the timer values are set through the mobile application [2]. Hence, the goal of this invention is to precautionary preventing the wrong posture of the human body, to avoid backache, knee pain, heal pain and varicose veins, and to help the mass distribution of the body weight using pressure sensors, vibrators and timers. Further, within the current invention, the piezo electric effect is used to generate electricity for the need of microcontroller, vibrators, and pressure sensors [3]. Bluetooth connection is provided between the smart sole shoe and the android application. The smart sole shoe vibrates when the pressure at a particular point exceeds the threshold value set in the pressure sensors [4], thereby avoiding the wear and tear of the knees & heals, also reduces pain on the upper back and lowers back of the human body, hence helping the user to set the posture of the body correctly. When compared to the accompanying drawings and the ensuing explanation, these and other features of the embodiments herein will be easier to understand and comprehend. However, it should be noted that the following descriptions are provided for illustration purposes only, even though they list

several detailed characteristics and preferred embodiments. The embodiments shown here encompass all possible alterations and adjustments that fall within the purview of the embodiments without going outside of them.

II. LITERATURE SURVEY

The paper "Development of planter foot pressure distribution system using flexi force sensors" proposes a way of measuring the pressure from the pressure sensors in a sole at a particular pressure point in the foot [1].

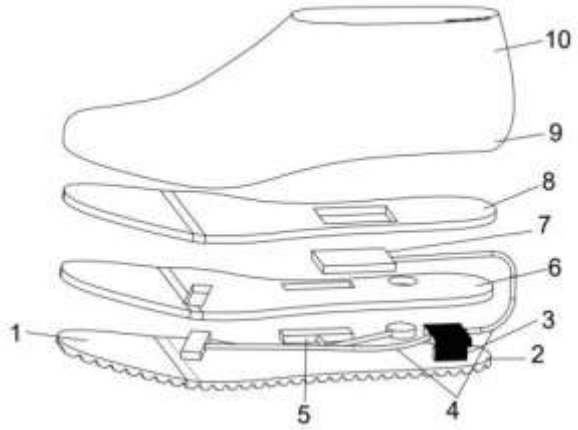
We also take reference from "Shoe-integrated sensor system for wireless gait analysis and real-time feedback" which focuses on the integration of the sensors system and getting back the real- time feedback of the sensors [2].

"Fabrication of PZT piezoelectric ceramic sheet" proposes the way of charging the batteries using the piezoelectric materials which helps us in this product not to charge the device at all and the electricity is generated by the applied pressure of the food on to the piezoelectric materials [3].

"Development of solenoid-Type Vibrators used for Mobile Phones" defines us the functionality of the coin vibrator in a mobile phone which help us to use it in our smart sole [4].

III. FIGURE

The novel posture-correcting smart sole shoe has a dual- layered sole structure with an upper and below sole that each contain a microprocessor. The system constantly monitors pressure locations while in use since it is outfitted with many weight pressure sensors that are dispersed across the sole..If sustained pressure exceeds a predefined threshold for a specified duration, a built-in vibrator activates, alerting the user to prolonged uneven weight distribution. This real-time feedback mechanism encourages heightened awareness of posture and foot balance, contributing to corrective measures. The shoe's intelligent design aims to enhance



overall body alignment and posture, promoting a healthier and more conscious approach to daily activities.

Figure-1: Structure of the smart sole to regulate the body's position.

IV. DETAIL DESCRIPTION

Referencing the non-limiting examples that are discussed in the following description and depicted in the accompanying drawings, the different features and advantageous details of the embodiments herein are elucidated in further detail. In order to avoid unduly obscuring the embodiments herein, descriptions of well-known parts and processing methods are avoided. Furthermore, as some embodiments can be combined with one or more other implementations to generate new embodiments, the various embodiments discussed herein are not necessary mutually exclusive. Unless otherwise specified, the term "or" as used here refers to a non-exclusive or. The examples provided here are meant only to help individuals who are proficient in the art better understand how to practise the embodiments shown here and to encourage them to do so. Consequently, it is not appropriate to interpret the examples as restricting the range of the embodiments described here.

The accompanying figures are intended to make a variety of technical elements easier to grasp, but they do not limit the embodiments that are described here. Because of this, it is appropriate to interpret the current disclosure to include any modifications, equivalents, and replacements in addition to those that are specifically

illustrated in the drawings that are attached. While some elements may be described in this context using terms like "first," "second," etc., these elements should not be constrained by these terms. Usually, these phrases are limited to differentiating one element from another.

Consequently, examples of smart sole shoes for correcting human posture are given here. The invention discloses embedding of many weight pressure monitors and vibrators along with a microcontroller and establishing the communication through Bluetooth/Wi-Fi to a mobile application, thereby avoiding the wear and tear of the knees & heals, and reducing the pain on upper back and lower back of the human body, and also helping the person to set the posture of the body correctly.

Referring figure 1 illustrates schematic view of smart sole shoe, based on the current invention. The smart sole sho 100 has just one 1. including a lower sole 9 and an upper sole 10; a piezo electric material 2 configured to place the lower sole 9 of the smart sole shoe 100; a microcontroller 3 placed inside the compartment on the sole 1. It is possible for the smart sole shoe 100 to have multiple weight pressure sensors 5 placed on the sole 1. The weight pressure sensors 5 and the microcontroller 3 are connected through a connecting wire 4. The piezo electric material 2 is fixed just below the weight pressure sensor`s layer, such that enough pressure is given to the piezo electric material 2 for generating the electricity.

Accordingly, the piezo electric material 2 is used as lighter, cheaper and a smaller number of components required. Thermal resistive material is fixed at the top most layers of the shoes, so that the heat of the foot does not percolate into the bottom layers thus protecting the weight pressure sensors 5.

Further, the smart sole shoe 100 includes a vibrator 7 placed on the sole 1 such that a layer of vibrator 7 is fixed above the pressure sensor layer, therefore the weight pressure sensors 5 are not disturbed for reading accurate values. When the user wears the smart sole shoe 100, The weight pressure sensors continuously gather the pressure from each foot's numerous weight pressure locations 5. A timer commences when the pressure surpasses a predetermined threshold value. The corresponding foot vibrator 7 will activate if, for a specific duration of time, the collective pressure on that foot is greater than the threshold value.

To alert the user that they are exerting more pressure on a specific foot for an extended period of time, the vibrator 7 is activated when the pressure stays above the threshold value for a predetermined amount of time.

Most of the human beings stand on only one part of the foot. Some people put more weight on the outer edges of their foot. In that case, the heel and inner edges of the foot do not share the distribution of the weight. On the contrary, flat-footed people tend to stand on the inner edges of their foot. The unequal distribution of weight disturbs the relationship between the stability of the ankle, the knee, the heel, the hip joint and the back bone which runs from neck to lower back. Therefore, categorize the body weight distribution on age (kids and Adult), gender, types of foot (flat-foot and normal-foot) and also between right and leftt foot.

Most of the human beings stand on only one part of the foot. Some people put more weight on the outer edges of their foot. In that case, the heel and inner edges of the foot do not share the distribution of the weight. On the contrary, flat-footed people tend to stand on the inner edges of their foot. The unequal distribution of weight disturbs the relationship between the stability of the ankle, the knee, the heel, the hip joint and the back bone which runs from neck to lower back. Therefore, categorize the body weight distribution on age (kids and Adult), gender, types of foot (flat-foot and normal-foot) and also between right and leftt foot.

Hence, the smart sole shoe 100 helps the feet to be in parallel to each other, so that the weight-bearing axis of the human body is aligned and there is minimal stress on the body joints. Here, customized correction of the flat-foot by inserting an arch in the foot wear. Another feature is that, If the wearer of the 100 smart sole shoes stands for an extended period of time, the timer sends a message to the mobile application saying that the person is standing for a long time and prone for varicose veins.

All of the weight pressure points on each foot are continuously collecting pressure as the wearer wears the smart sole shoe. The timer then begins to run when the pressure reaches a predetermined level. The vibrator alerts the user when he applies excessive pressure to a certain foot for an extended period of time if the pressure stays above the threshold value for a predetermined amount of time.

Accordingly, Every weight pressure sensor 5 continuously collects and stores its pressure values in a memory.. The data for a period of particular time is analysed and the inference regarding the weight imbalance is sent as an alert to the user. The pressure sensors 5 keep measuring the body weight pressure continuously. When the pressure goes beyond the given threshold pressure value, it initiates the timer. The timer starts from that instance onwards. After the timer exceeds a particular time (as set in the mobile application) it gives a signal to the 11 vibrators to vibrate. This is an alert to the user wearing the smart sole shoe to correct his posture.

Additionally, In order to make the user aware of the specific insufficiency, the current invention comprises a notification system that alerts the user via a mobile application when they are placing more pressure on their front or rear foot.

As a result, such adaptations and modifications should and are intended to be understood within the meaning and range of equivalents of the disclosed embodiments. The description of the specific embodiments provided above will sufficiently reveal the general nature of the embodiments herein, allowing others to readily modify and/or adapt for various applications without deviating from the generic concept. It should be noted that the vocabulary and phraseology used here are intended for descriptive purposes only, not for use in limiting anything. Consequently, even though the embodiments presented here have been explained in terms of preferred embodiments, those having skill in the art will understand that the embodiments can be modified while still adhering to the spirit and breadth of the embodiments as stated here.

V. ARCHITECTURE

The method of detecting pressure with a pressure sensor is depicted in the flow chart. An electrical signal is produced from pressure by the sensor. It usually consists of plastic or metal and has a sensor element integrated within it. The water-filled valve has a sensor attached to it. The water flow to and from the sensor is managed by the valve.

The process starts by checking if the time has exceeded a given limit. If it has, then the pressure is measured. If the pressure exceeds a threshold value, then the coin vibrator starts vibrating. Otherwise, the process ends.

Here is a more detailed description of each step in the flow chart:

1. Start: The process starts by checking if the time has exceeded a given limit. This is done to ensure that the pressure is measured at regular intervals.

2. Measure pressure: The pressure is measured using the pressure sensor. The sensor converts the pressure into an A electrical signal.

3. Check pressure: The electrical signal from the sensor is compared to a threshold value. If the pressure exceeds the threshold value, then the coin vibrator starts vibrating.

4. Combine both conditions: If the time has exceeded the given limit and the pressure exceeds the threshold value, then the coin vibrator starts vibrating.

5. Condition satisfies: If the coin vibrator is vibrating, then the condition is satisfied.

6. End: The process ends.

In eleven different applications, including consumer goods, medical equipment, and industrial operations, the flow chart can be used to quantify pressure. It could be used, for instance, to gauge the air pressure in a tyre, the pressure in a hydraulic system, or the blood pressure of a patient.

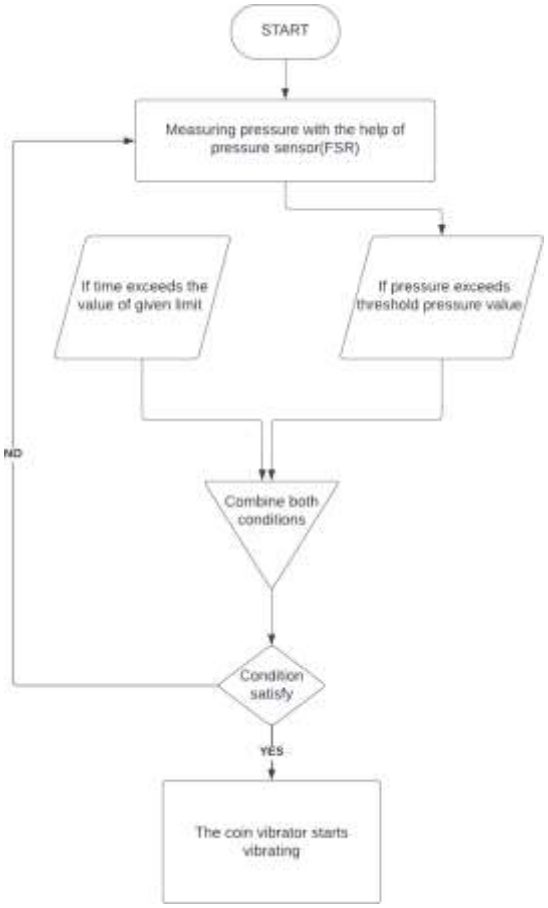


Figure-2: Working of the Smart sole.

REFERENCES

[1] S. L. Patil, M. A. Thatte, and U. M. Chaskar, "Development of planter foot pressure distribution system using flexi force sensors," Sensors & Transducers, vol. 108, no. 9, pp. 73–79, 2009.

[2] S. J. Morris, J. B. Oey, and J. A. Paradiso, "Shoe-integrated sensor system for wireless gait analysis and real-time feedback," in Proceedings of the Second Joint 24th Annual Conference and the Annual Fall Meeting of the Biomedical Engineering Society] [Engineering in Medicine and Biology, October 2002, pp. 2468–2469.

[3] T. Um, Y. Kobayashi and J. Qiu, et al., Fabrication of PZT piezoelectric ceramic sheets by doctor blade, J. Jpn. Soc. Powder Metallurgy 47, 674-680, 2000.

[4] S. M. Hwang, H. J. Lee, S. U. Chung, G. Y. Hwang and B. S. Kang, "Development of S o l e n o i d - Type Vibrators Used for Mobile Phones", EEE Transactions on Magnetics, Vol. 39,3262-3264,2003.