Designing a Device for Entire Body Posture and Eye Blink Analysis, Temperature and Heart Beat Assessment

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Abstract—**Now a days, computer is operated by the users for longer durations because of its vast growing technology. By the continuous use of computer health problems like variation in eye pressure, pain in spinal cord and neck, body ache can be caused, So the operators must take care of their sitting posture. These types of issues can be overcome by implementing good sitting posture by use of sensors and communication devices. In this project we continuously monitor the operators for the betterment of sitting posture of their entire body. The ARM board is used. Temperature sensor is used to monitor the change in temperature in human body. Heart-beat sensor is used to monitor the heart rate. Positioning and angles can have analyzed through accelerometer. Flex sensor is used to access the bending information of keen. Eye sensor is used to avoid change in eye pressure. All these alerts are provided via audio and display systems. Our main aim of this paper is to provide the entire body posture analysis along with temperature and heart-beat monitor assessment for the person's who works for extended several period of time such as computer operators.**

Keywords—Microcontroller; flex sensor; eye blink sensor; accelerometer sensor; audio and display system.

I. INTRODUCTION

REBA is convenient for (WMSDS) work related musculoskeletal disorder. By using different sensors and equipment's we can monitor the sitting posture of the human body in this preview. Now a days computer has been used as a very vast technology and it has been seen that the people are too dependent on the computer and laptop, so working for longer duration in front of computer or a laptop can lead to various health issues such as pain in spinal cord, pain in neck region and also change in eye pressure. These may result in various mental and physical disorders hence bad sitting posture is corrected by posture assessment to prevent posture abnormalities. Musculoskeletal disorders are the most widely spread and influential factor in industries and administrative personnel. There are two techniques named instrument and observation technique used to provide a quantitative measurement of postural strain caused by different sitting positions of the human body, continuous recordings of the body positions are done through instrument based techniques by using a device attached to a person, the observational techniques the purpose of development of the project is different for various circumstances, in their point of view the different values are assigned for different sitting. posture and evaluation techniques are different according to their performances.

Based on a review of different observational techniques, it is shown in Fig. 1, that the purpose of development of this project is for various uses and therefore they are applied in a multiple workplace circumstances. Each technique has its own posture classification application, which is different from other techniques, so different positional load rates can be assigned for a given posture, based on the technique used. On the other hand, there are lots of studies that evaluate many techniques with regards to their performance and dependability.
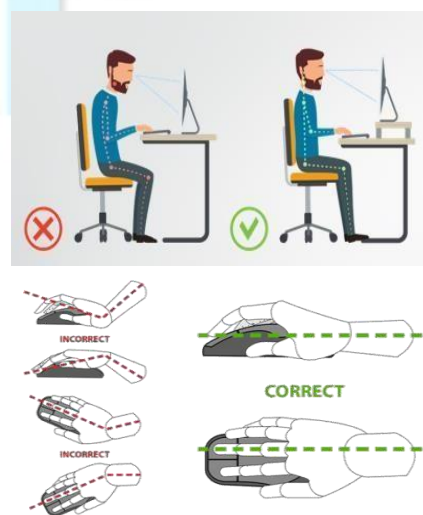
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Fig. 1. Correct and Wrong Postures

II.   LITERATURE REVIEW

In today's a greatest number of people suffer from the negative effects of poor posture and yet do not change the factors that causes problem in their lives. Sitting continuously for an extended period of time will gradually effects our mood and our health, because we humans are designed to move frequently.

- All of our body gets compressed if our body is in seated position continuously, constricted and our internal body system slow down. As a result, we feel irritable, tried and energy level decreases. These factors cause stress on our muscles and internal   systems.

- Our digestive system becomes weak and lungs, heart, intestines gets constricted because of bad sitting posture, these effects causes to develop unattractive belly that women's be afraid of. Thus, they can be attributed to poor sitting habits and slumping. This factors make digestion distress; you must take a closer look at your sitting posture.

- Poor posture restricts blood and oxygen flow, which makes it difficult to speak and breathe. The longer time you sit, the less your body is able to fight against the forces of gravity and maintain strong.

- Poor posture could incapacitate your digestive system and its visiting also because you to grow that unprepossessing belly pouch that girl's apprehension. This pouch influences both weighty and lean women and may be accredited to slouching and bad sitting style.

- Primitively common outcome of bad posture are back, neck and shoulder pain , and therefore its majorly detectable. Primitive common pain sectors include, Neck-53%, Wrist-33%, Shoulder-38%, Lower back-64%. If you're sitting on the table in an extremely slumped position for an expanded span of time puts a good compact on your overlying body mainly if your body isn't perfectly held up.

- Eventually, bad posture may also cause a imperfect alignment inside the spine and result in further strain. In addition, it results in joint stress. Sympathetic cushions are built if joints are safeguarded by connective tissue. Weight or strain must be reassigned to complete your slumping if the spine is imperfectly aligned.

- As a solution, a dense load which will be over it can manipulate if the joints are strained inward. In time, this ends up in strain and humiliation of the tissues adjoining the joints.

- Central system is constituted by your eyes which is attached on to the brain to task out the method that you are performing, and the light beams are received by your eyes. The photoreceptors are stricken by these beams, which are mentioned as rods and cones, at the end of your eye ball it is detected.

- Retina collects the sign which renders into electrical impulses and move on to the second cranial nerve into the brain's visual sector.

III.   HARDWARE REQUIREMENTS

Accelerometer: Vibration or acceleration of motion of a structure is measured using an Accelerometer. On the Neck cap, spinal cord and on thigh the accelerometers are mounted. These accelerometers outputs are given go the ADC unit of the ARM controller which has an implanted program code. The accelerometer generated voltage will be displayed on the LCD. Accelerometer IC is shown in Fig. 2.

Pulse sensor: Pulse sensors are commonly used to take live heart rate or pulse rate data and to feed it in ARM controller. could be a plug-and-play heart-rate sensor. Here above the eye level a pulse sensor is placed for measuring the variation in eye pressure, the data output pulse collected by the sensor is given to ARM controller.

Fig. 2. ADXL335 Accelerometer Module

LCD: Any changes in the output of voltage of accelerometer and message for posture indication are displayed in the LCD.

Microcontroller: The microcontroller will be the Centralized Unit which will be collecting the information from nodes of all direction and processing them with respect to the fed program code and results the output of the system. Here we are using "ARM7LPC2148" Microcontroller. It is a standalone board for iLPC2148.

ZIGBEE: We are dividing the project into two nodes. Where the two nodes will be communicating with one another through ZIGBEE one of the node will be connected to the leg and another will be connected to the centrosome (hand, spine, neck) portion. The ZIGBEE coordinator is shown in Fig. 3.
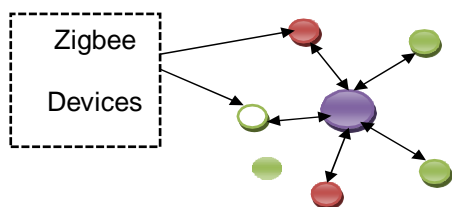
Fig 3. ZIGBEE Coordinator

IV. METHODOLOGY

The proposed system consists of an ARM controller which will be placed at the center of project representation figure which resembles control unit of the whole project system. Implanted in the ARM is a program code which assists the ARM to establish activities with respective inputs and outputs of the sensors. In this project the prior components used are ARMLPC2148 Accelerometers, ZIGBEE, LCD, Speaker and Sensor. The block diagram in Fig. 4 represents the hardware connection which implements the desired functionality of the working model.
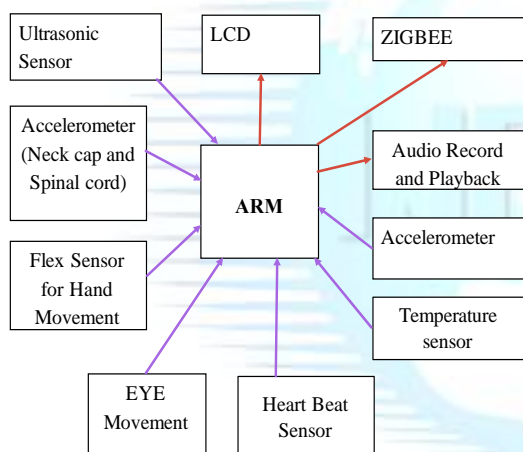

Fig. 4. Body Posture Analysis and Body Temperature-Heart Beat Monitoring Block Diagram

Several embedded systems have considerably non-identical composition consistent with their key purposes and Benefits. The ARM controller situated at the center of the figure forms the whole projects unit of control. The program code which is implanted within in the ARM controller helps the ARM controller to establish actions in support to the inputs. The sensor outputs are considered as inputs to the ARM controller. The project system is composed of ARMLPC2148, Liquid Crystal Display, Accelerometers, ZIGBEE, Speaker Sensors.

On the Neck, spinal cord and on thigh the accelerometers are Put on. To the ADC unit of the ARM controller these accelerometers outputs are given. The voltages generated by the accelerometers are ma d e to display on the LCD using the embedded program in the ARM controller.

A corresponding voice output will be produced through MP3 player via speaker, when voltages form of output from the accelerometers Exceeds the given specific value of threshold. An output in the form of voice will also be produced when the person wearing this system prolonged to sit in a place, this voice form of output is made to hear till

the prolonged sitting position person is altered to the position of upright stand or engaging in few bodily activities. Output voice from speaker which specifies the variation in position will be automatically turned on based on time-to- time periodically.

This equipment is also used to correct the sitting posture and hand palm posture. Considering the person who wears this device will bend instead of sitting straight, at this situation also an output through speaker will be produced saying them to sit straight. On the palm's rear side an accelerometer will be positioned, so that a MP3 voice output will be produced through the speaker when the palm is twisted to the improper position. The design Implementation methodology is shown in Fig. 5.
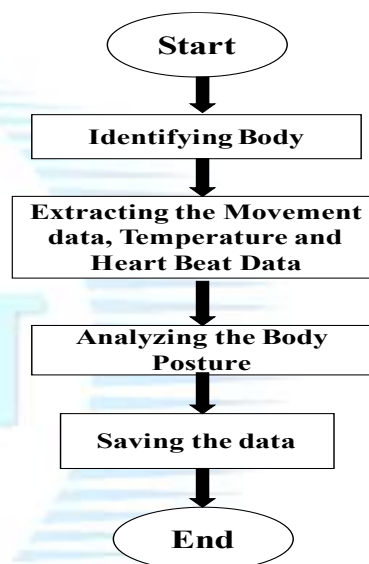

Fig. 5. Design Implementation Methodology

This is done in Arm controller by collecting and processing the output voltage generated by accelerometer in the with respect to the threshold value.
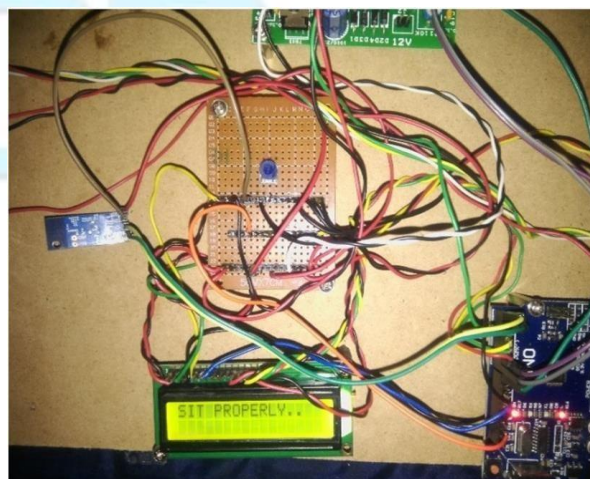

Fig. 6. Output of LCD

Above the eye level a pulse sensor is placed for measuring the variation in eye pressure. From the speaker

using MP3 player an output is produced if, there is a change in output form threshold value given within the ARM Controller. Along with this setup this system has an addition of temperature and heart beat sensors. These sensors collect the body temperature and Heart beat rate respectively. The data are sent to the controller through which these health data of a person will be monitored. For demo purpose LCD is employed to display the changes in output voltages of accelerometer and any event occurring.

We are dividing the project into two nodes one node will be connected to leg and another will be connected to the central body portion. The two nodes will be communicating with each other through ZIGBEE. Centralized Unit will be collecting information about all nodes

V. CONCLUSION

This project is outlined with the help of organized modeling and capable of giving the accepted result. With certain modification it could be a actual system.

Science has come across in different fields and hence from time to time technology remains revamping. Going more, with microcontroller many units may be manufactured as a single there by building the system dense and promising the surviving system furthermore successful. Components with significant range need to be evaluated in order to build the system relevant for actual determination.

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