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Rapid Entire Body Postural Analysis Assessment Device for Computer Operators

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Abstract: ***Our aim is to provide the Rapid Entire Body Assessment for computer operator, this review is convenience for assessment of jobs in various professions like construction, health care jobs and workshops, etc. The computer technology is growing in daily life, computer is operated by user for a longer time so, sitting posture should be taken care by the operator if not it may lead to harmful effect for the body such as body ache, neck pain, pain in the spinal cord, various disorder relating to change in eye pressure and also there may occur a vision related problem caused by continuous use of computer for longer duration of time and also work stress will cause incardiovascular diseases so, the computer operators can protect themselves from those health issues by implementing good body posture by the use of sensors and communication devices we can continuously monitor the computer operator for the betterment of sitting posture of human body. The Arduino UNO microcontroller board is based on the Atmega328 is used. Eye blink sensor is used to avoid eye pressure by continuously monitoring the eye, Flex sensor is used to access the bending information of the knee, the angles and positioning can be matched with the computer is analysed through accelerometer. All these alerts are provided through audio and display system.***
Key points: Arduino Uno, flex sensor, eye blink sensor, accelerometer sensor, audio and display system.

I. INTRODUCTION

Now a day's computer has been used as a very vast technology and it has been seen that the people are too dependent on the computer and also on a laptop that are useful in school's institute workplace hospital industries etc, so working for longer duration in front of computer or a laptop can lead to various disorders such as pain in spinal cord, pain in neck region, and also disorders related to eye. These may result in mental and physical disorder hence bad sitting posture is corrected by postural assessment to prevent posture abnormalities. Musculoskeletal disorders are the most widely spread occupational problems in industries and services, these disorders are caused factors by different risk factors results several factors which can be classified into individual physical factors and psychosocial, recurring and forceful activities and increasing muscle load overtime cause physical load of work and it is usually evaluated by body posture analysis. By instrument and observational techniques is to provide a quantitative measurement of postural strain caused by different 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 are widely used in industries with the low price. According to different observational techniques their 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.

REBA is convenience for (WMSDS) work related musculoskeletal disorder In current situation there were no system existing to monitor and changes in the sitting posture of human body. By using several sensors and equipment's we can monitor the sitting posture of the human body in this preview. The Arduino UNO microcontroller board is based on the Atmega328 is used. Eye blink sensor is used to avoid eye pressure by continuously monitoring the eye, Flex sensor is used to access the bending information of the knee, the angles and positioning can be matched with the computer is analysed through accelerometer. All these alerts are provided through audio and display system.

II. HARDWARE REQUIREMENTS

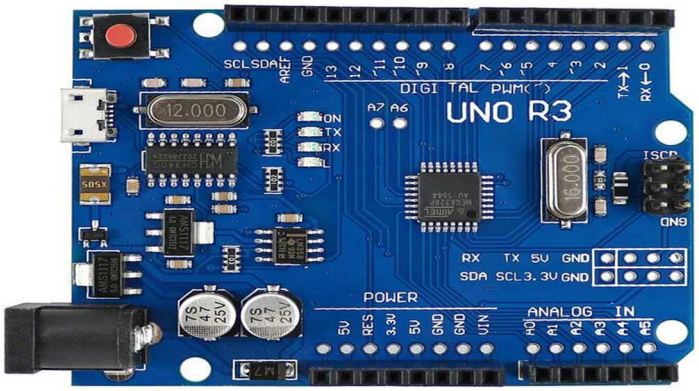
A. Arduino Uno

The Arduino UNO is a micro controlled board.

It consistsof 14 digital I/O pins, in which 6 can be used has PWM outputs,6 analog inputs, a 16 MHz ceramic resonator, an ICSP header, a reset button, a power jack and a USB connection. Arduino is powered on by connecting it to a computer with a USB cable or by ac – dc adapter.

UNO means one in Italian and is named to mark the upcoming release of Arduino 1.0. The UNO is the new series of USB Arduino boards.

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Other Hardware requirements

1) Accelerometer
2) Flex sensor
3) IR sensor
4) LCD display
5) Zigbee
6) APR system

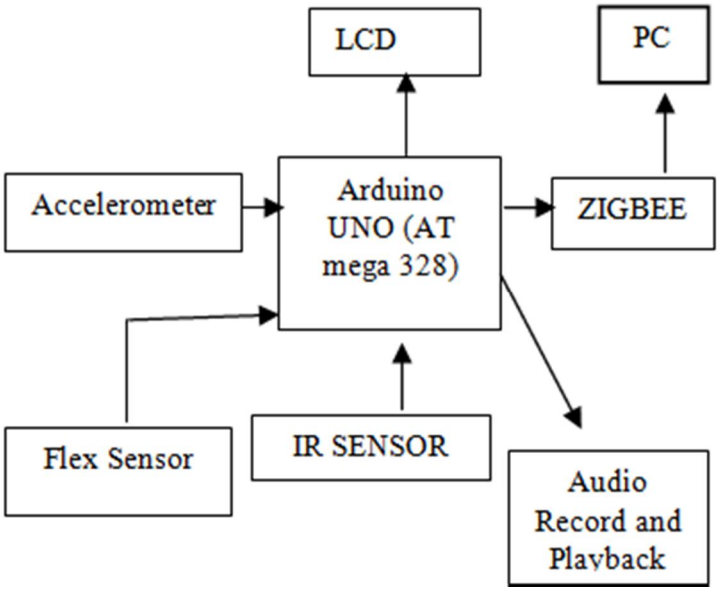
B. Software Requirements

1) Embedded C
2) Arduino tool

III. DESIGN AND IMPLEMENTATION

A. Block Diagram

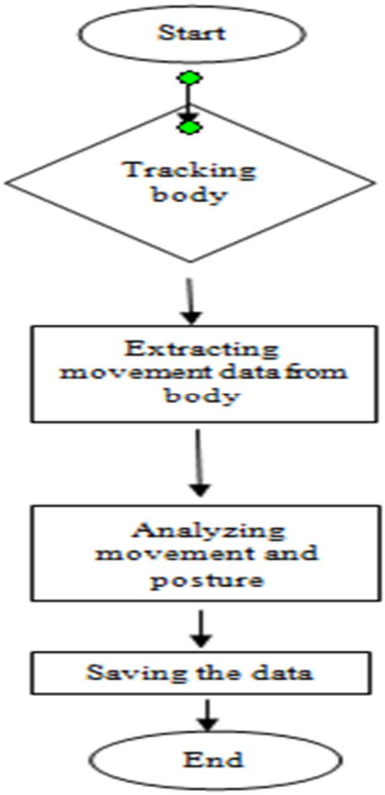
The proposed system consists of microcontroller that is located at the centre of block diagram to form a control unit of entire project. Embedded within the micro controller is a program that helps the microcontroller to perform action based on the inputs and outputs of the sensors. This project consists of microcontroller, Accelerometer, LCD, APR system.



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B. Project overview



IV. WORKING

A. The power is supplied to theArduino board then internally the power is distributed to all the sensors, usually the power required for the board are 3v, 5v, 9v.

B. The program that includes threshold values of the sensors is loaded into the Arduino board through Arduino software.

C. The sensors start continuous monitoring the human body to fetch the sensed information compared with the threshold value programme in the microcontroller.

D. Accelerometers are fixed on Neck, spinal cord. Theoutputs of these accelerometers are given to the ADC unit of the microcontroller. Based on the program embedded within the microcontroller the voltages generated by the accelerometer are displayed on the LCD.

E. If the output voltage crosses the threshold value corresponding voice output is generated through APR system.

F. The person wearing these devices is sitting for a long time, and then a voice output will be generated until the person changes from sitting position to standing position or doing some physical activity. Voice output indicating change in position is activated on a periodically basis from time-to-time.

G. The person wearing this device is bending more rather than sitting upright, then also a voice output will be generated insisting him to sit upright.

H. Accelerometer is placed on the back of the palm. When the palm is twisted more towards the right or left side the accelerometer generates an output voltage. This output voltage is fed to the microcontroller. Based on the variation of the output voltage from threshold value, the APR system generates voice output through the speaker.

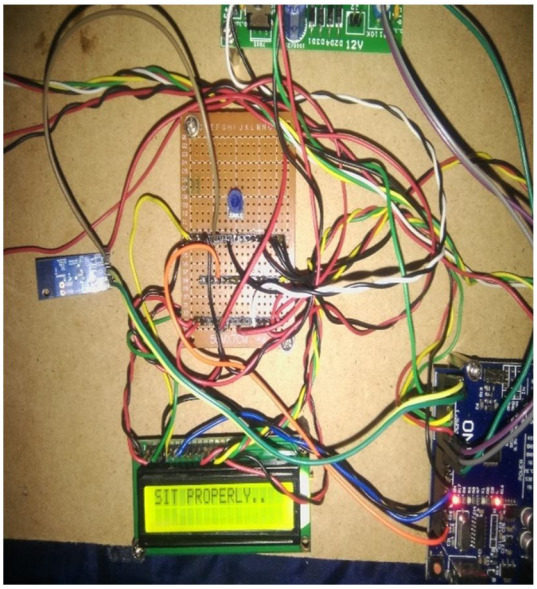
I. IR sensor is placed in front of the eye with a certain distance providing sufficient intensity to detect the blinking of the eyes, if the person doesn't blink his/her eye for longer duration the program is set to intimate or to alert the person to blink the eyes through voice message.

J. For demo purpose LCD is used to display the changes in output voltages of accelerometer and any event occurring.

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K. 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.

L. Overall Project module



V. FUTURE WORK

In our proposal based on the body posture analysis we have done monitoring the sitting posture of computer users and make to blink their eyes by intimating through the APR system. Going further, most of the sensors can be used at lower cost and less number of sensors in order to build the whole system. Apart from monitoring the sitting posture of computer users we can also sense the body temperature of the human body where the computer users working for a longer duration of time at one place.

VI. CONCLUSION

According to the literature survey, our project has been modelled and desired result has been obtained. And our project can be implemented as real time project and also, we can obtain a desired output from it. This model can be implemented easily to the single computer user without any harmful effects on the user body.

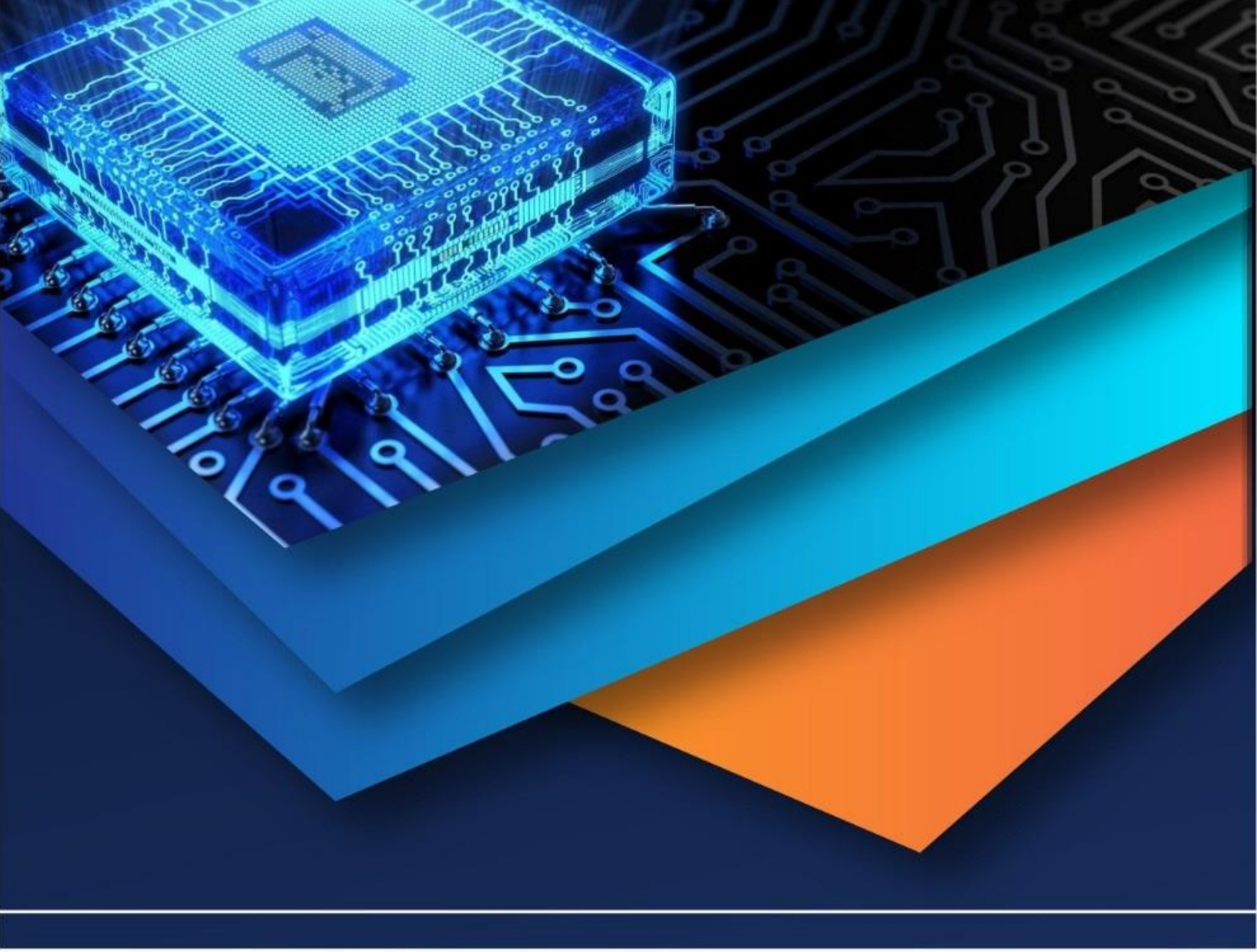
VII. AKNOWLEDGEMENT

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