Rapid Entire Body Postural Analysis Assessment

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Abstract: Postural instability affects many people and can compromise even many simple activities of the daily routine. The term Rapid Entire Body Assessment (REBA) depicts the usage and availability of postural assessment of jobs in numerous professional streams. As per the survey in major cases REBA methodologies have been used to compare the results with other observational units for level of conformity between the two when determined. This module is specifically designed to be sensitive to the type of unpredictable working postures found in health care and other service industries.

Keywords: Postural analysis, accelerometer, andriod device.

INTRODUCTION

Postural analysis is one of the powerful techniques for monitoring work activities of Ergonomic assessment. Issues observed with Ergonomic assessment of Work-Related Musculoskeletal Disorders (WMSDs) involves the evaluation of risk of developing a range of disorders like muscles, nerves and joints, primarily to the upper limb and low back etc[1]. Considering the both developed and developing countries these disorders are most likely to be spread over occupational problems wherein because of declining productivity and lower quality of life [3]. These disorders are found to be in high risk factor by interactions resulting from various criteria's, which can be generalized in individual terms as psychosocial and physical factors of model. As per the conception this model has Observational and instrument based techniques to provide a quantitative measure of discomfort and postural strain caused in terms of degree for different body positions [5][1]. Through the outcome of visual perception observational technique method can be implemented to generate the angular departure of a body segment from the neutral posture. Whereas the body positions are continuously monitored visualized in instrument-based techniques [3].

Upon the review of different observational Techniques, it is observed that the creation of these developments is for multiple uses and hence they are utilized in many workplace circumstances.

Considering various techniques every application has their unique way for posture classification apparently which is different from other techniques, considerable positional load rates are deployed into a particular posture. Many case studies have been reviewed to check the performance and dependability of various techniques.

METHODOLOGY

This architecture consists of Renesas microcontroller, Accelerometer, LCD, GSM and an android device.
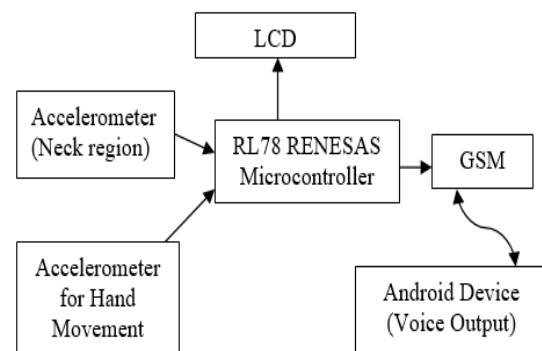

Fig. 1. Architecture of body posture assessment

Renesas microcontroller is located at the center of the block diagram forms the controller for the entire project. Based on the program embedded within the microcontroller the voltage generated by the accelerometer are displayed on LCD. Accelerometer is placed on the back of the palm or any part of the body. 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. From the microcontroller the processed information is sent to android device via GSM.
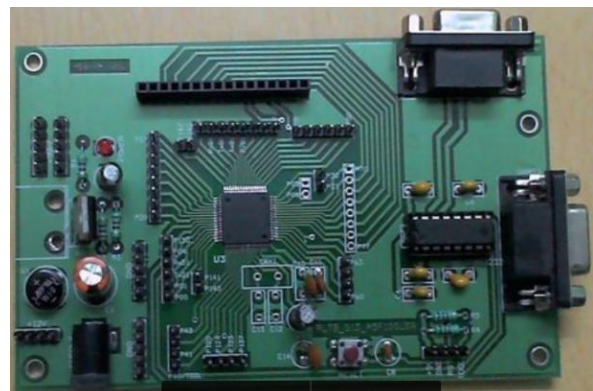
In android device an application is created. On receiving information sent by GSM module, a voice output is generated from android device.

Renesas microcontroller is a 16bit, operating at 34MHz. It is a 64pin IC where 58pins are used for general purpose IO pins. In the methodology we are making use of R5F100LE (Where R- RENESAS, 5 for Microcontroller unit, 100 for data flash, F-flash memory, L-pin count, E-ROM capacity 512kb). Main purpose of using renesas microcontroller is it delivers higher performance and low power consumption than previous microcontroller.

Fig. 3. Accelerometer Sensor

Accelerometer sensor are light weight and unobtrusive devices and have used to measure and analyses the quality of movement. It is a polysilicon surface micro machined structure built on top of a silicon wafer. It is a complete 3 axies (X, Y & Z) acceleration measuring system. It measures an acceleration due to Earth's gravity.

IMPLEMENTATION

Any individual facing pain in joints or else with Musculoskeletal Disorders, designed a belt is advised to be made used to place at that particular infected pain area. Considering his/her duration of working hours if they tends to sit at particular posture for long stretch. A desired amount of value will be created which will be displayed on the LCD display.

Fig. 4. Experimental model of rapid entire body posture assessment

Accelerometer is placed the it analyses the X,Y&Z axis the sensing value is converted voltage. When the accelerometer is placed on neck region if neck is bent and X,Y&Z senses voltage is not in range 195-180 for more than 30sec it gives a alter saying keep your head straight. For leg region if the leg is in same bent position X,Y&Z senses voltage is not in range 160-140 for more than 30sec it gives a alter saying please stand and take few steps. The range is given due to their will be slight movement in the body parts. The alert is given on LCD display, sends message to registered number using GSM module and also voice command is given from android device, if a person doesn't change their posture then a voice generated output will be triggered to change their posture.

RESULT

When a person posture is in same position for long period of time it sends an alert message on a display for back bone it alert sit straight, bend back. For legs it gives stand up, walk few steps. For wrist it displays rotate your wrist, fold your fingers. Also indicates in the android app with exercises image.

CONCLUSION

REBA is one of the most popular and widely used observational ergonomic assessment tools in multiple industries and services. Several studies were reviewed in order to provide an overview of this method's development, applications, validation and limitations so far. Future work is needed to support the predictive and concurrent validity and reliability of the method.

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