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Intelligent Sensor Sleeves for Enhancing Workplace Efficiency

Vishakha Sharad Patil[1], S. G. Khadke[2]

[1]G.H.Raisoni College of Engineering, Jalgaon

[2]G.H.Raisoni College of Engineering, Deparment of Electronics, Jalgaon

Abstract: ***This paper represents the design and implementation of intelligent sensor sleeves system and mood detection using ARM9 and MATLAB for industrial applications. . This paper reviews the systems on activity monitoring of humans based on wearable sensors and issues to be addressed to set up the challenges. The advancement of sensing technologies, embedded systems, technology of wireless communication, and miniaturization makes it possible to develop smart systems to monitor activities of human beings continuously.***

Keyword: Wireless sensor network, Activity monitoring, Wearable sensor

1. Introduction

In factories where products are mass-products manufactured, it's very important to know how long the human workers take to perform certain tasks. This not only allows the pace of the assembly line to be set, but it also allows factory owners to identify problems of wasting time such as superfluous movements, overly frequent tool changes, or impractically-located components. Typically, workers are timed by a stopwatch-wielding supervisor periodically, or using a timer that they start and stop themselves.

Wearable sensors became popular in most of the applications such as medical, entertainment, security and commercial fields. They are used to provide accurate and reliable information on people's activities and behaviors, thereby ensuring free from danger and sound living environment. It may be that the smart wearable sensors technology will revolutionize our life, social interaction and activities much in the same way that personal computers have done a few decades back.

In the medical sciences, where there are a lot of different applications in monitoring physiological activities. In the medical field, it is possible to observe patient's body temperature, heart rate, brain activity, muscle motion and other critical data. It is essential to have nearly light sensors that could be worn on the body to perform standard medical monitoring. It is possible the measurement of the blood pressure using wearable sensors through a modified volume-oscillometric technique which get rid of the need for an inflatable pressure cuff and using earphone and mobile device.

2. Methodology

Here, Block diagram of system shown in figure. Depending on the task of monitoring, different types of sensors are used. The raw data from sensors is collected by a processor. The data are processed and then displayed on a display. These simple types of wearable devices are used by normal people while jogging, running and other applications where the users look at the display to notice the values of the sensors measured.

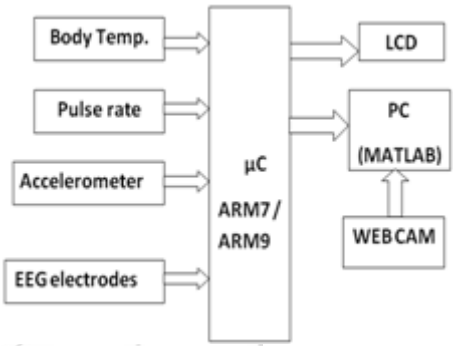

Figure 1: System Block diagram

This project incorporates two sleeves worn by the worker. Each sleeve contains three matchbox-sized sensors, located on the upper and lower arm, and the hand. These measure the acceleration and angular velocities of arms and hands in the X, Y and Z axes. After initially being "taught" by the user, the hardware can identify and isolate actions such as reaching, grasping, setting up, joining, checking or releasing. The system doesn't require any extra infrastructure (unlike GPS), and allows multiple workers - wearing multiple sets of sleeves - to be timed simultaneously. Once the data has been gathered, a PC application reconstructs the motion sequences, breaking them down into precisely-timed individual actions.

2.1 Physical Parameter Monitoring

Here we are connecting physical sensors such as Body temperature and Pulse rate and accelerometer for Fall detection. This way we can monitor the physical stress on employee.

2.2 Employee Efficiency Monitoring

Here we are monitoring and calculating the employee productivity chart by analyzing the gait movement time taken and stress level of particular Employee. All the graphs and Tables will be displayed on GUI. Such as Employee

Name, Time to complete the Job, No of jobs in an hour and employee efficiency.

2.3 EEG Based Stress/Emotion Detection

Designing a electrode based EEG system which will give us the estimation of stress / emotion of employees. For this electrodes are connected to High pass filter, Low pass filter, Amplification circuit is given to the inbuilt ADC of ARM7. The µC will sample the data and send it to the MATLAB server. On MATLAB we are doing feature extraction to analyze the current status of employees.

2.4 Mood Detection

Here we are interfacing MATLAB software which will continuously take snaps of the employee's face. Using Image processing we can detect the Mood/stress of employee so that steps can be taken to reduce the stress full environment.

3. Conclusion

The system gives important application on wearable sensors and devices for monitoring human activities. The human activity monitoring is a vital area of research and a lot of commercial development are reported. It is expected that many more light in weight, providing high-performance wearable devices for monitoring a wide range of activities will be available. The challenges faced by the existing design will also be intended in future devices. The development of light-weight physiological comfortable wearable devices to be lead by sensors for monitoring different ranges of activities of inhabitants. Formal and Informal survey to know an increase of interest and consequent usages of wearable devices in near future, the cost of the devices is also regard to fall resulting in of wide application in the society.

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