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A Non Invasive Method for Tracking Free Weight Exercises

Ms.S.Archana[1],S.Jeeva[2], V.Mahendhiran[3], K.Spavan Rubeenthar Sri[4], V.Venkatachalapathi[5]
Assistant Professor[1], Students[2,3,4,5]
Department of Biomedical Engineering[1,2,3,4,5]
Adhiyamaan College of Engineering[1,2,3,4,5], Hosur – 635109, India

Abstract - A Wireless Sensor Network is used for monitoring patient's physiological conditions continuously using Bluetooth. The physiological parameters of the person who are doing free weight exercises are obtained by sensors and the output of these sensors is transmitted via GSM and the measured parameters has been sent to the wireless monitor for monitoring the gym person's physiological signal. The wireless monitoring module is constructed of GSM and mobile application. The parameters has been sent to the GSM module, which provides monitoring. GSM is having a better data transmission rate with less power consumption. The process of the system is that the wireless sensors are used to measure heart rate, temperature, thumbels count and pressure from human body using sensors. Next process of the system is to process the signals using a PIC microcontroller. The final process is to transmit the processed signals using GSM and monitoring the signal in a mobile application.

Keywords-Health tracking, Exercises, GSM

1. INTRODUCTION

Exercise is an important contributor to physical and psychological well-being. Regular exercise reduces many chronic diseases, such as heart/cardiovascular diseases, diabetes, hypertension, obesity, etc.., the people who are doing exercise regularly, several researches focus on tracking and feedback through exercise management systems and tracking systems. For example, in the category of free weight exercises such as thumbells, squats, and running, there are GPS-based monitoring to track free weight excercises.

2. RELATED WORK

Several devices exist to track and share exercise routines based on the person ability, these devices offer limited functionality for free weight exercises. Thus introducing a system for tracking repetitive free weight exercises – such as weight training. The goal is to provide real-time and post-workout feedback, with no user-specific training and no obstruction during an exercise. Thus achieving accuracy and recall greater than 90.5% in identifying exercise periods, recognition of 89%, 91%, and 93% on circuits of 5, 7, and 16 exercises respectively, and counting that is accurate to ±2 repetition 98% of the time. These experiments shows that our approach enables a new category of fitness tracking devices. [1].

Strength and conditioning offer expert guidance to help those they work with achieve their personal fitness goals. However, because of cost and availability issues, individuals are often left training without expert supervision. The developments in IMU measurement and wireless monitoring have enabled the possibility of uninterruptive motion tracking systems and the provision of individualized feedback regarding exercise performance. These systems could enable S&C coaches to remotely monitor sessions and help gym user's record workouts. One component of these IMU systems is the ability to identify the exercises completed. Gym persons completed 10 cycles of the free weight exercises, deadlift, and squats with acceptable form. [2]. In free weight exercises, exercise execution is very difficult for increasing its effectiveness and for preventing higher complex injuries. However, given the complexion of these movements, it is a challenge for gym persons to know whether they are performing the exercise accurately. Reading the fact that wrong exercise may result in complex injuries, it is necessary to design monitoring modules that can detect abnormal exercise execution automatically. In this paper, we present a workflow to detect performance procedures from only observations of the correct performance of an exercise by the gym persons. [3].

3. METHODOLOGY

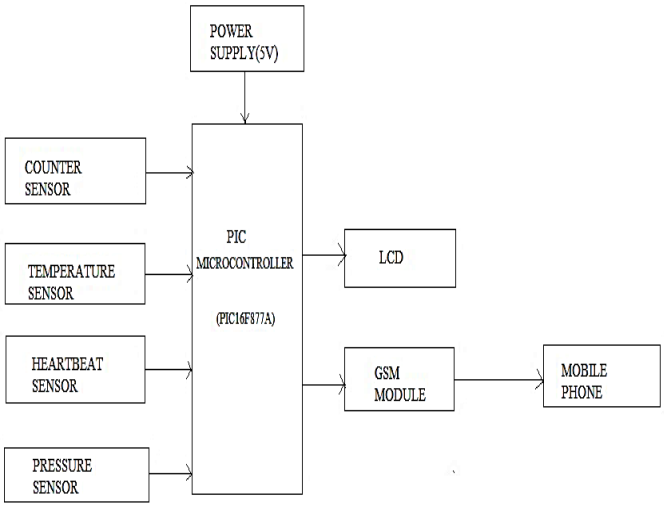

Fig. 1. Block diagram of Non Invasive Method For Tracking Free Weight Exercises

Non invasive measurement of weight excercise includes dfferent kinds of parameters such as thumbell count, temperature, heartbeat and pressure etc.., These parameters are measured by using counter sensor, temperature sensor, heartbeat sensor and pressure sensor. The measured values are displayed in LCD and using GSM module it is also monitored through the mobile phone.

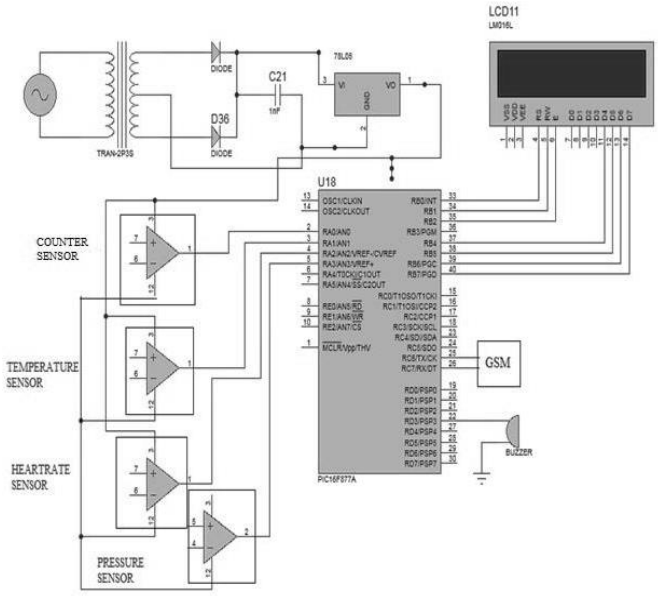

Fig. 2. Circuit Diagram

PIC Microcontroller and other sensor modules are connected as shown in the circuit diagram. The power supply unit is also connected to the microcontroller which consists of bridge rectifier, a filter capacitor and a regulator. The rectifier is used to convert the AC voltage to DC voltage. The capacitor filter is used to reduce the ripples. Regulator is used to convert the voltage to 5V. The counter sensor measures the thumbell count, temperature senor measures the temperature, pressure sensor measure the pressure applied by the gym person and the heartbeat sensor measures the heartbeat of the person. The buzzer is connected to the microcontroller to indicate when the pressure level reaches maximum. The GSM module is used to transfer the data to the mobile application to monitor the parameters in the mobile.

4. RESULT

Thus the project measures the non-invasive parameters such as temperature, heartbeat, pressure and thumbell count. The result is shown in the following figures.

Fig.3. Various Parameters

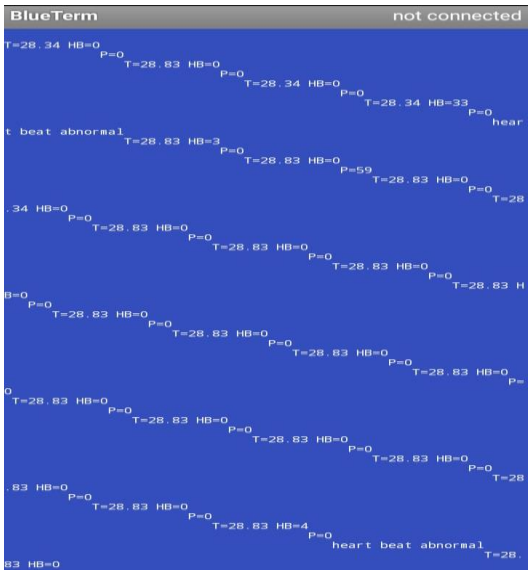

Fig.4. Various Parameters in Mobile App

5. ACKNOWLEDGEMENTS

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6. CONCLUSION

In this project, the design and development of an exercise tracker which provides the physiological conditions of the gym person such as heartbeat, temperature, pressure, thumb ell count during the workout condition which is used to prevent the medically distressed conditions. It also enables to monitor the person wirelessly. And then it sends the parameters to the mobile application through the GSM module to monitor via mobile phone.

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