International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 05 Issue: 02 | Feb-2018 www.irjet.net p-ISSN: 2395-0072

Survey on Human Emotion Recognition System using Heart Rate with IoT

Saranya S[1], Swathipriya T[2], Shuhashini A[3], Srimitha S[4], Prithviraj R[5]

[1]*Assistant Professor, Department of Electronics &Communication Engineering, Dr.N.G.P.Institute of Technology, Tamilnadu, India.*
[2,3,4,5] *Department of Electronics &Communication Engineering, Dr.N.G.P.Institute of Technology, Tamilnadu, India*

Abstract - *The work presented in this paper THE HUMAN EMOTION RECOGNITION is being analyzed using HRV(Heart Rate Variability) with different spectral bands based on RF(Respiratory Frequency) & HR(Heart Rate) and also four emotional states (joy,fear,anger,relax)are measured. Hence this HRV is considered to be a non-invasive technique for the assessment to balance between different emotional state. Thus the components VLF, LF & HF gives result based on power content of different band. This work improves the patient monitoring system.*

***Key Words*: Respiratory frequency, Heart rate variability, Emotion states, Frequency domain, parasympathetic activity, Wireless signals.**

1. INTRODUCTION

This emotion recognition method is majorly depends on sympathetic and parasympathetic hyper activity components. This method is based on level of heart rate and respiratory system range. The analysis of emotion is the low frequency range between 0.04Hz-0.15Hz and high frequency range between 0.15Hz-0.4Hz. Thus analysis is mainly deals with autonomic nervous activity of positive, neutral, negative state.

2. RELATED WORKS

[1]H. Lovheim, et al., is proposed a module on the human behaviour and emotions are based on molecules like monoamine serotonin, dopamine and noradrenaline. Monoamines neurotransmitter represents orthogonal axes and also indicates eight basic emotions (relax, joy, face). The eight basic emotions are called by possible extreme values. This measure helps to knowing human emotions, psychiatric illness and effects of psychotropic drugs.

[2]R. Bailon, et al., are analyzed heart rate variability method is during stress testing based on integral pulse frequency modulation model. This technique is also containing the time varying threshold and non-stationary mean rate. The technique used is autonomic nervous system (ANS) modulating signal for IPFM model. The ANS modulation has lower errors than IPFM model with constant threshold. The IPFM model is further used for studying property of biometric signals.

[3]L. Mainardi,et al., are determined heart rate variability during stress testing is measure by using WignerVille distribution to estimate the instantaneous frequency and amplifier of low frequency and high frequency comparison of heart rate variability. Low frequency and high frequency are varying linearly with time and high frequency indicates the respective frequency. High frequency SNRs is introduced when high amplifier error reaches low SNRs by means of mean of standard deviation. Time frequency methods are applied in study of non-state heart rate variability. The analysis is depending on instantaneous frequency and power of low frequency and high frequency components of heart rate variability stress testing.

[4]J.M. Martinez, et al., are analyzed panic disorder is measured by heart rate and respectively response to stimulate the doxapram. Panic disorder is characterized by anticipatory anxiety and piano, both causing physiological around. When respiratory simulant is at high heart rate, it causes panic attacks in panic disorder patients. This heart rate variability analysis is based on two branches, sympathetic activity and parasympathetic activity. The sympathetic activity refers to low frequency components and parasympathetic activity refers high frequency components. A parasympathetic component of heart rate variability (HRV) was lower during anticipatory atrocity in panic disorder.

[5]VictorM.Lubecke, et al., proposed tha**t** heart rate variability is measured using Doppler radar using linear modulation technique. The Doppler radar has ability to detect and monitor heart and respiration signals simultaneously. The Doppler radar has high accuracy with HRV parameters and mean beat to beat accuracy close to 1ms. The measures of heart motion don't exhibit as sharp at peak signals as in ECG.

[6]A. Rantanen, et al., states that the aim of the heart rate variability reflecting study is based on autonomic activity of subjects during positive reports, negative reports, and neutral reports. The beat to beat interval is measured and heart rate variability analysis is used to gain measure for sympathetic analysis (LF) and parasympathetic (HF) activity. Emotions can be found in central nervous system and autonomic nervous system. Stresses are majorly occurs due to increased sympathetic and decreased parasympathetic activity. The depression is associated with overall decrease in parasympathetic activity.

[7]G. Chanel, J.M. Kierkel, et al., are analyzed generally the human emotions are tested using peripheral as well as EEG. On short time period valence-arousal emotional space are categorized to three specific areas, such as negatively excited and positively excited and calm-neutral states. The accuracy for three emotional areas is 63% using EEGs time frequency features. In emotion, assessments human computer interaction (HCI) is measured by evaluation model. Here we use two discriminant analysis namely linear discriminant analysis and the quadratic discriminant analysis.

[8]R. Bailon, et al., proposed the spectral analysis of heart rate variability is accomplished by mean of the smoothed pseudo wignerville distribution. The different approaches to definition of low frequency and high frequency components considered which involve respiratory information derived either from respiratory signal or ECG. The respiratory frequency is restricted to the band from 0.15 to 0.14 Hz. The analysis of heart rate variability within standard frequency bands would yield in inaccurate estimate of autonomic nervous system activity.

[9]M. Orini, et al., are proposed analysis of heart rate variability during stress testing is measure by using distribution to estimate the instantaneous frequency and amplifier of low frequency and high frequency comparison of heart rate variability. The heart rate variability are measured using parameter decomposition of instantaneous frequency autocorrelation function in for sinusoidal waveform. Instantaneous auto correlation function is windowed and filled cross term reduction. The high frequency component of amplifier error has mean range 3.5% to 2.4% and standard deviation range 3% to 1.7%, the stress testing database has decrease in both low frequency and high frequency when stress is at peak range.

[10]Aletti, et al., are analysis, the heart rate variability is experimented in specific methods of emotion states in children. Here, the method deals with low frequency power and total power of heart rate variability were higher in children with the condition than in healthy controls. The children having more complex heart rate variability and sympathetic over activity it may be results in compensating for hemodynamic alteration.

[11]FoteiniAgrafioti, et al., are determined human emotions are measured using physiological signals which provide accurate state of emotions instead of using behavioral modalities. Two experimental setups are made for elicitation of active and passive arousal/valence. The valence measure is beneficial for both biometric recognition and emotion detections.

[12]Stephan sigg, et al., are analyzed human emotion recognition deals with potential of body movements and focusing on device RF sensing methods. The potential body movements provide high accuracy of emotion state. This application is used in tracking the behavior in real time, health monitoring and also in controlling of domestic appliance. The RF based activity recognition is applied using ubiquitous emotion technology.

[13]Swagata Devi, et al., are established the application methods are based on two main physiological signals: the electrocardiogram(ECG)and photoplethysmogram(PPG),are used to measure the heart rate and the capillary oxygen level of the patient. The additional parameters like blood pressure and blood sugar levels. The physiological signals are processed using a GUI. The healthy oxygen level lies within the range 95-99.The values recorded are transmitted as messages to mobile phones.

[14]MatiurRahmanMinar, et al., are states that health monitoring technologies include heart rate monitor, skin temperature measurement and body mass index. The spirometer is used to measure the ventilation, the movement of air into and out of the lungs. The types of ventilation patterns are obstructive and restrictive .The devices and sensors provide high accuracy and results are displayed in the application.

[15]Krithikashukla, et al., are determined emotion recognition are directly measured the physiological signals through EQ-radio by transmitting RF signals. The classification of emotional state is based on the arousal-valence model. The RF signal is capable of recognizing emotions without interfering the person, the accuracy is also high and the wireless sensing technology used in health monitoring and emotion recognition.

3. CONCLUSION

This approach on emotion recognition using wireless signals provides high accuracy by measuring heart rate variability and also the emotional states such as joy, fear, relax & anger have been measured. And thus patient monitoring system has been improved for chronic disease patients.

REFERENCES

[1] H. Lovheim. A new three-dimensional model for emotions and monoamine neurotransmitters. Med. Hypotheses, 78(2):341–8, 2012.

[2] R. Bailon, G. Laouini, C. Grao, M. Orini, P. Laguna. The integral pulse frequency modulation model with time-varying threshold: Application to heart rate variability analysis during exercise stress testing. IEEE Trans. Biomed. Eng., 58(3):642–652, 2011.

[3] R. Bailon, L. Mainardi, and P. Laguna. Time-frequency analysis of heart rate variability during stress testing using a priori information of respiratory frequency. In Computers in Cardiology, pages 169–172, 2006.

[4] R. Bailon, L. Mainardi, M. Orini, L. S ornmo, and P. Laguna. Analysis of heart rate variability during stress testing using

respiratory information. Biomed. Signal Process. Control, 5(4):299–310, 2010.

[5]J.M. Martinez, A. Garakani, C.J. Aaronson, J.M. Gorman. Heart rate and respiratory response to doxapram in patients with panic disorder. Psychiat. Res., page in press, 2015.

[6]A. Rantanen, S.J. Laukka, M. Lehtihalmes, and T. Seppaanen. Heart rate variability reflecting from oral reports on negative experience.Procedia Soc. Behav. Sci., 5:483–487, 2010.

[7] G. Chanel, J.M. Kierkels, M. Soleymani, T. Pun. Short-term emotion assessment in a recall paradigm. Int. J. Human-Computer Studies, 67(8):607–627, 2009.

[8]R. Bailon, P. Laguna, L. Mainardi, and L. S´ornmo. Analysis of heart rate variability using time-varying frequency bands based on respiratory frequency. In IEEE EMBS International Conference on Engineering in Medicine and Biology Society, 29th International Conference on, pages 6674–6677, 2007.

[9] VictorM.Lubecke, WansureeMassagram.Heart rate variability assessment using Doppler radar with linear modulation.978-2-87487-006-4.2009.

[10] Aletti, F., Ferrario, M., Almas de Jesus, T.B., Stirbulov, R., Borghi Silva, A., Cerutti, S., Malosa Sampaio, L.: Heart rate variability in children with cyanotic and acyanotic congenital heart disease: Analysis by spectral and non- linear indices (2012)

[11] Foteini Agrafioti, Member, IEEE, DimitriosHatzinakos, Senior Member, IEEE Adam K. Anderson. ECG pattern analysis for emotion recognition. 1949-3045/12.2012.

[12] Stephansigg, Muneebaraja.Applicability of RF based methods for emotion recognition.15968655. (2016).

[13] SwagatanDevi, SoumikRoy, Physiological measurement platform using wireless network with android application 2352-9148 2017 published by Elsevier Ltd.

[14]S.M.Farhad,MatiurRahmanMinar,SudiptaMajumder.'Measurement of Vital Signs with Non-invasive and Wireless Sensing Technologies and Health Monitoring. © 2017 J. Adv. Inf. Technol. doi: 10.12720/jait.8.3.187-193.

[15] KritikaShukla, Jigyasa Singh, Dipti Kale. Emotion Recognition "An Optimized Approach using RF Signals" ISSN: 2321- 8169 International Conference On Emanations in Modern Technology and Engineering (ICEMTE-2017).