Recognition of Human Emotion from Observation of Body Resistance, Heart Beat and Temperature

[1]Miss. Gaikwad Snehal S.,[2]Prof. Jagadale A. B.

Department of Electronics & Engineering,
SKNSCOE, Korti, Pandharpur, Solapur,India

Abstract : Automatic emotion recognition is a major topic in the area of human– robot interaction. This paper presents an emotion recognition system based on physiological signals. Emotion induction experiments which induced joy, sadness, anger, and pleasure were conducted on 6 subjects. The subjects' Body resistance, Heart beat and temperature signal were recorded simultaneously by a physiological monitoring device based on wearable sensors. Compared to the non-wearable physiological monitoring devices often used in other emotion recognition systems, the wearable physiological monitoring device does not restrict the subjects' movement. Change in body resistance due to variation in physiological and psychological conditions. The change is caused by the degree to which a person's sweat glands are active. Psychological status of a person tends to make the glands active and this change the skin resistance. Drier the skin is, higher will be the skin resistance. This variation in skin resistance ranges from 5kΩ to 25kΩ. In the current work, a subject whose skin resistance and heart beat is to be measured, has been shown/played a movie clipping, images or recorded audio signals. Due to the change in emotion, skin resistance and heart beat varies. This variation in skin resistance and heart beat is recorded for a fixed time interval.

***IndexTerms*–Body resistance, Heart beat, human emotions, Wearable sensors.**

I. INTRODUCTION

Human body is conductor of electricity and it has electrical properties similar to other material. Without emotions, life is experienced as having little meaning. Emotionless actions are often related to machines, which execute a sequence of pre-programmed commands. People express emotions through facial expressions, tone of voice, body postures, and gestures which are accompanied with physiological changes. Facial expressions, tone of voice, body postures, and gestures are controlled by the somatic nervous system while physiological signals, such as electroencephalogram (EEG), heart rate (HR), electrocardiogram (ECG), respiration (RSP), blood pressure (BP), electromyogram (EMG), skin conductance (SC), blood volume pulse (BVP), and skin temperature (ST) are mainly controlled by the autonomous nervous system[27]. That means facial expressions, tone of voice, body postures, and gestures can be suppressed or masked intentionally while physiological signals can hardly be masked. Using physiological signals to recognize emotions is also helpful to those people who suffer from physical or mental illness thus exhibit problems with facial expressions, tone of voice, body postures or gestures. Physical disease may cause mental disorders and mental discomfort may have adverse influence on physical health. EDR(electro dermal responses) is actually the medically preferred term for change of electrical skin resistance due to psychological condition. EDRs are changes in the electrical properties of a person's skin caused by an interaction between environmental events and the individual's psychological state. Psychological stress tends to make the glands more active and this lowers the skin's resistance. Our physical body and mind are interactive.

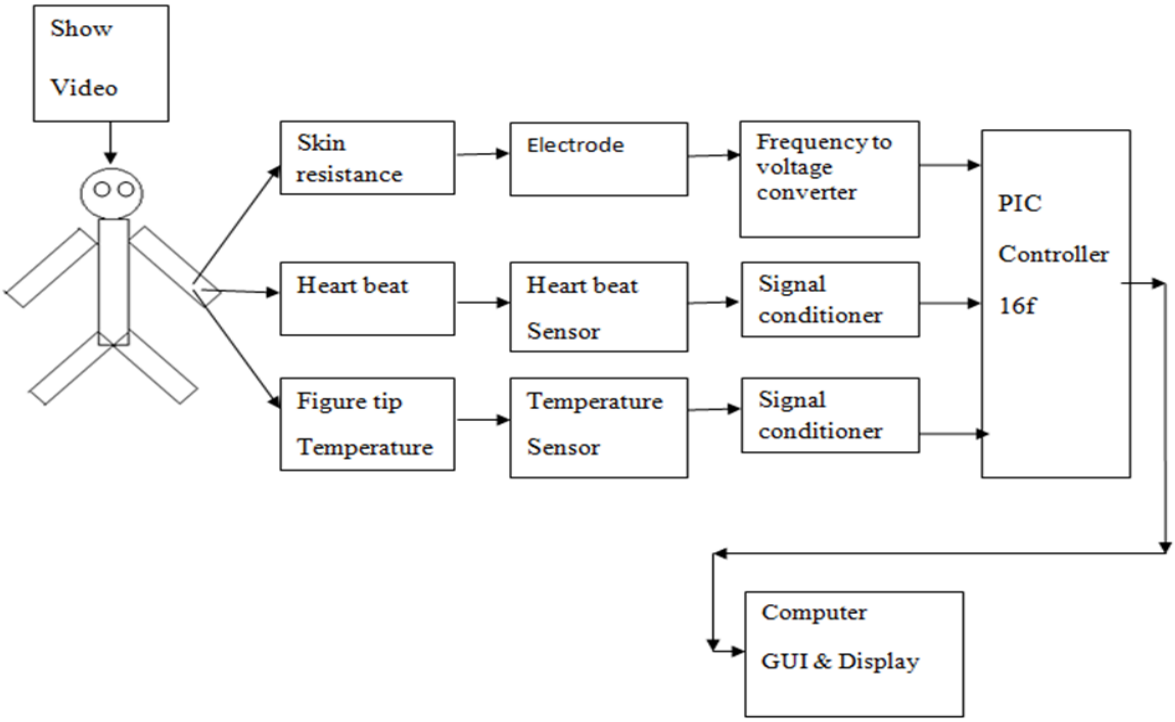
The changes in emotions are measured by considering parameter: Skin resistance, heart beat, temperature. For these parameter, we are considering different emotion conditions such as neutral, fear, happy, disgust, emotional and surprise. Data is acquired and analyzed separately for adult men, women and child from different ages.

When a person is subjected to stress beyond what he or she can withstand, physical or mental disorders may therefore develop. The mechanism is that the stress, when our brain senses it, may cause dysfunction of our automatic nervous system, endocrine system and immune system via the effect of neurological pathways. In clinical practice, biofeedback machine is used to find a way to detect an emotional tension caused by stress. Analysis is made to change the emotional status by external influence. Data are taken in a closed laboratory condition, by playing the video/audio clippings or showing images.

From the literature survey it has been seen that lot of study is done on physiological pattern and different human emotions. G shivkumar mainly concentrated on the GSR(galavanic skin response). The work on ANS studies resulted in the following commonalities [4].

For fear: increase of heart rate, skin conductance level and systolic blood pressure; for anger: increase of heart rate, systolic and diastolic blood pressure. Measuring sadness seems to be more difficult.
Because of this, the results are not as clear as for fear and anger. In paper [5] Also, measuring positive emotions such as happiness seems to be very difficult[9].

II. METHOD



To measure body resistance, constant DC current of few microamperes is passed through the body. The voltage drop across the body is measured. The body resistance is obtained from applied constant Current source.The constant current signal is injected in human body by source electrodes, then the voltage drop across the body is taken by sensing electrode and then voltage across human body is given to ADC of microcontroller. This voltage value is mapped to resistance using this mapping system.

Display and monitoring system consist of microcontroller and GLCD Display unit for user interface. Calculation and estimation of results is done by Display and monitoring system with the help of suitable controller.

III. Procedure for Experiment

creating an environment that will make person comfortable and also set audio/video music sessions for different age groups. Placing of screen and music system as proper arranged. Designing: designing of circuit should be in such a way that it must calculate body resistance, heart beat and temperature. As device will attach to person, then that person would be advice to get rid of different other activities or work and should watch video when played. All the different kinds
of video will be played and make the person watch whether person enjoying or nor. Position of person should be relaxed while experiment is performed, can make then sit on chair or can lay down on bed.

IV. RESULT

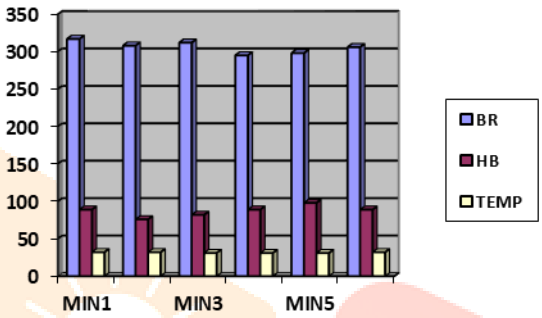
Research talk about different emotions like anger gives high arousal emotions and blood flow through body is increased due to which reduces body resistance of our body. And if emotion like relaxed will enhance the resistance as the resultant body resistance get increase. In this video is playing as input and output shown in GLCD. it is very easy to identify positive emotions like happiness unlike negative emotions like fear and disgust.

Normal:

Sr. No	Body resistance	Heart beat	Temperature
Minutes1	481	108	32
Minutes2	394	79	32
Minutes3	399	65	32
Minutes4	410	81	31
Min 5	400	87	32
Min 6	338	93	32
Min 7	389	91	31
Min 8	311	87	31

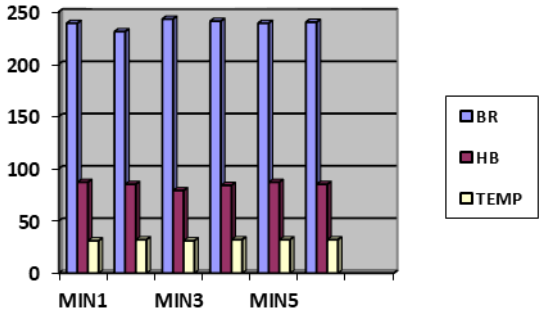
Happy:

Sr. No	Body resistance	Heart beat	Temperature
Minutes1	317	89	32
Minutes2	308	76	32
Minutes3	312	82	31
Minutes4	295	89	31
Min 5	298	98	31
Min 6	306	89	32
Min 7	217	80	31
Min 8	256	88	31



Fear:

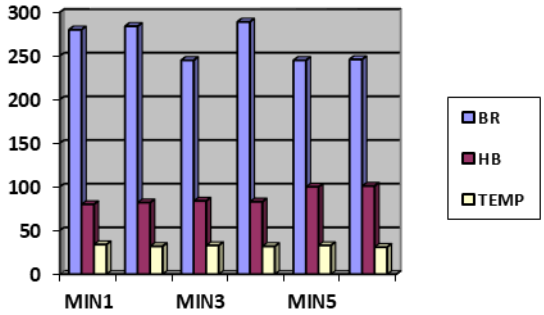
Sr. No	Body resistance	Heart beat	Temperature
Minutes1	239	87	31
Minutes2	231	85	32
Minutes3	243	79	31
Minutes4	241	84	32
Min 5	239	87	32
Min 6	240	85	32
Min 7	238	87	32
Min 8	244	84	31



Surpise:

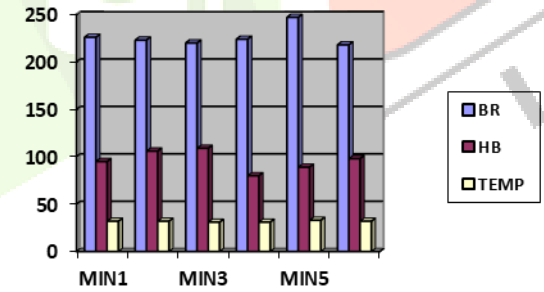
Sr. No	Body resistance	Heart beat	Temperature
Minutes1	280	80	34
Minutes2	284	82	32
Minutes3	245	84	33
Minutes4	289	83	32

Min 5	245	100	32
Min 6	246	101	33
Min 7	258	100	31
Min 8	280	83	31



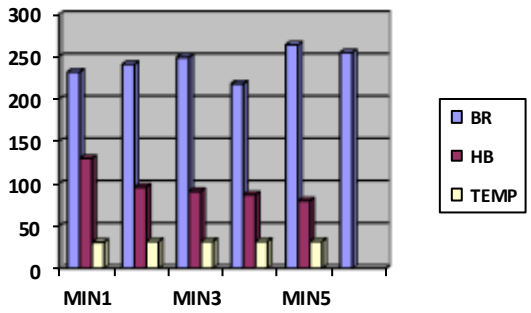
Disgust:

Sr. No	Body resistance	Heart beat	Temperature
Minutes1	226	95	32
Minutes2	223	106	32
Minutes3	220	109	31
Minutes4	224	80	31
Min 5	247	89	33
Min 6	218	98	32
Min 7	248	85	31
Min 8	237	87	31



Emotional:

Sr. No	Body resistance	Heart beat	Temperature
Minutes1	232	130	31
Minutes2	241	96	32
Minutes3	249	91	32
Minutes4	218	87	32
Min 5	264	80	32
Min 6	255	82	32
Min 7	247	91	32
Min 8	256	92	31



V. ACKNOWLEDGMENT

The authors would like to thank the authorities of SKN College of Engineering, Pandharpur, India for providing all facilities to do the research work at the institution and also the anonymous reviewers for the valuable comments and suggestions.

VI. Conclusion

Research talk about different emotions like anger gives high arousal emotions and blood flow through body is increased due to which reduces body resistance of our body. And if emotion like relaxed will enhance the resistance as the resultant body resistance get increase. In this video is playing as input and output shown in GLCD. it is very easy to evoke and identify positive emotions like happiness unlike negative emotions like fear and disgust.

REFERENCES

1 P. A. Vijaya and G. Shivakumar," Galvanic Skin Response: A Physiological Sensor System for Affective Computing", International Journal of Machine Learning and Computing, Vol.3,No.1,February 2013.
2 Tanu Sharma and Bhanu Kapoor," Emotion estimation of physiological signals by using low power embedded system," Conference on Advances in Communication and Control Systems 2013 (CAC2S 2013).
3 G. Shivakumar and P. A. Vijaya, "Face Recognition System Using Back Propagation Artificial Neural Network," International Journal of Computer Science and Information *Technology*, vol.1, Issue 1,pp.68-77, 2009.
4 G. Shivakumar, P. A. Vijaya and R. S. Anand, "Emotion Recognition Using Finger Tip Temperature: FirstStep towards an Automatic System," *International Journal of Computer* and Electrical Engineering, Vol. 4, No. 3, June 2012.
5 Jonghwa Kim," Emotion Recognition Based on Physiological Changes in Music Listening," IEEE Transaction on pattern analysis and machine intelligence,Vol.30,No.12,December 2008.