



iJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 3

Issue: XII

Month of publication: December 2015

DOI:

www.ijraset.com

Call: ☎ 08813907089

E-mail ID: ijraset@gmail.com

Emotion Regulated Auto System Shutdown (ERASS)

Mohsinuddin KhajaMoinuddin¹, Prof.Amol Barve², Misbahuddin Khajamoinuddin³

¹Department of Electrical & Electronics Engineering, LNCT, Bhopal 462021 (MP)-India

²Department of Electrical & Electronics Engineering, LNCT, Bhopal 462021 (MP)-India

³Department of Production Engineering, COEP, Pune (MH)-411005, India

Abstract— *In search of innovation for developing new advancement, we neglected human health which is also very important. 'Mental stress' is a problem in today's era which every individual suffers. The motive behind developing Emotion Regulated Auto System Shutdown (ERASS) is to reduce mental work load. ERASS makes use of a simple stress meter which works on the principle of galvanic skin response which converts skin resistance to a particular value of voltage. This voltage changes with change in emotional activity of the subject. This threshold values differs from subject to subject. The impulse from the stress meter is fed up in a microcontroller, which in turn switches OFF computer system, if stress level persists or increases. The aim behind designing such a system is to reduce mental stress and in turn helps stress management to a level. It is expected that developing ERASS does helps to overcome mental stress.*

Keywords— *Emotion Regulated, Galvanic skin response, Mental stress, Microcontroller, Stress meter, Threshold values.*

I. INTRODUCTION

Blood is carried from the heart to all parts of the body in blood vessels. Each time the heart beats, it pumps blood into the vessels. Blood pressure is created by the force of blood pushing against the walls of blood vessels (arteries) as it is pumped by the heart [1], [5], [11].

Hypertension, also known as high or raised blood pressure [2], [10], is a condition in which the blood vessels have persistently raised pressure. The higher the pressure in blood vessels the harder the heart has to work in order to pump blood [12]. If left uncontrolled, hypertension can lead to a heart attack, an enlargement of the heart and eventually heart failure [4]. Blood vessels may develop bulges (aneurysms) and weak spots due to high pressure, making them more likely to clog and burst [2]. The pressure in the blood vessels can also cause blood to leak out into the brain. This can cause a stroke. Hypertension can also lead to kidney failure, blindness, rupture of blood vessels and cognitive impairment [12].

II. SURVEY AND COSTING

A. Survey

Globally cardiovascular disease including high blood pressure accounts for approximately 17 million deaths a year, nearly one third of the total. Of these, complications of hypertension account for 9.4 million deaths worldwide every year. Hypertension is responsible for at least 45% of deaths due to heart disease, and 51% of deaths due to stroke [12], [5].

In 2008, worldwide, approximately 40% of adults aged 25 and above had been diagnosed with hypertension; the number of people with the condition rose from 600 million in 1980 to 1 billion in 2008. The prevalence of hypertension is highest in the African Region at 46% of adults aged 25 and above, while the lowest prevalence at 35% is found in the Americas. Overall, high-income countries have a lower prevalence of hypertension - 35% - than other groups at 40% [12], [5].

In 2008, 1 billion people were smokers and the global prevalence of obesity has nearly doubled since 1980. The global prevalence of high cholesterol was 39% and prevalence of diabetes was 10% in adults over 25 years. Tobacco use, unhealthy diet, harmful use of alcohol and physical inactivity are also the main behavioral risk factors of all major noncommunicable diseases, that is cardiovascular disease, diabetes, chronic respiratory disease and cancer [12], [5].

If appropriate action is not taken, deaths due to cardiovascular disease are projected to rise.

B. Costing

In certain low- and middle-income countries, current health expenditure on cardiovascular diseases alone accounts for 20% of total health expenditure [12], [5].

International Journal for Research in Applied Science & Engineering Technology (IJRASET)

Over the period 2011-2025, the cumulative lost output in low- and middle-income countries associated with noncommunicable diseases are projected to be US\$ 7.28 trillion. The annual loss of approximately US\$ 500 billion due to major noncommunicable diseases amounts to approximately 4% of gross domestic product for low and middle income countries. Cardiovascular disease including hypertension accounts for nearly half of the cost [12], [5].

Regarding the Indian patients there is approximately Rs 4000/- is required for the medicine and checkups of blood pressure disease. Mostly the use of tobacco and alcohol is considered here to reduce hypertension for which most of people invest money for no use. In-house treatment cost differently where as ayurwadic, unani and many more fields having the same treatment way which cost on monthly basis to maintain or put the blood pressure within safe limit to avoid heart attack issues.

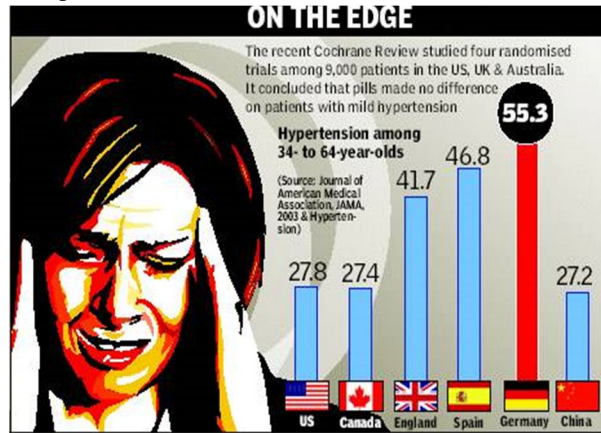


Fig. 1. Article from The Sunday Times, dated September 02, 2012

C. Classification of Blood Pressure for Adults

TABLE I: Classification of blood pressure for adults

Classification of blood pressure for adults		
Category	Systolic, mm Hg	Diastolic, mmHg
Hypotension	< 90	< 60
Desirable	90–119	60–79
Prehypertension	120–139	or 80–89
Stage 1 Hypertension	140–159	or 90–99
Stage 2 Hypertension	160–179	or 100–109
Hypertensive Crisis	≥ 180	or ≥ 120

III.MATHEMATICAL RELATION

Paper It has been observed as the hypertension is directly affects on blood pressure and blood pressure is affected by the heart pumping action which will increase or decrease blood flow [20].

Mathematically we can say

$$H_t \propto B_p$$

$$B_p \propto F_b$$

H_t = hypertension, B_p = Blood Pressure, and F_b = Rate of Blood Flow due to pumping action of heart.

$$B_p = \frac{1}{k} F_b$$

$$\frac{1}{k} = \text{Factors affecting Blood flow}$$

International Journal for Research in Applied Science & Engineering Technology (IJRASET)

The blood flow increases increase the permeability of skin, where as permeability is conductivity of skin to electrical current.
There for

$$F_b \propto P_s$$

P_s = permeability of skin

$$F_b = A \cdot P_s$$

A = Multiplying factor depends upon different locations at skin

$$B_P = \frac{A}{k} P_s$$

$$B_P = \frac{A}{k} C_s$$

C_s = conductivity of skin to electrical current.

Where as

$$C_s \propto \frac{1}{R_s}$$

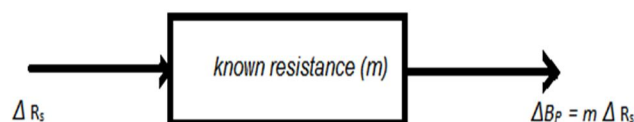
R_s = Skin Resistance to electric current

There for in the two cases the B.P and Resistance relationship is as given below

m = Known resistance

The case of high B.P

$$\Delta B_P = m \Delta R_s$$



The case of Low B.P

$$\Delta B_P = \frac{1}{m} \Delta R_s$$

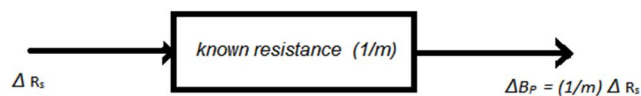


TABLE II
Relation between resistance and conductivity with blood pressure

B.P	Conductivity	Resistance
high	high	low
low	low	high

International Journal for Research in Applied Science & Engineering Technology (IJRASET)

Table III

Factors affecting resistance and Value of resistance

Factors affecting resistance	Value of resistance
thin skin	low
thick skin	high
dry skin	high
moisturized skin	low
sweating	low
temperature	high for high

IV. SYSTEM DESIGN AND IMPLEMENTATION

A. Requirement

Hardware Requirement

- 1) Arduino UNO (AtMega328) [19].
- 2) Conducting electrodes
- 3) Potentiometer(1M)
- 4) Relay (12V)
- 5) IC BC547
- 6) Connecting wires

Software Requirement

- 1) Arduino IDE
- 2) HyperTerminal

B. Block Diagram and Working

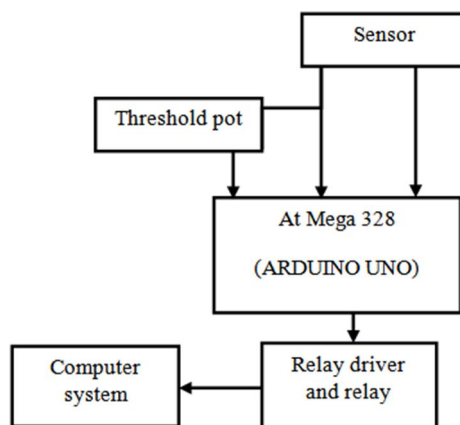


Fig. 2. Block Diagram of ERASS

- 1) Initially a sensor is prepared for measuring Galvanic Skin Response. In other word the skin resistance.
- 2) The sensor consists of metal strips embedded in a Velcro strap. These sensors are simply used for measuring the skin resistance, which in turn would help us measure the skin resistance.
- 3) Arduino Uno is a micro controller based board which is required for project.
- 4) The Arduino board consists of microcontroller ATmega328.
- 5) This board receives analog inputs from our sensors at pins A0 and the other at pin connected to a pot resistor.
- 6) The main function of this board is to receive the analog input from our sensor.
- 7) This board also converts analog data into digitized form.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)

- 8) For doing this initially, a series of data is recorded from the subject.
- 9) Ever since the readings for every individual changes, a threshold value is set depending on the varying values.
- 10) These values are fed up in software called, 'Arduino Uno 1.0.1', [19].
- 11) And hence a series of such values are obtained also the value of threshold is set.
- 12) Whenever the sensor is attached to subject, it instantly gives us a value for his/her external body resistance.
- 13) This analog data, if crosses its threshold value, the Arduino is programmed such that it knocks out the rest of the execution of the program and the loop is broken, resulting in an output to the result.
- 14) A normal relay is used here in order to transfer the output of the microcontroller to the computer system hardware.
- 15) The output from the pins of the Arduino once fed up in the relay, the relay then acts as a switch box circuit.
- 16) It means that the relay performs certain function which switches to different tasks depending upon the type of input provided.
- 17) Here, the relay has been provided for the restart button of the computer.
- 18) Once the reading of a subject changes above the threshold value, the relay gets in active stage where it directly switches off the system.
- 19) And once the subject comes back to his/her normal state, the values again relax below the threshold.
- 20) This time the relay switches of to low mode and then restarts the system.
- 21) Thus implementation of Emotion Regulated Auto System Shutdown is successful.
- 22) It is also noteworthy that with implementation of ERASS, we have successfully implemented our concept and also the basic need of people working under high stress condition.



Fig. 3. Arduino and sensor plate setup



Fig. 4. Shaving blade trick

International Journal for Research in Applied Science & Engineering Technology (IJRASET)

C. Flowchart

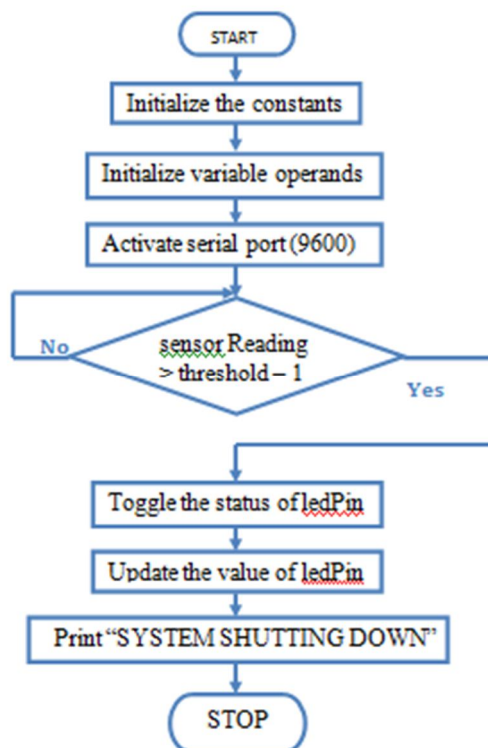


Fig. 5. Flow chart

V. RESULTS

TABLE IV

B.P READINGS WITH MEASURED SKIN RESISTANCE VARIATION FOR CASE-I

CASE	PRADNYA AUTADE			
SYS	141	135	136	156
DIA	78	73	111	144
PULS	73	75	89	153
R1	66	76	87	99
STATE	NORMAL		EXCITED	

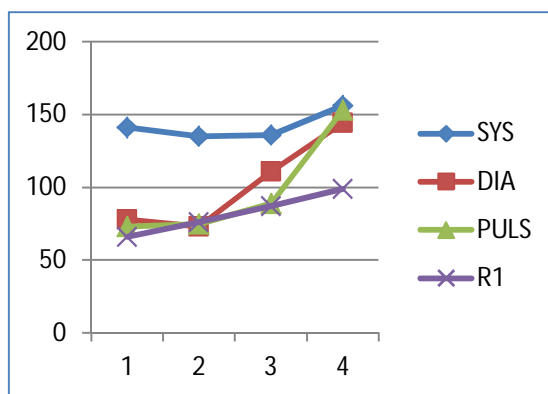


Fig. 6. Relation between blood pressure and skin resistance of CASE-I

International Journal for Research in Applied Science & Engineering Technology (IJRASET)

Table V

B.P readings with measured skin resistance variation for CASE-II

CASE	NAMITA CHAUDHARY			
SYS	107	109	104	129
DIA	67	59	64	106
PUL	83	76	81	72
R1	56	59	78	89
STATE	NORMAL		EXCITED	

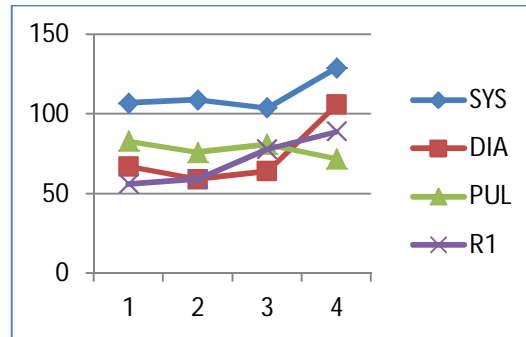


Fig. 7. Relation between blood pressure and skin resistance of CASE-II

VI.CONCLUSION

I.T. industries are completely dependent on computers. With increasing technologies the work load has also increased to such an extent that 90% of employees suffer. This device will not only benefit the I.T. firms but also other fields where stress level is high.

REFERENCES

- [1] Thomas G. Pickering, MD, DPhil, John E. Hall, PhD, Lawrence J. Appel, MD, Bonita E. Falkner, MD, John Graves, MD, Martha N. Hill, RN, PhD, Daniel, MD, Theodore Kurtz, MD, Sheldon G. Sheps, MD, Edward J. Roccella, PhD, MPH, "Recommendations for Blood Pressure Measurement in Humans and Experimental Animals" Hypertension.2005, pp. 142-161, Published December 20, 2004.
- [2] Aram V. Chobanian, George L. Bakris, Henry R. Black, William C.ushman, Lee A. Green, Joseph L. Izzo Jr, Daniel W. Jones, Barry J. Materson, Suzanne Oparil, Jackson T. Wright Jr, Edward J. Roccella, "Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure" Hypertension.2003; pp. 1206-1252, Published December 1, 2003.
- [3] Robert D. Brook, Lawrence J. Appel, Melvyn Rubenfire, Gbenga Ogedegbe, John D. Bisognano, William J. Elliott, Flavio D. Fuchs, Joel W. Hughes, Daniel T. Lackland, Beth A. Staffileno, Raymond R. Townsend, and Sanjay Rajagopalan, "Beyond Medications and Diet: Alternative Approaches to Lowering Blood Pressure: A Scientific Statement From the American Heart Association", Hypertension. 2013, pp. 1360-1383, published April 22, 2013.
- [4] Shanthi Mendisi, "Hypertension: a silent contributor to the global cardiovascular epidemic", Regional Health Forum – Volume 17, Number 1, 2013.
- [5] A global brief on Hypertension, Silent killer, global public health crisis, World Health Organization report, World Health Day 2013.
- [6] Leslie Cromwell, Fred J. Weibell, Erich A. Pfeiffer: "Resting and action potential". Biomedical instrumentation and measurements, pp.50:52, 2004.
- [7] Leslie Cromwell, Fred J. Weibell, Erich A. Pfeiffer: "Psycho physiological measurement". Biomedical instrumentation and measurements, pp.35:308, 2004.
- [8] Rudolph J. Liedtke "Fundamentals of Bioelectrical Impedance Analysis", February 1, 1998.
- [9] R. Fish & L. Geddes, "Medical and Bioengineering Aspects of Electrical Injuries" 2003 Lawyers & Judges Publishing Company, Inc.
- [10] Mozaffarian D, Benjamin EJ, Go AS, Arnett DK, Blaha MJ, Cushman M, de Ferranti S, Després J-P, Fullerton HJ, Howard VJ, Huffman MD, Judd SE, Kissela BM, Lackland DT, Lichtman JH, Lisabeth LD, Liu S, Mackey RH, Matchar DB, McGuire DK, Mohler ER 3rd, Moy CS, Muntner P, Mussolino ME, Nasir K, Neumar RW, Nichol G, Palaniappan L, Pandey DK, Reeves MJ, Rodriguez CJ, Sorlie PD, Stein J, Towfighi A, Turan TN, Virani SS, Willey JZ, Woo D, Yeh RW, Turner MB; on behalf of the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. "Heart disease and stroke statistics—2015 update: a report from the American Heart Association" [published online ahead of print December 17, 2014].
- [11] Marvin Moser, "High blood pressure- Lower it & live longer", Hypertension Education Foundation, NY, 2007.
- [12] The Seventh Report of the Joint National Committee on "Prevention, Detection, Evaluation, and Treatment of High Blood Pressure", U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES and National Heart, Lung, and Blood Institute. NIH Publication, August 2004.
- [13] Lewis JE, Boyle E, Magharious L, Myers MG. Evaluation of a community-based automated blood pressure measuring device. CMAJ. 2002; 166: 1145–1148.
- [14] Clement DL, De Buyzere ML, De Bacquer DA, de Leeuw PW, Duprez DA, Fagard RH, Gheeraert PJ, Missault LH, Braun JJ, Six RO, Van Der NP, O'Brien E; "Office versus Ambulatory Pressure Study Investigators. Prognostic value of ambulatory blood-pressure recordings in patients with treated hypertension". N Engl J Med. 2003.
- [15] Abdullah A.A., Hassan U.H., "Design and Development of an Emotional Stress Indicator (ESI) Kit" Proc. of the IEEE Conference Sustain. Utilization and

International Journal for Research in Applied Science & Engineering Technology (IJRASET)

Development in Engineering and Technology, pp. 253-257, 2012.

- [16] Gerrett N., Redortier B., Voelcker T., Havenith G., "A Comparison of Galvanic Skin Conductance and Skin Wettedness as Indicators of Thermal Discomfort during Moderate and High Metabolic Rates" *Journal of Thermal Biology*, 530-538 (2013).
- [17] Prokhorov E.F., Gonzalez-Hernandez J., Vorobiev Y.V., Morales-Sanchez E., "Electrophysical Characterization of Biologically Active Points and Human Skin by In Vivo Impedance Measurement" *Proc. of the 22nd Annual International IEEE Conference on Engineering in Medicine and Biology Soc.*, 2000, 2636-2639.
- [18] Sălceanu A., Iacobescu F., Anghel M., "Upon the Influence of the Real Value of Human Body Capacitance in ESD Immunity Tests" *Proc. of 19th IMEKO TC 4 Symposium, Barcelona, Spain, 2013*, 501-507.
- [19] ATMEL Datasheet of ATMEGA 328. Available in: <http://www.atmel.com/Images/doc8161.pdf>.
- [20] J. M. VAN DER VALK, M.D. and J. GROEN, M.D. "Electrical Resistance of the Skin During Induced Emotional Stress A Study of Normal Individuals and of Patients with Internal Disease". *Association for Research in Nervous and Mental Disease*, 279-96, 1949 Dec.



10.22214/IJRASET



45.98



IMPACT FACTOR:
7.129



IMPACT FACTOR:
7.429



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089  (24*7 Support on Whatsapp)