



IOT BASED SMART SECURITY SYSTEM FOR HUMANS

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ABSTRACT

This paper mainly concentrates to develop a wearable device for the safety and protection of humans. The purpose of this paper can be achieved by sensing individual condition and their body position. The individual situation can be analyzed through accelerometer. Acquiring the raw data is then followed by activity recognition. Real-time data will be attained by Wi-Fi module. The device is programmed to continuously monitor the individual parameters and sends an alert message via GSM module along with the location via GPS module of the victim to the caretaker when any dangerous situation presents itself. It does so by detecting the change in the monitored signals and comparing it with the predefined values that will be fed to the device.

Keywords—Galvanic skin resistance, Adrenal gland, eccrine gland, triple axis galvanometer.

I. INTRODUCTION

Human security is defined as “freedom from fear and freedom from want”. From the very early time, humans use defense strategy for their safety but we are still not successful in avoiding violence and eve teasing. There is a major need of protecting humans from harassments, sexual abuse and violence by implementing challenging systems with technological requirement. As we cannot estimate the happening of incidents, yet one can reduce the chances of sexual abuse, violence, assault by having a safety tool nearby and can overcome dangerous situations.

When an individual is exposed to a threat, the adrenal gland recognizes dangerous situation and gets into action automatically. The secretion of adrenalin from this gland affects the human body and sweat gland secretes sweat which reduces the temperature of the body below 35 C. The temperature of the body is sensed by a temperature sensor and also, the sweat increases the electrolytes present on the surface of the skin and conductance of the skin also increases which is detected by the skin resistance sensor. Another effect of adrenalin secretions are increased heartbeat i.e. above 100 beats per minute which is detected by a heartbeat sensor. Other effects are increased blood pressure, expansion of air passages of the lungs. A triple axis accelerometer is being used in this device which monitors the body posture of the victim is in a struggled position.

As the threshold values may vary from person to person this device is being included with machine learning in order to make the device intelligently set threshold values based on the large amounts of training data fed to it. When all the four criteria are satisfied the device gets activated on its own. It then sends an alerts to the caretaker of the victim via GSM module along with the current location of the victim via GPS module. In addition, the device sets a buzzing alarm in order to notify the public around the individual's location.

II. SYSTEM DESIGN

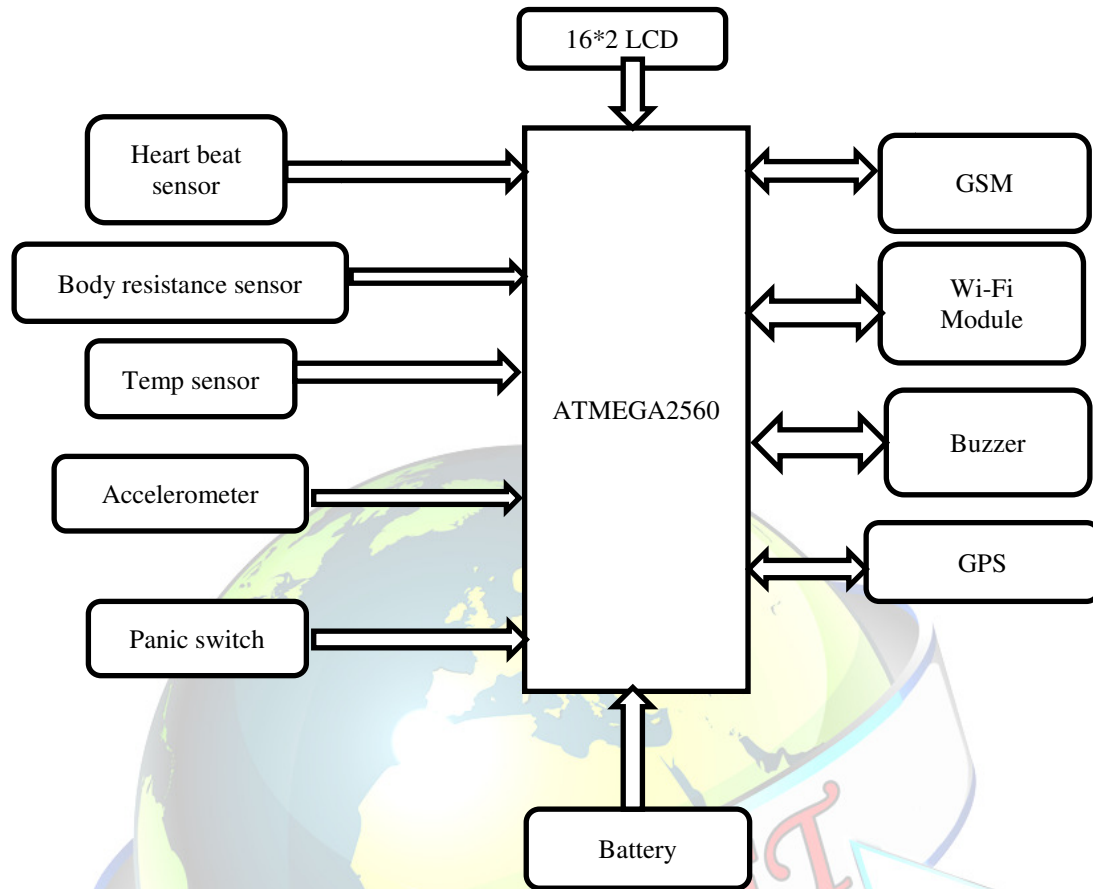


Fig 1: Block Diagram Representation of the System

Block Diagram Description.

Arduino mega collects the data from other devices connected to it and processes the values from the sensors. It helps in running all the devices connected as programmed according to our requirements. LCD acts as a reference to the individual by indicating if the person is in stressed situation or not. Buzzer is to alarm the public in case of emergency and the temperature sensor is used to indicate the drop in body temperature. GSM module is used to send alert message to the designated persons.

Heart beat sensor senses the increased rate of the victim under stress. The triple axis accelerometer reads the body position as well as body posture of the victim and sends real values

Battery is to supply required amount of power to the system. The copper strip picks up raw signals from the subject's body, and therefore has to undergo conditioning and attain stability before sent to the controller. ATMEGA has been programmed to continuously send data to cloud platform, via GSM and GPS module.

III METHODOLOGY

The idea is to implement a wearable device for safety, using different sensors to collect the different health parameters. Heartbeat sensor monitors the heart rate, if the heart beat rate goes above 100 beats per minute or below 55 beats per minute then it is one among the criteria to switch on the device. Temperature sensor monitors the temperature of the body. When the body temperature measured is above 38 C or below 35C it satisfies the second criteria for the activation of the device.

Skin resistance sensor to measure the skin conductivity. Accelerometer is used to check the body position and posture. The Arduino is programmed to run the sensors and other connected devices as desired to the situation. All the sensor output values are fed to the microcontroller which acts as the decision making



device. When all the criteria is met, the device automatically sends alerts via GSM module indicating the location of the victim via GPS module and also activates the buzzer to alert the surrounding environment.

A Equation

To calculate the body temperature of the person,

$$\text{Temperature} = (\text{temp}-0.5) * 100;$$

IV ALGORITHM AND ITS DISCRPTION

Initially the device detects the temperature of the body and resistance of the skin. Later based on the person's situation the data is segmented into smaller data sets.

The data is generated and evaluated, if the condition reveled as panic situation then the triple axis accelerometer detects the position of the body such as struggling, sitting, standing walking on the basis of the three axis.

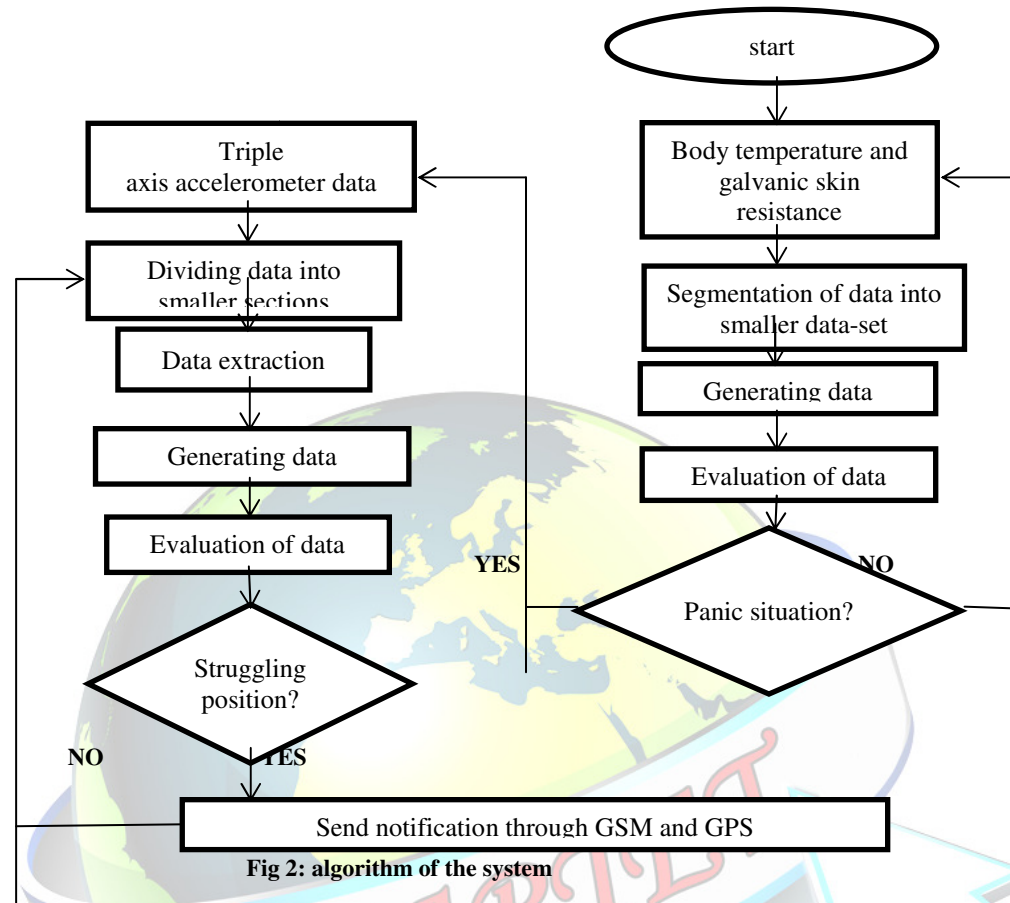
The data which is generated is divided into smaller segments, if the value generated is less than the fixed vdc value then the position of the victim is in dangerous position.

The table below shows the values of various parameters,

Fig : Table of various parameters

SL NO	VARIOUS PARAMETERS	THRESHOLD VALUES	BODY RESISTANCE	TEMPERATURE
1	STANDING	3.14	2.16	1.05
2	STRUGGLING	3.16	2.59	1.85
3	RUNNING	3.19	2.34	1.43
4	WALKING	3.17	2.76	1.21
5	SITTING	3.12	2.89	1.01

From the above table the threshold value is in the range of 3.1 to 3.15. If the individual is facing panic situation the temperature sensor detects the temperature and if it is higher than the normal temperature then the threshold value decreases and similarly the body resistance sensor also detects the conductivity of the body , if it is high then the threshold decreases and then the individual is exposed to threat.



V APPLICATIONS

At situations where women or girl children harassments takes place the device will alert the public as well as send message which might be useful for their rescue.

Physically challenged people and/or mentally retarded people can be monitored through this device by checking their location and activities. By monitoring mentally retarded people we can ensure their safety. By monitoring mentally retarded people we can ensure their safety.

VI EXPECTED OUTCOME OF THE PROJECT

The device is a more efficient and reliable safety and security device which provides individual's protection during the time of emergency or dangerous situations. This device provides information on body parameters of an individual's automatically without any manual activation.

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