International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 04 | Apr 2020 www.irjet.net p-ISSN: 2395-0072

Modern Era and Security of Women: An Intellectual Device

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Abstract - *Is it ethically right, if I say women in our society are not able to lead their lives independently even in this modernized era of 2020? A lot number of physical abuse attacks, rape cases, assaulting of women are being reported daily and are going exponentially high especially in the metro cities. The presence of CCTV's is helping in some manner, but when the attack happens there is no way to figure out the accused. This paper is intended with an idea for women self-reliance using technology, abating the crime rate against women and girls in India. The proposal document illustrates a rapid responding, cost- effective and easy to carry device empowering women a secure and independent life. Where IoT aims at unifying everything, we have designed and implemented the proposed system integrating IoT with SIM 800 GSM module, Force Sensing Resistor, Pulse Sensor, Bluetooth Module, LCD, Resistors, Transistors, Diodes, LED, Arduino UNO, Buzzers, PCB, Breadboards, Transformer, Switch, Arduino Compiler, and Neo6mv2 GPS module. The proposed system has a dual security feature using which women in agony can call for help and share her location with their predefined emergency number. She can activate the system in three different modes as per situation demands, at times she feels she is out in odd hours or insecure. The device can be activated by the victim using panic button or Bluetooth module. When the device is activated, pulse sensor, GPS module and GSM module incorporated in it automatically gets activated and the system will broadcast the message alert with latitude and longitude dimensions along with the heart rate measure to the authorized predefined numbers and to the police, concurrently will sound a buzzer relentlessly, lenient nearby comprehend with the happening. Force Sensing Resistor is equipped in this device, in case of any external force experienced by the device during any type of misconduct and mishandling. In the era of pepper spray, smart bands, this device is turned out to be more powerful and efficient in insulating the lives against barbarities cause to women.*

Key Words: **Internet of Things, Arduino ATmega328P, Neo6mv2 GPS module, GSM module, Force resistive sensor, Bluetooth module, Pulse sensor, Women Safety**

1. INTRODUCTION

Entire nation has a significant role in empowering women in terms of Shiksha, Swasthya, Swavlamban, SamajikNyay, Samvedan, Samta. Among these crucial six 'S', the growing concern of today's world is Swavlamban, meaning Self-Reliance. The woman should be self-reliant. That is, it's perfectly fine to go out alone or you don't need a man to feel secure. But today's scenario is antithetical to the words above. In the occasion of International Safe Cities for Woman Day, ActionAid UK report affirmed that nearly nine of ten women have experienced some sort of harassment or violence or a third grope or touch in public. Three quarters of women in UK cities have experienced violence or harassment, rising to as many as 79% of women in India, 86% of women in Thailand and 86% in Brazil[1].

Assaulting women has become a trend nowadays, and it's high time for women to take their security and safety in their hands. In modern era, women should have self- efficacy "having the confidence in one's ability to deal with a situation without being overwhelmed" [2]. Self-efficacy reflects confidence in the ability to exert control over one's own motivation, behavior, and social environment"[3].

However, Physical and psychological insecurities contribute in developing various psychological disorders like:

- Depression
- Post traumatic stress disorder (PTSD)
- Emotional Distress
- Suicidal tendencies
- Social Anxiety and Phobia
- Low self esteem
- Self blame and Guilt
- Self harming tendencies
- Aggression
- Trouble in forming positive relationship
- Difficulty in concentrating.
- Sleep disturbance and flashbacks

So it is very important to take precautionary measures to prevent and to keep safe from such happenings that may otherwise have impact not only at physical level but also at psychological and emotional level.

The concept of psychological security emerges from the hierarchy of needs theory[4], where Maslow (1943) argued that when security need (categorized as lower-order need) was not met, individual may develop feeling of harm or threat, feel anxious and tense, become less satisfied with life, and may not strongly desire higher level needs. Psychological security is a state in which a person perceives that his/her environment is safe and free from harm and threat (Maslow, Hirsh, Stein, & Honigmann, 1945)[5].

The Internet of Things (IoT)[6] refers to the use of intelligently connected devices and systems to strengthen the data gathered by embedded sensors, actuators and other type of physical objects. IoT is expected to spread rapidly over the coming years and this convergence will unleash a new dimension of services that will further improve the quality of life of consumers and productivity of enterprises. At the present scenario of our country in order to aid the security for women, several steps are being taken by various authorities and organizations and these days 'Internet of Things' (IoT) [7] is leading to a new era and opening a new dimension in security. Women contribute in many ways for the development of our nation [8]. But due to the rapid increase in the crime rate especially in the metro cities there have been many cases where cab drivers, taxi drivers or auto rickshaw drivers and other people have harassed, molested, raped or tried to kidnap the women in the day to day life which tends to create fear and anxiety of being harmed in working as well as in public places [9]. Location is one of the important and dominant features that need to be taken care into account. Identifying, simulating as well as processing the exact Global Positioning System (GPS) coordinates [10] of any type of the misconduct and unlawful act allows the police department and concerned person to give fast mediation in critical crime situations. This is sometimes implemented as a measure authenticated by the user [11], thus technology equipped with GPS bands and security measures would be useful to stop them being manipulated or removed, therefore by introducing GPS there will be significant change in the arrest [12] of crime offenders by tracking their locations. To resolve this concern, diverse people with their ideas and perception have come up with their innovative applications. On the contrary, government has also stringent the rules and regulations in this affair. Many codes related services were also initiated by the police and women welfare concern using which women in distress can call for help. But at times, it's difficult for women to call these codes during the happening. Some of the efforts were made earlier in order to safeguard women against atrocities of potential crime offenders are given as follows:

1) APSS (amrita personal safety system),

2) SHE (Society Harnessing Equipment).

3) VithU App etc.

Every system when develop and implemented it's born its own pros and cons. The complimentary efforts acquire few of the drawbacks. Some of which have been listed below:

- Single mode activation, failure of which leads to no activation of device.
- Application developed requires internet connectivity and
- Codes may sometimes result to no response.

2. RESEARCH METHODOLGY

In this section, the paper elaborates about the system design and the working principle behind it with intent to provide solution to the current problem in demand. The system is designed with the main motive of "Economically Feasible Women Safety Device". The system is equipped with Force Sensing Resistor, Bluetooth Module, Pulse Sensor, GSM (SIM900A) Module, Neo6mv2 GPS Module, Microcontroller Arduino ATmega328P, a Buzzer and a Panic Button. The initialization of the system can be possible in three different modes. The cause behind providing multiple modes in a single device lies in the situation because when a people is in a state of panic, it is quite obvious that initialization of the system may not work leading victim in danger situation. The three modes of system initialization are press of a panic button, a Bluetooth module and a touch sensor. In first case, that is press of a panic button, requires a manual press to the button as an input to the system. In case of Bluetooth module, the device is connected with a mobile or a tablet via Bluetooth. One just has to speak the predefined word in the mobile like "HELP" sort of, leading into system activation. The last case, that is touch sensor, we have used this taking into account a case like the device fells off before any of the above cases applied or the culprit snatches of and throws it then it will automatically get started because of the change in resistance due to applied pressure or force to the device. This is an extra hand to the victim even in the worse condition. After the system is activated, Pulse sensor measures the heart rate concurrently the Neo6mv2 GPS Module which is equipped with the device activates and gives the respective latitude and longitude coordinates reflecting the victim's position and with the GSM module incorporated in it helps to send SMS alert to the predefined numbers and to police station, if requires to ambulance too with a message of current coordinates of the victim along with the pulse rate. The GSM module sends SMS in every 10 sec of time, in order to perfectly trace the victim location. The microcontroller Arduino ATmega328P is used in this device which takes the given data through and executes in the LCD display. Simultaneously a sound gets initiated from the buzzer making nearby aware of the ongoing happening also giving a chance to the victim to escape.

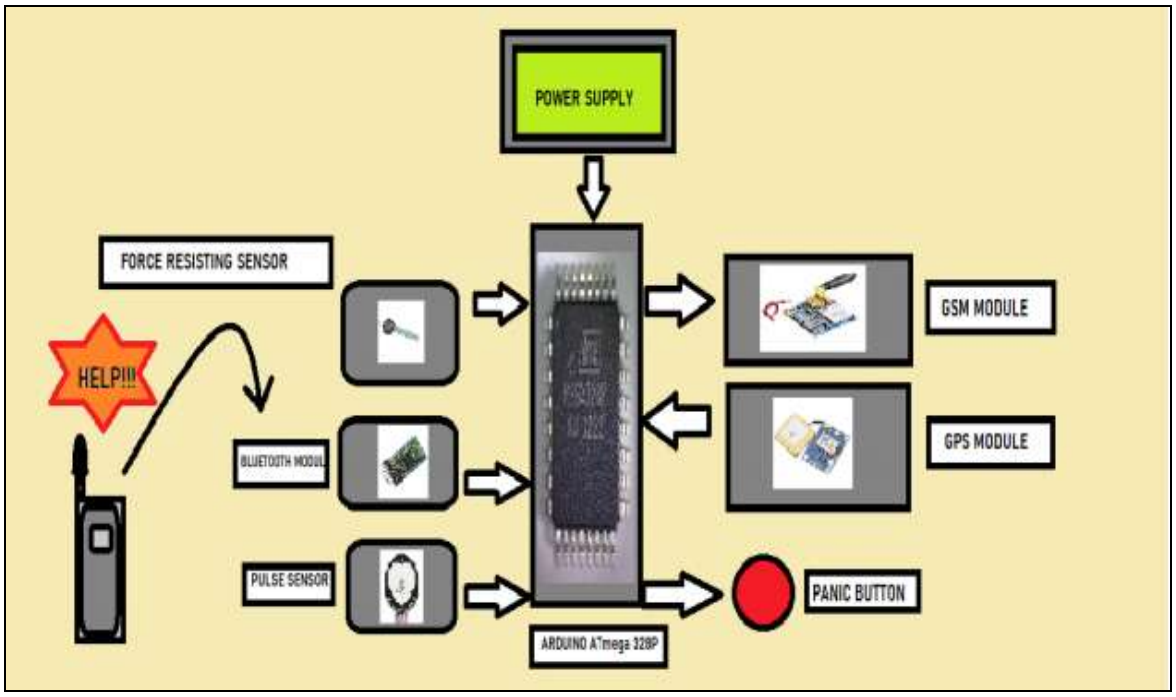

Fig -1: Block Diagram of the proposed model

3. FLOWALGORITHM

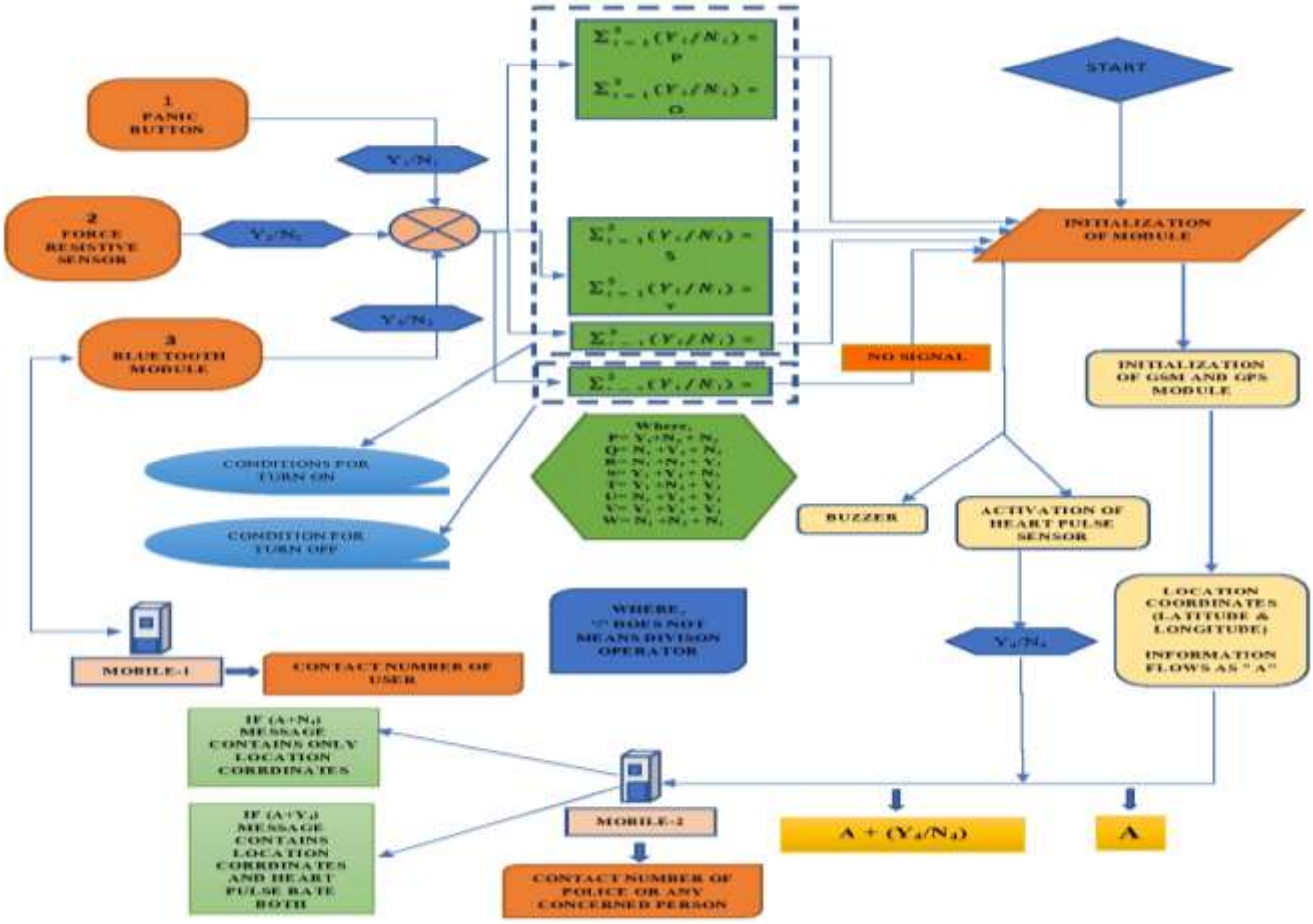

Fig -2: Flow algorithm of the proposed system

4. RESULT AND DISCUSSION:

The following images are the illustration of the working model for the Women Safety System. This section of the research consists of cases in order to efficiently understand and describe the broad working principle behind the idea. They are explained as follows, the default case includes Fig -3, 4, & 5 whereas the Case-I includes Fig -6 in which the system is activated by pressing the Panic Button (Heartbeat sensor located at the bottom should be touched by any of your hand or finger during the process). Corresponding to the output of Case-I (illustrated in Fig -7, 8, 9 &10), the Buzzer will make a sound as soon as the Panic Button is pressed and simultaneously will send the message to the predefined number with the Alert message: "Danger zone please Help"along with the current latitude and longitude values with the pulse rate (At the time of pressing it).

Case-II includes Fig -11 which represents the system is activation via touch sensor (For Demo purpose we have used touch sensor for the given model instead of Force resistive sensor (FSR) as it requires certain limit of pressure to develop a change in resistance in order to activate the system) the output resulted is the same as illustrated in Fig -7, 8, 9 & 10.

Case-III includes Fig -12 which represents system activation via Bluetooth module. In the panic condition the person can directly speak "HELP" (System is configured with Bluetooth) which is recognized by the app and instruct the module to act accordingly which results the same as the output of Case-I and Case-II.

The above cases (I, II, III) have different modes of input under any panic condition but the output results activation of the buzzer and subsequently send an alert message of "Danger Zone Please Help", coordinates of latitude and longitude and heart beat rate (triggering heart beat sensor)to the predefined number.

There are some of the benefits of the proposed model as given below:

1) The device can be activated in a quick span of time and can able to work even without internet connectivity,

2) The device itself has multiple modes for its initiation, which restrict the need for carry multiple devices,

3) System is cable of tracking live location and send SMS via GPS and GSM module respectively,

4) From the economic point of view the device is affordable with abiding multiple functionalities as explained in Table -1,

(5) The device is very much useful for child safety as well as the elder people living alone. Every device has some scope of improvement and optimization in context with its present working, the given below are some of the points:

- The device can be made more variable and can be optimized, such small that it can be fitted in address,
- The device can be equipped with fingerprint scanner, making the device authenticated to one person only and
- Use of camera and sending voice messages during the incident.

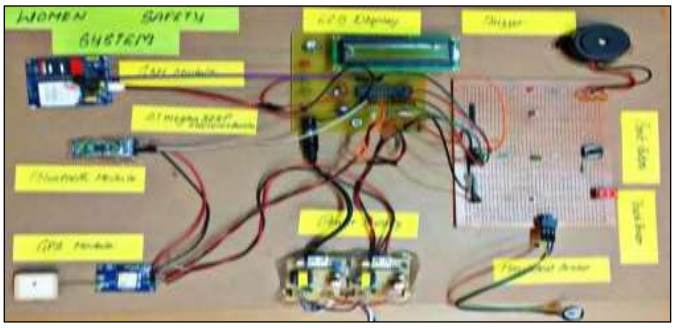

Fig -3: Default case: When the system is in its OFF state

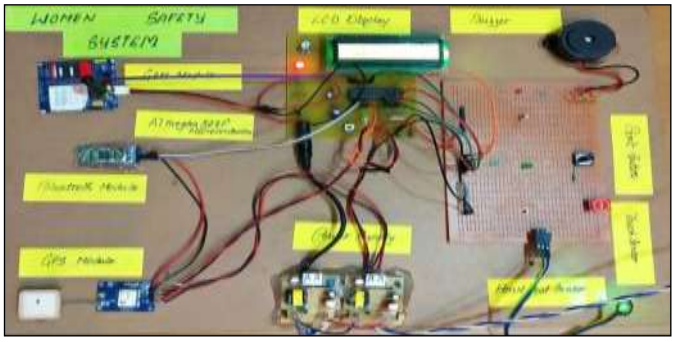

Fig -4: Default case: When the system is in its ON state

Fig -5: Output of the LCD Display screen.

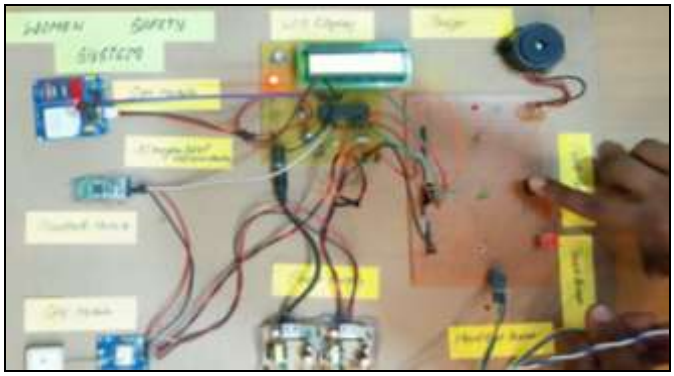

Fig -6: Case-I: System Activation by pressing Panic Button.

Fig -7: Danger Zone: "Please help" message displayed on the LCD screen same will be messaged to the predefined number

Fig -8: SMS delivered notification on the screen of the LCD

Fig -9: Output of latitude and longitude displayed on the LCD display screen

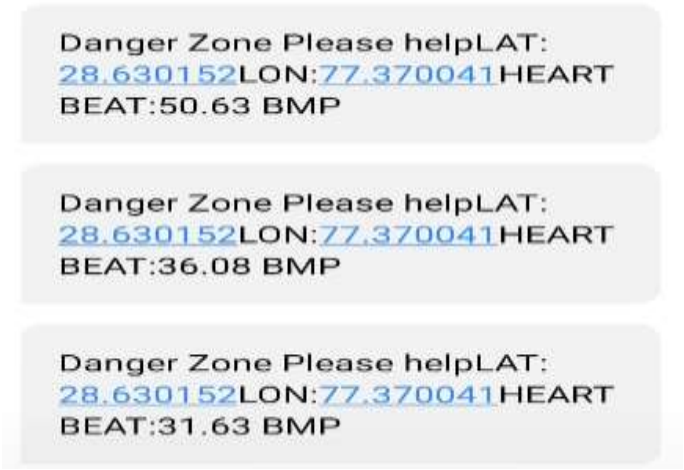

Fig -10: Alert message sent to the predefined number

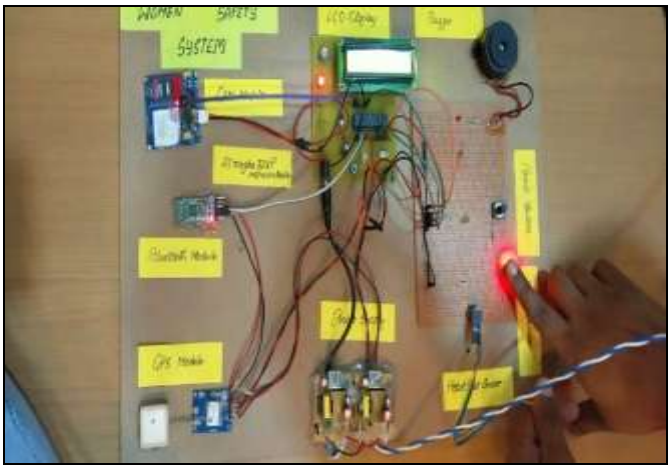

Fig -11: Case-II: System Activation by touching the Touch Sensor

Fig -12: Case-III : system activation via Bluetooth module

COMPONENTS	PER-UNIT COST IN Rs.	COST ANALYSIS
Arduino ATmega328P	449.00	Total cost of hardware components along with appropriate miscellaneous components is approximately Rs. 4500.00
GSM (SIM900A) module	1275.00	
NEO6MV2 GPS module	600.00	
Bluetooth module	470.00	
Touch sensor	459.00	
Pulse sensor	281.00	
Miscellaneous (Connecting wires, Resistors, Transistors, Push button, LED, LCD display, components need for power supply-SMPS)	700.00	
TOTAL COST (IN Rs.)	**Rs. 4500.00**	

Table -1: Cost analysis of proposed model

Women Safety device is very economical to buy. At present, when we all spent a huge amount on mobile phones, clothes, dress up, make up, and so on, just to maintain our standard. Then spending money on women safety has to be in the priority of the list. Going in the number, round estimated figure comes out to be Rs.4500/- as illustrated in Table-1. If in case one has to buy from the market it will cost around 5000-6000/- depending on the area and the market you buy. But as of now, many other devices with the aim of women safety are already in the market with huge amount and other facilities. In our proposed model, it is the very initial factor we have kept in our mind that is Economically Feasible Women Safety Device. Every woman is important whether it's a high-class princess or a low-class poor girl. The above table makes it very clear the amount spent on each of its component in its making process. An advisory to those people who help poor people in providing the basic living to them, can also initiate the distribution of this device to them, for their protective future and freedom free life.

4. CONCLUSIONS

Our main goal of this research paper is to ensure every woman in a society to feel safe and secure. Women need to push their boundaries and subvert the given norms of society/ Implementing and optimizing real time application within an upgraded device can solve many problems to an extent. With such research and innovation, it can be used safe guard the women in every critical situation. The proposed configuration of the IOT based system will manage basic issues confronted by women in the current past and will help illuminate them through innovative stable devices.

Individuals who feel psychologically secure usually perceive that the world is emotionally secure or free from emotional harm (Taormina & Sun, 2015; Olukayode Ayooluwa Afolab , Anthony Gbenro Baloguna,2017)[13]. They usually have high confidence and trust in themselves and others, feel less anxious, and tend to be more social and actively involve themselves in relationship with other people (Taormina & Sun, 2015)[14].

This device will help women to feel secure while travelling and work efficiently. Every woman should equip with such devices in modern era so that she can feel more confident that contributes in life satisfaction

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