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Smart Wearable Device for Women Safety using Internet of things

R.Aarthi¹, M.Chitra², Aishwarys.E³, Abinaya.K⁴

Assistant Professor, Department of ECE, R.M.D Engineering College, Kaveraipettai, Tamil Nadu, India ¹

UG Students, Department of ECE, R.M.D Engineering College, Kaveraipettai, Tamil Nadu, India ²³⁴

ABSTRACT: Over the last few decades, activity and funding has been devoted to improve the recruitment, retention of women in every domain. In past several years, revelations of the sexual harassment experienced by women in workplace and other areas have raised urgent questions about the specific impact of this discriminatory behaviour on women. As this comprehensive era's pace is inexorable, we think technology would greatly help to develop a solution to curb the aggravation faced by women. In this paper, we proposed a model which combines techniques like GPS, message sending protocol to mobile devices, internet of things and bio- medical equipments to develop the prototype. Microcontroller obtains the values sensed by the heart beat sensor and monitors the concerned person. If any deformity is incurred, the respective person's location is shared to their kith and kin and the victim is subjected to mild shock based on the delay decided by manufacturer. This novel recommendation method could considerably subdue the situations confronted by women. We believe that our approach could recommend high nosedive of sexual harassment.

KEYWORDS: internet of things, microcontroller, harassment

I.INTRODUCTION

In recent years, wearable sensors have gained considerable importance both in research and application fields. The reason for such interest lies in their use in many applications, which has been made possible by the progressive reduction of their size and costs. Some examples are wearable sensors in sport and physical activities, surveillance, human computer interaction, rehabilitation and monitoring elderly people [1].

In this framework, wearable sensors can be exploited in different ways, from the simplest panic button function up to the continuous monitoring of the user's physiological parameters. Wireless sensor network (WSN) is a promising solution for a number of monitoring applications including building structural health monitoring, environmental monitoring[2].we thought of building a solution to the situations faced by women, integrating the internet of things with the embedded systems. A wearable IoT sensor node for safety applications called WE-Safe. The aim of WE-Safe project is to provide early warnings for people working in extreme and harsh environment when they are not in the safe zones. Such an IoT platform will present new opportunities for saving life or preventing health issues etc [2]. The same concept can be used to monitor the women 24*7 which helps in preventing her from such harassments. The mood swings and variations of the women can be monitored by overseeing their heart-beat. The heart-beat sensor presents details on sensing modality and algorithm development for wrist- worn PPG, facilitating vital parameter estimation targeting key applications. wrist-worn PPG sensors can be used in ambulatory environment, which encompasses the state-of-the-art research work and open avenues presenting potential for future development [3]. PPG works on the principle of pulse oximetry, wherein a sensor emits light to the skin and measures the intensity of light which is rejected back or transmitted through the skin. PPG signal variations are caused by changes in arterial blood volume. The amplitude of the variations depend on the amount of blood rushing into the peripheral vascular bed, the optical absorption of blood, skin pigmentation, ambient light and the wavelength used to illuminate the blood. The cardiac rhythm corresponds to the periodicity of the PPG signal, which can be used towards estimating HR. Knowledge of HR aids in fitness tracking and can act as periodic intervention mechanism in CVD monitoring [3].

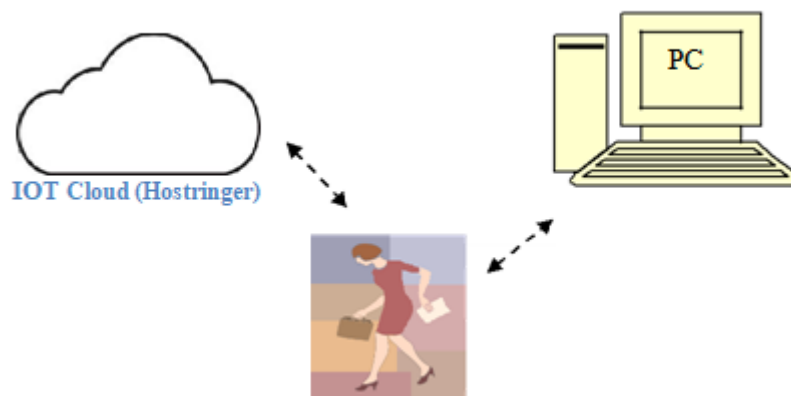
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FIG 1: NETWORK DIAGRAM OF PROPOSED MODEL



Hence a prototype is created integrating techniques like internet of things and human activity recognition. The remainder of this paper is organized as follows:

Section 1 introduces the techniques used in the proposed model. Section 2 outlines the system implementation; Section 3 discusses the experimental results, and a brief conclusion is given in Section 4.

II. ARCHITECTURE AND IMPLEMENTATION

Figure 1 represents the workflow diagram of the prototype used in the paper. The device can be activated by just merely pressing the emergency button once. This device gets activated and sends instant location with a distress message to the police pre-set numbers through a GSM module[4]. The prototype's architecture consists of ATMEGA 2560 arduino incorporated with the GSM module, location accessing protocol, IOT module, buzzer, heart-beat sensor, neuro-stimulator, sos button, zig-bee module and buzzer. The Arduino Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. The Mega 2560 board is compatible with most shields designed for the Uno and the former boards Duemilanove or Diecimila[5]. The AT mega controller is burned with the program developed with the help of work flow diagram. The two context has been included in the program. One if sos button is triggered and other one is when heart-beat sensor receives abnormal signal or input which remains out of accustomed range. When the deformity is arised, either the sos button is turned on or the women heart beat increases exponentially which intimates that the concerned person is in danger. Heart-beat sensor uses bright infrared (IR) LED and a phototransistor to detect the pulse of the finger. As soon as sos button is triggered, the neuro-stimulator is turned on. These devices give neurologists new ways to treat patients with a wide range of disorders, including epilepsy, chronic pain, depression, and Parkinson's disease. So far, these stimulators have been one-way devices that deliver a steady sequence of pulses to the nervous system but can't react to changes in the patient's body. These devices project some amount of electric shock to the person who attacked the women. The electric shock subjected to the person can be determined by the manufacturer who build the electric-shock producing device. A buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric. This device is included to forewarn the environment coz the victim will be in dreadful state. Then the control is relayed to the GPS module. These tiny devices can instantaneously give your exact position and time, almost anywhere on the planet. Dozens of GPS satellites, all containing extremely accurate atomic clocks, have been launched since the late 70's, and launches continue to this day. The satellites continuously send data down to earth over dedicated RF frequencies. Our pocket-

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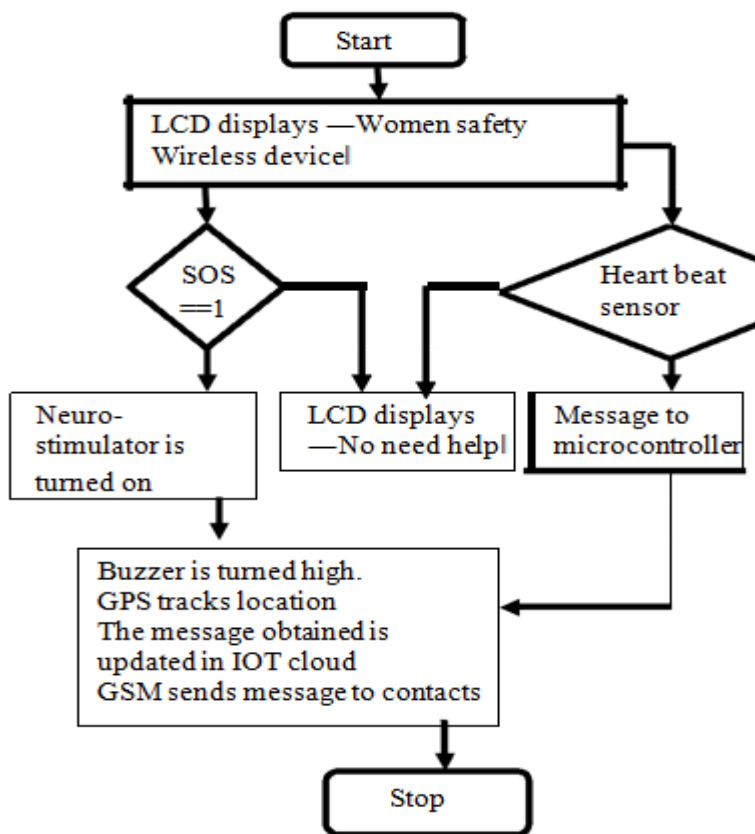
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sized GPS receivers have tiny processors and antennas that directly receive the data sent by the satellites and compute your position and time on the fly[6]. GPS receivers use a constellation of satellites and ground stations to compute position and time almost anywhere on earth. the GPS module receives a timestamp from each of the visible satellites, along with data on where in the sky each one is located (among other pieces of data). From this information, the GPS receiver now knows the distance to each satellite in view. If the GPS receiver’s antenna can see at least 4 satellites, it can accurately calculate its position and time. This is also called a lock or a fix.[6]. Thus the location of prototype is tracked and the influence is transferred to the IOT cloud. An IoT module is a small electronic device embedded in objects, machines and things that connect to wireless networks and sends and receives data. The IoT Module that is responsible for connecting virtually anything to wireless networks. IoT Modules come with a wide range of wireless technology standards, and they provide a variety of features that can impact the success of IoT applications. The key differentiator of IoT modules is that they provide always-on connectivity.

Since the data must be updated in the cloud from time to time[7]. The data obtained from the location-accessing module is then updated in the Hostringer cloud and the revised data is then sent to the top three contacts in the victim phone through GSM. A GSM module or a GPRS module is a chip or circuit that will be used to establish communication between a mobile device or a computing machine and a GSM or GPRS system. Thus the location is transferred to the parents and friends in the respective woman’s critical situation.

FIG 2: WORKFLOW OF THE PROTOTYPE



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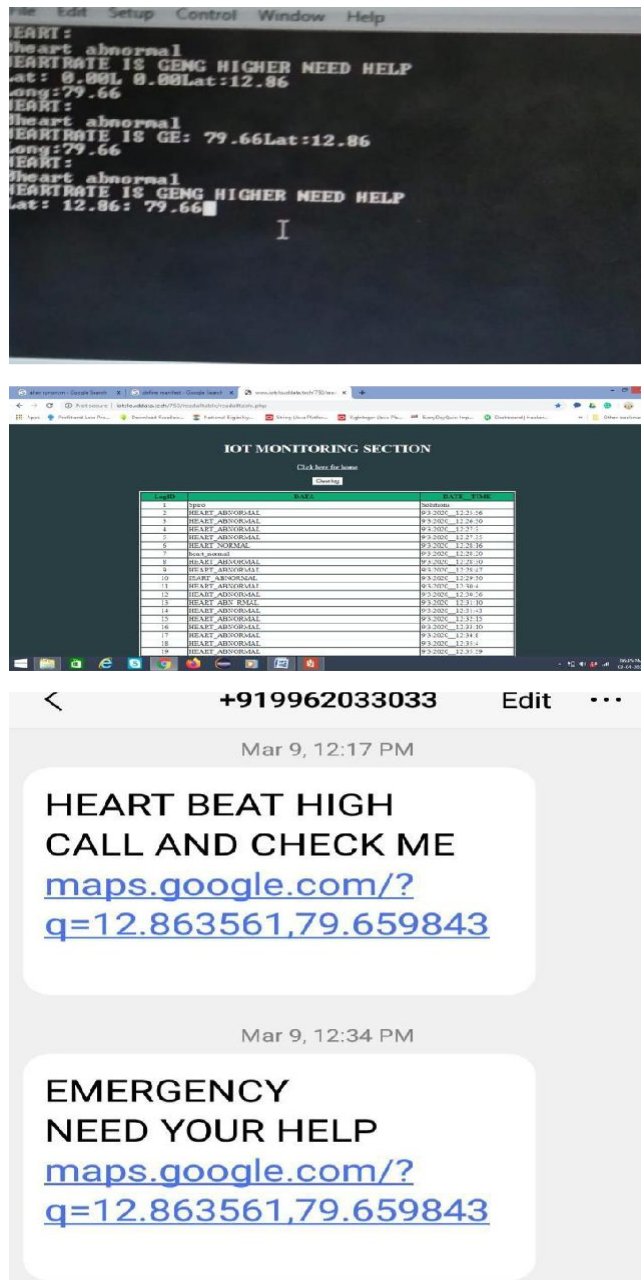
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III. EXPERIMENTATION RESULT

The results has been evaluated and analysed with the existing system. The experimentation results obtained from the prototype is manifested below as follows

FIG: 3, 4, 5



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FIG 3: Tera term application, FIG 4: IOT Monitoring Section, FIG 5: Mobile Phone FIG 5: The message is been sent to the top two contacts which is given as above. FIG 4: Then IOT cloud Hostringer is being updated whenever the module is turned on and superintend the women heart beat rate.FIG 3: In the monitoring section of the personal computer, the distinct software named —Tera term has been used. This software also appraise the person with the concerned woman’s heart-beat rate and their coordinates is also updated. The existing method KAVALAN APP is an application developed by Tamilnadu government that can be installed in mobile phone. These mobile device have innate GPS and message sending protocol. These application ensure safety of women during exigent situation.SOS (Save Our Ship) which is being named as (Save Our Soul).This sos button is used in marine region to caution about the present condition. The sos button automatically sends predefined custom message through the location alert application installed in the device. The cons analysed in the existing solution is that sos button has to be triggered manually in heedful situation. In the proposed system, by tracking the heart-beat rate of the women, the GPS, GSM system and SOS button is triggered. Besides neuro-stimulator is also triggered which prone some amount of electric shock to the offender and makes them unconscious. A production level solution is a working representation used to detect flaws or problems in advance of production. A prototype is a miniature-working model used to illustrate the product, and may be constructed at any stage in the product cycle. Some people have expressed apprehensions over the need to give the app access to personal details on the phone, and have even complained of difficulties in downloading the app/ accessing services. Mobile numbers of close relatives or friends and email IDs are collected while registering.A.S. Fathima Muzaffer, a social worker, said, —Allowing access to phone calls and device location is not an issue for me. But recording audio, accessing storage, media files and accessing contacts — that seems to be intruding into the privacy of an individual. Without allowing such access, it will not be possible to use the app at all, she added .A technologist, who is closely associated with the back-end of the app, said this does pose a risk to privacy of the user and claimed that the data of the app is maintained by a private party. Shahnawaz Khan, Director of AMTEX, which handles the software and call centre support for the app, said, —We cannot go beyond a limit while invoking privacy. The details we ask for are absolutely for people’s own safety. All these details are stored in a very secure server. People are sharing everything on Facebook and Instagram these days. When it comes to safety, we need to be a little more cooperative.[8] The prototype is easily accessible in the urban areas where the signal strength is in acme’s limit. It has very low access at the area where the signal strength is low. The production level solution can be developed in such a way that signal strength can be restored in rural areas which make every women feel secured. The model can also be developed in such a way that it can also be amended in high traffic areas and the model can be contrived in nano technology so it can be portable and remains handy.IOT cloud updation in a road range situation remains complex. These flaws can be acknowledged in the future with the further development in the protype.

IV. CONCLUSION

The integrated hardware devices are being controlled by the microcontroller which is being dumped with the embedded c program. When the emergency situation arises the GPS starts searching for the signal with the inbuilt antenna or with the help of external antenna. When it gets the signal it gets activated and makes the GSM system to transmit the short messages to the top three contacts of that person. with the help of sos(save our soul)button the information is being also transmitted to the nearby public service stations. The heart beat sensor detects the heart rate through the volume of blood that flows in the wrist which can be detected by the IR frequency which is being emitted from the sensor. The Neuro-stimulator is placed outside that stimulates the shock of high frequency which makes the opponent to fall unconscious. The aim of smart wearable device for women safety project is to provide early warnings for people working in extreme and harsh environment when they are not in the safe zones. Such an IoT platform will present new opportunities for saving life or preventing health issues etc. Our future work will focus on network performance of Hostringer network and more experimental results.

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