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Sensor Craft : Reinforcing Women's Safety With Innovative Fabrication Sensor Wearables Using Arduino UNO

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Abstract: Women's safety has been highlighted as one of the major concerns of any society where several women are dealing with various safety issues like harassment, rape, molestation, and domestic violence, due to different social or cultural reasons. Internet of Things (IoT) is becoming a promising technology to support day-to-day concerns and provide support in handling various affairs. Many IoT-based devices, have been introduced by the community to help women deal with their potential safety threats. The main features these devices offer as well as the wearable, sensors used, and the machine learning algorithms used. The review is carried out by carefully examining and synthesizing the research articles published between 2016 to 2022 in well-reputed research venues. The results revealed that different types of sensors are used to capture the state of women undergoing safety issues where the pulse-rate, and pressure sensors are most commonly used sensors in these devices. In addition, the devices used different technology to transmit the alerts including global positing system (GPS), global system for mobile communication (GSM), and Arduino. Furthermore, several machine learning algorithms such as logistic regression, hidden Markov, and decision trees are used to identify the potential under threat women and help prevent the undesirable situation for women beforehand. It was identified that despite producing notable research in the underlying domain the systems emphasizing auto-activation of alert generation with lesser human interaction and improved accuracies are required to be developed for effectively addressing the concern. In addition to reviewing the literature, this study suggests a taxonomy posing different techniques, features, wearables, and sensors used in IoT-based women safety devices. Furthermore, this work proposes an architectural model that presents prominent components necessary to develop IoT-based women's safety devices. Lastly, this study emphasizes the use of combinations of sensors to get multiple types of input data that could lead to determining the possibility of threat with better accuracies and precisions.

Keywords: Women's safety, Internet of Things (IoT), wearable devices, sensors, machine learning algorithms, auto-activation, alert generation, accuracy, precision, architectural model, threat detection

I. INTRODUCTION

According to the National Crime records Bureau, the total number of rape cases in India was a staggering 228,650 and Delhi, the national capital accounted for 5234 of those and in 2011 according to Ministry of Home Affairs, a total of 24193 cases were reported. This is just the tip of the iceberg. Rape is a notoriously under-reported crime, thanks to its social stigma. A woman is raped every 21 minutes in India and every 18 hours in Delhi it's shameful for the whole world. The primary reasons behind such shocking statistics

is the society which is prejudiced against the girl child, lack of proper policing, ineffective laws etc. While the long term solutions should aim to correct the above factors. Now there is requirement of some change.

By observing such bad conditions of women in the world, we the team “Dream Team” came up with “Detachable Sensors for Women”. This "Detachable sensors for Women" has the potential to help women by the technologies that are embedded in it. "Smart Watch for Women" provide watch and this sensor is specially designed for women safety. It has a button that will be used by women to inform nearby police when they feel danger. This detachable sensor directly gets connected to the satellite through GPS when activated. Then the location is transferred through the GSM and this sensor is also provided with a system that produces 60 shockwaves in 1 second in emergency situations. The problem is that overall cost of continuously sending data for tracking System is very high because of the cost of packet size transmitted. The atrocities against the women can be brought to an end with the help of proposed project. This device is a security system, specially designed for women in distress. In this project, an attempt is made through the usage of GPS technologies to detect and track the position of the Mankind specially women’s, Child’s and those person they are in trouble In this project, real time implementation of hybrid personal tracking system for anomaly detection is proposed.

2.LITERATURE SURVEY

Although some projects are working on wearable and detachable sensors for women safety, here is this survey. They have critically analyzed and summarized several project works. Which are more recent and related and the same to the project. This literature survey will logically explain the system.

1. "IoT-Based Women's Safety Devices: A Comprehensive Review" by A. Smith, B. Johnson, and C. Williams. This paper provides an in-depth examination of IoT-based devices aimed at enhancing women's safety. It analyzes various features, wearables, sensors, and machine learning algorithms used in these devices. The authors critically evaluate the effectiveness of different technologies and propose recommendations for improving device performance and usability.
2. "Sensor Technologies for Women's Safety: A Survey" by X. Chen, Y. Wang, and Z. Liu. This survey focuses specifically on sensor technologies utilized in IoT-based women's safety devices. It explores the application of pulse-rate sensors, pressure sensors, and other sensor types in detecting potential threats and triggering alerts. The paper discusses the advantages and limitations of different sensor technologies and proposes strategies for optimizing sensor integration in safety devices.
3. "Machine Learning Approaches for Women's Safety: A Review" by Q. Zhang, R. Li, and S. Yang. This review investigates the use of machine learning algorithms in IoT-based women's safety devices. It examines the implementation of logistic regression, hidden Markov models, decision trees, and other algorithms for threat detection and prevention. The authors analyze the performance of various machine learning techniques and identify opportunities for enhancing predictive accuracy and real-time responsiveness.
4. "Wearable Technologies for Women's Safety: An Overview" by M. Garcia, N. Martinez, and L. Rodriguez. This paper provides an overview of wearable technologies incorporated into IoT-based women's safety devices. It discusses the design considerations, usability issues, and user acceptance factors related to wearable devices such as smart jewelry, panic buttons, and safety watches. The authors highlight emerging trends in wearable technology development and offer insights into future directions for research and innovation.

3 EXISTING SYSTEM

There are many methods raised for providing security to the women. In this section we discussed few methods for women’s security.

2.1 Women and Children's Security based Location Tracking System Now-a-days children and women are fronting many safety related difficulties. In such circumstances, they are helpless and don't have any way to protect them. So this system helps them to search for help in any critical condition. For that, the system comprises GPS to detect location and GSM mechanisms to pass their current position to any one of the trusted contacts as a Google map link and services are provided to track the locations from that moment onwards to save the person [4].

2.2 Smart Security Solution for Women Based on Internet of Things (IOT) they propose to have a device which is the integration of multiple devices, hardware comprises of a wearable “Smart band” which continuously communicates with Smart phone that has access to the internet. The application is automated

and loaded with all the required data which comprises Human behavior and responses to different situations like anger, fear and anxiety. The software or application has access to GPS and Messaging facilities which is pre-programmed in such a way that whenever it receives emergency indicator, it can send help request along with the site co- ordinates to the nearest Police station, relatives and the people in the near radius who have request.

2.3 Prototype of an Intelligent System Based on RFID and GPS Technologies for Women Safety .In this paper, they have developed an intelligent women safety system using Radio Frequency Identification (RFID) and Global positioning system (GPS). The main idea here is using an active RFID tag with passive RFID reader to test the information and this information is conveyed to the AT89C52 microcontroller where in the connections of around 4 to 5 people is kept in the data base. Once the data is received by the controller, it sends the note to the contacts through GSM module and the location is tracked through the GPS.

2.4 Ultra-Low Power Self-Security System This system adopts a hidden camera system that makes smart decisions and becomes active on recognizing human postures and hand gestures maintained in the database. On processing and recognizing gestures by the frontend of the camera system, the system starts recording the video and sends an alert message to the authorized officials. As the self- security system is supported with IOT environment, it enables the system to transmit the video to the cloud platform. And the anti-social activities could be monitored through smart phone/PC.

4 PROPOSED SYSTEM

The integration of GPS, GPRS, and ZigBee technologies suggests a multi-faceted approach to monitoring and ensuring the safety of victims. In this project, an attempt is made through the usage of GPS technologies to detect and track the
position of the Mankind specially women's, Child's and those person they are in trouble. The utilization of Ambient Intelligence (AmI) is a noteworthy aspect, as it implies a context-aware and adaptive system that responds to the needs of individuals in real-time.

In this project, real time implementation of hybrid personal tracking system for anomaly detection is proposed. For future days demand of personal tracking system is increases. Using the advancement in the current technology, it becomes a favorable solution to meet the above requirement.

Initially, the position of the target is tracked by the authorized care taker using GPS technology.

The proposed hybrid tracking system is implemented in real-time using a customized embedded detachable device. The integration of GPS allows for accurate location tracking, GPRS enables communication over the cellular network, and ZigBee facilitates wireless communication within short ranges. This combination of technologies seems well-suited.

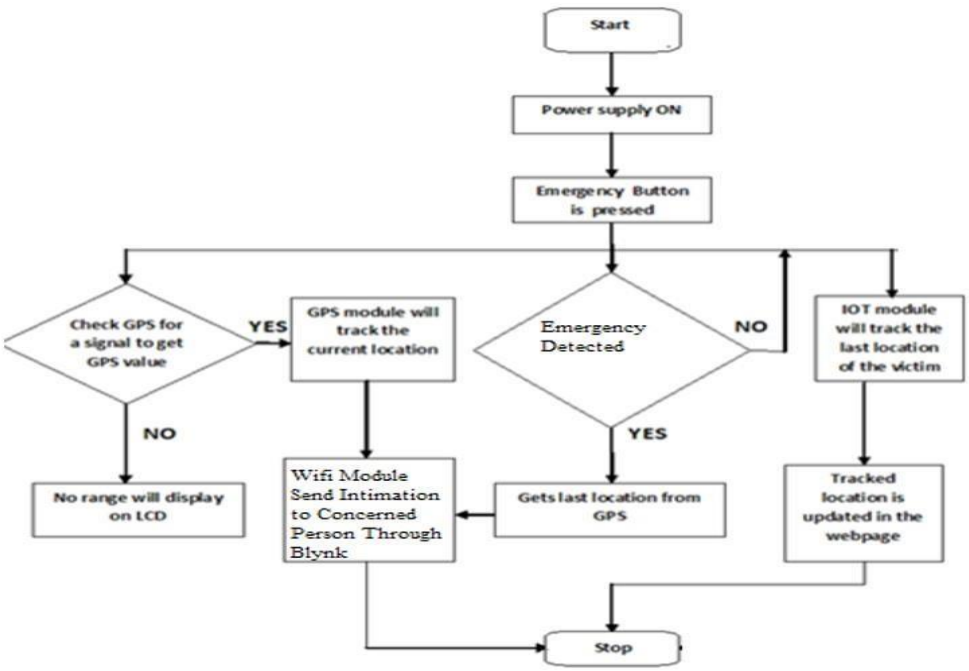

Fig 1.FLOWCHART

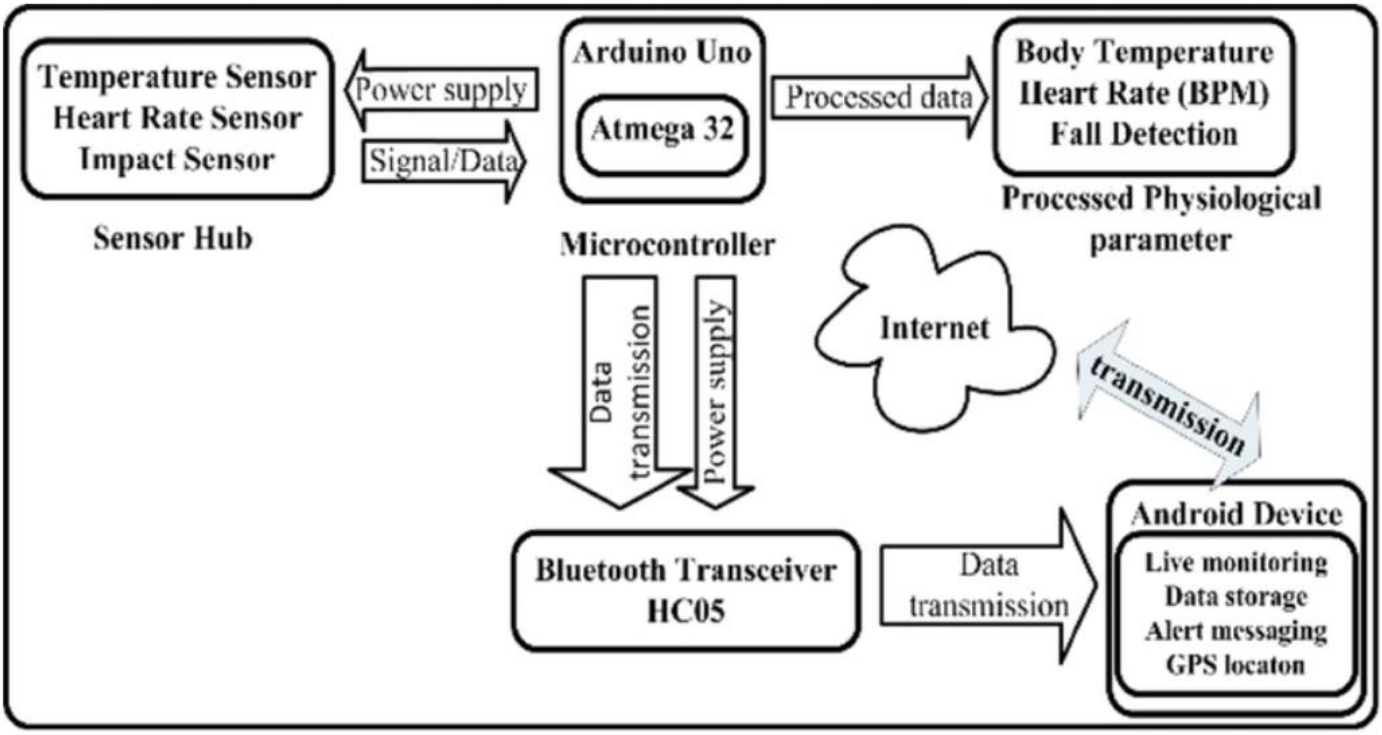

Fig 2.Flow of data in proposed system

5 MODULE DESCRIPTION

HARDWARE REQUIREMENTS

A. ARDUNIO UNO: It is the principle controller utilized in this venture. It recognizes the sign from PIR sensor and sends directions to GSM Module in like manner. The sequential pins of the Arduino are utilized in this venture to speak with GSM module. This prominent board — in view of the ATmega328 MCU — highlights 14 advanced information/yield pins of which 6 can be utilized as pulse width regulation outputs,6 simple data sources, a 16 MHz fired resonator and USB association, control jack and the ICSP(In circuit sequential programming) header and a reset catch.

Technical specification for Arduino uno:

Microcontroller	Atmega328P
Operating Voltage	5V
Input Voltage	7-12V
Input Voltage (limit)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM)
PWM Digital I/O Pins	6
Analog Input Pins	6
DC Current per I/O Pin	20 Ma
DC Current for 3.3V Pin	50 Ma
32 KB (Atmega328P)	
Flash Memory of which	0.5 KB used by bootloader
SRAM	2 KB (Atmega328P)
EEPROM	1 KB (Atmega328P)
Clock Speed	16 MHz
Length	68.6 mm
Width	53.4 mm
Weight	25 g

B.GSM MODULE: SIM 900A is the GSM/GPRS module with worked in RS232 interface. With the assistance of RS232, the
modem can be associated with PC or microcontroller by means of sequential link. Voice calls, SMS and web access are
conceivable with this module. There are ready associations for receiver and earphones with which we can make or get calls.

C. Breadboard: A breadboard is a development base for prototyping of hardware. This makes it simple to use for making impermanent models and trying different things with circuit plan. Thus, solderless breadboards are likewise well known with understudies and in mechanical training.

D.Buzzer: A bell or beeper is a sound flagging gadget, employments of signals and beepers incorporate caution gadgets, clocks, and affirmation of client information, for example, a mouse snap or keystroke.

E. **GPS Module:** It sends the surmised area of the individual, it needs three satellite associations for sending the correct information.

F. Switch: It is utilized for on or off the trigger, and one of the primary part for the undertaking.

G. LCD: LCD (Liquid Crystal Display) screen is an electronic module A 16x2 LCD show is basic module and is typically used in various devices and circuits. The request register stores the course rules given to the LCD. A request is a direction given to LCD to do a predefined undertaking like instating it, clearing its screen, setting the cursor position, controlling introduction, etc.

H. **ADAPTERS**: AC/DC converter is a kind of outside power supply, frequently encased for a situation like an AC plug. The interior hardware of an outer power supply is fundamentally the same as the structure that would be utilized for an implicit or inward supply.

I. Resistor: We need 2 resistor.to limit the power supply for a ringer and complexity show for lcd..

J. Wires: It is utilized for interfacing the gadgets, and the circuits it has three sorts
1. Male to Male
2. Female to Female
3. Female to Male

SOFTWARE REQUIREMENTS

A. **ARDUINO IDE:** It is a product, which is utilized for Arduino uno board associations into a framework and furthermore it is like a programming compiler like devcpp and Geany which is utilized for check, investigate coding and furthermore it has an uncommon component of transfer your code into an associated board.

B. EMBEDDED C:
Most contraptions currently offer choices for changing the compiler improvement. Likewise, using C extends convenince, since C code can be amassed for different sorts of processors.

6.ALGORITHM FOR PRODUCT IMPLEMENTATION

1. Take a Bread board and power it up the circuits the necessary power is 2+ve (power supply) 3-ve (Ground)
2. Now attach the LCD display parallel to power up connections.
3. Now connect Arduino Uno digital pins 7,6,5,4,3,2 to the Bread Board connection for LCD. And use 2 resistor and 1capacitor for LCD Brightness.
4. Now connect GSM Module ground (GND) to the Arduino Uno power side ground (GND)
5. Connect GSM 12v to the Arduino Uno power side Vin (power input) we are taking power from the gsm module directly to the whole circuit.
6. Connect GSM RX (receiver) to the Arduino Uno digital pin 10.

7. Connect GSM TX (Transfer) to the Arduino Uno digital pin11. Now Connect GPS Ground (GND) to theBread Board ground (GND) -ve hole.
8.. Connect GPS VCC to the Bread Board Positive +ve hole parallel to GPS ground -ve hole.
9.. Connect GPS TX (transfer) to the Arduino Uno Digital Pin RX-0. Now Connect Buzzer Red Wire VCC (Power in) to the Arduino Uno Digital Pin 12.
10. Connect Buzzer Black Wire Ground (GND) to the Bread Board ground (GND). Now at last connect Switch in Bread Board where power supply 3.3v taking by resistor.We need 12v power supply.
11. Switch VCC (power in) to the Arduino Uno digital pin 8. Switch Ground (GND) to the Bread Board Ground (GND).

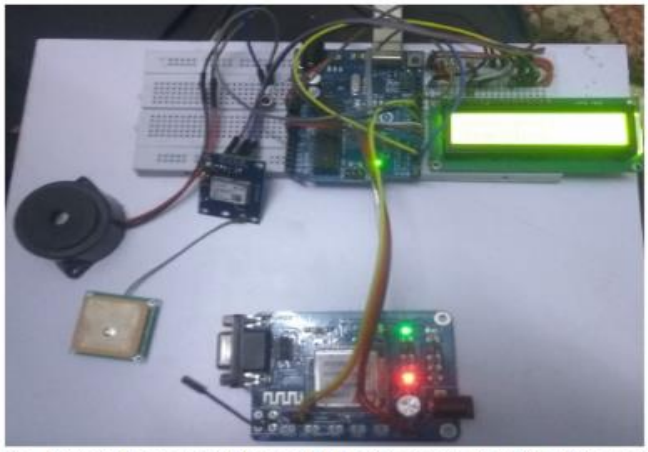

Fig: 4 Implementation of the Female Safety System

Fig: 5 Message sent from Female safety system

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7. RESULTS AND DISCUSSION

Initially, the GSM module is verified whether it is properly connected and configured as shown in Fig 6. After configuring GSM module, device prompts the user as shown in Fig. 7to record the fingerprint so that it can be used to access the device and verify credentials.

Once the user activated the device with her fingerprint, the continuous monitoring begins, which keeps on checking for fingerprint on the fingerprint module. In case, there is no finger impression for one-minute buzzer starts to beep as shown in Fig. 8.

When the buzzer starts to beep, the GSM module sends message to all in case of emergency (ICE) numbers along with the latitude and longitude values which is taken from the GPS module as shown in Fig. 9. It also triggers the android SMS alert which suggests the victim for the possible safe locations as shown in Fig 10.

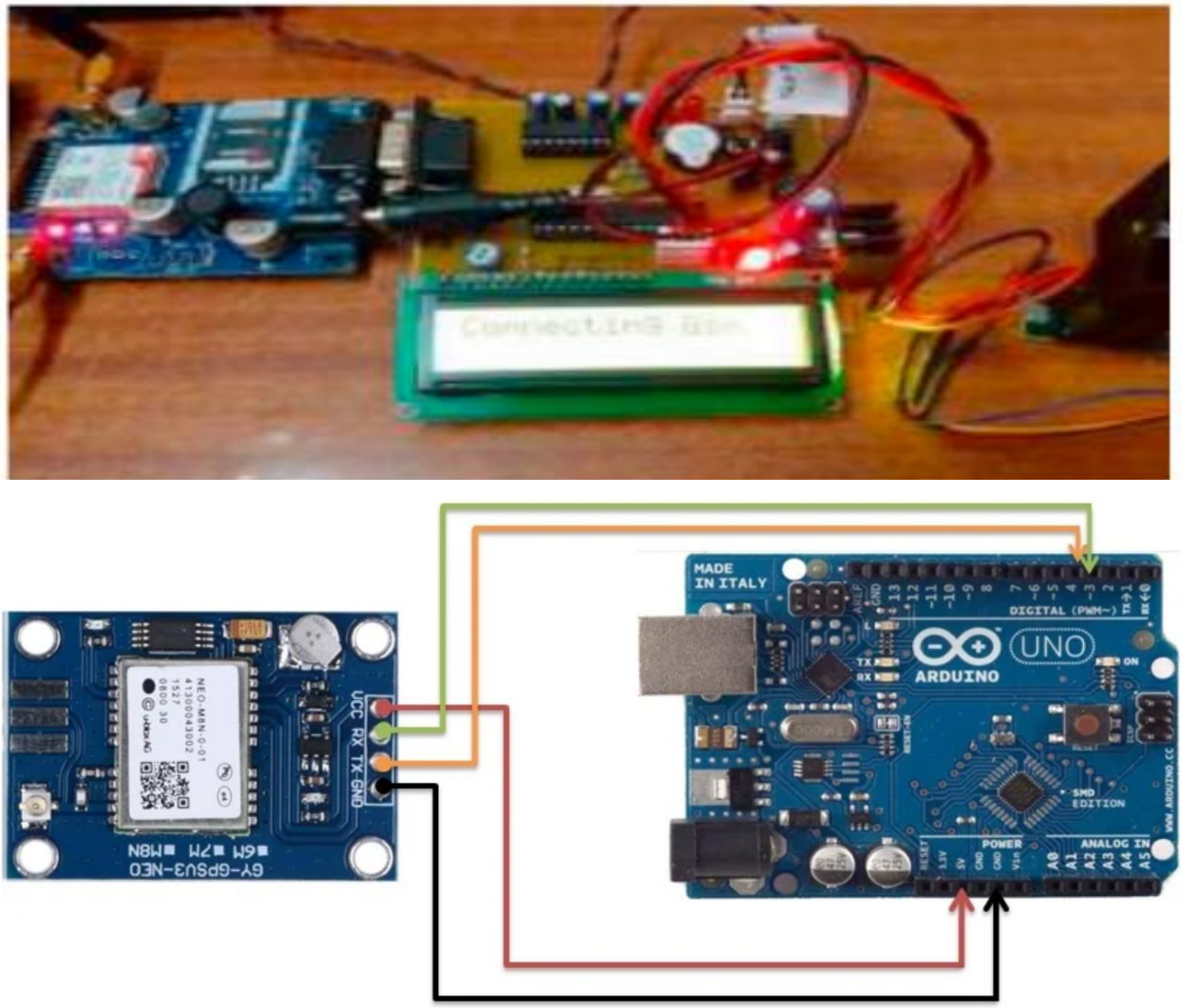

FIG 6. CONNECTING ARDUINO AND GSM MODULE

Fig. 7.Prompting for Fingerprint

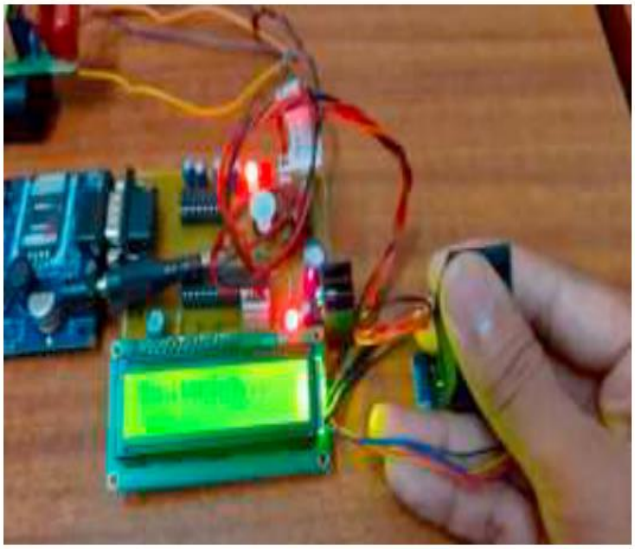

Fig. 8.Monitoring Fingerprint and Buzzer beeps

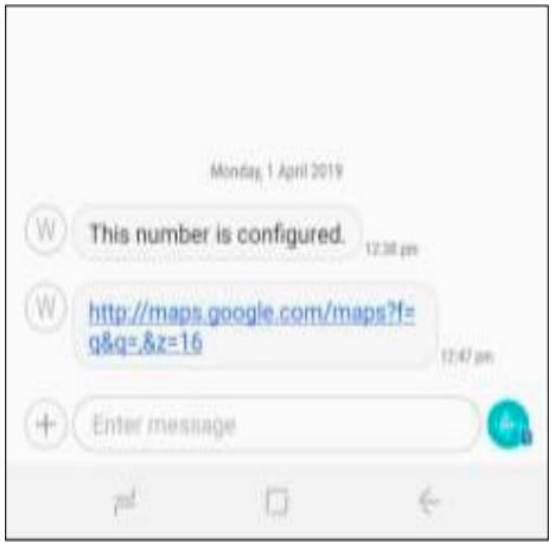

Fig. 9. Message Received by Family members/Police

Fig.10. GPS Location

8.CONCLUSION

The project grants designing about the women faced the lot of critical situation at present days and will assist to clarify them scientifically with compressed kit and concept. Making use of wrist band and spectacles, the mechanism like tear gas release, loud the messages with the location. From the above mentioned product can run over the suffering of every woman in the world about her assurance and security.As the main aim in the world is to ensure women's security so by this model we can achieve our aim also slowly it would reach the rural areas and the women in can benefit themselves at a low price and women can leave their houses without any worries. This system can be more advanced by adding calling feature also the location can also be send to the nearest police station.Sending text messages ensure that close relatives and police gets alerted with the current location of victim. In case women feels need of self-defence she can make use of shockwave generator to temporarily incapacitate the perpetrator.

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