WOMEN SHIELD: IOT ENABLED REAL TIME WOMEN PROTECTION SYSTEM

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ABSTRACT

This project shows an automotive localization system that uses GPS and IoT, with alarms transmitted over IoT to keep ladies safe. The technology can find the woman and send her location to the rescue team using SMS and the Internet. The system can be linked to the car alarm system, which will let those nearby know that the woman needs aid. A GPS receiver, a Microcontroller, and an IoT module make up this security tracking system. When a lady needs help, she presses the security alert switch. The GPS receiver then collects the location information from satellites in the form of latitude and longitude and sends an alarm through IOT. The Microcontroller takes care of this information and sends it to a specific individual using an IoT modem. The application shown is a cheap way to help women who are in danger. The suggested technique can also be applied in other situations, such as keeping children and women safe, when the information needed is only asked for once in a while.

Keywords: IoT, Women, GPS, LCD, Security, Saftey, Protection.

1. INTRODUCTION

Women are more likely to feel unsafe these days because they are more likely to be harassed. This is true for girls as well; their whole lives become a big question mark. They don't feel safe at work, on the road, or even at home. They feel unsafe all day, every day. That's why it's so important to make our ladies feel protected. It is our job to keep our women secure and give them a place to live that is safe and healthy. Women are not as powerful as males, but they are currently doing just as well in all areas as men. We have to help them if something goes wrong. The victim can call the resources right once to receive help and get out of dangerous situations including rape, sexual assault, robbery, and more. Women will feel protected and secure if they have security apps and the system with them. This security system helps ladies feel like someone is watching out for them. When the victim uses this system, they can call their loved ones right away if they are in danger, or they can send alerts all the time. You can also use it to find dangerous places and ask for aid. The system is mostly made to help working women feel safe and confident, and apps are a terrific way to do that. They merely need to make sure that the system is set to alert

mode. Let's talk about some of the women's safety systems that are out there.

Lately, this topic has been the subject of advanced studies that are typically rigid. This is because most communication technologies, like Bluetooth, are brief, and the tracking interface is typically limited to specific devices, like Android. These are the issues that this suggested system seeks to address. The LoRa wide area network (WAN) communication protocol and GPS are both used in this suggested system. This proposal's most cutting-edge feature is the Internet of Things, which makes it simple for users to trace down and locate a lost wallet. This Ubidot platform-created interface is adaptable because it can be accessed from any internet-connected device. Being a platform that is built on internet data rather than applications, it is not device-specific. The tracking technique has an accuracy of over 90% and can locate anything within 2 to 5 kilometers.

The proposed solution aims to offer a robust system and platform that can monitor, track, and locate wallets in the event that they disappear. The Internet of Things (IoT) platform will be used for data visualization, monitoring, and analysis. A GPS will be installed for real-time tracking at a distance of 2 to 5 kilometers using an Arduino Uno ESP8266 with LoRa WAN capability.

The fact that India is secular and has many traditions has long been known. Indian ladies are revered as goddesses. Women's protection in India should therefore be the first priority. The new concepts have somewhat improved the safety of women. To keep themselves safe, women need to carry a variety of devices and apps. They include a wristband. IoT Women Safety will ensure that all women, regardless of their income or occupation, are safe and protected. This plan outlines how to ensure that every woman is protected and receives help as soon as she needs it. She doesn't have to carry any electronics with her either. This idea will allow all women to go down the street fearlessly and with their heads held high. In the Internet of Things (IoT), devices can communicate and exchange data with one another. Using sensors, triggers, or cell phones, the Internet of Things provides information about the physical environment. It collects data from a few OSI Model layers and transmits it to the server. In a One Machine to Machine (OM2M) setting, the data needs to be able to communicate with people, objects, and the actual world. The Internet of Things improves people's lives everywhere. It can be applied to a wide range of settings, including smart skyscrapers, complex traffic management, games, farming, hospitals, rural-urban communities, and more.

"Self-defense device with GSM alert and GPS tracking and fingerprint verification for women's safety" [3]. They broke the process down into three parts. In stage 1, they came up with a way to recognize different marks. The client's fingerprint is put away, and the name and ID will be made. During the unique mark process, the coordinates will be compared to the client's unique mark and the stored unique mark. At that moment, the result will be obtained because the ID number that was checked should match the one that was shown. The next step is to start a low-voltage current circuit. The computerized PIN 4 of the ARDUINO NANO is connected to the HVLC circuit. This pin will turn on the client's unique mark acknowledgment for 15 seconds. The pin will stop working when the HVLC circuit is turned off. When the HVLC circuit is turned on, it will make a flash that will attack the stranger. The

last step is to transmit a message to the region using the SIM 808 module. The microcontroller will send the AT order to the SIM 808 module when it checks the client's unique mark. The SIM 808 module will then use GPS to find the client's region. Lastly, the GPS message will be delivered to the phone that was given. This study suggests a way for a victim to protect herself from an outsider by using a self-defense device that sends strong electric current. She may also send ready signals with her location to her family and the authorities. Spotlight can help her stay safe from sudden attacks.

With the help of technological devices like GPS, body temperature sensors, pulse rate sensors, motion sensors, and the Internet of Things (IOT), we can build a sophisticated system that can find out where a person is and how healthy they are. This would let us take action based on that information. We can employ a number of sensors to accurately find out what is going on with women who are in dangerous abusive circumstances right now. In these kinds of scenarios, a person's heart rate is usually greater. This, combined with other sensors like motion sensors, can aid make decisions by noticing the woman's unusual movements while she is being hurt. The goal of making a smart gadget for women is to make it fully comfortable and easy to use, unlike other women's security solutions that are already on the market, including separate clothing, heavy belts, and well-known mobile apps that are just highly abstract and out of date. The Smart band that works with a phone has an extra benefit: it costs less and is smaller. You may use the GPS and IOT on your phone. This also lets you use less power, and you can install the watch, which is useful for a few days on one charge.

2. LITERATURE SURVEY

A New Way to Keep Women and Children Safe with a Location Tracking System, Dr. Velayutham.R, Samarium, and Sorna Rajeswari.M. In India, women are being raised well. In many countries, women and girls feel unsafe and frustrated because they don't have safe places to go[1]. They are being persecuted and killed every minute of every day in some part of the world. In these instances, women feel powerless and can't find a means to protect themselves or ask family members or those close for help. To keep women secure, they need to be protected from harm. The security system helps people stop worrying about things like that and assists them in emergencies. A system that uses GSM, GPS, and Google Maps to broadcast the victim's current location to any of their trusted contacts, find the victim's location by satellite, and keep track of the victim's locations is employed [2].

Authors D. Amala Devi and B. Veeraswami Nayak wrote "Women Employee Security System using GPS and GSM-Based Vehicle Tracking." Women's safety is a big concern in today's world. It is the duty of everyone to make sure they feel safe when they are outside or at home [3]. Everyone needs to support women and get out of this problem. They employed a security system that had technology like GSM and GPS. This technology works with advanced algorithms to keep an eye on women who are in danger. The system will help find the victim and send signals to their loved ones when they are in danger. The only thing they need to do is push the danger button. Google Maps helps discover the exact place where the victim sent the car. These days, most firms make sure that their female workers stay late at night. They are

enforcing this through the security system and particular apps. A GSM and GPS combo is commonly used in most security systems to keep track of their female employees' cars [4].

Women Empowerment: One Stop Solution for Women, by Sharifa Rania Mahmud, Jannatul Maowa, and Ferry Wahyu Wibowo. Our world population is expected to reach over nine billion by 2050. Right now, it is just about seven billion. Approximately 53% of women face several security issues during their lifetimes [5].

A.Z.M. Tahmidul et al. [5] came up with the idea for a wearable gadget that works with apps. The main purpose of this device is to send text messages and the victim's current location to the nearest police station and family members. The app's interface is set up so that the map shows a safe place to be during a criminal attack. For women who live in remote areas, this equipment is not easy to use. A lot of the girls who live in the country don't know how to use mobile apps, and some of them might not even have a smartphone. But the shape of this item makes it too big to tote around conveniently. To address the issue of rape prevention, the study in [6] proposed a smart mobile application named **"BONITAA"**, equipped with functionalities such as sending SMS and location through GSM, providing health and medical support, counseling services, and self-defense tips for victims. To cater to rural women, the application included the **"Bangla"** language interface to improve accessibility. However, its limitation lies in the fact that women unfamiliar with smartphone technology may struggle to use its features effectively.

In [7], the authors introduced a **wearable safety device** designed to prevent sexual assaults, accompanied by a mobile application. This device incorporated GSM, GPS (Global Positioning System), and Wi-Fi modules connected to a microcontroller. It was capable of making calls and transmitting the user's location to pre-registered contacts or nearby police stations. Despite its usefulness, the device required a constant internet connection to access the web server, making it costly to build and less affordable for all women. Additionally, the application's interface was not convenient for all end-users.

The work in [8] also focused on a **women's safety device** that could send SMS alerts and location details to preset phone numbers. To enhance security, the authors integrated three push buttons, GSM, GPS, RFID (Radio-Frequency Identification), a vibrator, a buzzer, and a display, all controlled by a microcontroller. The drawback of this model was its **large physical size**, which made it difficult to carry, and its **multiple switches**, which could be confusing to operate in emergencies.

Similarly, U. Rai et al. [9] developed a safety device based on **Raspberry Pi** that utilized a GPS module and a push button. When activated, it sent the user's longitude and latitude coordinates. They also created a custom location-tracking application. While simple in design, the prototype was bulky and required continuous internet access for real-time location updates.

In another study, N. R. Sogi et al. [10] proposed an IoT-enabled **smart ring** for women's safety named **"SMARISA."** This Raspberry Pi-based device could transmit location data and capture images through an integrated camera module, which were uploaded to a local server. It also activated a buzzer alarm and connected with a mobile app to alert trusted contacts. However, the absence of a GSM module and the high

development cost made it less practical. Moreover, Raspberry Pi's high power consumption further limited its feasibility.

Other research works [13], [14], [18] integrated multiple sensors—such as pulse rate, motion, and temperature sensors—into safety devices. However, these sensors could produce inaccurate readings due to complex integration, leading to false activations. Additionally, the large size of these devices reduced their portability.

Another design [11] focused on protecting victims from molesters and included SMS and location-sharing features. Despite its utility, the heavy reliance on sensors made it unreliable due to potential errors in sensor readings.

T. Sen et al. [12] proposed another **Raspberry Pi-based safety system**, which included a camera module and a nerve stimulator. The device sent GPS-based location data through GSM and was supported by an Android app and local server for enhanced monitoring. Yet, its large size limited its portability.

V. Sharma et al. [15] designed a **smart shoe** for women's safety using both Raspberry Pi and Arduino Uno microcontrollers. However, the shoe's camera placement was inefficient for capturing clear footage, and the inclusion of both microcontrollers increased system complexity. Moreover, the shock output of 400 kV was potentially lethal, raising safety concerns.

In another work [16], a women's safety device was built to transmit SMS alerts and location data to family members in emergencies. The prototype, however, was bulky due to its AAA batteries and large LCD screen. Likewise, M. R. Ruman et al. [17] developed a similar device featuring a shock generator and location-tracking functionality. Yet, the addition of multiple components made the device too large to be conveniently carried.

To overcome these challenges, we developed a **compact, low-cost safety device** aimed at ensuring the protection of women and children. Our design is lightweight, portable, and affordable for users from all socioeconomic backgrounds. Additionally, the device supports a **"Plug & Play"** mechanism with a single operational button, simplifying activation and ensuring reliable performance in critical situations.

3. EXISTING SYSTEM

Most of the women's security systems we have now are based on simple alert systems like mobile apps, panic buttons, and GPS-enabled devices. When the panic button is pressed, these systems can track the person's location and send emergency alerts to family members or authorities. Some setups also use vibration or health sensors to find unusual conditions. However, most of these systems can only be turned on manually, take a long time to respond, don't monitor continuously, and often depend on the availability of mobile networks, which makes them less reliable in emergencies.

4. PROPOSED SYSTEM

We used sensors for temperature, heartbeat, and humidity in the proposed health monitoring system to keep track of different aspects of human health and show the data on an LCD and an Internet of Things server. The buzzer module will let us know when our pulse rate changes, which means our blood pressure is either too low or too high. The server will also be updated as needed.

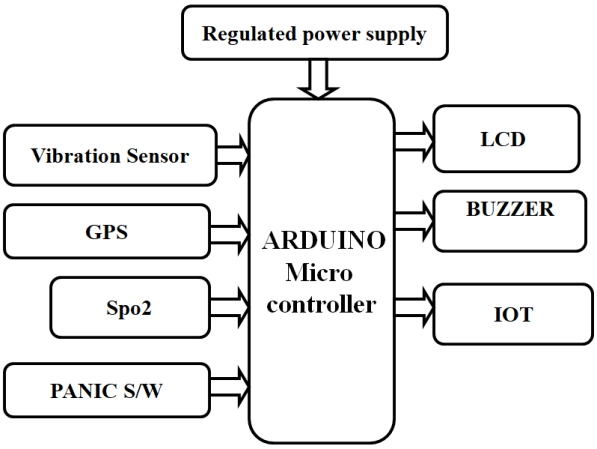

Fig.1. Proposed block diagram

WORKING MODEL:

Building an organized remote monitoring system for well-being is the goal of this methodology. The objective is to monitor the patient's body temperature and heart rate throughout the encounter with the NRF innovation specialist. In line with the evaluation of patients' well-being, medical centers provide care services. The patient's temperature and pulse are continuously taken and recorded on their body. The IoT Patient Safety Monitoring Program for Arduino and ESP8266 is demonstrated with this straightforward interface. BPM and ambient temperature are independently monitored using temperature sensors, Pulse, and LM35. A 16 2 LCD panel is displayed by the Arduino, which also designs the program. Initiates the data transfer over the WLAN, ESP8266 unit, which partners with both WiFi and the Internet of Things application server. The IoT server that's been used in this thing talks. Ultimately, confirming data from any location on Earth requires figuring out which channel the thing is speaking on. Below is an explanation of the hardware modules utilized in the suggested setup.

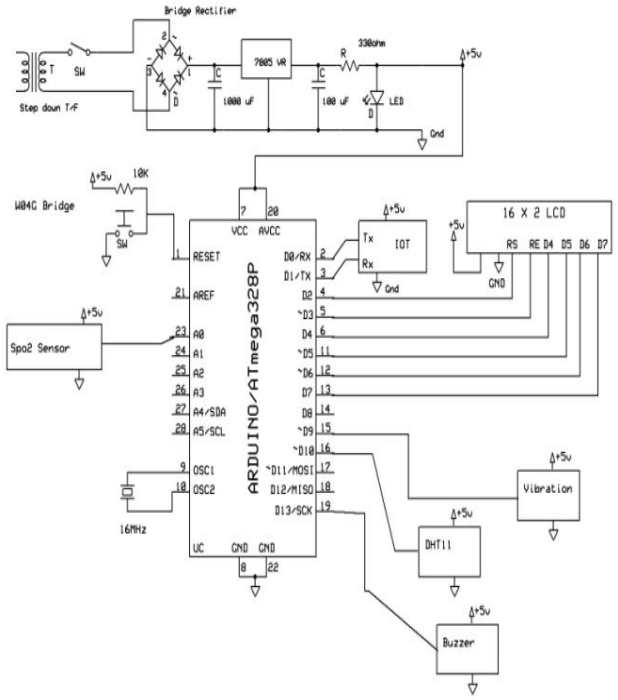

Fig.2. Proposed Circuit diagram

The suggested IoT-based women's safety system gets over the problems with current solutions by using a lot of sensors and smart communication technologies. The system has vibration sensors that can tell whether someone is moving quickly or being attacked, a Spo2 sensor that can tell how healthy someone is, and a GPS module that can tell where someone is at all times. There is also a panic switch that can be used to turn it on manually in case of an emergency. An Arduino microcontroller processes all the sensor data and sends an immediate answer when it finds something wrong.

If there is a threat, the device sounds a bell to alert others around, shows the status on an LCD screen, and communicates location and health information to pre-set contacts or emergency services through IoT connectivity. This arrangement is different from typical ones since it allows for both automated and manual

activation, faster reaction times, and real-time monitoring. The incorporation of IoT allows for remote access and constant tracking, which makes the suggested system more dependable, proactive, and successful at keeping women secure.

The proposed methodology focuses on developing an **organized remote monitoring system** designed to track the **well-being of patients** in real time. The primary goal is to continuously observe vital health parameters—specifically **body temperature** and **heart rate (pulse)**—using **IoT (Internet of Things)** technology. This system enables healthcare providers or medical specialists (such as NRF innovation specialists) to remotely monitor patient health data through wireless communication and cloud-based interfaces.

4.1. System Objective and Functionality

The main objective of this system is to ensure real-time patient monitoring by collecting and analyzing physiological data. During patient evaluation or medical consultation, the system measures and transmits vital information to healthcare professionals for timely diagnosis and intervention. This is especially beneficial for patients in rural or remote areas, elderly individuals, or those requiring constant supervision after surgery or chronic illness management.

Medical centers or health facilities can use this data to:

- Track patient conditions continuously.
- Detect abnormal variations (e.g., fever or irregular heart rate).
- Provide faster emergency response or teleconsultation support.

4.2. Working Principle

The patient's body temperature and heart rate are measured using compact sensors attached to the body. The data from these sensors are processed by an Arduino microcontroller, which acts as the system's central control unit. The Arduino receives analog signals from the sensors, converts them into digital data, and displays the readings on a 16×2 LCD display for local observation.

Two main sensors are used:

- LM35 Temperature Sensor – measures the patient's body temperature in Celsius with high accuracy.
- Pulse Sensor (BPM Sensor) – detects the heart rate by measuring changes in blood flow using an optical sensing technique.

The Arduino continuously updates these readings, ensuring that real-time health data is always available both locally and remotely.

4.3. IoT Integration with ESP8266

The system integrates an ESP8266 Wi-Fi module, which plays a crucial role in connecting the hardware setup to the IoT cloud server via a WLAN (Wireless Local Area Network). The ESP8266 transmits the health data collected by the Arduino to an online IoT platform, enabling remote access through mobile or web applications.

This process involves the following steps:

1. Arduino collects and processes sensor data.
2. The processed data is sent to the ESP8266 module.
3. The ESP8266 connects to a Wi-Fi network and uploads data to a cloud-based IoT application server (such as ThingSpeak, Blynk, or Firebase).

4. The data can be visualized on dashboards, graphs, or mobile interfaces from any location worldwide.

Thus, even if the patient and doctor are in different geographical areas, the doctor can monitor the patient's condition in real time.

4.4. Communication and Data Channel

The IoT server acts as the communication bridge between the hardware system and the remote user interface. Each IoT project typically uses a unique communication channel or data stream, where information is stored and updated periodically. Users (such as doctors or family members) can access this data securely by logging into the IoT platform and viewing the real-time readings.

5. RESULTS

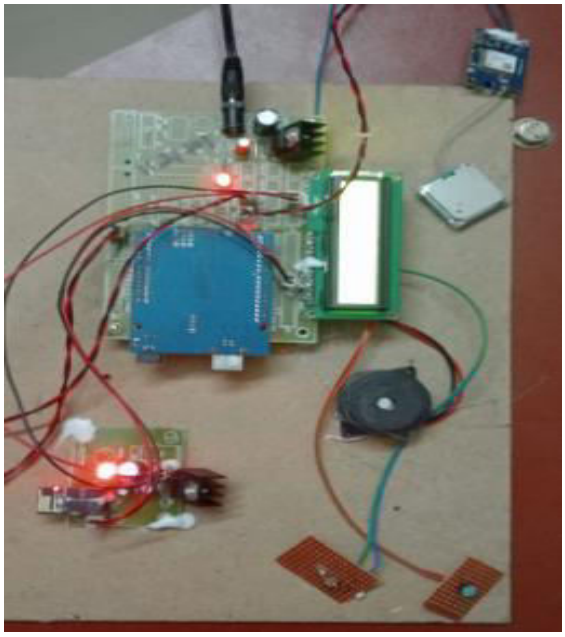

Fig.3. Proposed Output model

A 12-volt regulated power source that changes to 5-volt direct current is used to turn on the circuit here. The LED will automatically light up when there is 5 volts of current because it is the 5-volt current indication. The 5-volt direct current that is created goes to each hardware item in the circuit. When the vibration sensor acts as a switch in the circuit, it tells the doctor that the controller's data is coming from the satellite and that the patient may fall. For the output, we're using an IoT server and a piezoelectric buzzer. The IOT server sends data to the webpage over a WiFi network. Every five seconds, the information on the page changes. The buzzer and the IoT server are both output modules.

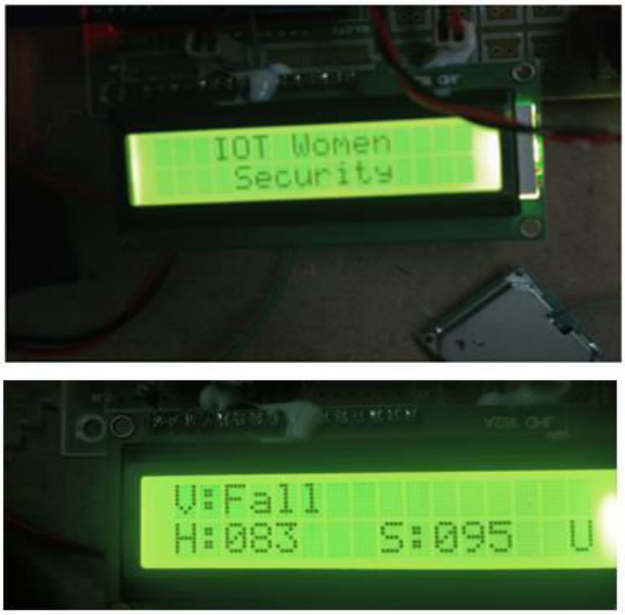

Fig.4. LCD Output

- The LCD panel is showing alarms and sensor readings in real time:
- V: Fall → This means that the vibration sensor has picked up on a fall or sudden impact, which might mean an accident or an attack.
- H: 083 stands for the heart rate (beats per minute) that the Spo2 sensor measured. The value here is 83 BPM, which is normal.
- S: 095 → This shows the level of SpO2

(oxygen saturation). The number 95% means that the blood has healthy levels of oxygen.

S.No	Heart_Beat	SPO2	Vib	Panic	Location	Date	
1	83	95	Fall	-	Location	Location	2025-09-11 19:23:08
2	0	0	Fall	-	Location	Location	2025-09-11 19:22:50
3	0	0	Fall		Location	Location	2025-09-11 19:22:29
4	0	0	-	-	Location	Location	2025-09-11 19:13:29
5	0	0	-	-	Location	Location	2025-09-11 19:12:18
6	0	0	-	-	Location	Location	2025-08-30 16:39:32
7	89	100	-	Panic	Location	Location	2025-08-30 16:39:31
8	0	0	-	-	Location	Location	2025-08-30 16:31:31
9	0	0	-	-	Location	Location	2025-08-30 16:13:40
10	88	100	-	-	Location	Location	2025-08-30 16:12:30
11	87	100	-	Panic	Location	Location	2025-08-30 16:11:46
12	85	100	Fall	-	Location	Location	2025-08-30 16:11:09

Fig.5. Web server Output

Table.1 Results comparison Table

Parameter	Existing Model	Proposed Model
Microcontroller	8051	Arduino
Speed	Low	High
Complexity	High	Low
Efficiency	LOW	HIGH

6. CONCLUSION

The IoT-based women's security system is a clever and dependable way to improve personal safety through smart sensing and real-time communication. The system makes sure that emergencies can be detected both automatically and manually by connecting vibration, Spo2, GPS, and panic switch modules to the Arduino microcontroller. IoT makes it possible to send alerts right away, keep an eye on things all the time, and access them from anywhere, which speeds up response times in emergencies. Overall, the proposed system is a cheap, easy-to-use, and successful way to protect women that fixes the problems with current techniques and makes the world a safer place.

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