

# A Novel Women Safety Wrist Band Development Scheme using Internet of Things with ESP32 Camera

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**Abstract**—Nowadays, ensuring the protection of girls and women is a top priority. Feeling safe and protected in the outer world is a challenge for them. Horror is a problem for women even in cities. Every day, the ladies endure the same horrific insensitivity from the guys who threatened them, molested them, and harassed them. In light of this situation, an internet-of-things-based smart security gadget was created to ensure the safety of the ladies. In order to activate the security services, it has been implemented as a smart device that includes a stm32, a touch sensor esp32, a buzzer, a camera module, and a push button. A victim may utilize this gadget in any scenario with the push of a button because to its tiny design. By pressing this button, the gadget will activate the camera and provide the victim's position. Through the victim's mobile device, contact information for emergencies or the police will get the victim's location along with a link to an associated image using the Telegram app; the gadget doesn't require any additional hardware, making it small.

**Index Terms**—Women Safety, Wrist Band, Internet of Things, IoT, ESP32 Camera, Women Security, Protection, Controller, Telegram

## I.INTRODUCTION

At the moment, women are achieving success in areas where men have been unsuccessful; but, this success has come at the cost of being harassed, abused, and violently assaulted both publicly and privately. It is impossible for users to leave their homes at any time of the day or night, they are unable to dress in accordance with their preferences, and they will not even opt to add peace [1]. There are a lot of suffocating inhibitions that girls are subjected to, which leads to the destruction of their self-esteem and goals, as well as the loss of their freedom. Due to the reasons that were discussed earlier, it is quite obvious that there is a need for efforts to be made in order to ensure the safety of women inside the country. However, it is important to recognize that the advancement of technology has left its imprint in the majority of aspects of life. Consequently, this indicates that there is a chance to exhibit intelligence by resolving issues that are faced by social groups with the assistance of contemporary technology [2]. In light of this, the objective of this effort is to make use of the prevalent technology trend known as the Internet of Things (IoT) in order to assist women in leading lifestyles that are less stressful. A network of physically linked devices that can be accessed online is referred to as the "Internet of Things" (IoT), which is an acronym for the phrase. In the context of this discussion, "the internet" refers to both the physical objects that are assigned an IP address as well as the communication that takes place between those physical objects and other software and hardware systems that are able to connect to the internet [3]. The Internet of Things (IoT) is anticipated to deliver enhanced device, system, and service features that go beyond Machine-to-Machine (M2M) connections. This is predicted to occur across a wide range of protocols, domains, and applications. As a result of the connectivity of these embedded devices (including smart items), automation is on the horizon in virtually every sector of the economy [4]. This connectivity will also pave the way for more complex applications such as a smart grid and expand into new domains such as smart cities. In recent years, there has been a significant rise in the number of reports of harassment of women, which has resulted in widespread dissatisfaction among women living in the current day. The ESP technology, which is the foundation of this project, is used to create a wearable smart device. This aids women who are at danger in their fight against this severe problem [5].

One of the objectives of the software designed to safeguard women is to lessen the number of instances of violent crimes, kidnappings, and stalking that take place. Through the provision of timely help and support, the Smartphone-based Women Protection System places the authority to seek assistance in the hands of the user. This is done with the intention of preventing various forms of criminal activity [6]. In the event that the user is in a precarious situation, she has the ability to communicate with the proposed system by uttering a predetermined safe-word. Following that, it will connect with the police control center as well as the

emergency contacts that you have already specified through the use of the Short Message Service (SMS method). Consider the following, which is the second instance in which the M- WPS displays intelligent behavior: It is possible for the user to activate the system in order to keep track of her locations through continuous GPS tracking while she is on the go. The recommended application will seek for assistance without needing the user to provide the safe-word in the event that the user does not choose to designate them safe within the time range that they have selected [7]. The user's average commute can be represented by this specified time range. The program was built using an object-oriented methodology all throughout its development [8]. Through the utilization of flowcharts, use-case charts, and state-chart layouts, this article provides a description of the architecture of the Women Protection System that is based on smartphones. With the assistance of these diagrams, future developers may be able to gain a deeper understanding of the proposed design and make improvements to it. Both the Default mode and the Active mode of the Women Protection System are competent to deal with the conditions that have been described by the previous sentence [9][10].

## II. RELATED STUDY

For efficient self-alert and protection, this article proposes and implements an Internet of Things (IoT) based women's safety gadget. A three-in-one safety module, the suggested gadget [11] records evidence, allows for self-defense, and keeps tabs on the user. Nowadays, women's safety is a top priority because of the alarming rise in crimes against women. The self-defense gadget uses a nerve stimulator to shock the assailant and, when activated, sounds a bell. In addition, you may capture evidence using a video camera—just press a button to activate it and the Raspberry Pi will store the film. An Android app allows the user to voice-activate the prototype's GSM and GPS modules. Pressing the "emergency" button in the app allows the user to set up automatic location- based SMS alerts and the dialing of a pre-set emergency contact number. The user may hear and communicate with the contacted person with a microphone and speaker that are attached to the GSM module. A Raspberry Pi 3 b+, a GSM module, a GPS module, a relay module, a buzzer, and a nerve stimulator are the pieces of hardware that are utilized [11].

In today's world, women, more than anybody else, face serious threats to their personal safety [12] and worldwide, 35% of women experience physical or sexual assault at some point in their lives, according to a new poll by the World Health Organization. The body count is slowly rising. We present a mechanism that guarantees women's protection here. They may carry the gadget with them anywhere they feel danger is imminent because it is portable. A women's safety gadget that can respond and report incidents quickly is the concept behind this project. The software gives women the tools they need to overcome their fears and reach out to their guardians for support.

The smart bracelet alerts you to events with the touch of a button. Our smart band—inspired device can keep the woman safe with its built-in sensors. Wearing the band or watch gives her the ability to report harassment or feel threatened with the click of a button. Using the GSM network and Raspberry Pi, the data is transmitted to a specified number in the event that she falls. This data includes her position, posture, heart rate, and an SMS alarm. We can use GPS to find the victim's exact position; the system sends the victim's longitude and latitude, so the authorities can find them fast and stop the incident, rescue the ladies, and bring the perpetrator to justice. We can remotely monitor the women's data using the Internet of Things platform one. Crimes perpetrated against women will decrease as a result of this [12].

Creating a smart device that can assist women experiencing feelings of insecurity and danger is the aim of this essay [13]. We worked hard to create a smart foot device that prioritizes the safety of women. The immensely rude men's roaming eyes that harass, insult, and humiliate women's dignity is a constant battle that young girls, women, and other females from all cultures face every day. The hunter now rules the roadways, public transportation, and public spaces. In light of these crimes taking place in the present context, it was proposed that ladies should utilize smart safety shoes that are connected to the internet. Because of an intelligent Internet of Things gadget, this is made possible. This smart device may be discreetly triggered by attaching it to footwear. Included in the smart wearable gadget are a button, a microcontroller board, GPS, GSM, and a buzzer. Tapping one foot behind the other three times will activate the alert [13]. By doing so, the GSM and GPS can route a message to pre-established destinations, such a parent's or police department's phone. Using a decision tree classifier, the results showed that this inexpensive device was far more reliable [13].

Despite the much technological advancement in recent times, women's safety remains a concern [14]. No place is secure for women, but they are more at risk when venturing out on their own into remote areas and unfamiliar roads. After recognizing danger, current women's handheld safety gadgets require human involvement to activate (e.g., pushing a button or shaking the device). In an effort to address the shortcomings of current

systems and provide women with false proof safety, we have put out a solution. Using a fingerprint-based way of connection, the proposed study seeks to build an Internet of Things (IoT) based safety gadget that notifies surrounding individuals and the police when a woman is not safe. After one minute of fingerprint verification, the gadget will immediately notify surrounding individuals and the authorities if it detects no signal, indicating a dangerous condition. In addition, women can employ shockwave generators to assault their attackers in a safe and effective manner [14]. The proposed layout has extra features, such as the capacity to record voice and send group communications. A safety app may show women on a map any places that are considered to be safe, so they can get there quickly and simply no matter where they are [14].

Harassment of women is a big problem on a global scale [15]. The safety of women has been the subject of several suggested technologies and methods, the majority of which lack full automation. In order for the current gadgets to function, they require human intervention. Taking this restriction into account, a new strategy has emerged that anticipates danger to women by utilizing technology such as the internet of things and machine learning models. The gadget's temperature and heart rate sensors are components of a Raspberry Pi-supported device. A logistic regression model is used to determine if a woman is in danger based on these values, which are taken from the device's sensors. Additionally, it is linked to an internet site that collects basic user data such as age, location, employment, and emergency contacts. This data is then used to enhance the accuracy of status predictions [15]. When the gadget identifies a user as being in danger, it immediately notifies the nearest police station and any contacts listed in the web portal of the user's position, heart rate, and temperature. Thus, the gadget saves the woman without the need for any kind of human intervention [15].

### III.METHODOLOGY

These days, women are confronted with a multitude of obstacles; for instance, when they travel alone, they might not be aware of whether or not they are in a secure location. There have been a great number of applications and gadgets produced in order to tackle this; nevertheless, our product stands out from the rest of the pack due to the automated alarm mechanism that it possesses. It is absolutely necessary for her to carry our device with her anytime she travels by herself, particularly when she is going to unknown or potentially hazardous locations. Additionally, if she is aware of the risks that are there in the region, she will be able to activate it before approaching the area. When it detects that someone other than the owner has touched the device, the alarm will sound, and a message will be sent to the registered number along with the device's current position. Additionally, the device will send a message to the registered number. The ladies are therefore aware of whether or not someone is following them, and if the person in question is someone she is familiar with, she is able to quickly disarm the device by hand. If she is not familiar with the person in question. By pushing the button that shows her name, age, and address, she is able to get in touch with her parents or guardians in the event of an emergency. This force sensor is able to determine if a woman is being verbally or physically assaulted, and it will transmit an alarm message if it determines that she is being subjected to either type of assault. The fact that our device does not require a connection to the internet in order to alert the victim, and that it may do so automatically for a period of up to three minutes, is the primary selling feature of our product. Figure 1 below clearly shows the block-diagram of the suggested method.

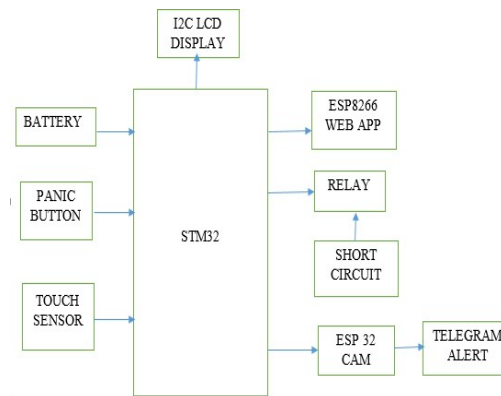


Fig.1 Block Diagram

The STM Controller of the suggested system is shown in Fig. 2, and the ESP-32 Cam Module used in the suggested hardware architecture is shown in Fig. 3.



Fig.2 STM Controller



Fig.3 ESP-32 Cam Module

Figures 4 and 5 show the touch sensor and ESP8266 Module, respectively, which would be used in the suggested scheme and hardware, respectively

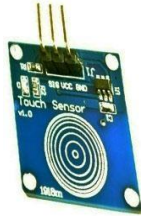


Fig.4 Touch Sensor

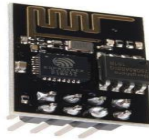


Fig.5 ESP8266 IoT Module

The suggested hardware design makes use of the LCD Display unit, as shown in the accompanying picture, Fig-6.



Fig.6 LCD Display

## RESULTS AND DISCUSSIONS

This proposed system would operate in two distinct ways: first, it would notify the relevant authorities if a woman is in danger; and second, it would make use of the Internet of Things (IoT) in order to properly offer protection. She has the ability to press a panic button, which will cause a sensor to activate and alert others who are nearby in the event that she has an unexpected fall, such as falling because she has fainted. The suggested online application perspective for women's safety is shown in Figures 7 and 8, which depict the circuit design and login page, respectively.

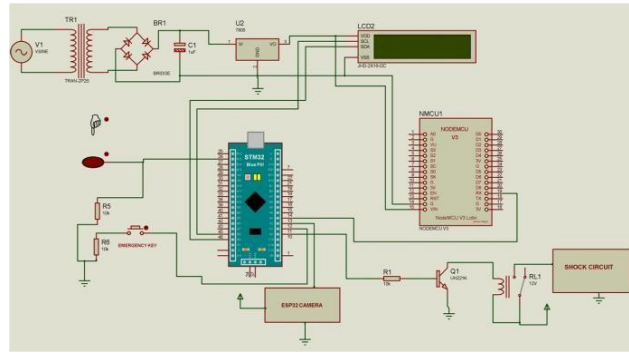


Fig.7 Hardware Circuit Design

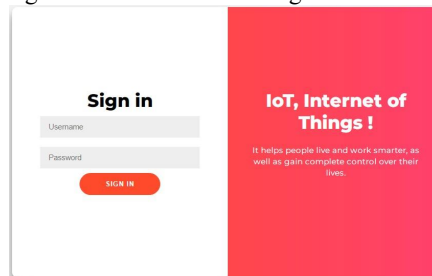


Fig.8 Login Page

The following figure, Fig-9 represents the home page design of the proposed web application perception of the women safety system.

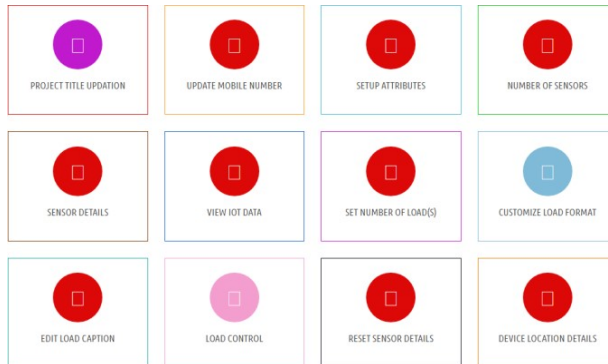


Fig.9 Home Page

The following figures, Fig-10 and Fig-11 represents the mobile numbers updation and setting master page designs of the proposed web application of the women safety system.



Fig.10 Mobile Number Updatons

## Settings Master

### Setup the Required Attributes

GSM  
 GPS

Fig.11 Settings Master

The following figure, Fig-12 represents the GPS based location updation details fetching design of the proposed web application perception of the women safety system.

### Smart IOT Device Location Details

#### Sensor Details

**Username**   
**Longitude**   
**Latitude**   
**Updated On**   
**Address**   
 [Locate on Map](#)

Fig.12 Location Updation using GPS

The following figure, Fig-13 represents the received Telegram Alert Message View of the proposed women safety system.

Location Summary			
Filter by Date: <input type="text" value="mm/yyyy"/> <input type="button" value="Filter"/> <input type="button" value="Back"/>			
Date/Time	Longitude	Latitude	Address
2023-03-04 12:18:30	78.1385107	11.6724509	72, Omakar Man Rd, Opp Bandhan Bank, Arthanari Nagar, Svaranapuri, Salem, Tamil Nadu 636004, India
2023-03-04 12:54:27	78.1377361	11.6718111	M4CQ+P3F Svaranapuri, Salem, Tamil Nadu 636016, India
2023-03-04 12:49:24	78.1388052	11.6708069	10, Saakagari - Salem Main Rd, Arthanari Nagar, Svaranapuri, Salem, Tamil Nadu 636016, India
2023-03-04 12:49:06	78.1398742	11.6698027	M49Q+YXM, Angammal Colony, Salem, Tamil Nadu 636009, India
2023-02-27 01:35:47	78.8334864	10.3596646	29B, Ashok Nagar Extension, Ashok Nagar, Thirumangal, Tamil Nadu 622001, India

Fig.13 Telegram Alert Message View

The following figure, Fig-14 represents the tracked location summary of the proposed web application perception of the women safety system.



Fig.14 Tracked Location Summary  
IV. CONCLUSION AND FUTURE SCOPE

Ensuring women's entire security in contemporary settings is the goal of the suggested ladies safety equipment. A user's fingerprint serves as identification, preventing the creation of a false alarm and limiting its activation to critical conditions. As an extra layer of protection, the design incorporates a buzzer to notify everyone in the vicinity of the incident. The goal of this study is to provide a framework that will ensure women's safety and

security, as mentioned in the introduction. An IoT- based smart wearable gadget for women's protection has been suggested, with the objective of making society a more secure environment for women and to provide them the ability to travel without worry wherever they go. Taking into consideration the present circumstances, this safety device for women is intended to provide complete protection.

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